

The Gemini Program Platform

Inception Design Review

Version 1.2

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1. Orientation & Guidelines for Reviewers

Thank you for participating in the Gemini Program Platform (GPP) inception design review. Your support is critical to the success of the project.[\[Q1\]](#)

1.1 What is the Gemini Program Platform?

The GPP provides the software foundation that modernizes the Gemini Observatory control system and replaces its principal user interface applications. Its purpose is to keep Gemini competitive in the era of extremely large telescopes and sky surveys.

The main highlights include:

- A web-based application for proposal submission and observation editing oriented toward science goals and automation rather than low-level instrument configurations.
- A web-based application for Observation execution which interfaces with the automated queue scheduler.
- A new web-based logger that will replace the nightlog and observing log and facilitate data quality assessment and time accounting.
- A new observing database built with standard relational database technology to improve query access.
- A collection of secure web APIs to all services to facilitate advanced user tasks, reporting, and automation.

1.2 What isn't the Gemini Program Platform?

The GPP is an ambitious project that aims to replace or modify much of the existing high-level software. Nevertheless to keep its scope in check a number of related projects are not included. In particular the following high-profile items are **out of scope**:

- Proposal evaluation support for “queue filling” (ITAC, LP, FT, etc.).
- MOS mask design and visualization (Gemini MOS Mask Preparation Software replacement).
- Long-term scheduling for making recommendations on instrument swaps, classical runs, etc.
- Automatic target acquisitions.

More information about the top-level vision for where high-level software is going may be found in [5]. These projects will all take advantage of the software model and services provided by the GPP.

1.3 What are we reviewing?

The charge to the review committee is to address the following questions:

- Is the inception design documentation consistent with the GPP Conceptual Design?
- Does the proposed design meet the stated goals?
- Is the inception design documentation sufficiently detailed to proceed to construction?
- Is the plan and the approach for the construction stage of the project sufficiently defined to carry out the proposed work?
- Are the scope and priorities of the construction work clear?
- Are the technology choices made for construction of the different tools appropriate?

Any comments or questions may be added directly to this document using the Google comment feature, or using your favorite PDF annotation software. We will then compile all the feedback at the end of this document in the “Questions & Answers” section.

The List of Acronyms in appendix [A](#) may be consulted to resolve any unfamiliar acronyms.

2. Introduction

The GPP is comprised of 9 separate web applications communicating with a common database and various micro-services. About half of these applications are externally available while the other half are for internal use only (see Table 2.1). The external applications provide publicly available information to unauthenticated users but logging in is required to submit proposals and access proprietary information.

At the top of each is an application switcher (circle with a grid of 9 dots) which provides a quick way to launch any of the Gemini applications in a new browser tab. The applications that are available via the switcher will depend on the user’s authentication, privileges, and location.

Many of the internal applications are site-specific and have a North/South switch at the top. This will default to the site which matches the user’s IP. If a user manually changes the site setting, the application will display a prominent warning at the top.

Sections 2.2 - 2.10 give a brief high-level overview of each application to provide context for understanding how they will work together as a system. Subsequent chapters go into detail about each application.

The user interface mock-ups are meant to be indicative of how each application could be organized and to convey ideas and be suggestive of actual controls. However, it is expected that the final product will **not** exactly match the mock-ups presented here. Our agile development process calls for multiple iterations, each producing test releases and generating feedback which then shape the design going forward.

The mock-ups show “active” controls where the user enters values directly in each field, instead of in a pop-up window, and changes are committed immediately to the database without an explicit “save” action. This makes for fast editing, and for applications like Explore, allows users to quickly try different configurations and conditions. However, a multi-parameter change may trigger unnecessary intermediate calculations and raise transient warnings, which could be costly to compute and may be confusing or distracting for users. These factors will be considered during the prototyping phase and the final model of interaction may differ from what is presented here.[\[Q2\]](#)[\[Q3\]](#)

This document describes the GPP system in it’s final state. However, the GPP suite of applications will be released in stages, as described in the Gemini Program Platform Software Plan.

Application	Availability
Explore	external
Dashboard	external
Browse	external
Chronicle	external
Weather	external
Observe	internal
Resource	internal
Schedule	internal
Admin	internal

Table 2.1: GPP Applications and their availability.

Service	Role
Auto Guide Star	Finds the best guide star for a given observation and set of conditions.
Calibration	Maintains a DB of existing calibrations, determines whether any new calibrations are required, and how they should be configured (lamp and on-sky standards).
Environmental Monitor	Aggregates available environmental data. Fed by sensors, forecast sites, measurements from observations, and human input.
Instrument	Backend service for Observe. Applies configurations to instruments, records execution events.
Integration Time Calc	Calculates peak counts, exposure time, and signal-to-noise ratio.
Observing Database	Stores science proposals, programs, and related data.
Resource	Tracks telescope, instrument, subsystem, component, and staff availability.
Scheduler	Examines the pool of available observations and weighs factors such as target availability, current weather conditions, etc. to suggest the next “best” observation to achieve the most scientifically productive semester.
Target	Provides target name resolution, location calculation, and non-sidereal ephemerides.

Table 2.2: GPP Services.

2.1 User Interfaces in Context

[Q4] While this document is primarily concerned with user interface ideas, it may be helpful to place the interfaces in the context of the platform as a whole. The suite of GPP user interfaces interact with cloud-based support services as shown in Figure 2.1 (and initially introduced in the Gemini Program Platform Software Conceptual Design document). This diagram shows that most of the interfaces used by PIs (green person in Fig. 2.1[Q5]) make use of the Observing Database service which provides permanent storage. Explore is the principal proposal and program editor and utilizes the Auto Guide Star, Integration Time Calculator, Resource, and Target services (see Table 2.2 for a brief description of the services). The interfaces used by the observer (red person in Fig. 2.1) feed into, or are fed by the Scheduler service which manages the queue under changing weather conditions and interrupting high priority observations. To do its job the Scheduler makes use of weather data and forecasts (via the Environmental Monitor service), resource availability, required calibration calculations, etc. [Q6]

2.2 Explore

“Explore” is used for writing proposals and preparing observations that will eventually be executed at the telescopes. Explore starts off by helping potential users choose the best instrument and configuration for their science out of all the capabilities available to the Gemini community. Explore will generate observations automatically with only minimal input, or users may create totally custom observations from scratch. After authenticating and attaching a PDF with proposal details, users may submit and modify their proposals up until the deadline. After being awarded time Explore is used to further refine the observations and submit them for execution. [Q11]

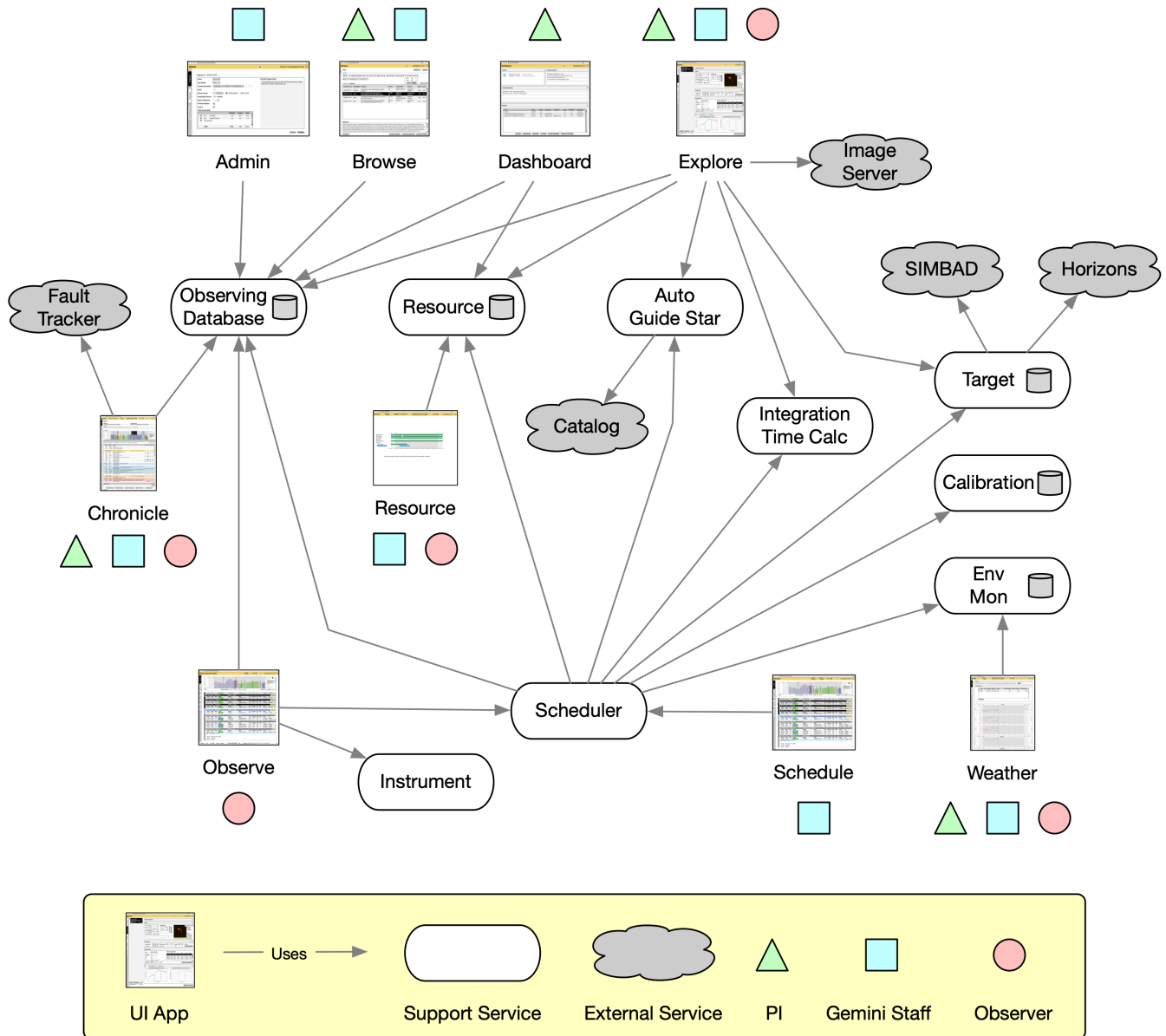


Figure 2.1: Diagram of the new GPP User Interfaces in context, with services and users indicated. Note that several legacy applications (QPT, QVis, LTTS) will continue to be supported but are not included here. [Q7][Q8][Q9][Q10]

2.3 Dashboard

“Dashboard” is where Gemini users may log in and access their proposals and programs (accepted proposals)[Q12][Q14] and share them with collaborators [Q13], as well as find proposals and programs [Q15] where they are not the PI, but have been granted access by the PI. The Dashboard is where users go to update their personal information, such as their email address and affiliation. The Dashboard also shows the current status of each telescope (open, closed, or in shutdown), as well as announcements about important upcoming events like proposal deadlines. There may also be a communications center to track messages between the PI and their contact scientists. [Q16]

2.4 Browse

“Browse” allows querying the database for publicly available information about programs. With authentication and the required permissions, Browse can also be used to quickly find and open programs where the user is not the PI. This will allow NGOs, contact scientists, and other staff to access programs they support.

2.5 Chronicle

“Chronicle” is the logging application which is used for creating, distributing, and accessing the night log[Q17], for commenting on datasets, for reviewing and updating the data quality assessments and time accounting, and for tracking program modifications. Chronicle has two modes which allow viewing and editing information by date or by program.

2.6 Observe

“Observe” will be used at night to view the queue plan from the scheduler, to request alternate observations from the scheduler, to respond to suggestions from the scheduler, and to execute observations. Observe will be used during the day to execute calibrations, and will optimize the order of the daytime calibration queue and execute them in parallel.

2.7 Weather

“Weather” is the interface to the conditions server and will be used to access and input information about the site conditions. Weather provides graphs of the conditions from different sources and provides a way to manually input information that cannot be (or is not yet) automatically ingested. Weather also allows informing the scheduler about future conditions. [Q18][Q19]

2.8 Resource

“Resource” is the interface to the resource tracking service which is used by the scheduler. This tracks everything from the telescope, the instruments, and even the night crew schedules. It also keeps track of instrument components (masks, filters, etc) as well as subsystem availability.

2.9 Schedule

“Schedule” is the Queue Coordinator’s interface to the scheduler. It will be used to schedule engineering tasks, run full-semester simulations[Q20], and tweak the automatically generated queue schedule when deemed necessary.

2.10 Admin

“Admin” provides program administrative controls such as approving special proposals and approving PI program change requests. The is the one internal application that is site independent because there is a single observing database shared between both sites. This application also requires additional permissions to use.

2.11 Application Programming Interfaces

Advanced queries and automation needs are enabled via an API, and one-off queries are available via a general purpose query UI.

3. Explore

“Explore” is a web application that facilitates resource exploration, basic observation preparation, proposal creation and submission, program organization and observation refinement, and data retrieval. Explore is meant to be easy and intuitive to use, requiring minimal effort for new users to prepare common observations, while providing advanced users the flexibility to construct custom observations. Users may get a brief explanation of any item by hovering the mouse cursor over it, or alternatively, in-application links lead to the appropriate section in the full online documentation. First-time users are initially presented with a fully populated User Interface (UI) with a common instrument configuration and pre-selected interesting target.[\[Q21\]](#) This will showcase all the features of Explore and allow users to jump right in and quickly start modifying details to see how things interact. Users unfamiliar with Gemini need only specify their target and a few high-level science requirements to be presented with a list of all the Gemini (and exchange partner [\[Q22\]](#)) resources that could be used, and how much time each will be needed to achieve their desired signal-to-noise.

3.1 Observation Life Cycle

Observations may have one of 8 statuses (Table [3.1](#)). Freshly created observations start with the status “New.” If the PI wants the observation to be included in the proposal the status is changed to “Included.” This allows PIs to construct multiple observations of different targets and select their favorite ones for inclusion in the proposal. When the proposal has been submitted the status of the included observations changes to “Proposed.” After the review process the observations that were approved are upgraded to “Approved,” while those that were not approved will change back to “New.”[\[Q27\]](#) The Approved observations may then be tweaked by the PI who then sets the observations to “For Review.” If no manual edits were made then no human phase-2 checking is required and the observation will advance directly to the “Ready” state. When the observation starts the status will change to “Ongoing,” and when it finishes the state will transition to “Observed.”[\[Q28\]](#)

3.2 Layout

The top orange bar of Explore starts off simple with just the application name, the application switcher, and the button to log in (Fig. [3.2](#)). When the proposal is given a title that will also appear here, as well as the proposal ID after it is submitted, and the program ID if the program is awarded time.[\[Q29\]](#)

On the left are vertical navigation buttons which show different “views” of the program, and initially there are five: Overview, Observations, Targets, Constraints, and Configurations. Moving to the right is a tree-view of the observations, with buttons at the bottom to create new observations, to create new observation

groups [Q30], to duplicate observations, and to delete observations. These buttons [Q31] (or keyboard shortcuts like ctrl-c, ctrl-v, etc) could be used to copy and paste most elements (targets, constraints, observations, timing windows, etc) within the proposal/program or between proposals/programs. Below this is a summary of the number of observations and the total planned time in the program, as well as a search box. On the right are panels with details about the selected observation. Each of these panels may be expanded to reveal additional details, controls, and instructions, or collapsed down to only the title-bar which summarizes the key information. The next sections describe each of the different “views,” and the “Overview view” will be described in §3.11. [Q32]

3.3 Observations View

The Observations view (Fig. 3.2) is the initial and primary view. In this view the observations are listed on the left and the details of the selected observation are shown in five panels on the right.

[Q23] Each observation has a badge (Fig. 3.1) summarizing the observation details with a progress bar [Q24][Q25] that indicates its place in the observation life cycle (Table 3.1). There is also a pull-down menu that shows the current status, and with appropriate permissions, allows changing the status. Each observation may also be separately marked as either “Active” or “Inactive” (not illustrated in the mockups). This will allow PIs to prevent or halt observations of “Ready” or “Ongoing” observations while retaining their status information.

Level	Status
0	New
1	Included
2	Proposed
3	Approved
4	For Review
5	Ready
6	Ongoing
7	Observed

Table 3.1: Observation statuses and badge progress bar levels.

3.3.1 Note for Observer

[Q33] The “Note for Observer” is the topmost panel in Figure 3.2 (shown collapsed to save space because it is initially blank). This is where the PI may provide observation-level instructions for the observer, and this note is available in Observe via the “info” button (Figs. 7.1 and 7.2).

3.3.2 Target

The Target panel is the second from the top in Figure 3.2 (expanded in Fig. 3.7). This shows the properties of the selected target, which may have a type of Sidereal, Non-Sidereal, or Target of Opportunity (ToO). Target details may be retrieved from SIMBAD / NED / HORIZONS, imported from a file, or entered manually.

For sidereal targets this panel includes the coordinates [Q34], proper motion, parallax, and radial velocity or redshift. For non-sidereal targets this panel includes the coordinates and velocity on the selected date, and this information is used when plotting the target’s visibility. The ephemeris will be automatically downloaded from HORIZONS if it is available, or else the user may upload their own and the system will parse and validate the file and use it (as if it had come from HORIZONS) for calculating the target position at the time of observation and selecting the best guide star.

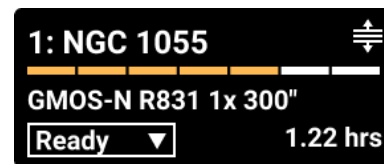


Figure 3.1: An observation badge showing the observation ID (1), target, instrument configuration, observation status (Ready)[Q26], and observation duration (1.22 hrs).

The screenshot displays the Gemini Observations web interface. At the top, the browser address bar shows 'explore.gemini.edu/observations/1'. The page title is 'Explore' and the user is logged in as 'anonymous'. A sidebar on the left contains navigation tabs: Overview, Observations, Targets, Constraints, and Configurations. The main content area is divided into several sections:

- Target Information:**
 - Name:** NGC 1055
 - Coord:** 02:41:45.233 +00:26:35.45
 - Type:** Sidereal
 - Profile:** Point Source
 - SED:** nova.sed
 - Magnitudes:** 14.3 B Vega, 12.095 J Vega, 11.513 H Vega
 - Observation Mode:** Semester Vis (selected)
 - Location:** DSS2 Gemini
 - Filters:** OIWFS (selected), PWFS1, PWFS2
 - Options:** FOV, Guiding, Catalog, Offsets
 - Coordinates:** 23:47:04.834 +29:27:32.17
 - Date:** 15-Oct-2022
- Constraints:**
 - Image Quality:** < 0.8 arcsec
 - Sky Background:** Gray
 - Elevation:** None
 - Contrast:** None
 - Cloud Cover:** < 0.3 mag
 - Water Vapor:** Any
 - Strehl:** None
 - Buttons:** Set Timing Windows
- Configuration:**
 - Mode:** Spectroscopy
 - Wavelength:** 715 nm
 - λ / Δλ:** 1600
 - S/N:** 40
 - λ Range:** 200 nm
 - Focal Plane:** Longslit, 60 arcsec
 - Capabilities:** None
 - Matching Configurations Table:**

Inst	Disp	R	Δλ	FPU	Avail	Time
GMOS-N	R831	2198	207nm	1"x300"	22A,22B	1:22
GMOS-S	R831	2198	207nm	1"x300"	22A,22B	1:22
GMOS-N	B600	1688	207nm	1"x300"	22A,22B	1:36
GMOS-S	B600	1688	207nm	1"x300"	22A,22B	1:36
 - Advanced Configuration** button
- ITC (Instrument Technical Configuration):**
 - S/N / exposure:** 16.3
 - S/N Total:** 40
 - Graphs:**
 - Signal and SQRT(Background) in one pixel:** Shows signal (e- per exposure per spectral pixel) vs wavelength (nm) from 425 to 675 nm. Includes curves for BB, HSC, and SC.
 - Intermediate Single Exp and Final S/N in aperture:** Shows Signal / Noise per spectral pixel vs wavelength (nm) from 425 to 675 nm. Includes curves for BB, HSC, and SC.
- Bottom Bar:**
 - Buttons:** Obs, Group, Copy, Print
 - Summary:** 1 Observation, 1.22 hrs
 - Search:** Search icon
 - Create Proposal** button

Figure 3.2: The Observations view with a single, pre-filled target, constraints, and the default configuration selected.

Targets of opportunity may be associated with a particular region of the sky which would be displayed here.

All targets have an associated brightness[Q35], morphology, and spectral energy distribution (SED)[Q36]. The closest SED may be selected from those pre-defined in the ITC (stellar and non-stellar template libraries, single emission line, blackbody, or power-law) or the user may upload their own and it will be visible in the Attachments list (Overview View) and available for other observations.[Q37]

Once the target and position angle have been specified, Explore will automatically search for the best guide star, including a 180° flip of the field if allowed.[Q38] Alternatively, if the PA is not constrained Explore can suggest the PA that will allow reaching the best guide star (brightest with the least amount of vignetting).

3.3.3 Visualization

The top-right of the Target panel is the Visualization module. This shows an interactive sky survey image of the target field. When an observation is selected the visualization will show the focal plane unit (FPU)[Q39], position angle (PA), and wavefront sensor (WFS) field of view (FoV) with the selected guide star. The target coordinates (sidereal + proper motion, or non-sidereal) calculated for the selected date are displayed below the image. The RA/Dec at the cursor will also be displayed. [Q40]

If an observation requires an acquisition and the target is fainter than a predefined limit (excluding MOS which use brighter acquisition stars) the system will recommend the use of a blind-offset star[Q43] and the user may add it here or in the Target View (Figure 3.7).[Q41]

The user may select between various sky survey sources which are supported by Aladin [Q42] (DSS, SDSS, 2MASS, etc) or upload their own FITS image (which can be saved for future use). This allows the visualization to match the wavelength of the observations which helps ensure that the field is oriented properly and that any sky offsets are really sampling clear sky.

The user may select from various visualization overlays:

- Science field of view
- WFS fields of view, taking into account the positions of all the guided offsets
- Telescope offset positions, with a clear indication which are guided and unguided
- User-defined targets like blind-offset stars
- Guide stars, with a clear indication of which are viable (bright enough and reachable at the base and blind-offset positions)
- A coordinate grid in Equatorial, Galactic, or Ecliptic reference frames

The user may interact with the visualization by moving targets, adding user-defined (e.g. blind-offset) targets, rotating the science field of view (position angle), selecting an off-axis pointing to enable reaching the best guide star, selecting alternate guide stars (by clicking the “Skip” button to reject the currently selected guide star and AGS will go to the next best one), or designating an observation as unguided. The image may be flipped, rotated, and scaled. It might be possible for the PI to annotate the image and save the annotations as another optional overlay to be used during acquisition.[Q44] The position and path of non-sidereal targets are overlaid on the image with customizable time steps, and the segment where the selected guide star is reachable will be illustrated.

3.3.4 Visibility

At the bottom of the Targets panel is the visibility plot which allows choosing between:

- An elevation plot for a user-selectable night at the site of the selected configuration showing the almanac details (sunrise, sunset, 12-deg twilights, moon rise, moon set, and moon phase), the calculated sky brightness throughout the night, timing windows, elevation constraints, and a clear indication of when all constraints are met. The user may choose to plot in UT, Sidereal Time, or Local Time.
- A plot of azimuth and elevation for a user-selectable night at the site of the selected configuration.
- A visibility plot showing the number of hours a target is up each night during the upcoming semester, and the number of hours the observation can be scheduled each night given all calculable constraints (background, timing windows, and elevation).[\[Q45\]](#)[\[Q46\]](#)[\[Q47\]](#)

3.3.5 Constraints

The Constraints Panel is the third from the top in Figure 3.2 (expanded in Fig. 3.8) and describes the acceptable on-source weather conditions and constraints. Depending on the instrument the constraints may include:[\[Q48\]](#)

- Delivered Image Quality
- Extinction (magnitudes or % signal loss) [\[Q49\]](#)[\[Q50\]](#)
- Sky Background (dark / gray / bright) [\[Q51\]](#)
- Precipitable Water Vapor (mm) [\[Q52\]](#)
- Elevation
- Strehl (for AO-assisted observations)
- Contrast (if supported by instrument)

This is also where timing windows may be set (see the Constraints View, §3.5).

3.3.6 Configuration

The Configuration Panel is the fourth panel from the top in Figure 3.2, and allows the user to describe what they need at the highest level without requiring detailed knowledge of Gemini’s instrument capabilities (or those of our exchange partners). Selecting the “mode” (imaging, spectroscopy, or manual) will populate the remaining configuration options:

- Mode
 - Imaging
 - * Filter
 - * Field of View
 - Spectroscopy

- * Wavelength & Range
- * Resolving Power, Spectral Resolution, or Velocity Resolution [Q53][Q54][Q55][Q56]
- * Slit Length / IFU / MOS
- Manual (provides complete control in selecting the instrument and configuration)
- Desired Signal / Noise (S/N) [Q57]
- Capabilities:
 - Nod & Shuffle (for improved optical sky line subtraction) [if spectroscopy]
 - Polarimetry
 - Speckle [if imaging]
 - Coronagraphy
 - Low-Overhead Readout (Frame Transfer) [if imaging]

Users may specify a few required configuration parameters (e.g. the mode, wavelength, FPU) to get an initial list of “Matching Configurations” on the right with all the available instruments and configurations that meet the minimum science requirements. Specifying additional parameters will further narrow the list. If there are no modes that meet the specified science requirements there will be a message that there are no instruments that provide the requested configuration. [Q58][Q59][Q60]

The Matching Configurations table lists the instrument, configuration, resulting spectral resolution and wavelength range (for spectroscopy) [Q61], the availability of the configuration [Q62], and the total time required to achieve the desired S/N at the specified wavelength including overheads. Hovering the mouse over the availability value will show more detailed availability information if it exists, allowing DD proposers [Q63] to select the configuration that meets their requirements and is available when they need it. The table is sortable by any column, defaulting to sorted by total time with the least at the top.

When targets are observable from both sites, the list of Matching Configurations includes both North and South instrumentation. Visitor instruments will be displayed in the list of instrument configurations, however, since they are not supported by the ITC the user will need to manually enter the total time required to achieve the desired S/N based on information in the instrument’s web pages. We will provide links to the appropriate pages to make this as easy as possible.

The selected line in the Matching Configurations table will be used for the observation. [Q64]

3.3.7 Advanced Configuration

Clicking the “Advanced Configuration” button at the bottom right of the Configuration panel will open the “Advanced Configuration” panel displayed in Figure 3.3. This allows customizing the instrument and sequence details if desired. Changing any component will update the resulting resolving power / spectral resolution / velocity resolution [Q65][Q66], Wavelength Coverage, Read Noise, and ITC output in real time.

The right column of the Advanced Configuration panel shows the automatic sequence generator input parameters. For spectroscopy the user may customize the wavelength dithers, and for both imaging and spectroscopy the spatial offsets. The “Exposure Mode” allows changing how the exposure time and number of exposures are determined. The default mode is “S/N” which uses the ITC (with the target parameters

Configuration (Advanced)

Name	GMOS-N R831 1x300"	Binning	2 x 2	λ Dithers	-5, 5	nm
Disperser	R831	Read Mode	Slow, Low Gain	Spatial Offsets	0, 15	arcsec
Filter	None	ROI	Full Frame	Exposure Mode	S/N	
Wavelength	715	$\lambda / \Delta\lambda$	2198	S/N	40	
FPU	1.0" x 300" slit	λ Coverage	612 - 819 nm	Exp Time	600	sec
Nod & Shuffle	No	Read Noise	4.1 electrons	Exp Count	6	
Position Angle	Average Parallactic	168.66 °E of N		<input type="button" value="Sequence Editor"/> <input type="button" value="Simple Configuration"/>		

Figure 3.3: The advanced configuration panel allows further customization of the instrument configuration, editing the wavelength and spatial dithers, changing the exposure mode, and viewing the details of the observation sequence.

and conditions constraints) to determine the optimal exposure time and number of exposures that will deliver the requested S/N, and the resulting values are displayed (uneditable) in the appropriate fields. Alternatively the user may change the mode to set the exposure time and/or number of exposures (and the resulting S/N will then be calculated and displayed) [Q67]. This is useful [Q68] when a specific exposure time is required for measuring time-variability and/or for observations that must be a set length, e.g. transits. The instrument scientists will provide rules [Q69] so that Explore can warn about non-optimal configurations and disallow nonsensical configuration.

If the spatial offsets cannot be easily listed [Q70] the user may open the Offset Generator (Fig. 3.4) which allows creating complex offsets sequences like a grid, spiral pattern, or random distribution. The user may also import a CSV list of offsets. [Q71][Q72]

At the bottom are buttons to view the resulting automatically generated sequence and to return to the “Simple Configuration” view.

3.3.8 Sequence Editor

The observation sequence is automatically generated to achieve the desired signal-to-noise. The button at the bottom of the Advanced Configuration panel will open the sequence editor (Fig. 3.5) which displays the input parameters and all the resulting steps of the observation (including the acquisition and on-sky GCAL calibrations for facility instruments). [Q73] Here the user can see exactly what they will get when the observation is executed.

The automatic sequence generator takes several input

Offset Generator

Geometry	<div style="border: 1px solid black; padding: 2px;"> ABBA Grid Spiral Random Import </div>	Offsets																																		
Parameters	P _o = 0.0 Q _o = 0.0 N = 25 D = 10.0	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>P</th> <th>Q</th> </tr> </thead> <tbody> <tr><td>1</td><td>0.00</td><td>0.00</td></tr> <tr><td>2</td><td>-0.18</td><td>-0.98</td></tr> <tr><td>3</td><td>1.13</td><td>0.85</td></tr> <tr><td>4</td><td>-1.72</td><td>0.16</td></tr> <tr><td>5</td><td>1.34</td><td>-1.48</td></tr> <tr><td>6</td><td>0.01</td><td>2.24</td></tr> <tr><td>7</td><td>-1.66</td><td>-1.80</td></tr> <tr><td>8</td><td>2.64</td><td>0.22</td></tr> <tr><td>9</td><td>-2.24</td><td>1.73</td></tr> <tr><td>10</td><td>0.51</td><td>-2.96</td></tr> </tbody> </table>		P	Q	1	0.00	0.00	2	-0.18	-0.98	3	1.13	0.85	4	-1.72	0.16	5	1.34	-1.48	6	0.01	2.24	7	-1.66	-1.80	8	2.64	0.22	9	-2.24	1.73	10	0.51	-2.96	<input type="button" value="Accept"/> <input type="button" value="Cancel"/>
	P	Q																																		
1	0.00	0.00																																		
2	-0.18	-0.98																																		
3	1.13	0.85																																		
4	-1.72	0.16																																		
5	1.34	-1.48																																		
6	0.01	2.24																																		
7	-1.66	-1.80																																		
8	2.64	0.22																																		
9	-2.24	1.73																																		
10	0.51	-2.96																																		

Figure 3.4: The Offset Generator produces a table of offsets that updates in real time as the parameters are changed.

NGC 7752 Spec Sequence: GMOS-N Longslit ⌕

GMOS-N Longslit Parameters

λ Dithers nm
Spatial Offsets arcsec

↔ Automatically Generated

This sequence is automatically generated based on the selected configuration and will be updated if the configuration is changed. If edited, the sequence will no longer be linked to the configuration.

Acquisition

Step	Type	Exp (sec)	p	q	λ (nm)	FPU	Disperser	Filter	Xbin	YBin	ROI	S/N
1	Acq	10		0.0	0.0			r	2	2	ccd2	≡
2	Acq	20		10.0	0.0	1"		r	1	1	stamp	≡
3	Acq	40		0.0	0.0	1"		r	1	1	stamp	≡

Science

Step	Type	Exp (sec)	p	q	λ (nm)	FPU	Disperser	Filter	Xbin	YBin	ROI	S/N	
1	Sci	1200		0.0	0.0	600	1"	B600	GG455	2	2	full 293.6	≡
2	Flat	3		0.0	0.0	600	1"	B600	GG455	2	2	full	≡
3	Flat	3		0.0	15.0	605	1"	B600	GG455	2	2	full	≡
4	Sci	1200		0.0	15.0	605	1"	B600	GG455	2	2	full 404.4	≡
5	Sci	1200		0.0	15.0	605	1"	B600	GG455	2	2	full 490.9	≡
6	Flat	3		0.0	15.0	605	1"	B600	GG455	2	2	full	≡
7	Flat	3		0.0	0.0	600	1"	B600	GG455	2	2	full	≡
8	Sci	1200		0.0	0.0	600	1"	B600	GG455	2	2	full 564.2	≡
9	Sci	1200		0.0	0.0	600	1"	B600	GG455	2	2	full 636.0	≡
10	Flat	3		0.0	0.0	600	1"	B600	GG455	2	2	full	≡
11	Flat	3		0.0	15.0	605	1"	B600	GG455	2	2	full	≡
12	Sci	1200		0.0	15.0	605	1"	B600	GG455	2	2	full 692.2	≡
13	Sci	1200		0.0	15.0	605	1"	B600	GG455	2	2	full 746.0	≡
14	Flat	3		0.0	15.0	605	1"	B600	GG455	2	2	full	≡

14 Steps, 2.3 hrs

Figure 3.5: [Q74][Q75]The sequence editor [Q76] shows the automatically-generated sequence [Q77] and allows customizing the input parameters (at the top) or any component of any step.

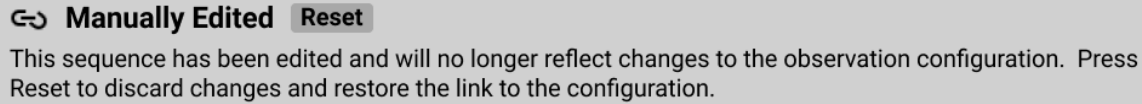


Figure 3.6: When a sequence is manually edited the banner at the top changes from “Automatically Generated” (Figure 3.5) to “Manually Edited” with a Reset button.

parameters: for imaging the offsetting geometry and size, and for spectroscopy the desired wavelength steps and spatial offsets. From these it uses rules described by the instrument scientist to generate a sequence that is guaranteed error-free and will result in the desired signal-to-noise when executed under the appropriate conditions.

Editing the sequence is completely optional, however, it may benefit some users to correct any simplifying assumptions made when automatically generating the sequence, thereby yielding the most accurate overhead estimates [Q78], and (assuming that the PI’s observing strategy does not change) it will result in observations which are ready for execution [Q79] if awarded telescope time. [Q80]

Any item of any step may be manually edited and steps may be rearranged by dragging and dropping them. However, once a sequence has been manually edited it is no longer linked to the input configuration that it was generated from, and changing the top-level instrument configuration may not be reflected in all the steps of the sequence [Q81], although there is a Reset button [Q82] to regenerate the sequence using the input parameters (Fig. 3.6). Manually edited sequences are flagged for human validation if awarded time, and PIs may only set them to “For Review”, in contrast to automatically generated sequences which PIs may promote from “Approved” directly to “Ready.”

Minimum Schedulable Units (MSUs) [Q83] are shown with brackets along the left side of the sequence table. While it is expected that many observations will be executed in their entirety without interruption, when that is not possible the MSUs indicate acceptable splitting points. These will be automatically placed at natural break points in the sequence according to rules developed by the instrument scientists, but PIs may choose to override these defaults by dragging and resizing the MSU brackets (which makes the sequence “manually edited”). Observations which may not be split will be comprised of a single MSU (which will in turn reduces the schedulability of the observation). [Q84][Q85]

3.3.9 ITC

The ITC Panel is displayed at the bottom of Figure 3.2, and shows all the ITC output including graphs that can be dynamically scrolled and zoomed to see details. These results are based on the steps in the Detailed Sequence, and if the user modifies the sequence the ITC will rerun and the output will update automatically.

3.4 Targets View

[Q86] The Targets View [Q87] (Fig. 3.7) shows all the targets in the proposal/program with any observations that use them (note that there may be targets with no observations). This makes it easy to see what observations there are of each target, and it is even possible to drag-and-drop observations to change the target, and since sequences are generated to achieve the desired Signal-to-Noise, the observation sequence

will automatically adjust based on the new target properties (if the observation has a manually-edited sequence this will generate a warning that those changes will be lost). When a target is selected and its properties are edited this will update all the observations under it. Editing the target when an observation is selected will open a dialog asking if those edits should apply to only that observation or to all the observations of that target. If a target is deleted in this view then all of its observations are deleted as well (with a prominent user confirmation – see also §3.13 about undo capabilities).

The panel on the right displays the details of the selected target. [Q88] Note that this is exactly the same view that one gets by expanding the Target panel while in the Observations View (Fig. 3.2). If an observation is selected then the instrument FPU, position angle, WFS FoV, and guide star are also included in the target visualization. Here one can change the guider and see the AGS-selected guide star and predicted guide-speed (Slow, Medium, or Fast). [Q89] If the default guide star is undesirable for any reason there are buttons to use the next best guide star in the ranked list of guide stars (or go back to the previous one), or designate the observation as unguided (not yet illustrated).

The finder chart section is at the lower right below the target visualization. Here users may add and associate finder charts with observations (they will also be listed in the auxiliary file list in the Overview View displayed in Figure 3.15). If there is more than one finder chart associated with the observation they may be ordered such that the primary one is at the top, and the top chart will be displayed by default (i.e. there is no need to select it). The user may select other finder charts to display them instead. The finder chart may be popped out into a separate window, flipped, rotated, and scaled to match the acquisition image.

The buttons at the bottom allow the user to create new targets from scratch or import a CSV list of targets. If observations of new targets are created they will have the status “New.” [Q90]

3.5 Constraints View

The Constraints view (Fig. 3.8) shows all the constraints in the proposal/program (with user-defined names) with any observations that use them (there may be unused constraints). This makes it clear which observations use which sets of constraints, and makes it easy to bulk-edit constraints for multiple observations.

The user may drag-and-drop observations to use a different set of constraints, or edit the constraints for an entire set of observations. The “+Const” button at the bottom-left may be used to create a new set of constraints into which observations may be moved. If a user changes the constraints to a more restrictive set of constraints [Q91] than were approved the observation status will change from “Approved” to “New” and the observations will acquire a “Needs Approval” indicator which is a link to the Change Request panel (§3.10.3).[Q93][Q92]

Absolute timing windows may be defined for a set of observations (e.g. “Good Seeing, Low Extinction” in Fig. 3.8), as well as for individual observations. When a single observation is selected it is possible to see all the timing windows that apply to that observation and to set a relative observation priority.

This panel also displays the likelihood of the requested conditions as well as the number of schedulable hours remaining in the semester (not yet illustrated in the mock-ups), with the goal of tempering expectations and discouraging setting of very tight constraints. [Q94]

The screenshot displays the Gemini Explore web interface for the target NGC 7752. The browser address bar shows `explore.gemini.edu/targets/ngc7752/2`. The page title is "Explore" and the user is logged in as "anonymous".

Target List (Left Sidebar):

- NGC 1055:** 1 Obs, GMOS-N R831 1x300", <math><0.8^{\circ}</math> <math><0.3</math> mag Gray, New, 2.0 hrs.
- NGC 7752:** 1 Obs, GMOS-N R831 1x300", <math><0.8^{\circ}</math> <math><0.3</math> mag Gray, New, 1.22 hrs.
- NGC 3705:** 0 Obs.
- NGC 1068:** 2 Obs, GMOS-N R831 1x300", <math><0.8^{\circ}</math> <math><0.3</math> mag Gray, New, 1.45 hrs; GNIRS SXD 0.60", <math><0.7^{\circ}</math> <math><0.3</math> mag Bright, New, 1.32 hrs.
- NGC 1087:** 1 Obs.

Target Details (Main Panel):

NGC 7752

- Type: Sidereal
- Name: NGC 7752
- RA: 23:47:04.834
- Dec: +29:27:32.17
- Proper Motion: μ RA = 0 mas/year, μ Dec = 0 mas/year, Epoch = 2000 years, Parallax = 0 mas, RV = 4926.4 km/sec.
- Source: Profile = Point Source, SED = Emission Line, λ = 2.2 μ m, Width = 500 km/s, Flux = 5E-19 W/m², Continuum = 1E-16 W/m²/ μ m.

Magnitudes:

14.3	B	Vega
12.095	J	Vega
11.513	H	Vega
11.187	K	Vega

Observation Details (Right Panel):

- Image: DSS Gemini
- Guide: GS OIWFS
- Coordinates: 23:47:04.834 +29:27:32.17
- Date: 15-Oct-2022
- Parameters: Fast R 12.56 23:46:43.934 +29:25:24.07

Visualizations:

- Image:** A large astronomical image of NGC 7752 with a red dashed box highlighting the target area and a cyan arrow pointing to it.
- Finding Charts:** A "Two-target" finding chart showing the target's location in the 2MASS H-Band and a GMOS-S r band image with a 10-second exposure. A 20 arcsec scale bar is shown.
- Light Curve Plot:** A plot showing magnitude versus time from February 25 to July 14. The magnitude is relatively constant around 10.0, with a slight upward trend (decreasing magnitude) over time.

Bottom Controls:

- Buttons: Obs, Target, Import Targets, Export Targets, Create Proposal.
- Site: GN, GS (selected).
- Plot: Night Elevation, Visibility (selected).
- Year: 2022B.

Figure 3.7: The Targets View with an observation selected. Note the slightly different appearance of the observation badge in this view – the instrument configuration is at the top and the constraints are below.

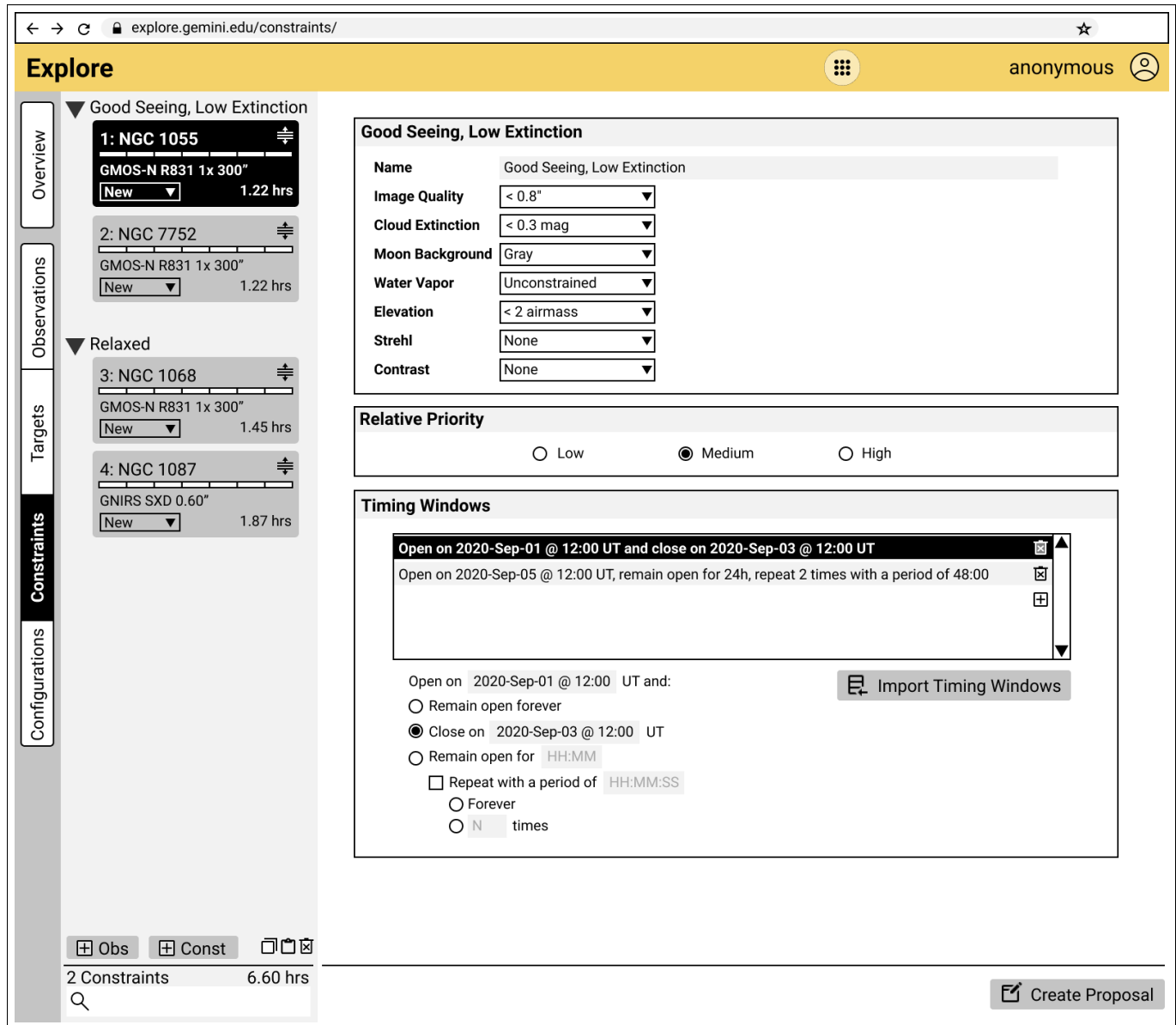


Figure 3.8: The Constraints View with an observation and timing window selected. Note that the constraint names are user-defined.

3.6 Configurations View

The Configurations view (Fig. 3.9) shows all the instrument configurations with any observations that use them (there may be configurations with no observations). This allows bulk-editing of instrument details or dragging observations to change their configuration. The buttons at the bottom may be used to create new observations or new configurations into which observations may be moved. If a user changes the configuration beyond what is allowed, or creates a new unapproved configuration the observation status will be “New.”

The panel on the right shows the input requirements and the selected configuration, and when an observation is selected, the table of Matching Configurations. A warning is given if the instrument configuration is changed such that the original requirements are not met.

The Position Angle is visible in both the Observations View (Fig. 3.3), and in the Configurations View (Fig. 3.9). The options are: “Fixed”, “Allow 180 deg flip”, “Average Parallaxic” [Q95], or “Unconstrained” for the PA that gives the best guide star with the least amount of vignetting. There is a UI to set the date and time of the observation, including the usual “Now”, and “Now + Acquisition”, however, at night the system will automatically set the time of observation, and the scheduler will only queue the observation when a guide star is available at the average parallactic angle.

3.7 Associated Calibrations

[Q97][Q98] Each observation may be expanded (by clicking on the triangle) to show any associated calibration observations (Fig. 3.10). These include daytime calibrations like arcs and flats [Q99], and nighttime on-sky calibrations like Telluric and photometric standards. This will inform users what calibrations they will get, and allow them to make any required customizations. Program calibrations may be added as needed (not yet illustrated in mock-ups), or default partner calibrations may be unchecked if they are not needed.

The associated calibrations themselves have limited configurability to minimize opportunities for errors. The instrument configuration and constraints are frozen to ensure they match the science observation (the constraints and configuration are displayed but grayed out and not editable). The sequences are automatically generated taking into account the on-sky conditions to give the appropriate S/N (nominally 2x the S/N of the science, depending on the type of calibration). The PI may select the Telluric spectral type and have the calibration service [Q100] select the best on-sky calibration target at the time of the observation [Q101][Q102], or the PI may choose their preferred standard star, in which case a warning will be given if the airmass match will be poor.

3.7.1 Groups

[Q104] Observations may be combined into OR groups and AND groups, which may be nested. An “OR” group (Fig. 3.11) allows the PI to request that a subset of the grouped observations [Q105] be executed. This allows inclusion of a larger sample of observations to facilitate scheduling. OR groups display estimates for the minimum and maximum total planned time based on the lengths of the individual observations.

AND groups (Fig. 3.12) allow the PI to request relative timing constraints between the observations in the group. The simplest options are that all members of the group must be observed consecutively, or that the

The screenshot shows the 'Explore' web interface for Gemini Observatory configurations. The main content area displays configuration details for 'GMOS-N R831 1x300\"'. The configuration parameters are as follows:

- Mode:** Spectroscopy
- Wavelength:** 715 nm
- $\lambda / \Delta\lambda$:** 1600
- S/N:** 40
- λ Range:** 200 nm
- Focal Plane:** Longslit, 60 arcsec
- Capabilities:** None

A 'Matching Configurations' table is also present:

Inst	Disp	R	$\Delta\lambda$	FPU	Avail	Time
GMOS-N	R831	2198	207nm	1"x300"	20A,20B	1:22
GMOS-S	R831	2198	207nm	1"x300"	20A,20B	1:22
GMOS-N	B600	1688	207nm	1"x300"	20A,20B	1:56
GMOS-S	B600	1688	207nm	1"x300"	20A,20B	1:56

Additional configuration parameters include:

- Name:** GMOS-N R831 1x300"
- Disperser:** R831
- Filter:** None
- Wavelength:** 715 nm
- FPU:** 1.5" x 300" slit
- Nod & Shuffle:** No
- Binning:** 2 x 2
- Read Mode:** Slow, Low Gain
- ROI:** Full Frame
- $\lambda / \Delta\lambda$:** 1465
- λ Coverage:** 612 - 819 nm
- Read Noise:** 4.1 electrons
- λ Dithers:** -5, 5 nm
- Spatial Offsets:** 0, 15 arcsec
- Exposure Mode:** S/N
- S/N:** 40
- Exp Time:** 600 sec
- Exp Count:** 6

A warning message is displayed: **Warning: Requirement Not Met. Delivered $\lambda/\Delta\lambda$ (1465) is less than requested (1600).** A 'Dismiss' button is available next to the warning.

Below the configuration details, there is a section for 'NGC 1055 Spec Position Angle' with a dropdown menu set to 'Average Parallaxic'.

The left sidebar contains navigation tabs: Overview, Observations, Targets, Constraints, and Configurations. The 'Configurations' tab is active. At the bottom of the sidebar, there are buttons for 'Obs', 'Config', and a search icon. A summary shows '2 Configurations' and '6.60 hrs'.

The top right of the interface shows the user is logged in as 'anonymous'.

Figure 3.9: The Configurations view with an observation selected. Note that the observation badge shows the target at the top. Here the configuration has been manually edited so that the resulting resolution does not meet the original requirement and a warning has been generated. [Q96]

The screenshot shows the Gemini Explore web interface. The browser address bar is `explore.gemini.edu/observations/3`. The page title is "Explore" and the user is logged in as "anonymous".

Observations List:

- 1: NGC 1055 (GMOS-N R831 1x 300", 2.0 hrs, New)
- 2: NGC 7752 (GMOS-N R831 1x 300", 1.2 hrs, Included, Daytime Arcs)
- 3: NGC 1068 (GNIRS SXD 0.6", 2.4 hrs, Included, Telluric Standard, Daytime Pinhole)
- OR 1 of 2
- 4: NGC 1087 (GMOS-N R831 1x300", 1.83 hrs, Included)
- 5: NGC 1087 (GMOS-S R831 1x300", 1.83 hrs, Included)

Target Section:

- Auto-select the best standard star with spectral type: **A**
- Manual standard star selection: [Search]

Constraints Section:

- Image Quality: ≤ 0.7 arcsec
- Sky Background: Bright
- Elevation: None
- Contrast: None
- Cloud Cover: ≤ 0.5 mag
- Water Vapor: Any
- Strehl: None
- Set Timing Windows

Configuration Section:

- Name: GNIRS 32 l/mm SXD
- Disperser: 32 l/mm
- Pixel Scale: 0.15
- Wavelength: 1.65 μm
- FPU: 0.675" x 7" slit
- Cross Disp: SXD
- Read Mode: Bright Object
- Resolution: 755
- λ Coverage: 0.702 - 2.531 μm
- Read Noise: 30 electrons
- Spatial Offsets: -2, +1 arcsec
- Exposure Mode: S/N
- S/N: 80
- Exp Time: 15 sec
- Coadds: 1
- Exp Count: 4
- Position Angle: Average Parallactic 168.66 °E of N
- View Sequence

ITC Section:

- S/N / exposure: 40
- S/N Total: 80

Signal and SQRT(Background) in one pixel:

This graph plots "e- per exposure per spectral pixel" (0 to 1,750) against "Wavelength (nm)" (425 to 675). It shows signal curves for BB, HSC, and SC channels, along with their respective SQRT(Background) curves. The HSC channel shows a prominent emission line at approximately 575 nm.

Intermediate Single Exp and Final S/N in aperture:

This graph plots "Signal / Noise per spectral pixel" (0 to 130) against "Wavelength (nm)" (425 to 675). It compares the signal-to-noise ratio for single exposures and final S/N for BB, HSC, and SC channels. The HSC channel shows a sharp peak in S/N at approximately 575 nm.

At the bottom left, there are buttons for "Obs", "Group", and a search icon. The text "5 Observations 7.51 hrs" is displayed. A "Create Proposal" button is at the bottom right.

Figure 3.10: A GNIRS observation with an associated Telluric standard selected. The target will be an A-star automatically selected to yield the best airmass match when the observation is scheduled. [Q103]

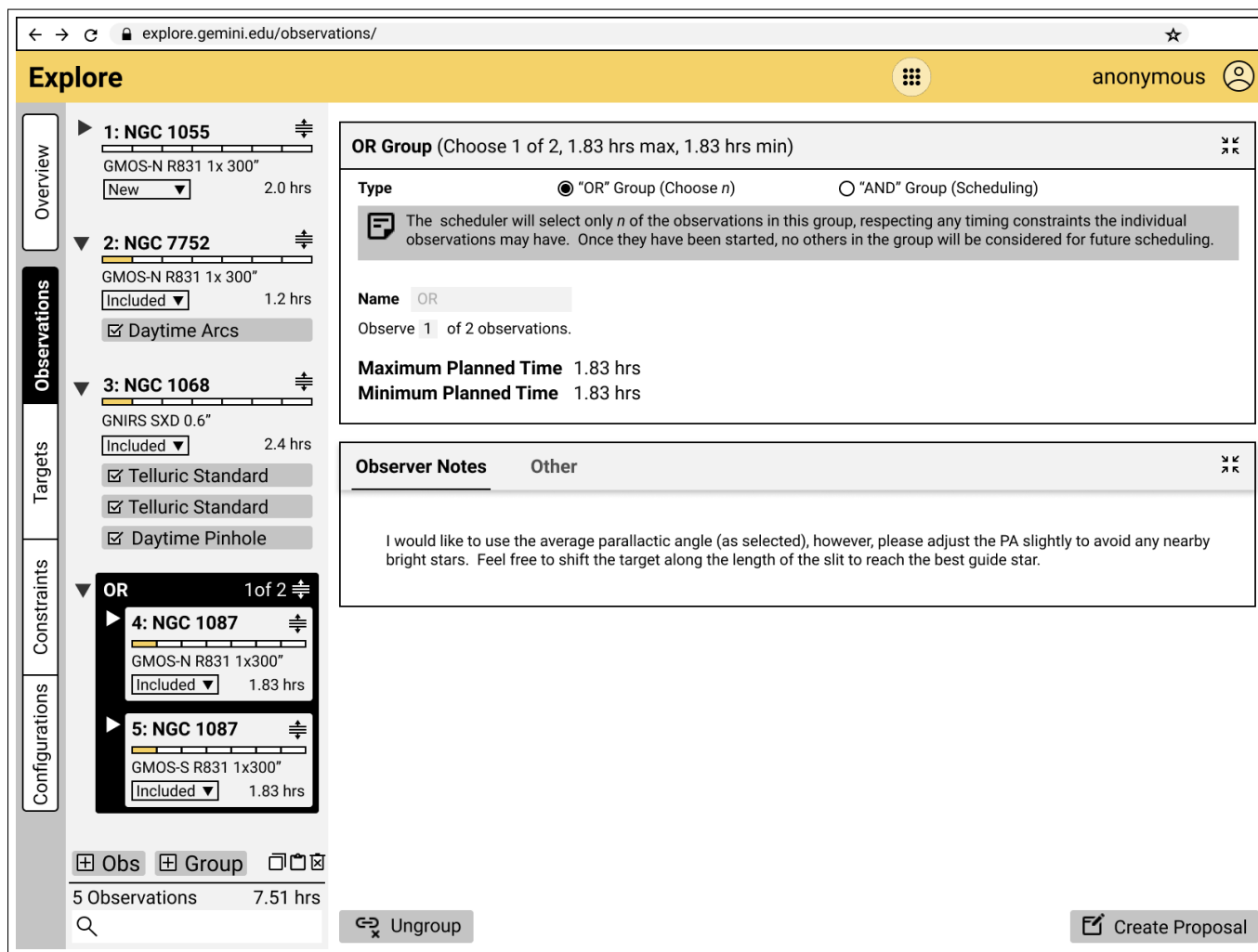


Figure 3.11: The Observations View of an OR group consisting of a GMOS-N and a GMOS-S observation of NGC 1087.

The screenshot shows the 'Explore' interface for Gemini observations. The main view is an 'AND Group (Ordered, 3.66 hrs)'. The group is composed of two 'OR' groups, each containing two observations of NGC 1087. The first OR group has observations 4 and 5, both using GMOS-N R831 1x300" with a duration of 1.83 hrs. The second OR group also has observations 4 and 5, both using GMOS-S R831 1x300" with a duration of 1.83 hrs. The 'Type' is set to '"AND" Group (Scheduling)'. The 'Name' is 'AND'. The 'Planned Time' is 3.66 hrs. The 'Observer Notes' section contains the text: 'I would like to use the average parallactic angle (as selected), however, please adjust the PA slightly to avoid any nearby bright stars. Feel free to shift the target along the length of the slit to reach the best guide star.' The interface also shows a sidebar with 'Overview', 'Observations', 'Targets', 'Constraints', and 'Configurations' tabs. At the bottom, there are buttons for 'Obs', 'Group', 'Ungroup', and 'Create Proposal'.

Figure 3.12: The Observations View of an AND group of nested OR groups. This will result in two observations of NGC 1087 separated by 1-2 days using either GMOS-N or GMOS-S. [Q111]

targets must all be observed on the same night (but not necessarily consecutively). The last option allows defining the minimum and maximum time between each observation in the group, for example, observing a target multiple times with a cadence of 7-10 days. [Q106]

Users may submit observations of the same target using multiple instruments and/or configurations at multiple sites (e.g. GMOS-N and GMOS-S) and organized in an OR group. This will provide flexibility when filling the queue and ensure that high-priority observations can be executed as quickly as possible given the current telescope and instrument availability.

3.8 Authentication

[Q107] Everything discussed up until this point can be done anonymously. However, in order to use the "Create Proposal" button or save their work, the user must authenticate. New users may register and existing users may login by clicking on the icon in the top right corner which brings up the following menu. Logins will be done using ORCID [Q108], however, once logged in the user's preferred email address will be displayed next to the login/logout button as that is more identifiable than the 16-digit ORCID. [Q109]

3.9 Proposal View

[Q110] Clicking the “Create Proposal” button will ask the user to authenticate, if not done already, and then add the “Proposal” view on the left-hand side vertical navigation bar (Fig. 3.13). The proposal will include all the observations with a status of “Included.” The Proposal View includes three panels.

The Proposal Details panel allows entering the proposal class, category, keywords, target of opportunity status, whether band-3 is acceptable (if this is still needed), and the total time request from each partner.

Requests for classical time will also allow entering scheduling constraints for the awarded classical nights, with a UI to enter and edit ranges of “Optimal” and “Impossible” dates with optional explanations.

The Abstract [Q112] panel is a simple text-entry box [Q113] for the abstract.

The Preview panel shows a preview of the current proposal and has a button for downloading the proposal PDF. At the bottom of the page are buttons for downloading the proposal template, attaching a PDF, and submitting the proposal.

Once partners and proposal type have been selected the proposal deadline is known and can be displayed. This information can also be used to provide a link to download the correct proposal template. Metadata embedded in proposal template PDFs will also indicate the associated semester and proposal type and be checked to ensure consistency upon upload.

3.9.1 Submitting, Retracting, and Resubmitting Proposals

[Q114][Q115][Q116][Q117]

The “Submit Proposal” button becomes active when all the details have been entered into the proposal. When the “Submit Proposal” button is pushed:

- A unique ID is assigned to the proposal and displayed at the top
- A confirmation email is sent to all investigators with the proposal URL and the PDF summary attached
- The proposal is locked against further edits
- The “Submit Proposal” button is replaced by a “Retract Proposal” button which will be active up until the proposal deadline

Clicking the “Retract Proposal” button will withdrawal the proposal from TAC consideration and unlock the proposal so that further edits may be made by any collaborator with write privileges. An email will be sent to all investigators stating that the proposal has been retracted, and the “Retract Proposal” button will be replaced by a “Resubmit Proposal” button.

Clicking the “Resubmit Proposal” button has the same effect as the “Submit Proposal” button except that the original proposal ID is retained.

At any point (before or after submission) the user may go to the Dashboard (Figure 4.1) and duplicate the proposal. This could be used to copy an old proposal to be used as the base for a new proposal. It would also allow one to submit an early version of a proposal, copy it to make changes, and then submit the new version and retract the original proposal.

The screenshot shows a web browser window at `explore.gemini.edu/proposal/`. The page title is "Explore Spectroscopic investigations of novae in nearby galaxies" and the user is logged in as `pdoe@gmail.com`. A vertical sidebar on the left contains navigation tabs: Proposal, Overview, Observations, Targets, Constraints, and Configurations. The main content area is divided into three sections: Proposal Details, Abstract, and Preview.

Proposal Details

Name Spectroscopic investigations of novae in nearby galaxies	Category Galaxy Evolution
PI P. Doe, University, CA F. Lastname, University, US	Keywords Stellar Populations, Spiral Galaxies
Request 6.56h Total 3.28h 3.28h	ToO Activation None
Class Queue	Band 3 Yes

Abstract

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut sem nulla pharetra diam sit amet nisl suscipit adipiscing. Sit amet commodo nulla facilisi nullam. Morbi enim nunc faucibus a pellentesque sit. Molestie a iaculis at erat pellentesque adipiscing. Aliquam id diam maecenas ultricies mi eget. Feugiat scelerisque varius morbi enim nunc. Quis commodo odio aenean sed adipiscing diam donec. CURSUS sit amet dictum sit amet justo. Ut sem nulla pharetra diam sit amet nisl. Consectetur purus ut faucibus pulvinar elementum integer enim neque. Fames ac turpis egestas integer eget aliquet nibh. Feugiat nibh sed pulvinar proin gravida hendrerit lectus a. Tellus pellentesque eu tincidunt tortor aliquam nulla facilisi.

Senectus et netus et malesuada fames ac turpis egestas maecenas. Semper feugiat nibh sed pulvinar proin gravida hendrerit lectus. Viverra suspendisse potenti nullam ac. Imperdiet massa tincidunt nunc pulvinar sapien et ligula ullamcorper malesuada. Dui id ornare arcu odio ut sem nulla pharetra. Bibendum est ultricies integer quis auctor. Tellus at urna condimentum mattis pellentesque id nibh. Sed nisi lacus sed viverra tellus in hac. A lacus vestibulum sed arcu non odio.

Preview

GEMINI OBSERVATORY
observing time request summary

Semester: 2020A	Observing Mode: Queue	Gemini Reference:
Instruments:		
Time Awarded: NaN	Thesis: No	
Band 3 Acceptable: Yes	Band 3 Time: 10.0 hr	Band 3 Minimal Time: 5.0 hr

Title: Spectroscopic investigations of novae in nearby galaxies

Principal Investigator: Pat Doe
PI institution: University, CA,
PI status: PhD
PI phone/e-mail: 123-456-7890 / pdoe@gmail.com

Partner Submission Details *(multiple entries for joint proposals)*

Partner	Lead	PI Request		NTAC Recommendation			
		Time	Min	Reference	Time	Min	Rank

At the bottom of the page, there are three buttons: "Attach PDF", "Download Template", and "Submit Proposal".

Figure 3.13: The Proposal View of an unsubmitted proposal. [Q118][Q119]

3.10 Program View

When a PI is awarded time the observations that were approved by the TAC will be promoted from “Requested” to “Approved” and a Program button (Fig. 3.14) will appear in the vertical navigation bar. This view has three panels.

3.10.1 Program Details

The Program Details panel lists all program information. Notable differences from the Observing Tool include: program start and end dates, a top-level listing of the time from each partner, a simplified time usage summary, a single list of contact scientists, and a checkbox and form for eavesdropping availability.

3.10.2 Program Notes

The Program Notes panel provides [Q120] a central location for PIs to give a top-level overview of their observing strategy, and a list of any special requirements of the program.

3.10.3 Change Requests

The database maintains a list of all the approved combinations of target + configuration + conditions for each program. If a PI changes observations such that they are outside the allowed set [Q121] those observations will change status from “Approved” to “New” and those observations cannot be advanced along the observation track (i.e. changed to “For Review” or “Ready”) by the PI until they either get approval or until the PI changes the observations such that they once again have an allowed set of parameters. Observations which need approval will have a “Needs Approval” indicator and clicking on the indicator [Q122] will bring the user to the Change Request panel [Q123] (which has not been mocked-up, but will be at the bottom of Fig. 3.14) [Q124].

The Change Request panel will list all observations that have a status of “New”, as well as why they are not currently approved, i.e. never submitted at phase-1, changed target, changed config, or changed conditions. Here the PI may select a set of observations that they wish to request approval for and change their status to “Include” to be included in the change request. There is a box to provide a brief justification for the changes, and a “Submit” button which will send a notification to the relevant Head(s) of Science Operations with a copy to the PI and Contact Scientists.

The change request goes to the Head of Science Operations for review via the “Admin” interface described in section 11. While the PI awaits a decision on the change request those observations will have a status of “Proposed.”

When the change request has been addressed the PI will receive notification, the included observations will change status to either Approved or Rejected, and a record of the change request (date, targets, justification, and outcome) will be retained on this panel for future reference.

The screenshot shows a web browser window with the URL `explore.gemini.edu/2022B-Q-2145/program/`. The page title is "Explore" and the program name is "2022B-Q-2145 Spectroscopic investigations of novae in...". The user is logged in as `pdoe@gmail.com`.

Program Details

Reference	2022B-Q-2145	Time Award	US 🇺🇸 1.25h	Contact Scientists	astephens@gemini.edu, bmiller@gemini.edu, kchiboucas@gemini.edu
PI	P. Doe		CA 🇨🇦 1.25h		
Co-Investigators	A. One, A. Two, A.Three				
ToO Status	Standard				
Class	Queue				
Start	2022-Aug-1				
End	2023-Jan-31				
Thesis	False				
Proprietary Period	12 months				
Ranking Band	2				
		Allocated	2:30:00	Notifications	<input checked="" type="checkbox"/> New Science Data <input checked="" type="checkbox"/> Expired Timing Windows
		Planned	2:15:00 (0:15 underfilled)	Eavesdropping	<input checked="" type="checkbox"/> 📅
		Used	1:00:00		
		Remain	1:30:00		
		Completion	40%		

General Notes **Special Requirements** 🗨️ 🗨️ 🗨️

This is an area for top-level Program notes.

Change Requests 🗨️ 🗨️

This is where Change Requests are created, submitted, and archived.

Figure 3.14: The Program View.

3.11 Overview View

The Overview View holds information relevant to all observations, and although it is displayed in Figure 3.15 at the Phase-2 stage, this view is present from the beginning.

3.11.1 Observation Summary

The observation summary is the topmost panel in the Overview View (Fig. 3.15). It is a sortable table of all observations which includes the following columns: observation ID, target name and coordinates, a short summary of the instrument configuration, observing constraints, target type (sidereal, non-sidereal, or ToO), presence of timing windows and scheduling groupings, the next timing window, user priority, status, planned time, charged time, associated files, completion (%), and whether the observation has any warnings or errors. This will help the PI and support scientists see which observations need to be reviewed, verify that all the configurations are the same, spot observations that don't have finder charts [Q126] or have expired timing windows, etc. Selecting an observation in this table will take you directly to the observation.

3.11.2 Warnings & Errors

The second panel in the Overview View lists any warnings and errors. Explore will check all observations using rules generated by the instrument scientists. These rules will need to be updated when new instruments are commissioned and whenever new observing techniques are adopted, with the goal of eliminating the need for human checks. Observations that fail the automated checks but are believed to be acceptable by the PI may be elevated [Q127] to their contact scientist for validation. [Q128] If the observation is indeed acceptable the contact scientist will override the error [Q129] and change the observation status to "Ready." The instrument scientist will then work with the software group to update the automatic checking rules so that similar observations in the future will not trigger errors.

When the time frame of the proposal/program is known (e.g. is it a 2022B queue proposal, Fast Turnaround, or DD), Explore will also perform visibility and schedulability checks on each observation. These consider the intersection of when the target is visible, sky brightness constraints, timing windows, as well as the telescope and instrument schedule.

If an error or warning is triggered a red mark will appear on the observation badge (not illustrated in the mock-ups). The PI must correct errors or communicate with their contact scientist to get an override. Warnings must be either corrected or acknowledged to further advance the observation. The Warnings & Errors panel summarizes all warnings and errors that were triggered so that the Contact Scientist can see them and which checks have been overridden. The warnings and errors will also be visible in internal web reports that list the status of all programs.

3.11.3 Attachments

The third, and last, panel in the Overview View (Fig. 3.15) lists program attachments. This shows all the auxiliary files, such as finder charts, ephemerides, SEDs, pre-imaging, and MOS designs. This panel shows which observations use each file and allow the PI to upload new and/or replacement files. There are checkboxes that allow NGOs and staff to mark finder charts and MOS mask designs as checked. There

The screenshot shows the 'Explore' interface for program 2022B-Q-2145. The browser address bar shows 'explore.gemini.edu/2022B-Q-2145/overview'. The user is logged in as 'pdoe@gmail.com'. The 'Overview' panel is active, displaying three sections:

Observation Summary

Observation	Target	Configuration	Windows	Time (hrs)
101 ✓ Ready	NGC 1055	GMOS-N R831 1x300"	20-09-01 12:00	2.0 0.0
102 ✓ Ongoing 50%	NGC 7752	GMOS-N R831 1x300"	20-08-15 02:00	1.2 0.7
103 ⊗ Ready	NGC 1068	GNIRS SXD 0.6"		2.4 0.0
AND				
104 ✓ Ready	NGC 1087	GMOS-N R831 1x300"		1.8 0.0
105 ✓ Ready	NGC 1087	GNIRS SXD 0.6"		1.8 0.0
106 ✓ New	Comet X	GNIRS SXD 0.6"		0.6 0.0
107 ✓ New	3451 Mentor	GNIRS SXD 0.6"		0.6 0.0

Warnings & Errors

Observation	Description
⊗ 103	Observation excluded: Couldn't open finder.
⚠ 106	Ephemeris data in comet.eph will run out in 5 days.
⊗ 108	Observation excluded: Couldn't find target.

Attachments

File	Size	Last Update	Observations	Description	Checked
NGC7752_Finder.pdf	1.23 MB	2022-Jun-03	102	Finder chart for nova in NGC7752	✓
nova.sed	4.27 MB	2022-Mar-18	101, 102, 103	Nova SED for ITC	
comet.eph	126 KB	2022-Jun-25	106	Uncataloged comet ephemeris	
2022BQ2145-01_ODF.fits	14 KB	2022-Jul-19	109	MOS mask	✓

A 'New' button is located at the bottom right of the Attachments section.

Figure 3.15: The Overview View includes three panels. The Observation Summary (top) gives a concise listing of all observations in the program, the Warnings & Errors (middle) [Q125] summarizes any problems that need attention, and the Attachments (bottom) lists all the auxiliary files with buttons to download, replace, upload, and delete files.

is a “link” button to discover the URL of any attached file so that it may be bookmarked, opened in a separate browser window, or copied into an email.

3.12 Executed Sequences

A partially executed sequence is displayed in Fig. 3.16. Here one can see that the observation badge has changed to “Ongoing” with 6/7 bars illuminated. The Constraints and ITC panels are minimized to save space, and the title bar of each shows a summary of the important information. Hovering the mouse over the Constraints icons will show a tooltip explaining BG=Gray, WV=Any, Priority=Medium, and the next timing constraint.

The Sequence title bar gives a brief overview of the sequence and time accounting, and includes a download icon which links to the Gemini Observatory Archive (GOA). The executed steps are shown in gray with timestamps, filenames, indicators of the Quality Assessment (QA) [Q132], archive state, and comments from the observer. This section will also show public events from the Chronicle (not yet illustrated in the mockups).

The database makes a snapshot of the sequence when the status is changed to “Ready.” This allows comparison of what was requested with what was delivered [Q133]. One can switch between the original and current sequences using the toggle at the top-right of the Sequence panel (Fig. 3.15).

If authenticated as Gemini staff or designated as a visiting observer, selected “Ready” or “Ongoing” observations may be sent to “Observe” for execution (§7). One possible implementation of this is a “Send to Observe” button as illustrated in Figure 3.16. This button will load the observation into Observe (if nothing else is running) and provide the observation details to the telescope control application “Engage.”

3.13 Undo

[Q134][Q135] Undo support is a highly desirable and often requested feature, but full distributed undo is a difficult engineering problem requiring significant effort. One of the first steps of the prototyping and development phase will be to investigate local undo support [Q136][Q137]. Regardless, our expectation is that improvements to the UI and program representation will have made undo less critical than in current Gemini planning tools like the Observing Tool. As an example of this, generating calibration observations on demand when needed means that changing (or unchanging) the instrument configuration is done in a single place. Sequence generation means less editing is required in general, etc.

Observer Note Scheduling Note Other

I would like to use the average parallactic angle (as selected), however, please adjust the PA slightly to avoid any nearby bright stars. Feel free to shift the target along the length of the slit to reach the best guide star.

Target NGC 7752

Type: Sidereal
 Name: NGC 1055
 Coord: 02:41:45.233 +00:26:35.45
 Profile: Point Source
 SED: nova.sed

Magnitudes:
 14.3 B Vega
 12.095 J Vega
 11.513 H Vega

Night Elevation Semester Vis

Constraints IQ<0.8" CC<0.3mag **ITC** S/N / exposure: 16.3 S/N Total: 40

GMOS-N Longslit: 5 of 18 Steps executed, 1.22 hrs (00:21:50 executed, 0:52:20 remaining)

Partially Executed
 This sequence has been partially executed and will no longer reflect changes to the observation configuration.

Acquisition

Step	Type	Exp (sec)	p	q	λ (nm)	FPU	Disperser	Filter	Xbin	YBin	ROI	S/N
1	Acq	10	0.0	0.0				r	2	2	ccd2	
					2022-12-11 03:56:21	N20221211N0233	Pass	Archived				
2	Acq	20	10.0	0.0		1"		r	1	1	stamp	
					2022-12-11 03:56:42	N20221211N0234	Pass	Archived				
3	Acq	40	0.0	0.0		1"		r	1	1	stamp	
					2022-12-11 03:57:24	N20221211N0235	Pass	Archived				

Science

Step	Type	Exp (sec)	p	q	λ (nm)	FPU	Disperser	Filter	Xbin	YBin	ROI	S/N
1	Sci	1200	0.0	0.0	600	1"	B600	GG455	2	2	full	293.6
					2022-12-11 04:18:54	N20221211N0236	Pass	Archived				
					Seeing is 0.7" in this image.							
2	Flat	3	0.0	0.0	600	1"	B600	GG455	2	2	full	
3	Flat	3	0.0	15.0	605	1"	B600	GG455	2	2	full	
4	Sci	1200	0.0	15.0	605	1"	B600	GG455	2	2	full	404.4
5	Sci	1200	0.0	15.0	605	1"	B600	GG455	2	2	full	490.9
6	Flat	3	0.0	15.0	605	1"	B600	GG455	2	2	full	

Figure 3.16: A partially executed sequence. [Q130][Q131]

4. Dashboard

The Gemini Dashboard is displayed in Figure 4.1. Here users may update their contact information and affiliation, access their proposals and programs and share them with collaborators, and access programs where they are not PI but have been granted access by the PI.

The Dashboard table of projects lists the title, status of each (phase 0, 1, or 2) [Q138], the proposal ID (if submitted), and if awarded time, the program ID, time award, program completion, and the user-set %-Useful. [Q139] There is also a column [Q140] that indicates whether the proposal or program is shared with any collaborators. Clicking the Share button will open a pop-up window (Fig. 4.2) that allows inviting new shares and selecting the privileges of each collaborator: [Q141] read only, edit, or the ability to submit the proposal [Q142]. Adding a new collaborator [Q143] will send them an email with a link to access the proposal. Hovering over a line in the proposal list will show the full program title and investigator list.

At the bottom of the Dashboard are the following action buttons:

- “New” will create a new blank project with no targets or observations
- “Duplicate” will create a copy of the selected project with the observation status set to “New”
- “Delete” will delete the selected project if it has not been submitted
- “Share” will open the sharing dialog window (Fig. 4.2)
- “Open in Explore” will open the selected program in the Explore application
- “Open in Chronicle” will open the selected program in the Chronicle application

There will be a mechanism / button for PIs to enter their pre-GPP program IDs [Q144], and the system will then fill in the remaining details. This will allow all previous telescope usage to be automatically filled out in new proposals. [Q145]

Other possible information that could be displayed on the Dashboard includes the status of each telescope (open or closed, and whether accepting ToOs) and instrument availability, archived communications with Gemini (options will be investigated during the prototyping phase), and relevant announcements [Q146], such as when the user has signed up for eavesdropping (with a link to the eavesdropping instructions).

The database will send [Q147] a courtesy reminder of the upcoming proposal deadline [Q148] to users who have submit privileges, and a reminder of the phase-2 deadline, expired timing windows, and expired ephemerides to users who have program edit privileges. [Q153]

The dashboard is titled "Dashboard" and shows the user "pdoe@gmail.com". It is divided into several sections:

- Status:**
 - North: 2022-Mar-30 08:05 pm, Closed for weather
 - South: 2022-Mar-31 03:05 am, Open and accepting ToOs
- Announcements:**
 - 2022B proposal deadline in 2 days.
 - You have 2 observations to check in 2022A-Q-1234.
 - You have new data in 2021B-Q-1234.
 - You are signed up for eavesdropping tonight.
- Communications:**
 - 2022-Mar-29 anitta New targets approved
 - 2022-Mar-28 pdoe Request for target approval
- Projects:**

Title	Status	Shared	Proposal ID	Program ID	Award	Completion	Useful	Last Updated
untitled	phase-0	<input type="checkbox"/>	--	--	0h	0%	--	2 min ago
Testing stellar atmosphere models with...	phase-1	<input checked="" type="checkbox"/>	2022A-P-0219	--	0h	0%	--	92 days ago
Spectroscopic investigations of novae in...	phase-2	<input checked="" type="checkbox"/>	2022B-P-0725	2022B-Q-2145	12h	10%	10%	12 days ago

At the bottom of the Projects section, there are buttons: New, Duplicate, Delete, Share, Open In Explore, and Open In Chronicle.

Figure 4.1: The Gemini User Dashboard.[Q154]

The window is titled "Sharing Proposal 2022B-P-1234" and contains a table for sharing the proposal:

Email	Read	Edit	Submit
Luke.Skywalker@tatooine.planet	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Leia.Organa@rebelmail.org	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Anakin.Skywalker@empire.gov	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

At the bottom of the window, there are buttons: New, Cancel, and Accept.

Figure 4.2: The proposal sharing window.

5. Browse

The Browse user interface is used to find and open programs in Explore or Chronicle. It is comparable in purpose to the “Open” [Q149] dialog in Gemini’s existing Phase 2 preparation tool (OT), but much more capable. Advanced queries and automation needs are enabled via an API, and one-off queries are available via a general purpose query UI, both described in §12. [Q150] “Dashboard” [Q151] offers a program listing and launcher as well, but it is limited to the user’s own proposals and programs and contains unrelated PI-focused features. In contrast, Browse has a single purpose but queries all programs in the database. This document will present a mockup and ideas for Browse.

NGOs might use Browse to find all of their programs for a given semester. Staff might use Browse to find all the active programs where they are listed as a Contact Scientist. A Daytime SOS might use Browse to find all programs that were executed last night. An instrument scientist might use Browse to find all the programs that use their instrument. A QC might use Browse to find all the programs completed in the past week.

The Browse interface is displayed in Figure 5.1. At the top is the common application switcher that allows users to quickly navigate between Home, Explore, Chronicle, and Browse.

Below this is the filter section. The first line is a search box that allows using regex queries to search program IDs, investigators’ names, contact scientists, and words in the program title or abstract. The second line is the set of default filters: semester, instruments, partner, science band, Target of Opportunity, Thesis, and program completion (which defaults to 0-100%). The third line shows optional filters that the user has selected from the “More” pull-down menu. In Fig. 5.1 the user has included a single optional filter (“Last Updated”), requesting to see programs that were updated over 2 months ago. Filters may be saved and shared (made public) using the buttons in the upper right. Filters are specified in the URL and may therefore be bookmarked or shared via email.

The “Filters” slide-out tab on the left holds common filters, e.g. Observed Last Night, Active ToO Programs, etc., as well as each individual’s “favorite” filters (Fig. 5.2).

Below the filter section is the table of results. As the user changes search filters the results table updates automatically to show the matching programs. The user may customize which columns are displayed using the “Columns” drop-down menu on the top-right of the results table (the defaults are shown). The results are sortable by any column. Selecting an entry in the table will display the program’s abstract in the bottom panel. At the bottom are buttons to open the selected program(s) in Explore or Chronicle which are enabled if the user is logged in and has sufficient privileges.

The number of buttons displayed at the bottom depends on the user’s privileges. The “Export” button on the left is visible to everybody and may be used to save the displayed data in CSV format. The “Open in Chronicle” and “Open in Explore” buttons are visible to Gemini staff and NGOs. The “Open in Admin” button is available to the designated Heads of Science Operations.

The screenshot shows the Gemini Browse web interface. At the top, there's a navigation bar with the URL 'browse.gemini.edu/' and a user profile for 'pdoe@gmail.com'. Below this is a 'Filter' section with various dropdown menus for program ID (2022A), instrument (GMOS-N, GMOS-S, GNI...), partner (US, CL), band, TOO status, thesis status, and completion percentage (30-80%). There are also buttons for 'Save As', 'Share', and 'Columns'. A table below the filters displays program details:

Program ID	Investigator	Program	Partner	Instruments	Contact	Award	Comp
2022A-Q-101	Johnson	Searching for the Least Massive Brown Dwarfs	US	GNIRS, NIRI, F2	astephens, bmiller	10.88	42%
2022A-Q-102	Perez	Observational Characterization of Recurrently Active main-Belt Comets	CL, BR, CA	GMOS-N, GMOS-S	kchiboucas, tseccull	9.32	58%
2022A-Q-103	Carter	Unveiling the Nature of Rapid Transients in the Local Universe	US, UH, CL	SCORPIO, GMOS-N, GNIRS	rsalinas, achene	8.39	67%
2022A-Q-104	Park	Chemodynamical Evolution of the Milky Way Through Ultra Metal-Poor Stars	KR, US, AR	GNIRS, F2	frantakyro, rdiaz	11.26	38%

Below the table is an 'Abstract' section containing placeholder text. At the bottom, there are buttons for 'Export', 'Open In Admin', 'Open In Chronicle', and 'Open In Explore'.

Figure 5.1: The Browse interface allows unauthenticated users easy access to public information and authenticated users quick access to programs they have privileges to open. The Filter bar allows simple regex searches of the program ID, PI name, or words in the program title or abstract. Custom filters may be saved and shared.

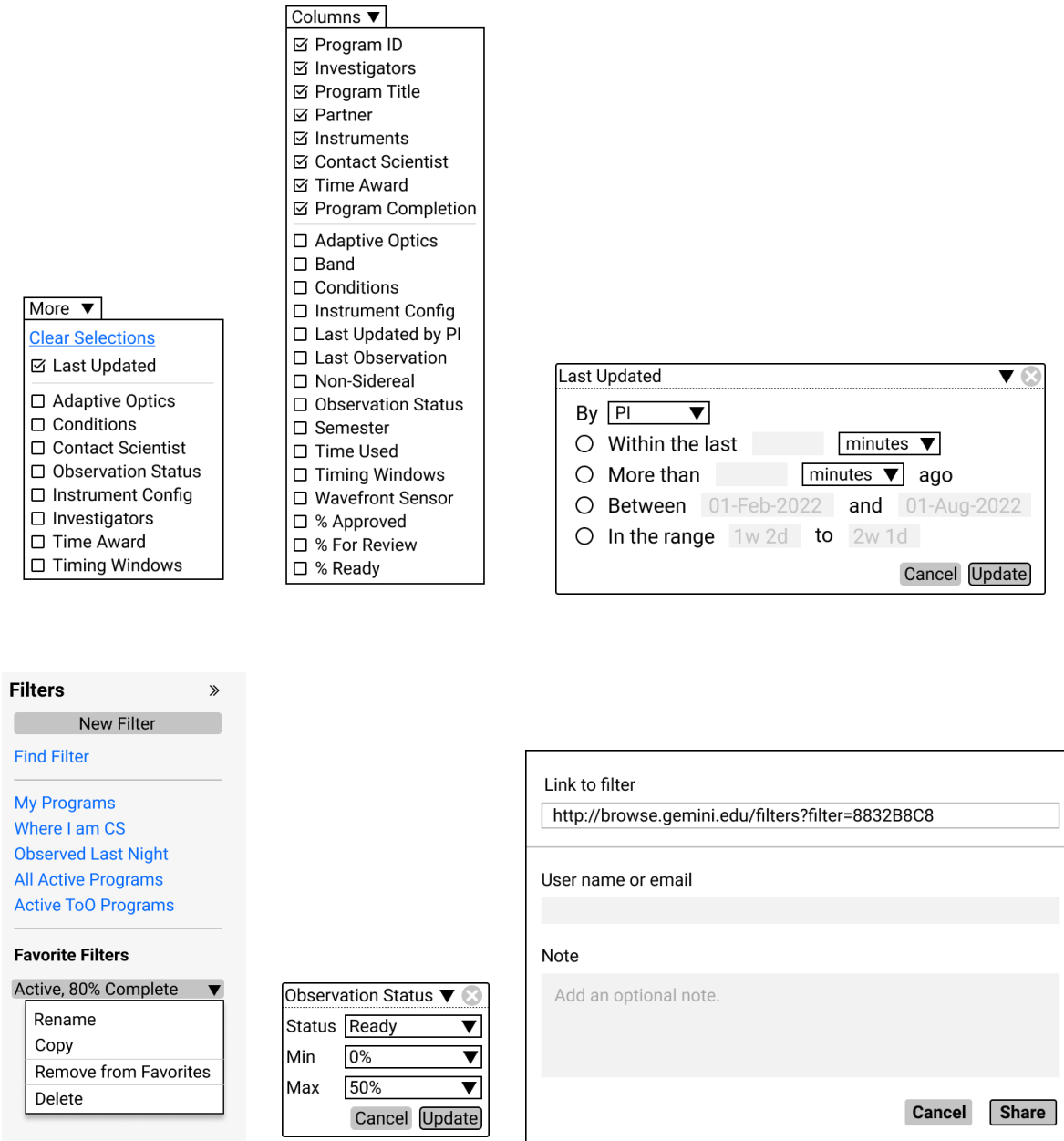


Figure 5.2: Browse menus: More, Columns, Last Update, Filters, Observation Status, and Filter Sharing. [Q152]

More advanced searching capabilities, such as searching for programs that use a particular instrument component or configuration, will be supported via the Application Programming Interface described in §12.

6. Chronicle

6.1 Users

[Q156] Chronicle will be used by many people involved in Observatory operations [Q155]; a few examples include: [Q157]

The Observer and Operator will use Chronicle to:

- Record the names of the Night Crew and all who support them
- Record all events that happen and might affect operations or the data
- Enter Quality Assessment (QA) states and add comments about FITS files
- Record when time is lost to weather (fault time loss will be automatically calculated)
- Create fault reports (which may also be done from OSC) [Q158]
- Communicate handover information to the day crew, day SOS [Q159] and QC

The Daytime SOS will use Chronicle to:

- See which programs were observed the previous night
- Update QA states and conditions
- Update time loss due to weather
- Make additional comments about FITS files
- Enter comments about data checking (in lieu of the data checking blog)

The Queue Coordinator will use Chronicle to:

- See programs observed the previous (or any) night
- See a timeline of when time-loss happened and why
- See and adjust time accounting for any night or any program
- Comment about the data checking priorities

The Day Crew, Day SOS, and QC will use Chronicle to:

- Communicate handover information to the Night Crew (in addition to the Plan-For-The-Week at GS and the Transition Wiki at GN) [Q160][Q161][Q162]

Contact Scientists will use the Chronicle to:

- See which of their programs were observed
- See how much time was charged to each observation and acquisition
- See the modification history of programs [Q163]

NGOs will use Chronicle to:

- See which of their programs were executed
- See comments from the night crew that may help understand any problems that may have been encountered during those observations

PIs will use Chronicle to:

- Read weather and fault report entries that may affect their program
- Read comments from the observer (events and comments on individual files)
- See QA states

The public may use Chronicle to:

- See the summary of the night and which programs were observed

6.2 Events and Types

[Q164] The data available via Chronicle include:

- Observation execution: slew, configure, start sequence, start/end datasets, pause, continue, abort, readout.
- FITS files: datalabel, file number, QA state, Archive state
- Weather: updates from the conditions server [Q165]
- Faults: as queried from the Operations Support Center (OSC) JIRA server
- Facility Protection System (FPS) events
- LGS shutters due to laser or airplanes
- Comments which are “world” readable
- Comments which are readable by users with program access
- Comments which are readable by Gemini staff only
- Program edits, including a timestamp and username

6.3 Title Bar, Modes, & Views

The top-left of Chronicle shows the same application selector as is seen in Explore which allows users to navigate to their personal Gemini dashboard [Q166], Explore, Chronicle, or to the program Browser. The

next item on the title bar is a mode toggle which allows the user to select between “Date” mode and “Program” mode. These allow seeing all the events that happened on the selected date at the selected site or in the selected program. The date defaults to today with a button that will bring up a calendar widget. Likewise, in Program mode there is a box to enter the Program ID (or use the Program Browser to select the desired program). One may select a date (in Program mode) or a program (in Date mode) and toggle the mode to see the events for the selected item. The mode is also implicit in the URL, which allows sending links via email or bookmarking a program or date

Programs and observations that are accessible to the user will be selectable and this will open the associated item in Explore.

Chronicle provides 7 different “Views” which may be selected with the vertical buttons on the left side navigation bar: Observing, Nightlog, Summary, Quality Assessment (QA), Time Accounting, Faults, and All Events. Each view provides a customized way to access and export related data from the selected date or program, and organizes the data to facilitate different tasks. Observation IDs will link to Explore and datasets will link to the Gemini Observatory Archive (GOA).

6.4 Observing View

The “Observing” view is the first button at the top, and it is meant for anybody who is using the telescope or instruments. It has three collapsible sections: Afternoon, Night, and Morning, designed for use during the three periods of observing. These sections allow users to focus on the entries that are the most relevant to them.

The Observing in the Afternoon section (Fig. 6.1) is designed for viewing and commenting on data taken in the afternoon as part of instrument calibrations. In addition, the daytime SOS may leave comments for the Night Crew, e.g. about the status of the instruments and things to watch out for at night. The QC may add comments about plans and priorities for the night (to be used in combination with [Q167] the Transition Wiki at GN and the Plan for the Week at GS). [Q168] The Day Crew may add comments [Q169] on the status of the telescope, instruments, and enclosure. It will be possible to select a user or instrument and Chronicle will highlight all comments from that user or datasets from that instrument.

The Observing at Night view (Fig. 6.2) is designed for use by the nighttime telescope operator and observer. This section starts off with the usual fields for the Night Crew, Additional Support, and Summary of the Night. Any roles that can be obtained from the telescope schedule will be automatically filled in (but still editable). After typing the first few letters of a person’s name Chronicle will provide completion options.

There is a collapsible Timeline section which includes an interactive elevation plot of the executed observations which builds up as the night progresses and is color-coded by instrument. This provides an overview of all the observations, with vertical bars indicating time lost to weather, faults, laser shutters (due to satellites or airplanes), or spent on engineering, commissioning, or shutdown.. Hovering over an observation shows a tooltip with details about the observation, and selecting an observation in the plot will highlight the timespan of the observation in the detailed section below. Double-clicking an observation will open it in Explore.

Below the timeline is a horizontal bar chart which breaks down the time usage for the night [Q172] between science, weather, faults, engineering, laser shutters, commissioning, shutdown, and unused (idle time between programs). On laser nights this will also display the time the laser was shuttered for airplanes (from TBAD and VITRO) or satellites (from the LTTS).[Q173]

chronicle.gemini.edu/north/20220114/observing/afternoon

Chronicle Date Program North South 2022-Jan-13/14 CLST obs_jo

▼ **Afternoon**

Daytime SOS Lindsay Magill Joy Chavez **Queue Coordinator** Fredrik Rantakyro Show Datasets

CLST	User	Obs-ID	Instrument	File	Type	QA	GOA	
CAL-20220115								
14:01	fits	CAL-20220115-1-001	NIRI	S20220115S0001	F	○	●	
14:02	fits	CAL-20220115-2-001	GMOS	S20220115S0002	F	○	●	
14:02	fits	CAL-20220115-1-002	NIRI	S20220115S0003	F	○	●	
14:03	fits	CAL-20220115-3-001	GNIRS	S20220115S0004	R	○	●	
14:03	fits	CAL-20220115-1-003	NIRI	S20220115S0005	F	○	●	
14:14	fits	CAL-20220115-2-002	GMOS	S20220115S0006	F	○	●	
14:14	fits	CAL-20220115-1-004	NIRI	S20220115S0007	F	●	●	
	daysos	Strong NIRI pattern noise						
14:15	fits	CAL-20220115-3-002	GNIRS	S20220115S0008	R	○	●	
14:15	fits	CAL-20220115-2-003	GMOS	S20220115S0009	R	○	●	
14:15	fits	CAL-20220115-1-005	NIRI	S20220115S0010	F	○	●	
14:16	fits	CAL-20220115-1-006	NIRI	S20220115S0011	F	○	●	
14:16	fits	CAL-20220115-3-003	GNIRS	S20220115S0012	R	○	●	
14:17	fits	CAL-20220115-1-007	NIRI	S20220115S0013	F	○	●	
14:17	fits	CAL-20220115-2-004	GMOS	S20220115S0014	F	○	●	
14:18	fits	CAL-20220115-1-008	NIRI	S20220115S0015	F	○	●	
Ⓜ 15:35	daysos	GMOS, GNIRS, and NIRI cals taken and ready for tonight. Altair is still down. GMOS shutter test looked good.						
Ⓜ 16:04	daysos	Keep an eye on the lower-left quadrant of NIRI. We had to reboot it several times today. Just try to disconnect and reconnect from the DHS first and if the test image is still bad then reboot according to the quickfix procedure.						
Ⓜ 16:22	qc	Altair is unavailable, so don't bother tuning M1 tonight; just go with the open-loop model. Use ENG-1 to assess the seeing. I'll be away from my phone until 8pm, but feel free to call after that.						
Ⓜ 16:32	daycrew	End-of-day checks complete. Instrument vacuum and temperature checks good. Telescope was left in Standby mode: HBS OFF, CRCS power OFF, PCU2 left on, Telescope locking pins out, M1 cover closed, M1 unparked.						

► **Night**
► **Morning**

Comment Private

Figure 6.1: The Observing in the afternoon view. [Q170][Q171]

The details section is a mix of lines added by the Night Crew and automatically populated lines with information from various sources. Each line has the time the event started, the “User” who made the entry, and a description of the event. Chronicle will automatically add lines with:

- Almanac details (sunset and sunrise, twilights, moon set and rise)
- A header line for each observation with the Obs-ID, instrument configuration, and constraints
- Exposure actions (pause, resume, stop, abort)
- Sequence actions (pause, resume) during the science steps of an observation
- Slew times
- gacq offsets
- FITS files
- Weather updates from the Conditions Server
- Facility Protection System (FPS) events
- Laser shutters due to satellites or airplanes
- Laser collisions
- When eavesdroppers connect and disconnect (TBD)
- When Rapid Targets of Opportunity are triggered (TBD)

Automatic entries are not editable (but staff may add associated comments) and will always be interleaved with the user comments in chronological order.

When an exposure is paused it is assumed to be weather loss. The observer may select events to add comments or change the weather loss to a fault [Q174] (which will open the fault creation dialog).

Dataset entries have dedicated columns in the log that summarize relevant state at a glance. In particular the corresponding sequence step, dataset type, QA state and GOA status are all indicated. Dataset types are represented by a single styled letter:

QA states are unset (white), pass (green), usable (orange), or fail (red). Gemini Observatory Archive (GOA) [Q175] status is similarly indicated with colors and more information is available via tooltip popups.

One may add a comment at any time by simply typing into the “Comment” [Q176] box at the bottom of the page, or by selecting an event. By default comments are “world-readable” but selecting the “Private” checkbox will make the comment so that it is only readable by Gemini staff. Private comments are indicated with a lock icon and yellow background (Fig. 6.1), and comments may be toggled between private and public after-the-fact by selecting the comment to show it in the comment editor (visible at the bottom of Fig. 6.2). It is possible to attach files to comments.

One may select datasets to add comments about them (Fig. 6.3). This also provides a convenient method to enter details about the current conditions (which are then passed to the Conditions Server) [Q177], and set the QA state. One may select multiple datasets by using the familiar shift-click and control/meta-click to set the QA state of them all at once. Sequences of datasets may be rolled up into a single line if the user desires.

There are five action buttons [Q179][Q178] to create new events (bottom of Fig. 6.2):

- Start Weather Loss

chronicle.gemini.edu/south/20220114/observing/night
★

Chronicle
Date ▼ Program
North South
◀ 2022-Jan-13/14 ▶
CLST ⚙
obs_jo

Observing
▶ Afternoon
▼ Night

Night Crew
Ariel Lopez
Bryan Miller
Visitor P. Doe
Additional Support
René Rutten
Rolando Rogers
Arturo Nuñez

Summary

A night with good seeing, but increasing thickening clouds. Observed a full set of Q-101 observations.

Timeline

■ Fault Loss 0.42 hrs (5.1%)
 ■ Weather Loss 0.92 hrs (11.2%)
 ■ Science 6.81 hrs (83.6%)
 Full Night 8.15 hrs

CLST	User	Event	Step	Type	QA	GOA
20:37	almanac	Sunset				
21:30	obs_jo	Tuning M1...				
21:45	envmon	IQ=0.72" 0.7um NNE 85°				
21:48	almanac	Nautical 12 degree twilight				
22A-Q-232 [38]		GMOS + OI IFU-R B1200				
IQ < 0.8" CC < 0.1 mag BG 50 WV any						
21:49	odb	Slew to 22A-Q-232 [38] NGC 1024				
22:01	fits	S20220115S0028	001	Q	●	●
22:03	tcc	P=0.92" Q=-0.32"				
22:03	envmon	IQ=0.59" 0.63um SSW 72°				
22:04	fits	S20220115S0029	002	Q	●	●
22:06	obs_jo	Centering between the two clumps of emission				
22:06	tcc	P=-0.17" Q=-0.03"				
22:07	fits	S20220115S0030	003	Q	●	●
22:09	fits	S20220115S0031	004	F	●	●
22:11	fits	S20220115S0032	005	S	●	●
22:11	odb	└ Start exposure				
22:21	odb	└ Pause exposure: cloud passing overhead				
22:26	odb	└ Resume exposure				
22:31	odb	└ End exposure				
22:32	obs_jo	Start weather loss: What we thought was just a seeing bubble has turned into downright poor seeing that is worse than this program can take.				
22:32	fits	S20220115S0033	006	S	●	●
22:42	obs_jo	The clouds got thick ~half way through this exposure. (comment associated with file 33)				
22:42	envmon	Band of thin cirrus passing overhead. Extinction 0.2 mag				
22:45	envmon	Cirrus getting thicker. Extinction 0.5 mag				
22:50	obs_jo	It doesn't look like the clouds are improving, so calculating a plan for these conditions...				
22:53	fits	S20220115S0034	007	F	●	●
22A-FT-110 [29]		F2 + OI MOS				
IQ < 1.0" CC < 0.8 mag BG 50 WV any						
22:55	odb	Slew to 22A-FT-110 [29] NGC 2048				
23:05	op_lee	FR 40936: Start time loss				
23:15	op_lee	We can't find the guide star. It looks like a problem with the TCS. Calling the TTM for help.				
23:30	op_lee	We rebooted the TCS and re-slewed and things look much better. Resuming acquisition...				
23:31	fits	S20220115S0035	001	Q	●	●

Comment
 Private

Add

Start Weather Loss
 Start Engineering
 Start Commissioning
 Start Shutdown
 Fault Report

Morning

Figure 6.2: The Observing at night view with the cursor in the Timeline.

Time

All Events

22A-Q-232 [38]		GMOS + OI IFU-R B1200	IQ < 0.8" CC < 0.1 mag BG 50 WV any
21:49	odb	Slew to 22A-Q-232 [38] NGC 1024	
22:01	fits	S20220115S0028	001 Q ● ●
22:03	tcc	P=0.92" Q=-0.32"	
22:03	envmon	IQ=0.59" 0.63um SSW 72°	
22:04	fits	S20220115S0029	002 Q ● ●
22:06	obs_jo	Centering between the two clumps of emission	
22:06	tcc	P=-0.17" Q=-0.03"	
22:07	fits	S20220115S0030	003 Q ● ●
22:09	fits	S20220115S0031	004 F ● ●
22:11	fits	S20220115S0032	005 S ● ●
22:32	obs_jo	Start weather loss: What we thought was just a seeing bubble has turned into downright poor seeing that is worse than this program can take.	
22:32	fits	S20220115S0033	006 S ● ●
	obs_jo	The clouds got thick ~half way through this exposure.	
22:42	envmon	Band of thin cirrus passing overhead. Extinction 0.2 mag	
22:45	envmon	Cirrus getting thicker. Extinction 0.5 mag	
22:50	obs_jo	It doesn't look like the clouds are improving, so calculating a plan for these conditions...	
22:53	fits	S20220115S0034	007 F ● ●
22A-FT-110 [29]		F2 + OI MOS	IQ < 1.0" CC < 0.8 mag BG 50 WV any
22:55	odb	Slew to 22A-FT-110 [29] NGC 2048	
23:05	op_lee	FR 40936: Start time loss	
23:15	op_lee	We can't find the guide star. It looks like a problem with the TCS. Calling the TTM for help.	
23:30	op_lee	We rebooted the TCS and re-slewed and things look much better. Resuming acquisition...	

☆
Dataset S20220115S029 / 22A-Q-232 [38] 002

Image Quality 0.75 arcsec (Requirement: < 0.80")

QA State ● Pass ○ Usable ○ Usable (weather) ○ Fail ○ Unset

Comment

Extinction 0.10 mag (Requirement: < 0.10) Send to Conditions Server

Cancel
View in Program Mode
Update Dataset

▶ Morning

Figure 6.3: The Observing at night view with a dataset selected.

- Start Engineering
- Start Commissioning
- Start Shutdown
- Create a Fault Report

Each one of these will open one of the panels displayed in Figure 6.4.

In the event of poor weather, the Night Crew may use the “Start Weather Loss” action button. This will open the Weather Loss dialog box where the user can enter a comment with the start and end time. If the end time is left blank then the “Start Weather Loss” button toggles to a “Stop Weather Loss” button, and the weather loss will accrue until the Stop button is pushed or until morning twilight, whichever comes first. Time lost to weather is indicated by blue on the Timeline graph (top of Fig. 6.2). This time is not charged, and non-band-4 datasets are changed to Usable with “Weather” as the reason. If the entire night is called off early due to weather the user may start a “Weather Loss” event, make a note about the reason for the weather loss, and check the box “Entire Night Lost” which will auto-fill the start time as evening twilight and the end time as morning twilight. There are also buttons to fill evening or morning 12-degree twilights as the start or end times for when the night starts or ends with weather loss.

When a fault happens the Night Crew may add time-stamped comments to Chronicle as events unfold, recording exactly what is happening and the actions taken to troubleshoot and resolve the problem. When they have time available they can either go to the Operations Support Center (OSC) JIRA web interface to file a fault, or use the “Fault Report” action button at the bottom of Chronicle. When a ticket has been submitted Chronicle will automatically retrieve the fault information, including the start and stop times, and these times will be indicated on the Timeline graph (top of Fig. 6.2) and the time will not be charged to any program [TBD: how to get times from OSC for repeat occurrences of a fault during the night]. Any datasets collected during time-loss faults will have their QA states changed to Usable. [Q180][Q181] If necessary, the details of the fault may be adjusted later in the OSC and Chronicle will adjust the time accounting and QA states accordingly (datasets that are no longer inside the modified fault time range will be changed from Usable to Unset).

If necessary, the start and stop time of the weather loss or faults may be adjusted after-the-fact and the system will automatically adjust the time accounting and QA states accordingly. Alternatively, the QA state of individual files may be changed to “Usable due to weather” [Q182][Q183][Q184] (shown at the bottom of Fig. 6.3) and the total weather time loss will be adjusted accordingly. If a required on-sky calibration is rendered “Usable” due to a fault or weather the associated science observation will be marked as “Usable” as well, with a dataset comment that the calibrator is missing.[Q185] Likewise, if a science observation is rendered Usable the associated calibration will be marked Usable if it is not shared by another observation.

The Observing in the Morning view (Fig. 6.5) shows the morning calibrations, which are interleaved when run with the web seqexec. This view also allows the QC to communicate data checking priorities, and the daytime SOS to communicate any changes made to the QA states (in lieu of the data checking blog). [Q186]

Engineering

Start Time 21:48:00 **End Time** 05:57:00 **Duration** 08:09:00 Entire Night

Comment Engineering shutdown.
Checking "Entire Night" will set the start time as evening twilight and the end time as morning twilight.

Commissioning

Start Time 21:48:00 **End Time** 05:57:00 **Duration** 08:09:00 Entire Night

Comment Scorpio commissioning.
Checking "Entire Night" will set the start time as evening twilight and the end time as morning twilight.

⚠ Fault Report

Start Time 23:05:00 **End Time** 23:30:00 **Duration** 00:25:00 With Time Loss

Title TCS Reboot to Find Guide Star

Description Observation 22A-FT-110 [29]
23:15 op_lee We can't find the guide star. It looks like a problem with the TCS. Calling the TTM for help.
23:30 op_lee We rebooted the TCS and re-slewed and things look much better. Resuming acquisition...

🛑 Shutdown

Start Time 21:48:00 **End Time** 05:57:00 **Duration** 08:09:00 Entire Night

Comment Unplanned telescope shutdown.
Checking "Entire Night" will set the start time as evening twilight and the end time as morning twilight.

☁ Weather Loss

Start Time 12:34:56 🌧 **End Time** 12:52:00 🌧 **Duration** 00:17:04 Entire Night

Comment What we thought was just a seeing bubble has turned into downright poor seeing that is worse than this program can take.

Figure 6.4: Observing action dialog windows.

Chronicle Date Program North South 2022-Jan-13/14 CLST obs_jo

Observing

- ▶ Afternoon
- ▶ Night
- ▼ Morning Show Datasets

CLST	User	Obs-ID	Instrument	File	Type	QA	GOA	
7:04	fits	2022-Q-232-38-001	GMOS	S20220115S0201	F	○	●	
7:04	fits	2022-FT-110-29-001	GMOS	S20220115S0202	F	○	●	
7:05	fits	2022-Q-203-11-001	GPI	S20220115S0203	F	○	●	
7:05	fits	2022-Q-101-22-001	F2	S20220115S0204	F	○	●	
7:06	fits	2022-Q-307-3-001	NIRI	S20220115S0205	F	○	●	
7:06	fits	2022-Q-307-3-002	GMOS	S20220115S0206	F	○	●	
7:07	fits	2022-Q-101-22-002	F2	S20220115S0207	F	●	●	
	daysos	saturated						
7:07	fits	2022-Q-307-3-003	GPI	S20220115S0208	F	○	●	
7:08	fits	2022-Q-307-3-004	GPI	S20220115S0209	F	○	●	
7:09	fits	2022-Q-307-3-005	GPI	S20220115S0210	F	○	●	
7:10	fits	2022-Q-101-22-003	F2	S20220115S0211	F	○	●	
7:10	fits	2022-FT-110-29-002	GMOS	S20220115S0212	F	○	●	
7:11	fits	2022-Q-203-11-002	GPI	S20220115S0213	F	○	●	
7:11	fits	2022-Q-101-22-004	F2	S20220115S0214	F	○	●	
7:12	fits	2022-FT-110-29-003	NIRI	S20220115S0215	F	○	●	
Ⓜ 8:05	qc	Priority for data checking is 22A-Q-130.						
Ⓜ 8:20	daysos	All calibrations taken.						
Ⓜ 8:41	daysos	22A-Q-130 [129] setps 34-36 set to Pass 22A-Q-130 [124] standard set to Pass 22A-Q-901 [105] acq to Usable - looks like observer re-did the acq after this ToO 21B-Q-107 [126] acq step 2 to Usable - step 1 was Usable already and acq was repeated Biases checked and processed						

Comment Private

Figure 6.5: The Observing in the morning view

6.5 Nightlog View

The Nightlog view (Fig. 6.6) provides a read-only report of the nighttime events without all the FITS files and telescope offsets. It is expected that this view will be used by anybody who wants a quick summary of what happened during a night. If viewed outside of Gemini the private comments will be suppressed, so this view is suitable for distribution, either in its entirety via email or with just the URL.

6.6 Summary View

[Q187] The Summary by date view (Fig. 6.7) gives an overview of the specified date (or date range), showing how we did over the past week, month, or semester. There are graphs with the time spent on science, engineering, weather, and faults as well as the breakdown between instruments and science bands. On the right is a list of all programs observed.

The Summary by program view (Fig. 6.8) gives an overview of the specified program. The top graph shows the time spent on science, program calibrations, partner calibrations, and acquisitions. The second graph shows the breakdown of time per by instrument, and if multiple bands were assigned by the TAC there could be a graph illustrating that breakdown as well. On the right is a table listing all the observation dates with (cloud) buttons to download the data from the GOA. Selecting a date and toggling the mode will show the Summary by date view for that date. [Q189]

6.7 Quality Assessment View

The Quality Assessment (QA) view (Fig. 6.9) [Q190] shows the QA state for every file taken on the specified date or in the specified program. There is a header line for each observation which lists the instrument and the minimum required conditions. For each file Chronicle shows the delivered conditions and colors the background according to whether the required conditions were satisfied. There is also an automatically set conditions (“Cnd”) indicator which shows whether all the conditions have been met (green) or if any have been violated (yellow). [Q191] This will help the observer or data-checker by showing the best possible QA state.

The user can optionally also choose to display weather events, faults, telescope offsets, and general comments. This view makes it easy to see which observations need checking and makes it easy to set or change the QA state in bulk. There is a filter to only show datasets with a particular QA value (e.g. unset), or only show datasets for a particular program.

Observations may be selected in the table or in the elevation plot timeline, and this opens an editor panel displayed at the bottom of Figure 6.9. Here the user may update the conditions, QA state, and add a comment about the dataset. The conditions and QA state will be propagated to the FITS header. [Q193]

6.8 Time Accounting View

The Time Accounting view in Date mode (Fig. 6.10) lists all the time charges on the selected date. Time lost to weather and faults is clearly marked. One may select an observation in the Timeline graph to select

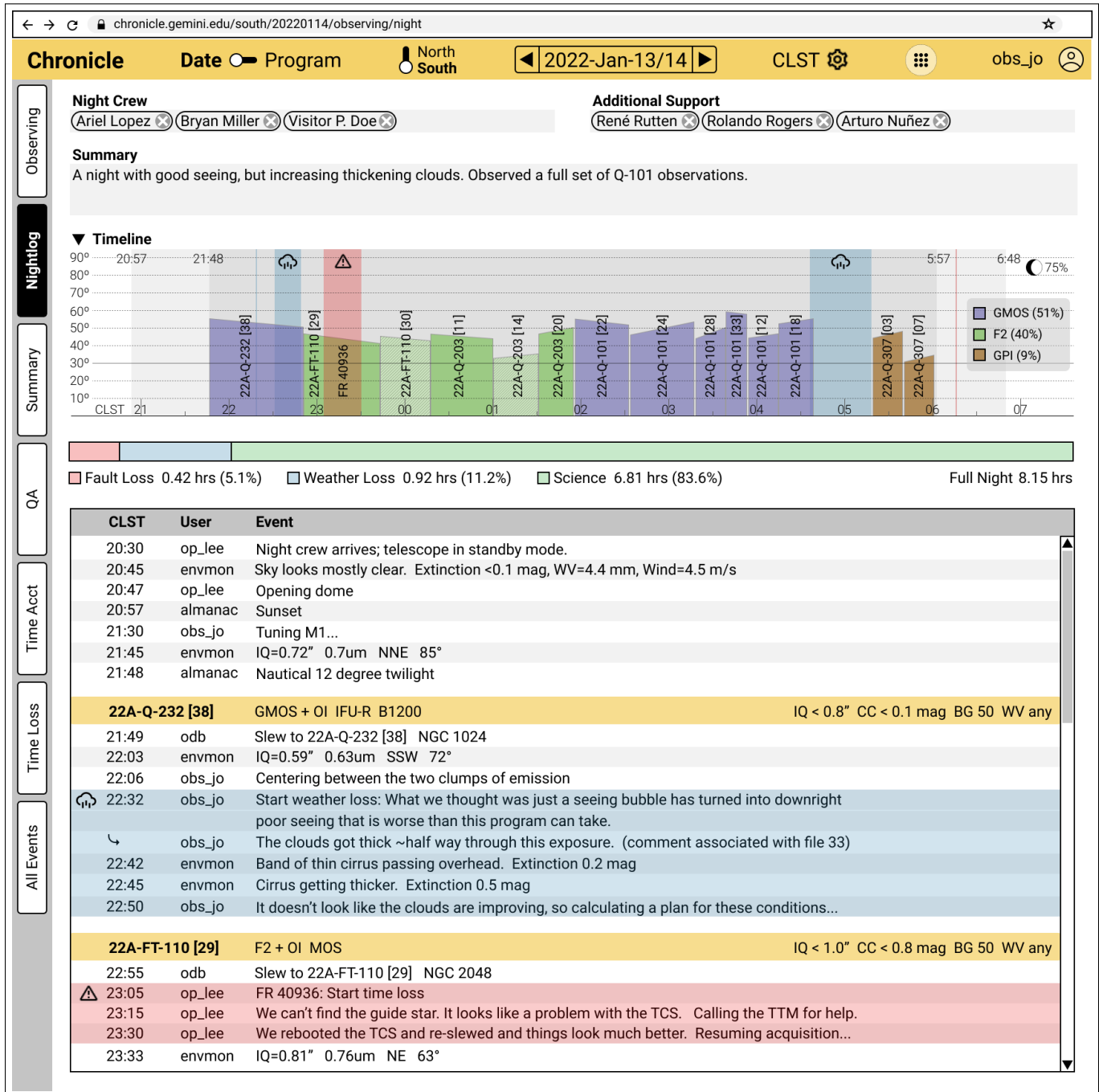


Figure 6.6: The Nightlog view.

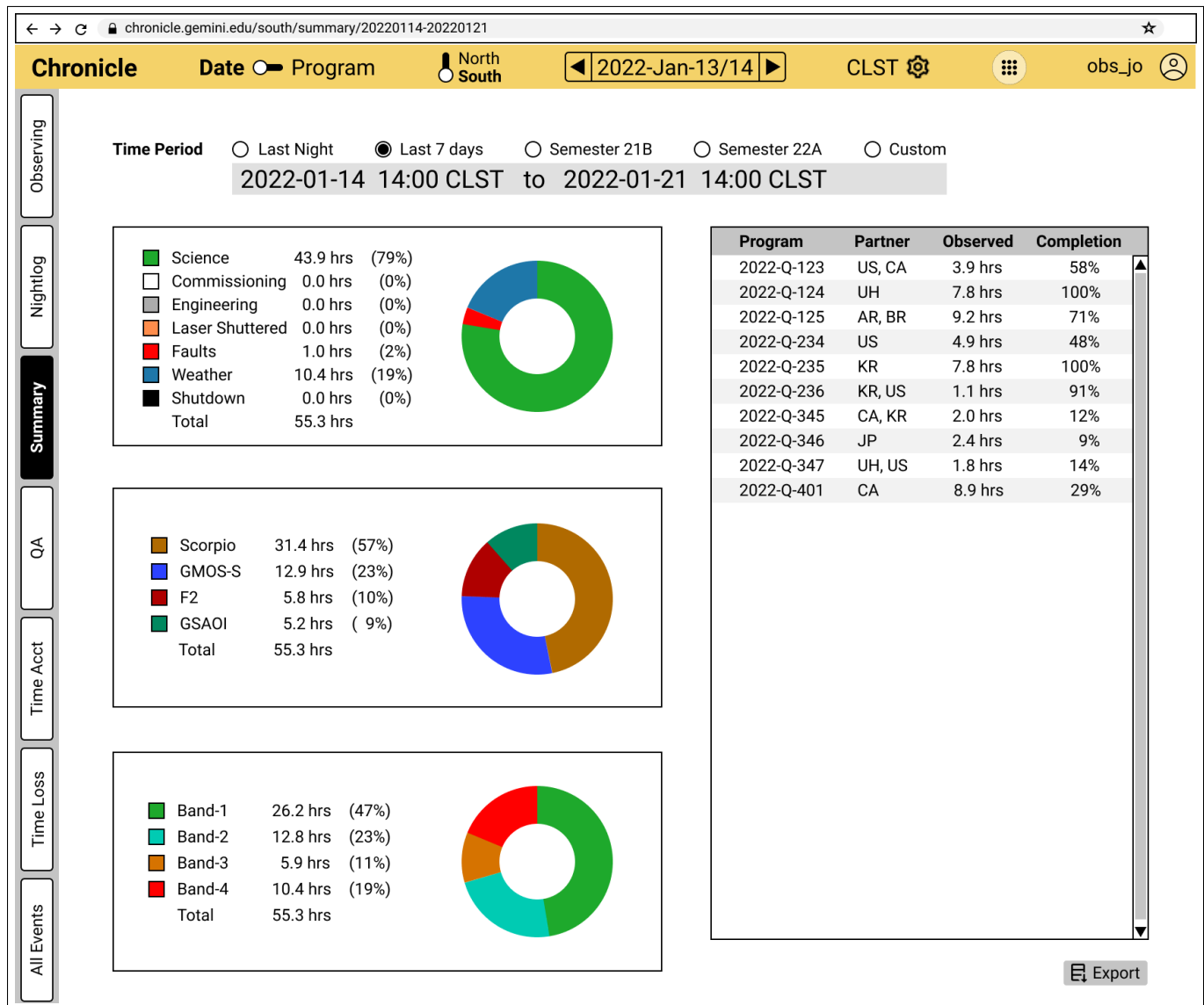


Figure 6.7: The Summary by date view. [Q188]

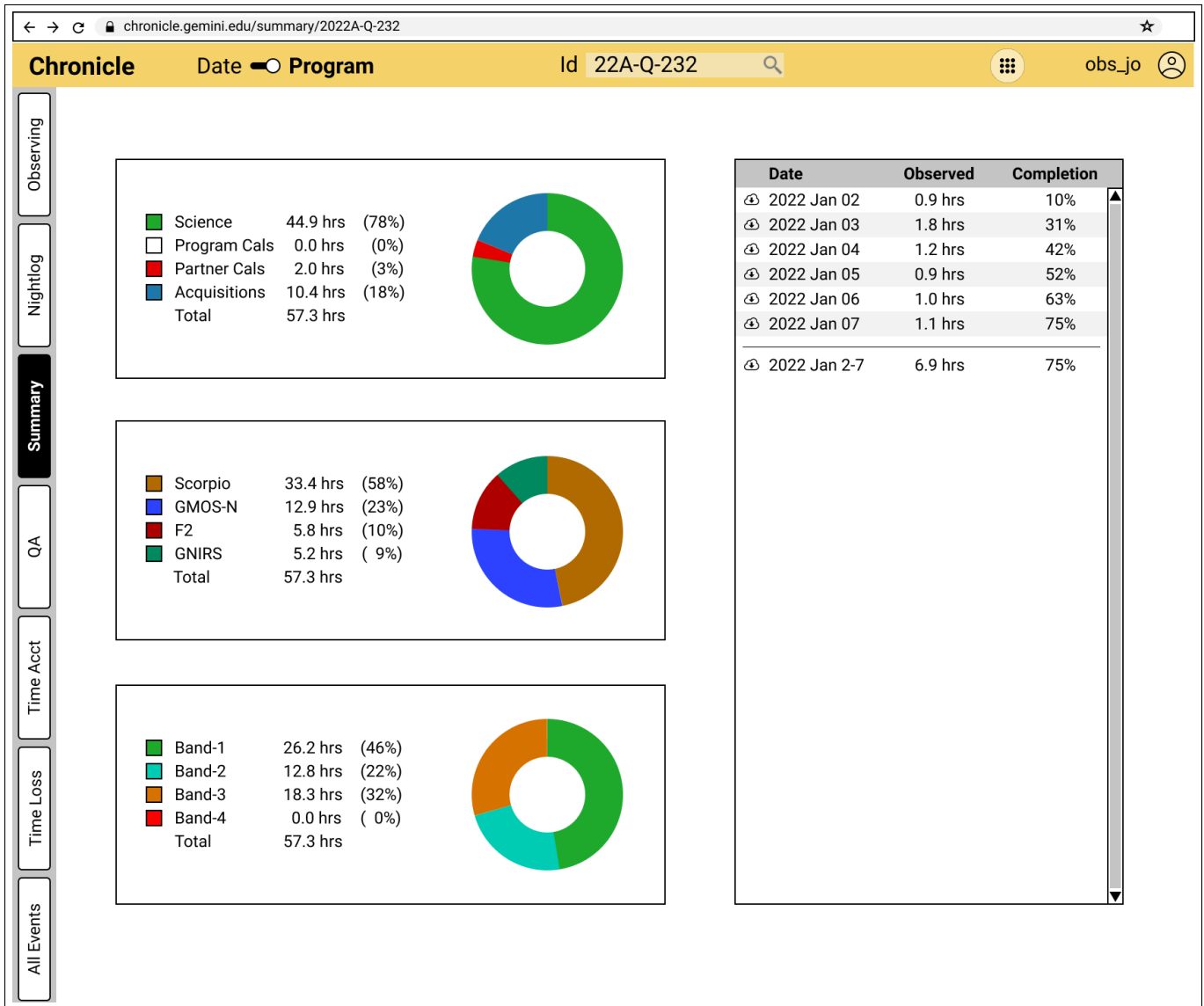


Figure 6.8: The Summary by program view. [Q192]

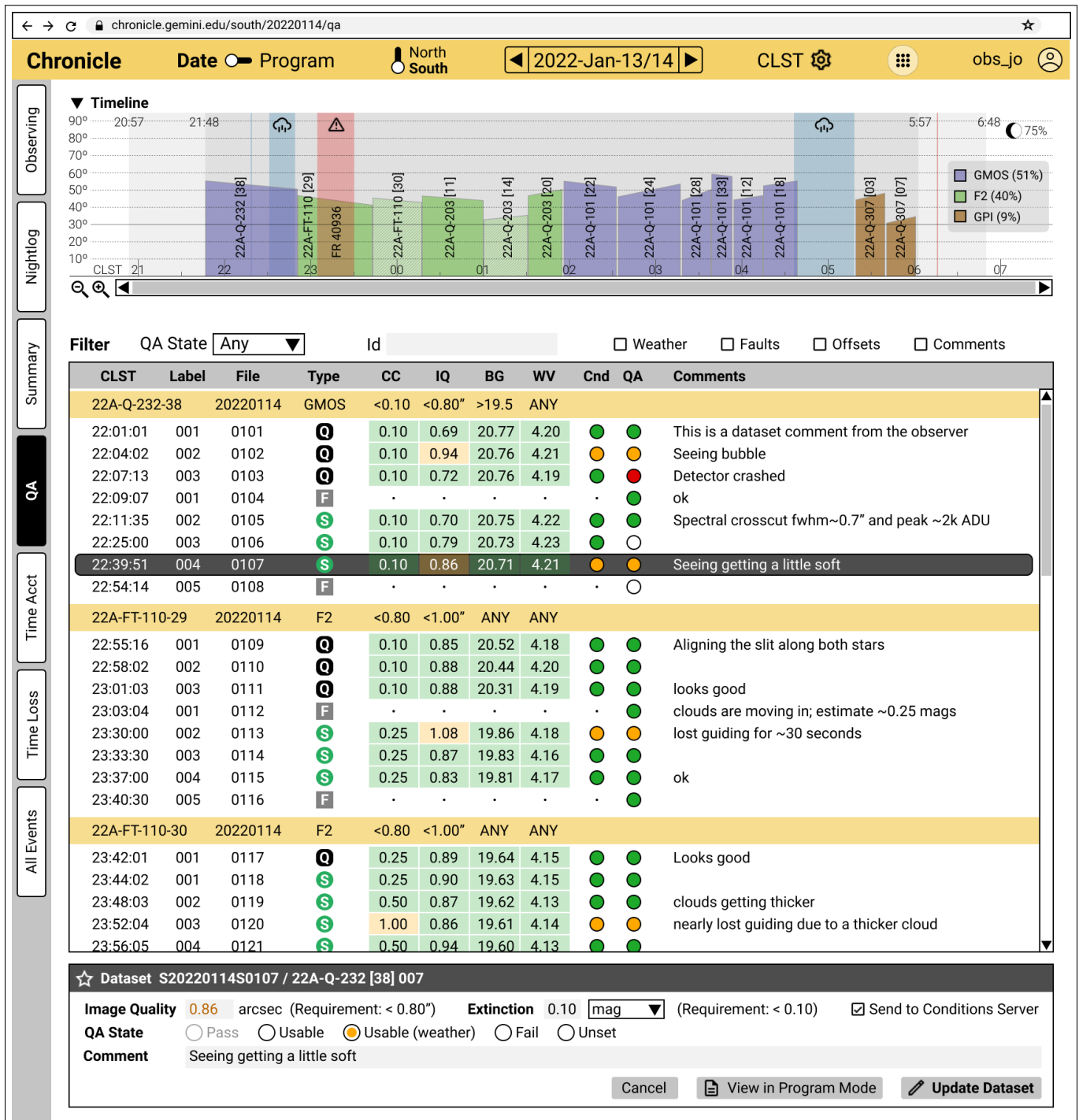


Figure 6.9: The Quality Assessment view. [Q198]

it in the table, or vice versa. The planned and charged times are shown side-by-side, as well as the setup and acquisition times to help identify irregularities which can be flagged if the discrepancy [Q196] is over some threshold.

The system will automatically apply time corrections for weather, faults, and rapid ToOs. Selecting an entry allows making manual adjustments to the partner or program time charges. These adjustments are then shown in the table, with the pre- and post-adjustment charges and the identity of the editor [Q197]. When an observation is selected one can click the “View in Program Mode” button to see all the time charges for that program.

The Time Accounting view in Program mode shows all the time charges for the selected program (Fig. 6.11). If an observation was executed on multiple nights it will show each set of time charges separately as well as the total charges. Here again the setup and acquisition times are displayed, facilitating identification of overcharges that may need to be adjusted.

6.9 Time Loss View

The Time Loss view (Fig. 6.12) provides quick access to (and editing of) the time loss events that happened on the selected night or in the selected program. The fault data are from OSC and FR [Q194] numbers (e.g. FR-40936) are links to OSC. Any event start/end times that overlap with start/end times of other events will be marked in red to help identify potential problems. It is possible to see the event in any of the other Views by selecting the fault and then switching to the desired View.

6.10 All Events View

The All Events view shows everything that happened on the selected night or in the selected program (Fig. 6.13). This includes all program edits from the program creation to completion, all datasets with QA states, execution details (configure, observe, readout, write), comments, offsets, weather records, and fault reports. At the top of the table are filters that may be used to restrict the amount of data.

6.11 Privileges

The appearance and functionality of Chronicle depends on the user. The Nightlog and Summary views are public and no authentication is required. Authenticated PIs will also see the QA, Time Accounting, and All Events views filtered for their programs. NGOs will have the PI view for all the programs they support. Gemini Staff will also see the Observing and Faults views, as well as QA and Time Accounting for all programs.

6.12 Dashboard & Browser

The user Dashboard and program Browser (introduced in the Explore document) will both have the option to open programs in either Explore or Chronicle. This will allow PIs to quickly find the nightlogs when their observations were executed, the quality assessment summary of their data, and the time accounting

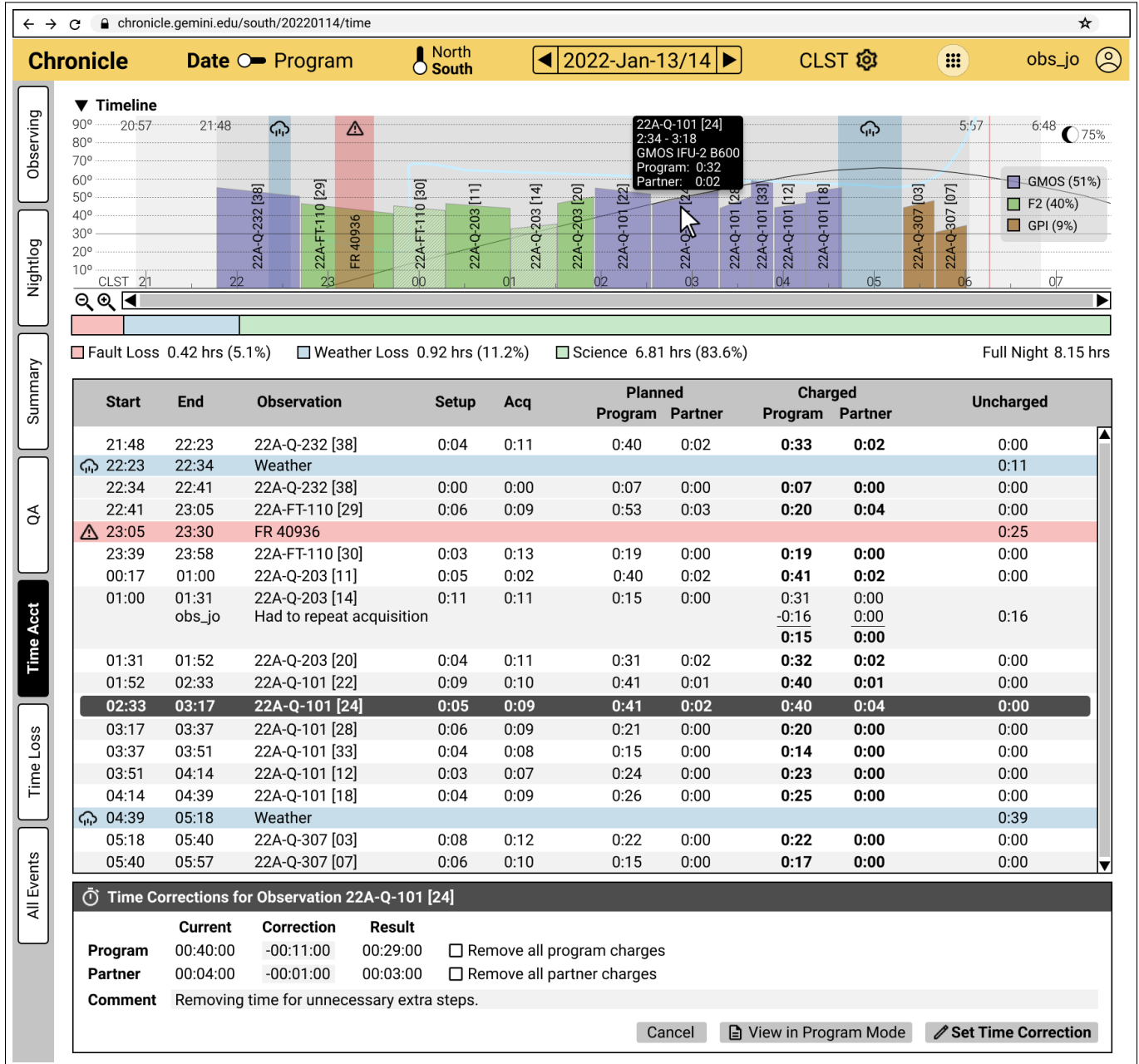


Figure 6.10: The Time Accounting view for a selected date.

Chronicle Date Program Id 22A-Q-232 obs_jo

Observation	Date	Setup	Acq	Planned		Charged		Uncharged
				Program	Partner	Program	Partner	
22A-Q-232 [1]	2022-Jan-05	0:04	0:11	0:40	0:02	0:41	0:02	0:00
22A-Q-232 [2]	2022-Jan-02	0:06	0:09	0:27	0:02	0:28	0:02	0:00
	2022-Jan-03	0:05	0:10	0:56	0:04	0:55	0:04	0:00
	2022-Jan-09	0:06	0:09	0:42	0:02	0:41	0:02	0:00
				2:05	0:08	2:04	0:08	0:00
22A-Q-232 [3]	2022-Jan-04	0:06	0:13	0:40	0:02	0:39	0:03	0:00
	2022-Jan-07	0:05	0:13	0:40	0:02	0:41	0:02	0:00
				1:20	0:04	1:20	0:05	0:00
22A-Q-232 [4]	2022-Jan-05	0:05	0:08	0:40	0:02	1:03	0:02	0:00
obs_jo	2022-Jan-05	Had to repeat acquisition				-0:23	0:00	0:23
				0:40	0:02	0:40	0:02	0:23
22A-Q-232 [5]	2022-Jan-06	0:10	0:05	0:31	0:02	0:32	0:02	0:00

Time Corrections for Observation 22A-Q-232 [4] 2022-Jan-05

	Current	Correction	Result	
Program	01:03:00	-00:23:00	00:40:00	<input type="checkbox"/> Remove all program charges
Partner	00:02:00	00:00:00	00:02:00	<input type="checkbox"/> Remove all partner charges
Comment	Had to repeat acquisition			

Figure 6.11: The Time Accounting view for a selected program.

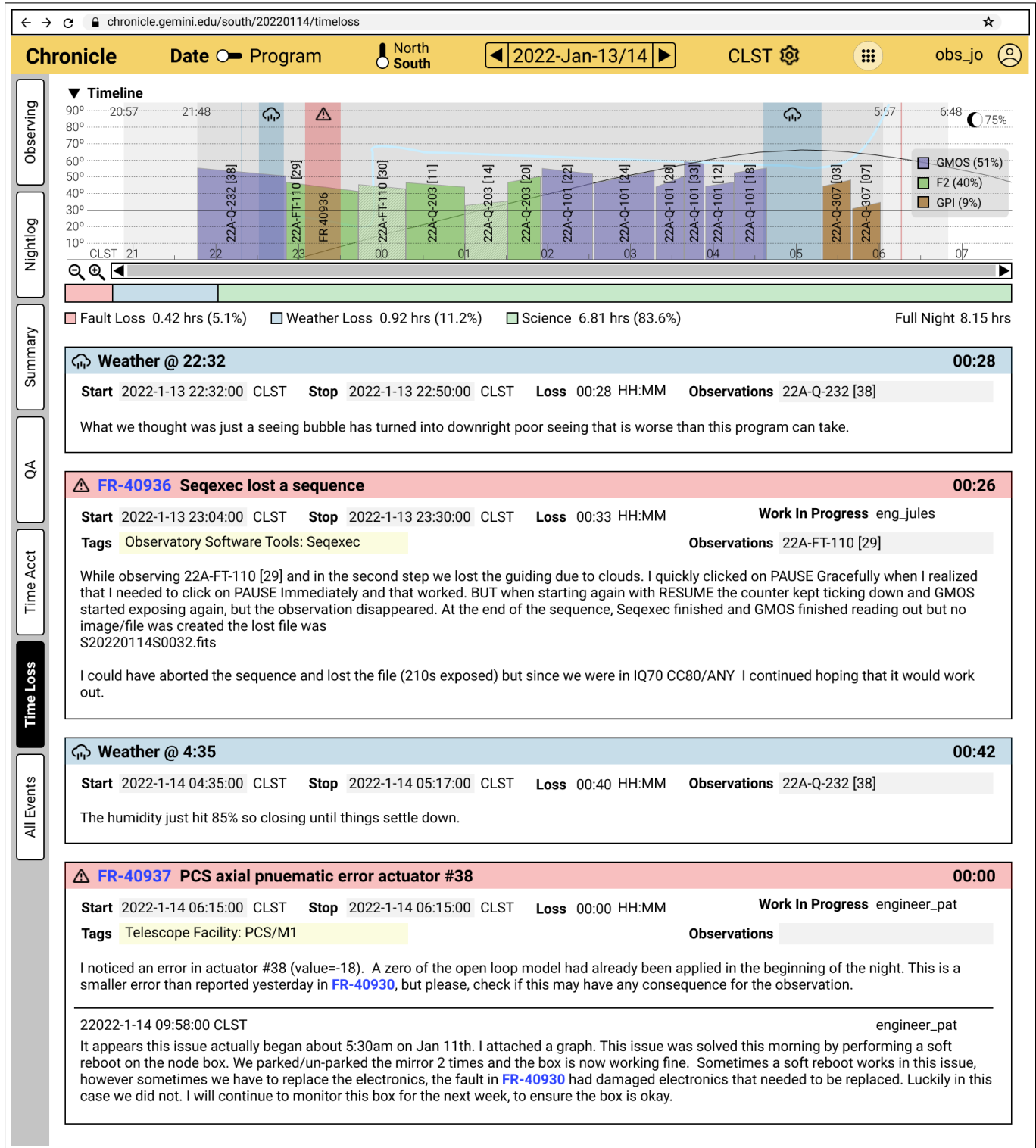


Figure 6.12: The Time Loss view for a selected date. [Q195]

chronicle.gemini.edu/2022A-Q-123

Chronicle Date Program Id 22A-Q-232 obs_jo

Comments Datasets Program Edits Execution Faults Offsets Time Corrections Weather

Date	UT	User	Action	Step	Type	QA	GOA
2022-Dec-10	22:43:02	admin	Create program				
2022-Dec-15	23:37:03	pdoe	Change priority of observation [38] from Low to High				
2022-Dec-15	22:56:04	pdoe	Set [38] to For Review				
2022-Dec-16	00:58:05	cs_sam	Set [38] to Ready				
2022-Dec-20	10:10:00	sos_max	Slew to 22A-Q-232 [38]: NGC 1024				
2022-Dec-20	10:20:00	joastro	Start 22A-Q-232 [38]				
2022-Dec-20	10:20:00	ocs	Start S20220114S0123				
2022-Dec-20	10:20:00	ocs	Configure				
2022-Dec-20	10:20:07	ocs	Observe				
2022-Dec-20	10:20:17	ocs	Readout				
2022-Dec-20	10:20:37	ocs	Write				
2022-Dec-20	10:20:43	ocs	End S20220114S0123				
2022-Dec-20	10:20:43	fits	S20220114S0123	22A-Q-232 [38] 001	Q	●	●
2022-Dec-20	10:21:11	tcc	P=0.92" Q=-0.32"				
2022-Dec-20	10:22:04	envmon	IQ=0.59" 0.63um SSW 72°				
2022-Dec-20	10:22:07	ocs	Start S20220114S0124				
2022-Dec-20	10:22:07	ocs	Configure				
2022-Dec-20	10:22:14	ocs	Observe				
2022-Dec-20	10:22:24	ocs	Readout				
2022-Dec-20	10:22:44	ocs	Write				
2022-Dec-20	10:20:51	ocs	End S20220114S0124				
2022-Dec-20	10:20:51	fits	S20220114S0124	22A-Q-232 [38] 002	Q	●	●
2022-Dec-20	10:21:12	jastro	Centering between the two clumps of emission				
2022-Dec-20	10:21:37	tcc	P=-0.17" Q=-0.03"				

Figure 6.13: The "All Events" view for program 22A-Q-232.

summaries of their programs. The Program Browser will allow NGOs to quickly navigate to their supported programs, instrument scientists to find programs that use their instruments, and contact scientists to find details of the programs they support.

7. Observe

“Observe” is a web application used to run observing sequences, and is an evolution of the web seqexec. Its main functionality includes [Q199] (where bold indicates changes from the 2020 version of the web seqexec, and these changes will be discussed in the remainder of this document):

- Run, pause, continue, stop, abort observations (including Nod & Shuffle)
- **Show which steps are acquisition, science, and calibrations**
- Show the configuration of each step (FPU, disperser, offsets, exptime, etc)
- **Show the locations of minimum schedulable blocks in the sequence**
- Show how long the current step will take
- **Show how long the current scheduling unit will take**
- Show how long the current observation (or the scheduled piece of an observation) will take
- **Allow switching between “Automatic” and “Manual” queue modes**
- **Automatically insert pauses at the appropriate places in acquisitions**
- **Ask the user if more steps are needed during acquisitions and add them**
- **Suggest alternate observations when the conditions change**
- **Provide instructions for how to best interrupt observations**
- **Display calibrations that need to be run in the morning**
- Run the list of morning calibrations
- **Optimize the order of the morning calibrations to finish in the least amount of time**
- Give visual and audible notifications of Targets of Opportunity
- **Retrieve weather conditions from conditions server**
- Warn when the required conditions are violated
- Warn when the target in the observation does not match where the telescope is pointed
- Show the status of the Mount, M1, Tip/Tilt, and Coma corrections
- **Sequence the M2 baffles**

Observe communicates with the scheduler that will simultaneously generate queue plans for both telescopes based on the weather forecast at each site, and update those plans in real time as conditions change, as faults happen, and as new observations become available. This document describes the user interface and how one interacts with it in different situations. The scheduler rules and algorithms will be discussed in a separate document.

Observe has a bar across the top which allows switching between automatic and manual queue modes, switching between sites, customizing the time zone, opening the Gemini Application Switcher, and logging in and out.

Along the left side are four vertical tabs which allow switching between the different views: Schedule, Nighttime, Daytime, and Excluded. The Schedule view is the observer's interface to the queue scheduler. The Nighttime view is for running single sequences interactively. The Daytime view is for running multiple daytime calibrations in parallel. The Excluded observations tab allows viewing and re-enabling observations which were previously excluded from being scheduled.

7.1 Auto vs Manual Mode

At the top of Observe is a toggle button for switching between “Automatic” queue mode and “Manual” queue mode.

In automatic mode the plan is continuously updated based on the observations available and the current and forecast conditions. The elevation plot at the top will always show the best possible plan, and it will adapt to unexpected delays or observations going faster than expected. It is not possible to manually queue observations from Explore in automatic queue mode.

In manual mode a human uses the Queue Planning Tool (QPT) to publish static plans for a variety of weather conditions and Observe allows selecting which of these plans to display. Observe will still give warnings when the conditions have degraded beyond what is required by the ongoing observation, and will give instructions on where to stop at a scheduling block boundary (and make sure to get the standard), but it will not give recommendations on what to do next.

The remainder of this document focuses on “automatic” queue mode. [\[Q200\]](#)

7.2 Status Bar

At the bottom of the page is a status bar which is visible from all the tabs. On the left are indicators for the telescope Mount tracking, M1 figure, Tip/Tilt guiding, the Coma correction, and the guide frequency. On the right is a progress bar that shows the status of the currently executing observation. The status bar will also show if there is a decision to be made about changing conditions or any type of interrupting observation.

7.3 Schedule View

The scheduler will behave like your car's GPS, navigating you along the most scientifically productive route to the end of the night with a goal - for example, of completing the most high-priority programs throughout the semester. [\[Q201\]](#) If a more productive route is found, either because the conditions have changed or a new observation has become available, the scheduler will recommend the new route. If a turn is missed, the scheduler will give a warning and recalculate the best plan given the new situation. The Schedule view is like your car's GPS screen, showing your current location, where you have been, and where you are going. When you approach a crossroads the Schedule view will display both options so that you can make an informed decision about which way to turn.

The Schedule view is illustrated in Figure 7.1.

The Elevation Plot at the top has a vertical red line that indicates the current time. To the left of the line are executed observations [Q202] and to the right are planned observations. The duration of each observation in the graph starts out as the planned time, but will expand or shrink if the acquisition takes more or less time than planned. This plot shows weather loss, faults, and laser shutters for LGS observations. Selecting an observation highlights it in the details section below and reveals the sky brightness curve and any timing window constraints.

The right side of the plot expands to reveal an altitude-azimuth plot of the selected observations, showing the path they will take on the sky and an indicator of the current wind direction and speed, as well as any pointing constraints indicated.

Observation Details are listed below the elevation plot and are split into three sections labeled along the left side: Executed (top, black), Observing (middle, blue), and Remainder of Night (bottom, gray). The details will auto-scroll [Q203] to keep the current observation in the middle of the page with the elevation plot fixed at the top.

Each logical group of associated observations (as defined in Explore, e.g. science + Telluric) is displayed in a group here with a header showing the planned observation group start and end time, the program ID, the instrument configuration, and indicators for the observer: parallactic angle, blind-offset acquisition, non-sidereal, eavesdropping, etc. For each observation in the group the table lists the start time, the observation duration, the observation ID which is a link to Explore, the observation type (Science, Telluric, Photometric standard, etc), the target name, wavefront sensor and guide star brightness, the required conditions, and the time range when each observation may be executed (not counting acquisition). At the end of the line may be icons to open the finder chart and/or the “Observer Info” note from Explore. Any observer warnings are indicated by symbols to the right of each observation: low or high elevation, lunar proximity, etc. (not illustrated).

Observers often review the plan at the start of the night, however, the plan will change if observations progress at a different speed than planned, or if the conditions, forecast, active observations, timing windows, or priorities change. To avoid surprises caused by a changing plan, each observation will start with a “New” tag when it appears in the plan for the first time each night. After reviewing each observation the observer can dismiss the “New” tag by clicking on it. [Q204] As with all imagined GPP software features at this point, this is a preliminary plan. [Q205] Experience with the scheduler may reveal that the plan is quite volatile as minor changes in execution time provoke updates to suggested future observations. [Q206] If that is the case, having to explicitly dismiss “new” observations may not be found useful. [Q207]

7.4 Nighttime View

The Nighttime view, as seen at the start of an acquisition, is shown in Figure 7.2.

The top of the Nighttime view is identical to the top of the Schedule view, showing an elevation plot of all the observations with a vertical red line indicating the current time. Observations to the left have been executed, the current observation is under the red bar, and planned observations are to the right.

Beneath and to the right of the elevation plot are fields to enter the telescope operator and observer’s names.

Selecting an observation in the elevation plot will “load” the observation for execution, set the average

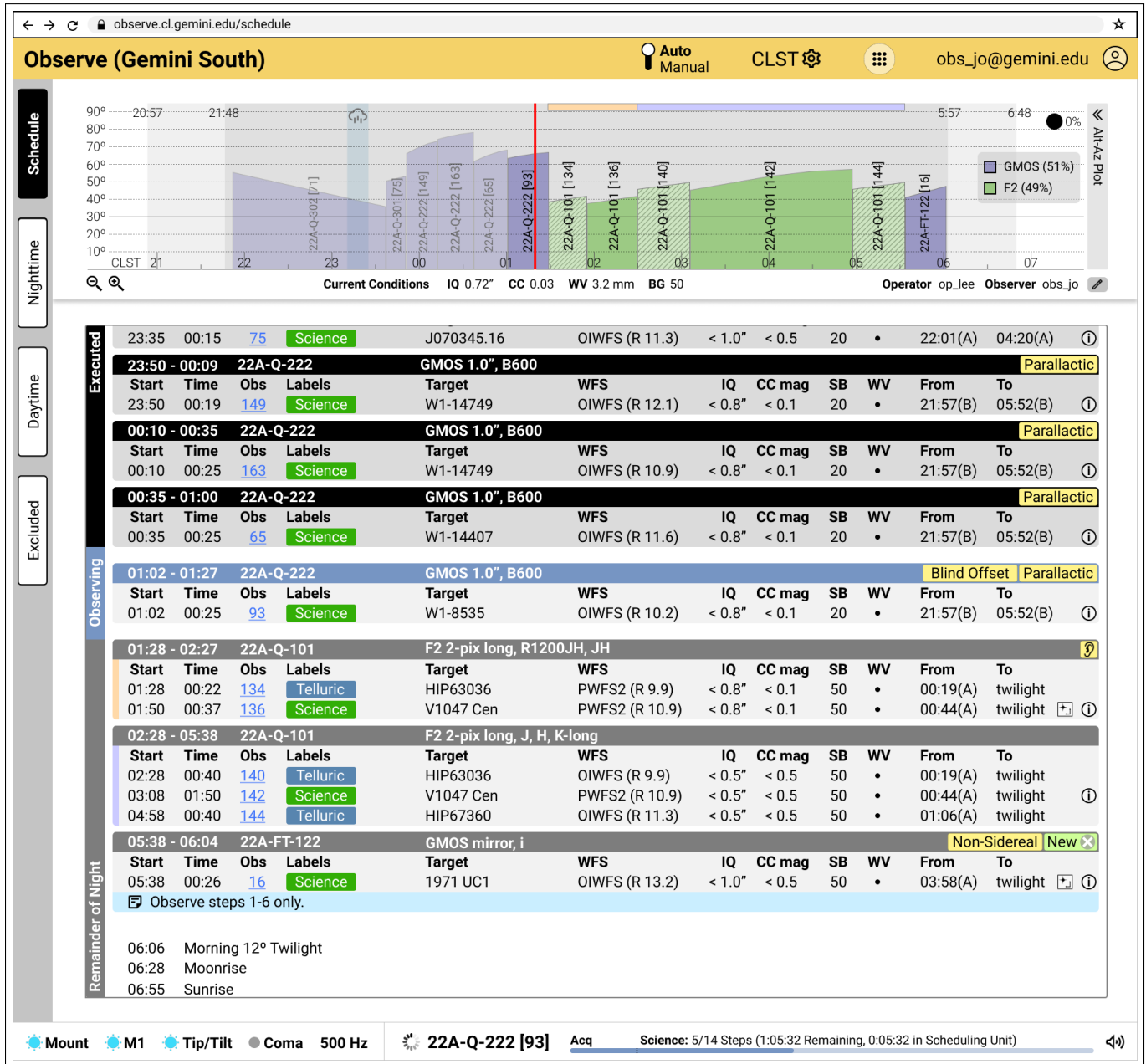


Figure 7.1: The Observe Schedule view.

parallactic angle (if necessary), and send it to Engage [Q208] (the new TCC) - this is the same functionality as the “Send to Observe” button in Explore [Q209] (Figure 3.16). Only one observation can be loaded at a time in the Nighttime view (the previous observation must be stopped to load a new one), so that the running sequence is always displayed.

Below the elevation plot is the Observation ID, the target name, the target type (Science, Telluric, Photometric Standard, etc), and potentially flags about being at the parallactic angle or if eavesdropping is requested. There are also icons/buttons to open the finder chart and the “Observer Info” note from the PI. The next line gives a summary of the instrument configuration, and the required conditions. If any of the conditions are violated they will turn red as a warning to the observer.

The blue box below the instrument configuration displays notes from the scheduler which could include details about the observation, e.g. “Stop after step 6. Steps 7-12 have been deactivated.” or a warning that the timing window may be tight (as illustrated in Figure 7.2).

Observe will give a warning if you attempt to run an observation when the target doesn’t match where the telescope is pointed.

Below the observation details is the acquisition section which is clearly separated from the observation section. Steps in each section are numbered independently to avoid confusion that could otherwise result from renumbering of the observation steps when acquisition steps are added.

Each acquisition starts with the minimum number of required steps (as defined by the instrument scientists). Observe automatically inserts breakpoints (pauses, indicated by a red dot and horizontal line) between the appropriate steps (also defined by the instrument scientists).

To the left of the observation ID is a “Run Sequence” button that will start the sequence from the first unexecuted step. Once the sequence starts the run button is replaced with a “Pause Sequence” button which will put a breakpoint after the running step.

The selected step has a “Run” button which makes it simple to jump to any step, e.g. for twilight flats. Once an exposure starts the “Run” button is replaced by “Pause”, “Stop”, and “Abort” buttons (depending on what is supported by the current instrument). When an exposure is paused the “Pause” button toggles to a “Resume” button, and the “Stop” and “Abort” buttons remain.

To the right of the “Run” button are three subsystem configuration buttons: “TCS”, “GCAL”, and the instrument, e.g. “GMOS” in Figure 7.2. [Q210][Q211] These buttons allow configuring any of the three subsystems for the selected step before running the step. This is useful for pre-configuring the instrument while the telescope is slewing. When the subsystems are configuring the buttons show a spinner, and when the configuration completes the buttons turn green.

7.5 End of Acquisition

When the end of the acquisition is reached Observe will ask if the target has been acquired (Fig. 7.3). If the acquisition was successful the observer will click “Yes,” and if all the constraints (sky brightness, timing windows, etc.) are met and the M2 baffles are in position, the sequence will start the first science step, or else it will count down until the constraints are met and the M2 baffles are in position, with a button to override and start the observation immediately (not illustrated). If the target(s) is(are) not positioned well enough the observer will click “No” and Observe will add more steps to the acquisition.

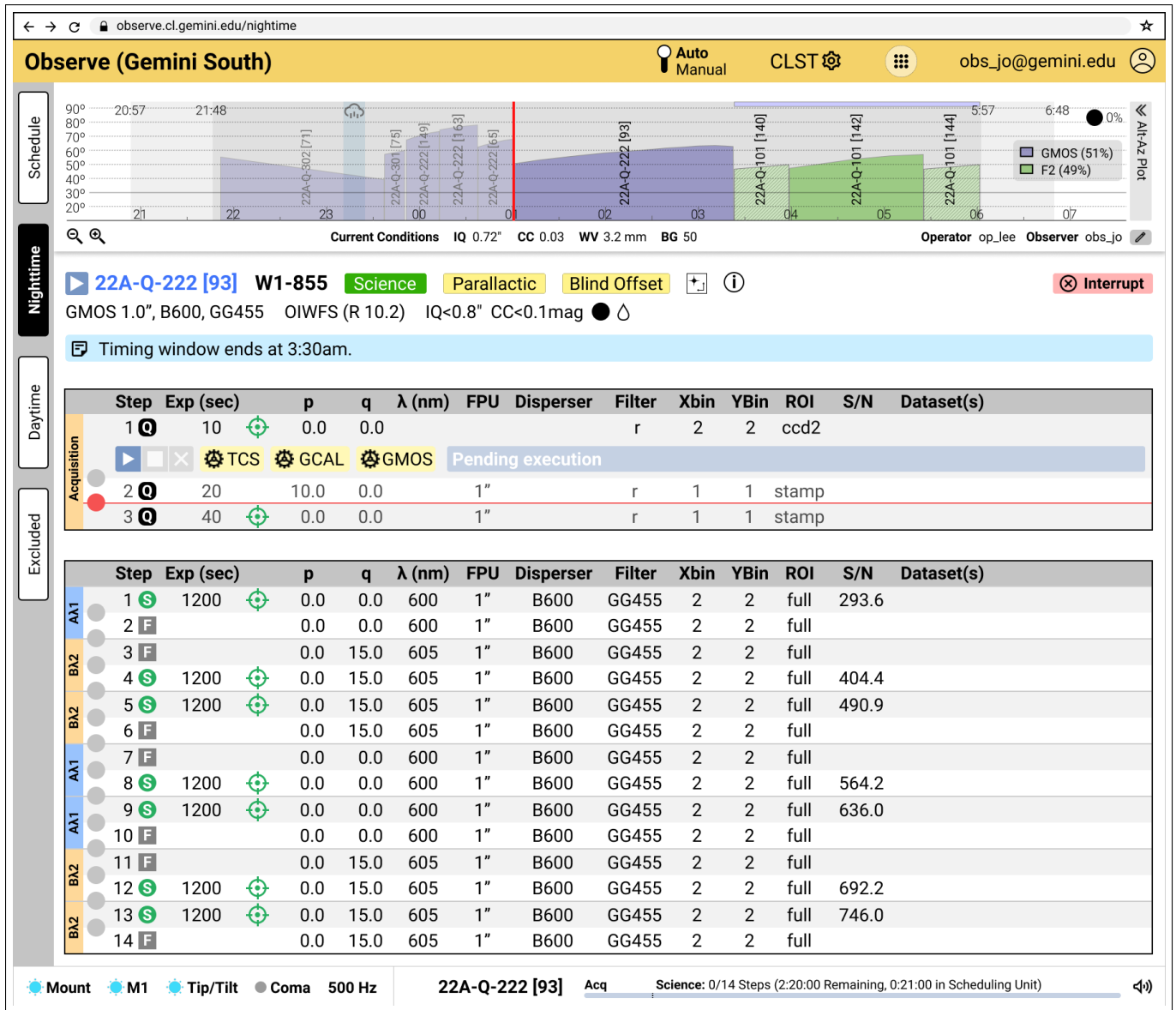


Figure 7.2: The Nighttime view at the start of an acquisition. [Q212][Q213]

If the Observer decides that a different exposure time is needed (e.g. shorter to avoid saturation or longer to see a faint target) or they want to restart the acquisition they would open the observation in Explore (e.g. by clicking the Obs-ID) and make the edits there and Observe will automatically pick up the changes. [Q214]

7.6 M2 Baffles

Observe will move the secondary mirror (M2) baffles to the requested position for science [Q215] and nighttime calibration observations. Observe will not move the M2 baffles for acquisitions (assuming that the baffles are initially set on slew) or daytime calibrations. At the end of the acquisition, after the observer has confirmed the target has been acquired, if the M2 baffles are not already in position Observe will open a dialog informing the user that it is waiting for the M2 baffles to reach position, with a button that allows starting the observation immediately [Q216]. If the M2 baffles fail to reach position due to a system failure an error will be raised.

7.7 Minimum Scheduling Units

[Q217] The science steps are grouped into minimum scheduling units [Q218] which define where the observation may be split without compromising the scientific value of the data. Observe indicates these units in two ways: each is marked with colored bars on the left (A λ 1, B λ 2, etc) and separated by thin lines. These make it clear to the observer where to stop if there is a choice. The time to reach the end of the current unit is displayed below the step table above the progress bar (Figs. 7.2 and 7.3).

7.8 Changing Conditions

When conditions degrade such that the requirements of the current observation are no longer being met, or the conditions credibly improve such that a more productive plan could be executed, the required conditions in the Nighttime view change color (red if too poor [Q219], and yellow if too good [Q220]) and Observe will suggest interrupting the current observation (Fig. 7.4).

At this point the observer will have two options: continue with the current observation, or interrupt the current observation and switch plans. To help inform the observer's decision, Observe will illustrate the two options with two elevation and Alt-Az plots displayed at the top of the Nighttime view and mirrored at the top of the Schedule view.

In the Nighttime view a yellow warning message will appear below the step where the scheduler suggests stopping. This message explains why the current observation should be interrupted (e.g. degrading conditions), and gives instructions on where to stop the current sequence, and which observation should be next. The next observation ID is a link to Explore for quick access. There is a button to deactivate steps so that only those up to the suggested stopping point at a scheduling block boundary plus any on-sky calibrations remain active. Once the stopping point is reached and the sequence stopped the button to switch to the new observation will become active. (Note that the user can also do these things manually if they prefer.)

If the user decides to continue with the current observation they simply ignore the suggestion to interrupt. When Observe passes the suggested stopping point the instructions for interrupting will disappear and

Observe (Gemini South) Auto Manual CLST obs_jo@gemini.edu

Current Conditions IQ 0.72 CC 0.03 WV 3.2 mm BG 50 Operator op_lee Observer obs_jo

22A-Q-222 [93] W1-855 Science Parallactic Blind Offset Interrupt

GMOS 1.0", B600, GG455 OIWFS (R 10.2) IQ<0.8" CC<0.1mag

Timing window ends at 3:30am.

Step	Exp (sec)	p	q	λ (nm)	FPU	Disperser	Filter	Xbin	YBin	ROI	S/N	Dataset(s)
1	10	0.0	0.0				r	2	2	ccd2		S20220406S0233
2	20	10.0	0.0		1"		r	1	1	stamp		S20220406S0234
3	40	0.0	0.0		1"		r	1	1	stamp		S20220406S0235

Has the target been acquired?
 Yes, start observation No, take another step

Step	Exp (sec)	p	q	λ (nm)	FPU	Disperser	Filter	Xbin	YBin	ROI	S/N	Dataset(s)
1	1200	0.0	0.0	600	1"	B600	GG455	2	2	full	293.6	
2		0.0	0.0	600	1"	B600	GG455	2	2	full		
3		0.0	15.0	605	1"	B600	GG455	2	2	full		
4	1200	0.0	15.0	605	1"	B600	GG455	2	2	full	404.4	
5	1200	0.0	15.0	605	1"	B600	GG455	2	2	full	490.9	
6		0.0	15.0	605	1"	B600	GG455	2	2	full		
7		0.0	0.0	600	1"	B600	GG455	2	2	full		
8	1200	0.0	0.0	600	1"	B600	GG455	2	2	full	564.2	
9	1200	0.0	0.0	600	1"	B600	GG455	2	2	full	636.0	
10		0.0	0.0	600	1"	B600	GG455	2	2	full		
11		0.0	15.0	605	1"	B600	GG455	2	2	full		
12	1200	0.0	15.0	605	1"	B600	GG455	2	2	full	692.2	
13	1200	0.0	15.0	605	1"	B600	GG455	2	2	full	746.0	
14		0.0	15.0	605	1"	B600	GG455	2	2	full		

Mount M1 Tip/Tilt Coma 500 Hz **22A-Q-222 [93]** Acq Science: 0/14 Steps (2:20:00 Remaining, 0:21:00 in Scheduling Unit)

Figure 7.3: The Nighttime view at the end of an acquisition.

the scheduler will recalculate the options. If the new most favorable plan again involves interrupting the currently executing observation then the yellow warning message will reappear with new instructions on where to stop.

In the Schedule view the observer may select either option to display the full details of each plan (not illustrated).

7.9 Rapid Target of Opportunity

When a rapid Target of Opportunity (RToO) is received Observe switches to the Nighttime view [Q222] so that immediate action can be taken (Fig. 7.5).

There is a verbal alert and a message that “A Rapid ToO is now available!” The observation ID in the message is a link to open the observation in Explore, and there are two options to facilitate a rapid response: “Stop and Switch” and “Abort and Switch” which do what they say: either stop or abort the current exposure and switch to the RToO observation.

The top elevation plot section (of both the Schedule view and the Nighttime view) will expand to show both future possibilities: continue with the current observation, or interrupt and start the RToO. If the observer switches to the RToO the Continue plan will disappear (as in the case of changing conditions).

If the observer decides to continue the current observation [Q223] the Rapid ToO alert message (in the list of steps) will remain and move so that it is always below the current step, and both elevation plots will remain at the top. This is to remind the observer that they should switch plans, and give them the opportunity to switch, if and when they finally decide to switch.

If there is a problem with the ToO observation that prohibits it from being observed it should be deactivated in Explore which will remove it from Observe.

7.10 Interrupting & Excluded Observations

If, at any point during an observation, there is a problem and the observer wants to leave the current observation, they may click the “Interrupt” button at the top right (below the elevation plot). In general, there are two categories of problems that might prevent the scheduler’s suggestion from being executed at a given moment:

- The observation has an issue that needs to be addressed by the PI or the contact scientist before it may be scheduled. For example:
 - The guide star is too faint for the current conditions, even though the observation otherwise meets the current scheduling constraints.
 - The finder chart is inadequate.
- The observer feels that the scheduler is acting on incomplete or incorrect information and wishes to override its suggested course of action. For example, the conditions are degrading but the observer is more conservative than the scheduler

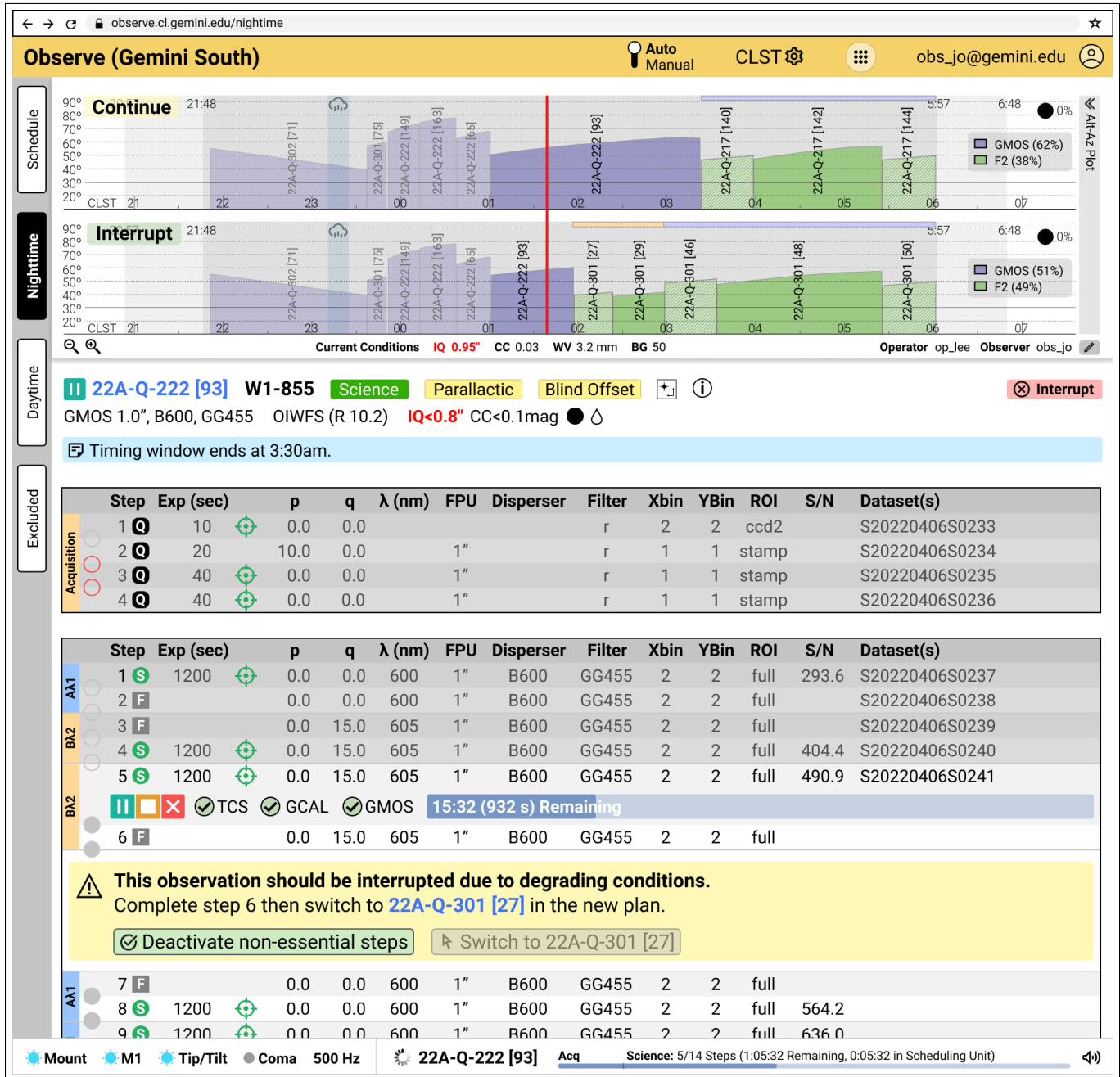


Figure 7.4: The Nighttime view during changing conditions. [Q221]

Observe (Gemini South) Auto Manual CLST obs_jo@gemini.edu

Schedule **Nighttime** **Daytime** **Excluded**

Continue 21:48

Interrupt 21:48

Current Conditions IQ 0.72" CC 0.03 WV 3.2 mm BG 50 Operator op_lee Observer obs_jo

22A-Q-222 [93] W1-855 Science Parallactic Blind Offset Interrupt

GMOS 1.0", B600, GG455 OIWFS (R 10.2) IQ<0.8" CC<0.1mag

Timing window ends at 3:30am.

Step	Exp (sec)	p	q	λ (nm)	FPU	Disperser	Filter	Xbin	YBin	ROI	S/N	Dataset(s)
1	10	0.0	0.0				r	2	2	ccd2		S20220406S0233
2	20	10.0	0.0		1"		r	1	1	stamp		S20220406S0234
3	40	0.0	0.0		1"		r	1	1	stamp		S20220406S0235
4	40	0.0	0.0		1"		r	1	1	stamp		S20220406S0236

Step	Exp (sec)	p	q	λ (nm)	FPU	Disperser	Filter	Xbin	YBin	ROI	S/N	Dataset(s)
1	1200	0.0	0.0	600	1"	B600	GG455	2	2	full	293.6	S20220406S0237
2		0.0	0.0	600	1"	B600	GG455	2	2	full		S20220406S0238
3		0.0	15.0	605	1"	B600	GG455	2	2	full		S20220406S0239
4	1200	0.0	15.0	605	1"	B600	GG455	2	2	full	404.4	S20220406S0240
5	1200	0.0	15.0	605	1"	B600	GG455	2	2	full	490.9	S20220406S0241

15:32 (932 s) Remaining

A Rapid ToO is now available!
Switch to **22A-Q-119 [87]** immediately.

Stop and Switch Abort and Switch

6		0.0	15.0	605	1"	B600	GG455	2	2	full		
7		0.0	0.0	600	1"	B600	GG455	2	2	full		
8	1200	0.0	0.0	600	1"	B600	GG455	2	2	full	564.2	

Mount M1 Tip/Tilt Coma 500 Hz 22A-Q-222 [93] Acq Science: 5/14 Steps (1:05:32 Remaining, 0:05:32 in Scheduling Unit)

Figure 7.5: The Nighttime view during a Rapid Target of Opportunity. [Q224]

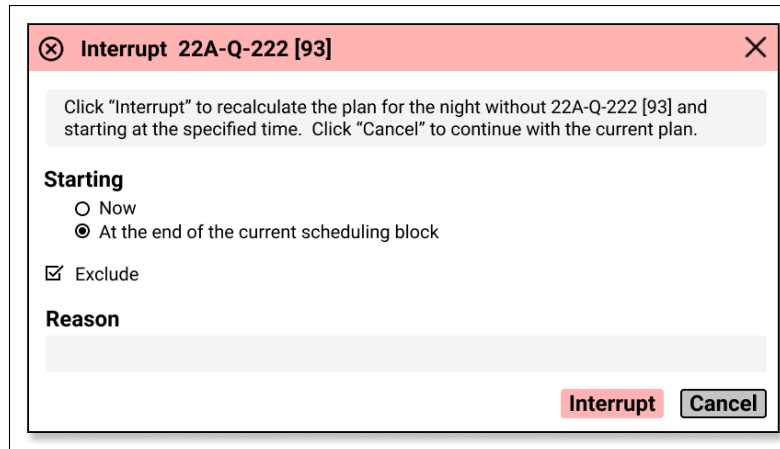


Figure 7.6: The Interrupt observation dialog.

Clicking on “Interrupt” in either case results in a pop up confirmation window (Fig. 7.6). The confirmation requires specifying why the observation is being interrupted and presents the option of excluding (deactivating) it from future consideration until corrective action is taken. For problems in the first category, excluding the observation is necessary.

When an observation is interrupted the scheduler will recalculate the queue plan starting at the desired time, deactivate unnecessary steps (to help the observer stop at the correct place and not miss any required calibrations), and add an entry to Chronicle with the user’s reason appended, e.g. “Interrupted 2022A-Q-222-93 - Could not find target.” The Interrupt button will also toggle to “Resume”, allowing the Observer to change their mind. If the Observer chooses to take additional steps after pushing the Interrupt button they may either “resume” or manually reactivate the steps and the scheduler will re-calculate the plan using the new projected end time.

If the observer checks the “Exclude” box in the Interrupt dialog box the observation will be deactivated and not rescheduled. The scheduler takes note of which observations have been excluded and will not schedule them until the observations are reactivated. [Q225] The “Excluded” tab on the left of the Observe window shows a listing of all of the excluded observations (not illustrated here). The Observer may re-enable any previously excluded observations and this will trigger a re-calculation of the queue plan. At the end of the night notifications will be sent about any new excluded observations so that the problems may be addressed and the observations reactivated.

7.11 Daytime View & Daytime Calibration Queue

The Daytime view will look similar to the 2020 version of the web seqexec, with tabs for each instrument, and observations that don’t compete for resources may be run in parallel.

As sequences are executed at night, Observe will keep track of the required daytime calibrations (flats, arcs, darks, biases) and add them to a morning calibration queue visible in the Daytime view [Q226]. Observe will organize the morning calibration queue in the optimal order to finish in the least amount of time [Q227] and give a prediction for when it will finish. In the morning the observer will switch to the Daytime view and start the calibrations running before leaving.

The Daytime view includes a mechanism to deactivate the connected subsystems: TCS, GCAL, and

Instrument. These allow executing “observes” (which would normally be taken on-sky) during the day for calibration and engineering purposes.

8. Schedule

“Schedule” is the Queue Coordinator’s interface to the scheduler, and it will have four views: “Tonight”, “Engineering”, “Daily QC”, and “Simulations.” The Daily QC and Simulations views will be defined by the scheduler team and will not be discussed at this time.

8.1 Tonight View

The Tonight view (Fig. 8.1) shows the same content as the “Tonight” view in the Observe application. This gives the QC (or whoever want to see the plan) everything they need without needing to open Observe (which will be reserved [Q228] for the observer). One difference is that here at the top there is a North/South toggle that allow the QC to view either the North or South schedule.

8.2 Engineering View

“Resource” will inform the scheduler about the telescope schedule: shutdowns, instrument swaps, classical nights, visitor instrument blocks, etc. This includes partial nights, and whether classical and visitor runs have required conditions. However, the scheduler also needs to know about engineering tasks (ENTs) that need to be scheduled at night. The Scheduler Engineering view (Fig. 8.2) provides a mechanism to inform the scheduler of these events. The table at the top lists all events, and active ENTs will be scheduled according to their priority, required instrument and staff availability, and timing windows. The bottom panel shows the details of the selected ENT, including the required staff and instruments (which may be combined with logical operators), how long it will take, the required conditions, the task description and timing windows, and a link to any associated observations which will open in Explore.

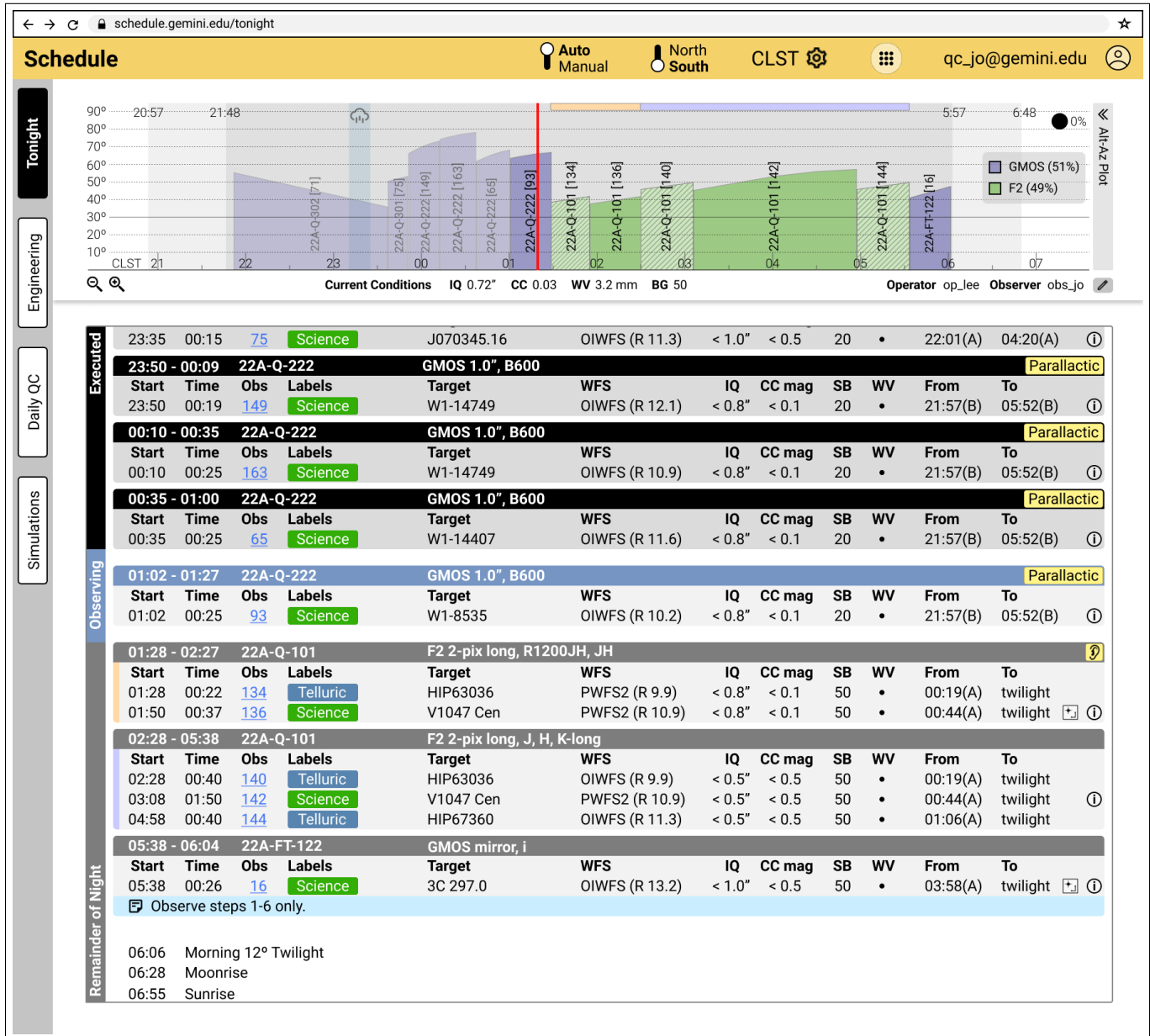


Figure 8.1: The Schedule Tonight view shows the same content as the Observe Tonight view.

The screenshot shows a web interface for scheduling engineering tasks. At the top, there's a navigation bar with 'Schedule' and user information. A sidebar on the left has buttons for 'Tonight', 'Engineering', 'Daily QC', and 'Simulations'. The main content area features a table of tasks and a 'Details' panel for the selected task.

ENT	Title	Status	Contact	Duration (hrs)	Priority	Constraints	Visibility Tonight
22-1234	GMOS IAA check	Active	Gimeno	0.5	0.0	<0.8", <0.5 mag, BGany, WVany	20:57-22:00
22-1235	GPI on-sky checks	Active	Rantakyro	1.5	0.5	<0.7", <0.3 mag, BGany, WVany	20:57-00:00
22-1236	Pointing model update	Pending	Lopez	2.0	2.5	<1.5", <1.0 mag, BGany, WVany	20:57-06:48

Details

ENT: 22-1235
 Title: GPI on-sky checks
 Required Staff: Fredrik Rantakyro OR Bryan Miller
 Systems: GPI
 Duration: 2.0 hrs
 Priority: 0.5
 Status: Active
 Image Quality: < 0.8 arcsec | Sky Background: Gray | Cloud Cover: < 0.3 mag | Water Vapor: Any
 Description: Lorem ipsum dolor sit amet, putant doctus moderatius nec ei, no qui amet ancillae molestiae. Iriure periculis nec an. Quo ut feugiat ponderum, fabulas saperet voluptaria pro id. Scripta legimus per ea, ex his impetus viderer.
 Observations: [2022A-ENG-123-456](#)

Timing Windows

- Open on 2022-Sep-01 @ 20:00 CLST, remain open for 4h, repeat 4 times with a period of 24h.
- Open on 2022-Sep-08 @ 20:00 CLST, remain open for 3h, repeat 2 times with a period of 24h.

Open on 2022-Sep-01 @ 20:00 CLST and:
 Remain open forever
 Close on YYYY-MMM-DD @ HH:MM CLST
 Remain open for 4:00:00
 Repeat with a period of 24:00:00 Forever 4 times
 Observe at YYYY-MMM-DD @ HH:MM CLST

Figure 8.2: The Schedule Engineering view is used to inform the scheduler about engineering tasks that need to be scheduled at night, but which might not have associated observations.

9. Resource

“Resource” is the web interface to the Observatory resource tracking service. This informs the scheduler about the telescope, instrument, and staff schedules as well as the availability of instrument components and modes. Resource makes it easy for the nighttime staff to quickly update the availability of instruments, components, or modes as they are validated through nighttime engineering tasks (ENTs) or if they become unavailable due to a fault. This ensures that the scheduler is always aware of what resources are available and therefore which observations may be scheduled. Resource has three views:

The “Calendar” view shows the month-by-month availability of Observatory systems and staff over the duration of the semester:

- Engineering nights
- Classical nights
- Priority Visitor nights
- Visitor instrument nights
- Instrument availability
- Instrument mode availability
- Subsystem availability
- Staff availability [\[Q229\]](#)

Knowing which nights are available (or unavailable) for queue observations helps the scheduler prioritize observations. This is especially important for observations that are setting, have sky background constraints, or timing windows.

The instrument availability and instrument component availability (discussed below) are decoupled from the instrument “mode” availability. Here the “mode” refers to using one system with another; while both systems may be perfectly functional, they may not have been calibrated to work together. Examples of “modes” include GNIRS + PWFS2, NIRI f/14 + Altair, GMOS-S + Nod & Shuffle, etc. All the systems and the mode must be available before an observation can be scheduled.

The “Pointing Limitations” view displays any telescope pointing restrictions:

- Azimuth
- Elevation
- Wind (e.g. cannot point within 20 degrees of the wind when over 30 m/s)

The “Instrument Component Tracking” view will replace the functionality of the current ICTD, tracking the availability of all instrument components (masks, gratings, filters, etc), including:

- When masks are submitted and checked [Q230]
- Which masks are ready to be cut
- Printing barcodes and mask images
- Which masks have been cut (and when)
- Mask location (base, summit, instrument, archive, etc)
- Submitting and closing change requests
- Shipping details

Resource will also allow scheduling future components changes. This will enable the QC (and eventually the scheduler) to propose future component changes which in turn enable the scheduler to better calculate observation schedulability.

10. Weather

“Weather” is the interface to the environmental monitor service. This service will aggregate, model, and respond to queries about the site conditions at any location in the sky for any time in the past, present, or (near) future. The environmental monitor will collect directional seeing and extinction from the Quality Assessment Pipeline¹ (QAP) processing of science data [Q231], directional DIMM and MASS measurements from the weather tower, and precipitable water vapor measurements from Caltech Submillimeter Observatory (CSO, Maunakea). The server will calculate the sky background and apply offsets to match QAP measurements. [Q232] The server will ingest machine-readable summit weather forecasts for the upcoming week, which will facilitate scheduling time-constrained observations with relative timing windows as well as planning instrument grating and mask changes.

Weather has two views available: “Actual” which displays the measured conditions, and “Forecast” which displays the ingested weather forecasts. At the top are the usual widgets for switching between the North and South sites, a date selector which defaults to today, a button for customizing the time zone, the Gemini application switcher, and the login/logout button.

The Night Crew will use the Weather “Actual” view to input supplementary data. This may include the seeing estimate from tuning the primary mirror at the start of the night, extinction estimates from the wavefront sensors, seeing estimates from spectral crosscuts, extinction estimates from the CFHT SkyProbe² (Maunakea), etc. [Q233] Each measurement will include a timestamp, azimuth, elevation, and the waveband when appropriate (the “Measurements” box in Fig. 10.1). The UI for entering this information will have a mechanism to query parameters from the telescope, e.g. azimuth, elevation, filter, etc. to facilitate rapid and accurate data entry.

The observer may also input by-eye weather information, for example from looking at the satellite image loop or the summit cloud cameras and predicting what the weather will be in the near future (the “Intuition” [Q234][Q235] box in Fig. 10.1). For example, while it may be photometric now, the night crew may predict that clouds will arrive in the next 1.5 hours. This will allow the scheduler to include the required photometric standards, and avoid starting long observations that require photometric conditions.

The server will fit models to the available data to enable responding to internal and external conditions queries about locations and times that may not match any of the raw data in the database. For example, after each exposure the Observing Database will query the environmental monitor to get the average conditions during the exposure, which will in turn be fed into the ITC to estimate the S/N of the exposure. Explore, Chronicle, and Observe will all display the conditions and S/N of each exposure. The scheduler will query the environmental monitor to figure out the best observation to do next, and it will use the conditions at the position of the next target to calculate the optimal exposure time and observation length. [Q236]

¹<https://www.gemini.edu/observing/phase-iii/after-data-are-taken#DataQA>

²<https://www.cfht.hawaii.edu/Instruments/Skyprobe>

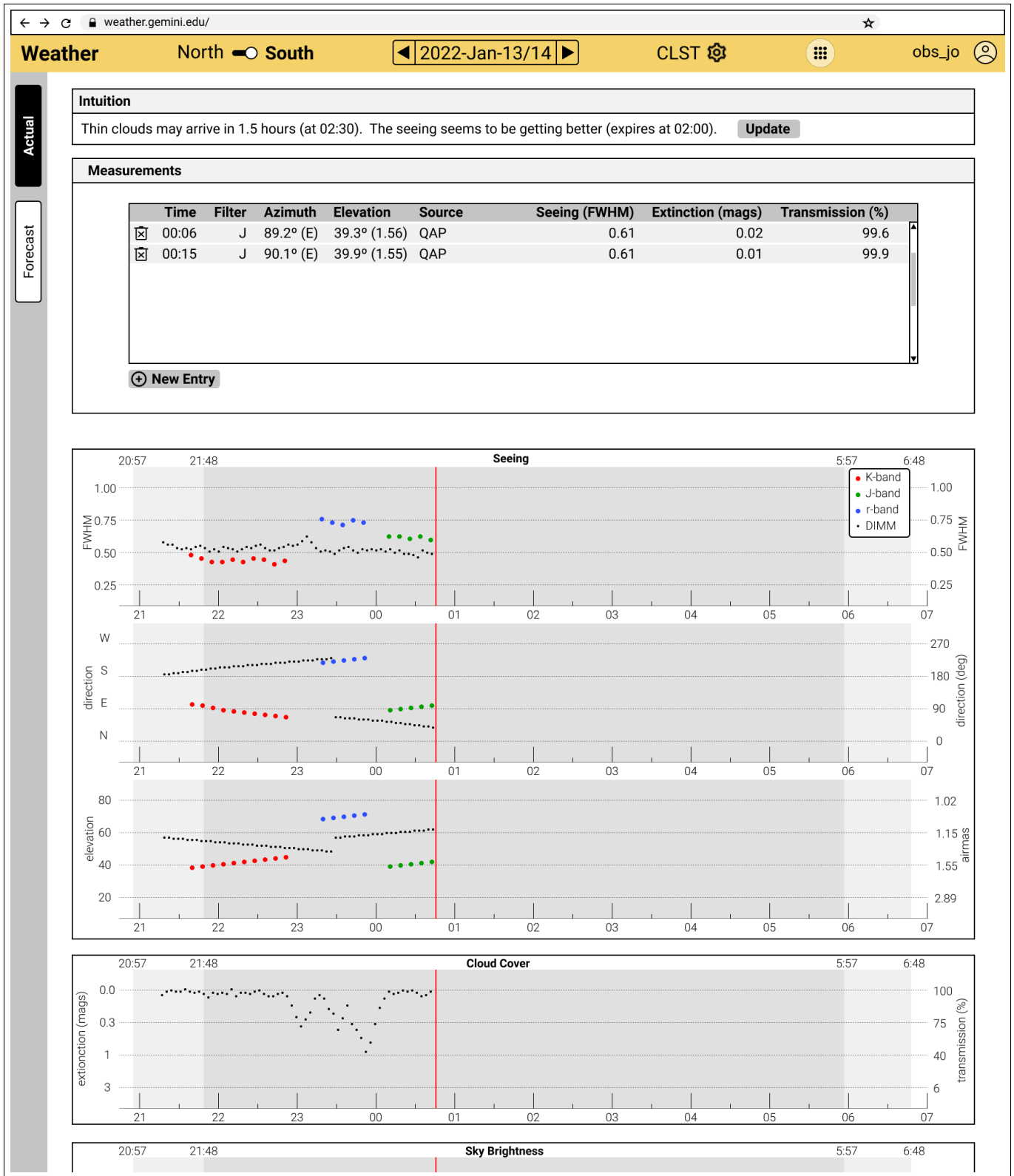


Figure 10.1: The Weather “Actual” view.

Weather will be publicly available and the environmental monitor service will accept external queries from PIs and other observatories. [Q237] The environmental monitor [Q238] will retain long-term weather information for the purpose of calculating weather trend statistics for optimizing the ITAC queue filling.

11. Admin

The (internal) Admin interface is purposefully separate from the (externally available) Explore application and provides the only interface for editing program administrative information (not content). This interface is available to designated Heads of Science Operations, Chief Scientist, and anyone else who [Q239] needs administrative access, to edit program information, or to see and respond to change requests and special proposals. Admin has three views: “Programs”, “Proposals”, and “Change Requests”.

11.1 Programs View

The Programs View [Q240] is shown in Figure 11.1 and allows modifying parameters of existing programs that have already been awarded time. The program may be selected by typing into the “Program ID” box at the top which presents matching programs as you type, or by using Browse to find the program and then clicking “Open in Admin” (Figure 5.1, page 42).

Once a program has been selected it is possible to edit any of the program parameters, which currently comprise:

- Program Class – Queue or Classical
- ToO Status
- Contact Scientists – typing names will present auto-complete options
- Science Band
- Active Period – this will default to the appropriate period for the proposal type, e.g. 1 year for queue band-1, 6 months for queue bands 2-4, 3 months for FT, etc, or may be manually set to a custom date range.
- Proprietary Period [Q241]
- Band 3 minimum time – the minimum amount of time that is required for the program to be considered successfully observed
- Private Headers – whether FITS meta data are public
- Thesis – if the data will be part of a thesis project

There is a Time Accounting table which lists the detailed time allocation from each partner. [Q242] This may be edited by typing in the table, and partners may be added or removed as necessary.

On the right is a “Private Program Note” which may be used to record notes about the program. This might be useful for recording details about why certain parameters have the values they do, e.g. why a

Admin head_of_sciops@gemini.edu

Program ID 2022B-Q-1234

Class

ToO Status

Contact Scientists

Band

Active Period 2022B 2022-Aug-01 - 2023-Jul-31

Proprietary Period months

Band 3 Minimum

Private Headers

Thesis

Time Accounting

		Program	Partner	Total
<input checked="" type="checkbox"/>	CA Canada	4.2	0.4	4.6
<input checked="" type="checkbox"/>	US United States	6.4	0.6	7.0
<input type="button" value="+"/>	Add partner			
Total		10.6	1.0	11.6

Private Program Note
The headers are private as they will be observing a target that has not been made public yet.

Figure 11.1: The Admin Programs View allows authorized users to modify parameters of existing programs.

particular contact scientist was assigned, why the active period is non-standard, or why a program has private headers.

After making the desired changes the user may click the “Confirm” button at the bottom to save the changes, or “Cancel” to discard the changes. All changes will be recorded in the database with a timestamp and username, and be accessible via Chronicle.

11.2 Proposals View

The Proposals View (Figure 11.2) is used to review and respond to special proposals like Director’s Discretionary (DD) time and Poor Weather (PW) proposals. The toggle selector at the top allows displaying “Resolved” proposals or just the “Unresolved” proposals which are awaiting a decision.

The top table lists all the proposals, and includes the date the proposal was received, the proposal ID, the PI name, the type of proposal, the amount of time requested, and the proposal title. The icon at the left of each row allows downloading the proposal PDF summary.

Selecting one of the lines in the table will show the proposal details below. This includes the abstract and a table of the proposed observations. The observation table shows the targets, coordinates, time requested per observation, the instrument configuration, observing conditions, and whether there are any duplicate observations already in the database.

The proposal may be accepted with all or a subset of the requested observations, or rejected. The time award defaults to the sum of the approved observations, and the proprietary and active periods will default to the standard values for the proposal type.

There is a field for adding private program notes, and at the bottom is a text-entry box to send a response to the PI. The box is pre-filled with boilerplate text based on whether the proposal is being rejected or accepted.

11.3 Change Requests View

The Change Requests View displayed in Figure 11.3 is used to review and respond to Change Requests (CRs) from PIs. The toggle selector at the top allows displaying “Resolved” CRs or just the “Unresolved” ones which are awaiting a decision. The table includes the date the CR was received, the program ID, the PI name, the type of change that has been requested (target, configuration, or constraints), and the program title. Selecting one of the CRs displays the details of the change, including the note from the PI about why the change is being requested. For target and configuration changes it will show whether the change will duplicate any observations already in the database (past or present). There are buttons to approve or reject each change, and a box to enter text that will be sent to the PI when the “Confirm” button is pressed. This box will be pre-filled with boilerplate text based on whether the changes are approved or rejected.

The screenshot displays the 'Admin Proposals View' interface. At the top, there is a navigation bar with 'Admin', 'Resolved', and 'Unresolved' tabs, and a user profile for 'head_of_sciops@gemini.edu'. A sidebar on the left contains three buttons: 'Programs', 'Proposals', and 'Change Requests'. The main content area is organized into several sections:

- Proposals:** A table with columns: Received, Prop ID, PI, Type, Request, Title. It lists three proposals, with the second one, '2022-Aug-04 21:36 2022-P-1236 P. Johnson PW 9.0h Black Hole Masses', highlighted.
- Abstract:** A text block containing placeholder text: 'Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua...'.
- Observations:** A table with columns: Accept, Target, RA, Dec, Time, Config, Conditions, Duplication. It lists three observations for target NGC 1024, 1025, and 1026.
- Decision:** A form with radio buttons for 'Accept' and 'Reject'. Under 'Accept', there are fields for 'Time Award' (6.0 hours), 'Band' (1), 'ToO Status' (None), 'Thesis' (checked), 'Contact Scientists' (astephens, bmiller, kchiboucas), 'Active Period' (2022B, 2022-Aug-01 - 2023-Jul-31), 'Proprietary Period' (12 months), and 'Private Headers' (checked).
- Private Program Note:** A text area containing the note: 'The headers are private as they will be observing a target that has not been made public yet.'
- Response:** A text area containing the response: 'Dear Pat, Thanks for considering Gemini Observatory for your science. This is automatic boilerplate text based on whether the proposal is accepted or rejected.'

A 'Resolve' button is located at the bottom right of the interface.

Figure 11.2: The Admin Proposals View provides an interface for reviewing and responding to special proposals.

The screenshot displays the 'Admin Change Requests View' interface. At the top, there is a navigation bar with 'Admin', 'Resolved', and 'Unresolved' tabs, and a user profile for 'head_of_sciops@gemini.edu'. A sidebar on the left contains buttons for 'Programs', 'Proposals', and 'Change Requests'. The main content area is divided into several sections:

- Change Requests:** A table with columns: Received, Program, PI, Type, Title.

Received	Program	PI	Type	Title
2022-Aug-03 08:09	2022B-Q-1234	P. Carter	Target	Globular cluster abundances
2022-Aug-04 21:36	2022B-Q-2345	P. Johnson	Config	Revealing stellar multiplicity
2022-Aug-05 15:42	2022B-Q-3456	P. Perez	Constraints	Confirming the most distant galaxy
- Note From PI:** A text block containing:

Dear Rene,
 Three of my targets were lost, so I would like to add three similar targets at a later RA.
 Thanks,
 -Pat
- New Targets:** A table with columns: Approve, Target, RA, Dec, Config, Conditions, Duplication.

<input type="checkbox"/> Approve	Target	RA	Dec	Config	Conditions	Duplication
<input checked="" type="checkbox"/>	NGC 1024	02:39:12	+10:50:49	GMOS-S, IFU-R, B600	IQ70, CC70, BG50	
<input type="checkbox"/>	NGC 1025	02:36:20	-54:51:51	GMOS-S, IFU-R, B600	IQ70, CC70, BG50	2022B-Q-1011 [123]
<input checked="" type="checkbox"/>	NGC 1026	02:39:19	+06:32:39	GMOS-S, IFU-R, B600	IQ70, CC70, BG50	
- Response:** A text block containing:

Dear Pat,
 Thanks for submitting a change request. This is automatic boilerplate text based on whether all, some, or none of the changes are accepted.

A 'Resolve' button is located at the bottom right of the interface.

Figure 11.3: The Admin Change Requests View provides an interface for responding to change requests from existing programs.

12. Application Programming Interfaces

We expect that the web-based user interfaces discussed in previous chapters will cover the vast majority of our user's needs. Nevertheless some advanced user requirements and ToO triggering will need to be met with one-off queries, programmatic APIs, or even direct database queries via SQL (albeit for a read-only copy of the data).

In GPP we have chosen to use GraphQL¹ as the query language for all data communication between user interfaces and backend services and between the services themselves. Advanced users can take advantage of the same GraphQL APIs that are used internally. GraphQL is a query language for data APIs. It doesn't limit the user to any particular host programming language and cleanly isolates the consumer of the information from its source.

This chapter explores GPP programmatic APIs in the context of the Browse user interface (§5). Some familiarity with our plans for that application will be helpful before going further, but the idea isn't to teach GraphQL in detail or worry too much about this particular use case per se. There are plenty of GraphQL tutorials online and Browse was chosen because it is relatively straightforward. Instead, the goal of this chapter is to provide an intuition for what it will be like to use our APIs as a data consumer in general.

Browse is a web application that finds programs of interest in the observing database. It allows the user to set up filters and obtain matching program listings, with configurable output. The user interface will provide a collection of commonly needed filters that users may employ to refine their search. The user may configure the resulting listing to show some subset of all the information about a program that may be of interest. Access to advanced filters and complete program listings can be made available via APIs.

This chapter presents the beginning of a plausible GraphQL schema for Browse. It is simplified and might be structured radically differently in the actual implementation, but should serve to get across the general idea.

12.1 What About SQL?

Before we dive into the GraphQL API for Browse it is important to note that GraphQL is not a different, newer version of SQL. SQL makes it possible to structure queries for relational databases. A service might make use of SQL to fulfill its GraphQL queries, but GraphQL services are not limited to database queries (Fig. 12.1). The service might also need to communicate with a different service altogether or perform a complex calculation to provide a response to the client. For example, GPP will have an Automated Guide Star (AGS) service with a GraphQL API. Clients will be able to ask for the best guide star for

¹<http://graphql.org>

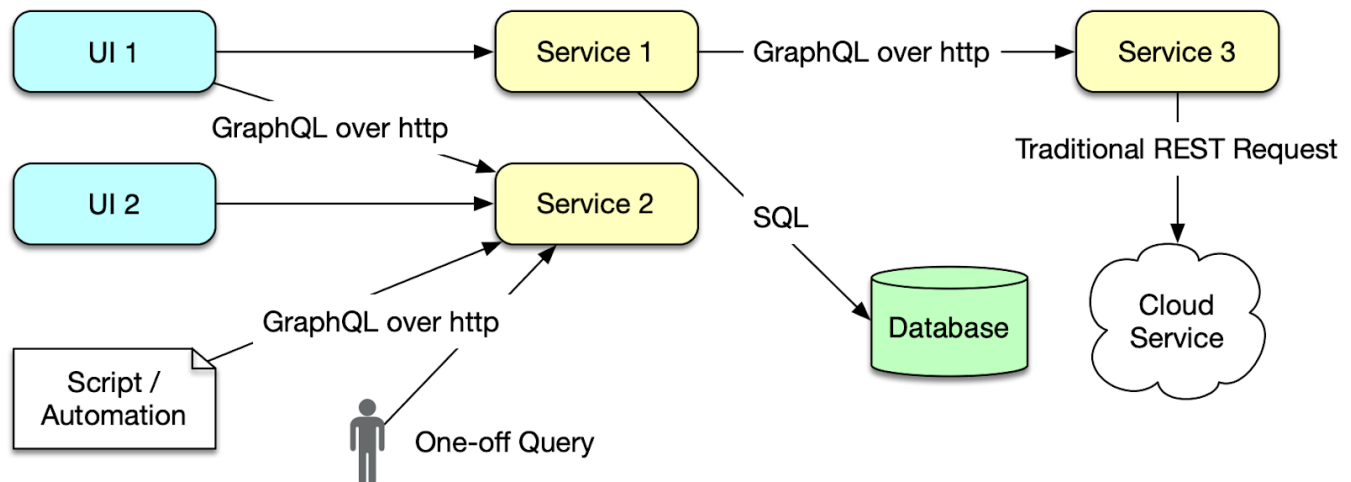


Figure 12.1: GraphQL in the context of GPP services.

a given target and instrument, which will cause the AGS service to query guide star catalogs, evaluate candidate guide stars and select a result. The Explore app will make use of this API, but users may also take advantage of it for their own needs.

The GPP backend is a collection of cooperating services, some of which will have their own database focused on just the service they provide. Providing a single system-wide SQL schema would prohibit this type of distributed design. Just as importantly, the database schema will evolve over time and inevitably break user scripts that depend upon it. We will see how GraphQL offers a more stable API for scripts. That said, for some things an SQL query might be the best approach and we anticipate providing read-only copies of some databases for this reason.

12.2 Example Query

Performing a query involves sending a document describing the expected response and, typically, a collection of query variables. GraphQL doesn't constrain the actual transport mechanism, though usually information is posted over http. The client controls the structure and content of the information that is returned, which helps to isolate it from changes in the underlying service. The next section will show how the requested structure conforms to a schema that describes the entirety of available data.

```

1 query ($filters: FilterInput) {
2   programs(filters: $filters) {
3     pid,
4     pi {
5       lastName
6     },
7     title,
8     allocation {
9       minutes,
10      partners {
11        code
12      }
13    },
14    obsSummary {
15      instruments,

```

```

16     completionPercentage
17   },
18   contact
19 }
20 }

```

We start with a sample Browse query in client code as shown above. It roughly corresponds to at least part of the example query depicted in the Browse document. The bulk of the query identifies the items of interest: program id (pid), PI last name, etc. More data is potentially available from the server (e.g., the science band, ToO status, etc.), but the client fetches only the subset that it needs.

In addition to the structure, the client provides query parameters, which in this case is identified as a `filters`² variable of type `FilterInput`. We'll cover the `FilterInput` type in the Schema section (§12.3). `FilterInput` is initialized apart from the query structure shown above. This makes it easy to reuse the result structure while changing the query inputs. As we'll see in the Schema section there are many potential filters but we only need to include those we're interested in matching.

```

1 {
2   "filters": {
3     "searchString": "Q-10?",
4     "instruments": ["GMOSN", "GMOSS", "GNIRS"],
5     "partners": ["CL", "US"],
6     "completionPercentage": {
7       "minPercentage": 30,
8       "maxPercentage": 80
9     }
10  }
11 }

```

For example this query will only retrieve programs whose id, title or abstract contains a match for the “Q-10?” regular expression, with time allocated by either (or both) Chile (CL) or the United States (US). The programs will have completion percentages of between 30 and 80% and will use GMOS-N, GMOS-S, and/or GNIRS. Other filter options, such as the ToO status are not mentioned and so not considered when fulfilling the request.

When these documents are posted to the Browse service, a matching JSON³ response is generated and returned (showing only the first two results here)⁴:

```

1 {
2   "data": {
3     "programs": [
4       {
5         "pid": "2022A-Q-101",
6         "pi": {
7           "lastName": "Johnson"
8         },
9         "title": "Searching for the Least Massive Brown Dwarves",
10        "allocation": {
11          "minutes": 653,
12          "partners": [ { "code": "US" } ]
13        },

```

²Not to be confused with instrument filters. Here we're referring to query arguments that filter the results. Notice that query arguments are specified as a JSON variable dictionary and so have quoted names and conform to JSON format in general.

³<https://www.json.org/json-en.html>

⁴Lightly edited to make it fit on the page.

```

14     "obsSummary": {
15       "instruments": [ "GNIRS", "NIRI", "F2" ],
16       "completionPercentage": 42
17     },
18     "contact": [ "astephens", "bmiller" ]
19   },
20   {
21     "pid": "2022A-Q-102",
22     "pi": {
23       "lastName": "Perez"
24     },
25     "title": "Observational Characterization of Recurrently Active main-Belt Comets",
26     "allocation": {
27       "minutes": 559,
28       "partners": [ { "code": "CL" }, { "code": "BR" }, { "code": "CA" } ]
29     },
30     "obsSummary": {
31       "instruments": [ "GMOSN", "GMOSS" ],
32       "completionPercentage": 58
33     },
34     "contact": [ "astephens", "bmiller" ]
35   }
36 ]
37 }
38 }

```

12.3 Schema

GraphQL APIs are based on a schema document, describing possible types, operations, and available data. Each service will make a schema available at runtime, enabling generic query UI tools such as GraphiQL⁵ and GraphQL Playground⁶ to present APIs, show the documentation, and permit experimentation with queries before coding them up. In fact, for simple one-off queries there is no need to write any code. Figure 12.2 shows Playground [Q243] opened to a service like the one that would be backing Browse. The user can enter a query, as shown in the upper left panel. While typing, the Playground UI offers suggestions to complete the query, fill in values, or correct errors. Variables can be defined in the lower-left hand panel with the same level of support. Once satisfied, the play button (top center right-pointing triangle) is pressed and the results are shown in the panel on the right.

For automation, queries will need to be scripted but will take advantage of the same schema defining the available data used by the UI and one-off queries. In this section we take a look at an example schema⁷, starting at the highest level where the available queries are specified:

```

1  """
2  The Browse query interface.
3  """
4  type Query {
5
6    """
7    Obtains ProgramSummary for all matching programs in the database. (In a

```

⁵<https://graphql.org/swapi-graphql>

⁶<https://www.graphqlbin.com/v2/6RQ6TM>

⁷Keeping in mind that the schema is for demonstration purposes only. The Browse implementation will make use of a service that offers a complete version.

The screenshot shows the GraphQL playground interface. The top bar includes a search icon, a tab labeled 'programs', a plus sign for new tabs, and a settings gear. Below the bar are buttons for 'PRETTIFY', 'HISTORY', and 'COPY CURL', along with the URL 'http://localhost:4000/'.

The main area is split into two columns. The left column contains the GraphQL query:

```

1 query($filters: FilterInput) {
2   programs(filters: $filters) {
3     pid
4     pi {
5       lastName
6     }
7     title
8     allocation {
9       minutes
10    partners {
11      code
12    }
13  }
14  obsSummary {

```

The right column shows the JSON response, which is partially expanded:

```

{
  "data": {
    "programs": [
      {
        "pid": "2022A-Q-102",
        "pi": {
          "lastName": "Renner"
        },
        "title": "Observational
        Characterization of Recurrently
        Active main-Belt Comets",
        "allocation": {
          "minutes": 4456,
          "partners": [
            {
              "code": "US"
            },
            {
              "code": "CA"
            }
          ]
        },
        "obsSummary": {
          "instruments": [

```

At the bottom left, there are tabs for 'QUERY VARIABLES' and 'HTTP HEADERS'. The 'QUERY VARIABLES' tab is active, showing:

```

1 {
2   "filters": {
3     "searchString": "Q-10?",
4     "instruments": ["GMOSN", "GMOSS", "G
5     "partners": ["CL", "US"],
6     "completionPercentage": {
7       "minPercentage": 30,
8       "maxPercentage": 80
9   }

```

At the bottom right, there are buttons for 'TRACING' and 'QUERY PLAN'. On the far right edge, there are vertical buttons for 'DOCS' and 'SCHEMA'.

Figure 12.2: The GraphQL playground.

```

8     real implementation this would include pagination arguments.)
9     """
10    programs(filters: FilterInput): [ProgramSummary!]!
11
12    """
13    Obtains ProgramSummary for the indicated program, or 'null' if not found.
14    """
15    program(id: ID): ProgramSummary
16
17 }

```

The first query, `programs`, is the one we featured in the previous section. It accepts a `FilterInput` and returns a (possibly empty) list of `ProgramSummary` (defined a little later). The `!` characters indicate that the data will not be `null` in the response JSON document. As noted in the documentation, a production implementation would include pagination parameters so that potentially large results sets can be retrieved in a controlled way.

The second query returns a `ProgramSummary` for a single program. The requested information for a single program might differ from the information required in a program listing. For example, the program abstract is relatively large and only displayed by the Browse UI when a particular program is selected so there's no need to return the abstract for every matching program. Instead a separate query could be made to retrieve just the abstract of the selected program.

```

1 query ($id: ID) {
2   program(id: $id) {
3     abstract
4   }
5 }

```

Drilling down, `ProgramSummary` is a type that describes the available data. When the client creates a query, it must conform to the structure described in the Schema.

```

1     """
2     Public information about a program.
3     """
4     type ProgramSummary {
5       id:          ID!
6       pid:         String!
7       pi:          Investigator!
8       cois:        [Investigator!]!
9       contacts:    [String!]!
10      title:        String!
11      abstract:     String!
12      allocation:   TimeAllocation!
13      obsSummary:   ObservationSummary!
14    }

```

Going one level deeper, the `Investigator` type contains:

```

1     """
2     Investigators have an internal ID and, optionally, a first and last name.
3     """
4     type Investigator {
5       id:          ID!
6       firstName:   String
7       lastName:    String
8     }

```

To get a listing of program IDs and PI last name then, the corresponding query is:

```

1 programs(filters: $filters) {
2   pid,
3   pi {
4     lastName
5   }
6 }

```

Finally we'll turn to the query variable type, `FilterInput`. It contains a series of potential filters that may be of interest. All filters are nullable so that only those needed by the client are specified.

```

1  """
2  FilterInput is a series of filters that can be matched against programs in
3  the database. Only the fields of interest need to be specified. Null
4  fields are ignored (all programs match them).
5  """
6  input FilterInput {
7
8    """
9    Search string is a regular expression that, if specified, must match one
10   of the program id, title or abstract.
11   """
12   searchString: String
13
14   """
15   Programs with a non-zero time allocation attributed to any of the
16   specified partners are matched.
17   """
18   partners: [Partner!]
19
20   """
21   Programs with at least one observation using one of the specified
22   instruments are matched.
23   """
24   instruments: [Instrument!]
25
26   """
27   Programs whose collection of observations have a completion percentage
28   that falls within the given completion percentage range are matched.
29   """
30   completionPercentage: CompletionInput
31
32   """
33   Programs whose collection of observations have a status that falls within
34   the given range are matched.
35   """
36   observationPercentage: ObservationStatusInput
37
38 }

```

When a `programs` query is made, the `filters` variable is specified separately making it easy to reuse the same response structure with different query inputs.

12.4 Schema Evolution

GraphQL is designed to isolate the client and server and allow each to evolve independently. For example, a year after Browse is placed in production we might decide to include some new information in the `ProgramSummary` result, say a planned execution time summary. Existing clients, by definition, will not be referencing this information and so need not be changed to continue working.

On the other hand once clients rely on a particular field, it is never removed from the Schema but may be marked `@deprecated` and thereby hidden from tools like GraphiQL. For example we might decide that a simple `searchString` that applies to the program id, title and abstract is too broad and instead separate filtering on program ids vs. text searches of title and abstract.

We make the following changes:

```

1  input FilterInput {
2
3      """
4      Search string is a regular expression that, if specified, must match one
5      of the program id, title or abstract.
6      """
7      searchString: String @deprecated(reason: "Use programIdSearch or
8      titleAndAbstractSearch instead.")
9
10     """
11     Include programs that match the given regular expression.
12     """
13     programIdSearch: String
14
15     """
16     Include programs whose title or abstract include the given string.
17     """
18     titleAndAbstractSearch: String
19
20     ...
  }
```

Existing clients can still specify a `searchString` that works in the old way but new clients could take advantage of the individual `programIdSearch` and `titleAndAbstractSearch`.

12.5 External API Use

As mentioned in the introduction, GraphQL will be used for internal communication between the different components of GPP. However, these APIs will also be available for staff and investigators with appropriate authentication who need to perform actions not available using the GUIs or who need to interact programmatically with GPP.

Actions that will be possible via the APIs include:

- Querying observatory status and recent history (e.g. open/closed/conditions/available instruments/-ToO status/RA pressure)
- Query for instrument configurations that meet a set of science requirements

- Create, modify, submit, and retract observations
- Query for program and observation information
- Run ITC calculations
- Run guide star queries for given instruments and wavefront sensors
- Upload and download attachments such as ephemerides, mask design files, and finder charts

While GraphiQL and GraphQL Playground make it convenient to try out queries, it is also possible to submit them programmatically. A Python example is given below. Constructing the query and specifying the information to be returned is very different from using the RESTful APIs that many astronomers will be familiar with. We will investigate how to make the APIs as easy to use as possible. We may define some common queries/actions and then allow the users to set the variables. This would be equivalent to defining RESTful endpoints. The Python example below is structured like this. The GraphQL is defined in a function or class and the user just has to provide the values of the variable. Or, we may need to provide an interface layer for converting a simpler format, such as Python dictionaries, into GraphQL. This will be done as part of creating a Gemini plugin for the TOM Toolkit⁸.

12.6 Python Example

```

1 import requests
2
3 headers = {"Authorization": "TBD"}
4
5 # A simple function to use requests.post to make the API call. Note the json= section.
6 def run_query(query, variables):
7     request = requests.post('https://browse.gemini.edu', json={'query': query, 'variables
8     if request.status_code == 200:
9         return request.json()
10    else:
11        raise Exception("Query failed with {}. {}".format(request.status_code, query))
12
13 # The GraphQL query. This could be in a library
14 def browse_query(variables):
15     # A standard GraphQL query
16     query = """
17 query ($filters:FilterInput) {
18   programs(filters: $filters) {
19     pid,
20     pi {
21       lastName
22     }
23   }
24 }
25 """
26
27 # Execute the query
28 result = run_query(query, variables)
29
30 return result
31

```

⁸<https://tom-toolkit.readthedocs.io>


```
32 # Filter settings using a dictionary. This is all the user has to do.
33 variables = {"filters":
34             {"searchString": "Q-10?",
35              "instruments": ["GMOSN", "GMOSS", "GNIRS"],
36              "partners": ["CL", "US"],
37              "completionPercentage":
38                  {"minPercentage": 30,
39                  "maxPercentage": 80
40                  }
41             }
42         }
43
44 # Execute the query
45 result = browse_query(variables)
46
47 # Extract the programs from the result.
48 programs = result["data"]["programs"]
49
50 # For each program, print the pid and PI lastName
51 for p in programs:
52     print(p["pid"] + " - " + p["pi"]["lastName"])
```

13. Use Cases

[Q244]

13.1 Submitting a proposal for spectroscopy of single named target

1. Go to Explore in your favorite web browser (<https://explore.gemini.edu>) (Figure 3.2, page 16)
2. In the Target panel enter the target name and click the magnifying glass to query it's coordinates and spectral type from SIMBAD.
3. In the Constraints panel set the desired conditions.
4. In the Configuration panel select the configuration, e.g. Mode=Spectroscopy, central wavelength, and the desired spectral resolution and S/N.
5. The first entry in the table of "Matching Configurations" is selected by default and the predicted spectrum is displayed in the ITC panel. Check that these are acceptable.
6. Click the "Create Proposal" button in the bottom right corner to generate and switch to the Proposal View (Figure 3.13, page 32).
7. Enter the proposal details, abstract, download the template, and attach the filled template PDF.
8. Check the "Preview" panel and if everything looks good, click the "Submit Proposal" button. [Q245]

13.2 Creating observations of many targets with GMOS-N or GMOS-S

1. Go to Explore in your favorite web browser (<https://explore.gemini.edu>)
2. Import the target list by going to the Targets View (Figure 3.7, page 24) and click the "Import Targets" button at the bottom of the page to import a CSV list of targets. [Q246]
3. Create the first GMOS-N observation
 - (a) Select the Observations View (Figure 3.2, page 16)
 - (b) Click the +Obs button at the bottom left to create a new observation
 - (c) In the Target panel use the pull-down menu to select one of the imported targets (the pull-down is not shown in Figure 3.2 because there is only one target, but the pull-down is visible in Figure 3.16, page 38).

- (d) In the Configuration panel set the mode, central wavelength, desired resolution, and S/N
 - (e) Select the GMOS-N line from the “Matching Configuration” list
4. Create an identical GMOS-S observation by copying and pasting the GMOS-N observation and selecting GMOS-S in the list of “Matching Configurations.”
 5. Put the GMOS-N and GMOS-S observations in an “OR” group by selecting them both – this will give the option to put them into a group (not illustrated) – and then select “OR” (Figure 3.11, page 29) as the group type.
 6. Create identical observations for the remaining targets
 - (a) Go to the Targets View (Figure 3.7, page 24)
 - (b) Select the observation group (GMOS-N + GMOS-S) and type Ctrl-C (or use copy button)
 - (c) Select all the remaining targets with no observations (with shift-click). These targets will be displayed like NGC 1087 (Figure 3.7, page 24) – as a parent target with no children observations. Paste the observation in/on the targets with Ctrl-V (or the paste button).
 7. Change the required conditions for some fainter targets:
 - (a) Select the Constraints View (Figure 3.8, page 25)
 - (b) Click the “+Const” button to create a new constraint and set the desired values
 - (c) Drag the desired observations under the new constraint

13.3 Activating automatically generated observations

1. Open your program in Explore, either by clicking the link in the email from the Time Allocation Committee, or go to the Gemini Dashboard at dashboard.gemini.edu (Figure 4.1, page 40), select the project, and click “Open in Explore.”
2. In the Observations View (Figure 3.2, page 16) the TAC-approved observations will have badges (Figure 3.1, page 15) with the status “Approved” and 3 ticks on the progress bar. If you don’t want to change anything, use the pull-down menu to set the status to “Ready,” the progress bar will advance to 5 ticks (skipping the “For Review” phase), and it will immediately be included in the pool of observations considered by the scheduler.

13.4 Observing at the start of the night

The Conditions Server ingests the published weather forecast and the scheduler generates a queue plan for the night. The night crew opens the Schedule view to see what is in store for the night and the observer dismisses the “New” icon as they review each group of observations. After tuning the primary mirror the telescope operator enters the seeing into Weather (the web interface to the Conditions Server) and Observe displays the updated queue plan.

The first observation in the updated plan is unchanged so the observer switches to the Nighttime view. Clicking the first observation in the elevation plot displays the sequence steps and sets the average parallactic angle. The telescope operator slews to the target [Q247] and the observer selects the first step of the

sequence and clicks the instrument button to pre-configure for the acquisition. Clicking the observation ID opens it in Explore. Clicking the finder chart icon opens the finder chart in a separate window. Clicking the info icon opens the “Observer Info” note from the PI.

The observer can see in the bottom status bar when the guide loops are closed, and when things stabilize they click the “Run Sequence” button. Observe takes the first two steps and then pauses at the automatically placed breakpoints. The observer runs `gacq` to measure and send telescope offsets and then takes the through-slit image. Observe automatically pauses after step 3, and asks the observer if the target has been acquired (Figure 7.3, page 73). The observer runs `gacq` on the image and finds that additional offsets are required so clicks the “No” button and Observe adds another step. [Q248] Observe pauses again and asks if the target has been acquired. The observer runs `gacq` on the new image and finds that the target is centered in the slit nicely so clicks “Yes” and Observe starts the first step of the science.

13.5 Observing during changing conditions

The night crew notices some unexpected clouds approaching in the cloud cameras. They enter their best estimate for the clouds’ arrival time in Weather. Observe pops up a warning notifying them that the observation should be interrupted at the end of the following scheduling block (Figure 7.4, page 75). The observer looks at the alternative plan, agrees, and clicks the button to “Deactivate non-essential steps.” [Q249] About 30 minutes later Observe reaches the agreed upon stopping point and stops with a verbal notification. The button to switch to the new observation activates, and after checking the data look good, the observer clicks it and the telescope operator slews to the new program.

13.6 Observing and encountering a problematic observation

The night crew slews to the next planned observation, but after taking the acquisition image they realize that the field doesn’t match the attached finder chart. The observer clicks “Interrupt” (Figure 7.2, page 71) and in the pop-up window (Figure 7.6, page 77) selects “Starting Now”, checks the “Exclude” box to deactivate the observation so that it is not rescheduled until the problem is resolved, and enters the reason as “Finder chart does not match field.” The scheduler recalculates and Observe shows the new plan as the “Interrupt” option (Figure 7.4, page 75) with the message “An interrupt has been requested. Switch to 22A-Q-301 [27].” with a “Switch” button so the observer doesn’t even need to click in the elevation plot.

Option A. The observer clicks the next observation in the “Interrupt” plan (or clicks the “Switch to 22A-Q-301 [27]” button) and the operator slews to the new observation.

Option B. After flipping the finder chart upside down and backwards it matches the field! The observer clicks “Resume” and simply continues with the original plan [Q250], adding a note to Explore for the next observer, and a note to Chronicle that the observation was not interrupted.

13.7 Observing a Rapid Target of Opportunity

Near the end of a long exposure Observe pops up an alert and verbally announces that there is a rapid target of opportunity that should be slewed to immediately. The observer can see the observation in the

“Interrupt plan” and clicks the “Stop and Switch” button and the telescope operator immediately slews the telescope.

13.8 Observing and missing a calibration

Option A. The observer stops an observation before taking the final flat and clicks on the next observation in the elevation plot to load it. Observe pops up a message warning that the final flat is required.

Option B. The observer accidentally skips over a Telluric standard and loads the subsequent observation. Observe pops up a message warning that a required observation is being skipped [Q251]. The pop-up has two options: “Load Standard” and “Ignore Standard.” The observer agrees that the standard should not be ignored and observes it next.

13.9 Instrument on-sky checkout

The QC uses Schedule (§8) to assign priorities to approved ENTs which are subsequently automatically included by the scheduler. Staff required for the ENT enter their availability in Resource (§9). After performing the instrument checkouts the instrument scientist updates the instrument’s availability in Resource and the scheduler recalculates the plan for the remainder of the night with the instrument included.

13.10 Observing interrupted by a fault

A fault occurs with an instrument and it is no longer available for science. The night crew go to Resource and update the instrument’s availability, and the scheduler recalculates the plan for the remainder of the night.

13.11 Observing during a classical night

The visiting classical observer is granted permission to queue observations from their program in Explore.

13.12 Observing during a Visiting Instrument block

The visiting instrument team is granted permission to access the programs that use their instrument. They may choose to use an automatic queue plan with only their visiting instrument, or they may use the QPT to generate a manual plan, or they may run in “Classical” mode with multiple programs.

13.13 Instrument commissioning

The instrument team will queue observations directly from Explore. [Q252]

A. Acronyms

AGS - Automatic Guide Star - the system that automatically chooses the best guide star.

CR - Change Request - a request from a PI to change some aspect of an approved program.

ENT - Engineering Nighttime Task - an engineering task that requires using the telescope at night.

FITS - Flexible Image Transport System - the file format used for astronomical data.

FoV - Field of View - the angular area of the sky that is instantaneously visible to an instrument.

FPU - Focal Plane Unit - the device in the telescope focal plane that shapes light going into an instrument.

FR - Fault Report - a work ticket to record details about problems and any time lost.

gacq - Gemini ACQuisition - the application used by the observer to center targets in an instrument.

GOA - Gemini Observatory Archive - the public cloud-based archive of Gemini data.

GPP - Gemini Program Platform - the suite of web-based applications for the Observatory Control System.

ITC - Integration Time Calculator - a service that calculates the time required to achieve a desired S/N.

JSON - JavaScript Object Notation - an easy-to-read, language independent, data interchange format.

LTTS - Laser Target Tracking System - keeps track of laser target approvals from Space Command.

M1 - the first mirror - the 8m primary.

M2 - the second mirror - the 1m secondary.

NGO - National Gemini Offices - offices run by each participant that provide local support to users.

ORCID - Open Researcher and Contributor ID - an alphanumeric code to uniquely identify scientists.

OSC - Operations Support Center - the Gemini ticket system for tracking fault reports.

PA - Position Angle - the orientation of an instrument measured in degrees from north through east.

PI - Principal Investigator - the primary contact for a program.

QC - Queue Coordinator - the person who creates daily queue plans for multiple weather variants.

QPT - Queue Planning Tool - the stand-alone Gemini application used to manually create queue plans.

QVis - Queue Visualiation - a tool used to help the QC plan and create a queue schedule.

SED - Spectral Energy Distribution - the amount of light energy as a function of wavelength.

S/N - Signal to Noise - the ratio of the amount of signal compared to the amount of noise in an observation.

SOS - Science Operations Specialist - staff who observe, operate the telescope, and verify data quality.

TAC - Time Allocation Committee - the group that assesses and ranks observing proposals.

TBAD - Transponder-Based Airplane Detector - used to shutter the laser when airplanes get close.

VITRO - Sistema de Visualización de Tránsito Aéreo Oceánico - warns when airplanes are getting close.

WFS - WaveFront Sensor - a device that measures light from a star to calculate guiding corrections.

Questions & Answers

AB = Alan Bridger
JC = Joy Chavez
GG = German Gimeno
BG = Bob Goodrich
IJ = Inger Jørgensen
JW = Jonelle Walsh
SX = Siyi Xu

- [1] BG: You might mention somewhere high up that there is an acronym glossary at the end, in case readers are baffled by some of the acronyms, and didn't fully read the Table of Contents. (page 7)

Answer: That's a good suggestion, and the text has been updated accordingly.

- [2] BG: I prefer the idea of the user explicitly indicating when she/he thinks they have a complete version ("save"). The combination of saving everything yet tagging a state in which the information is complete allowed the best of both worlds. It allows for complex experimentation which can make it difficult to return to a baseline state using a series of "undo" commands. (page 9)

Answer: there are advantages to each - we will need to experiment...

- [3] AB: I agree that committing changes immediately is potentially confusing, I'm glad you propose prototyping and strongly support that. Will some relatively "real" users be able to participate in this stage? (page 9)

Answer: We will organize a group of external users who can start testing as soon as possible.

- [4] AB: General comment: I really like the consistency of look and feel through the views - nice work. Small suggestion: such a consistency can be too successful - perhaps some thought could be given to distinguishing some a more, perhaps by colour (currently a consistent yellow), perhaps a logo? It is a small comment - I like the mockups. (page 10)

Answer: Yes, there should be clear ways to distinguish the apps. We are looking into getting logos for each application...

- [5] IJ: In future incarnation of this diagram, you may want to add shape differences to your stick figures to assist especially red/green color blind readers. You could use one traditionally male, one traditionally female, and one mixed gender figure. (page 10)

Answer: Thanks, that's a good point and the figure has been updated with generic shapes replacing the stick figures.

- [6] JW: Maybe mention the interfaces used by Gemini Staff (blue person in Fig 2.1). (page 10)

Answer: Sorry, could we get some clarification on what is being asked?

- [7] BG: Very nice contextual diagram. This shows, however, that an observer may be interested in a number of UIs, each which may have multiple tabs, and each of which, from the mock-ups, is fairly large. Has consideration been given to effectively managing screen real estate? (pages 5 and 11)

Answer: We have attempted to provide "views" that show all (and only) the information that is required for various tasks, but there is a lot of information that needs to be available. We will keep this in mind during prototyping and testing. If we can find any places where information or interfaces may be consolidated we will take those opportunities. The improved integration should make it easier to switch between apps and tabs.

- [8] SX: Nice figure! I have a few questions: Gemini staff is not the observer? (pages 5 and 11)

Answer: The observer may be Gemini staff, or the PI of a classical program, or a visiting NGO, or a visiting instrument team.

- [9] SX: Can the ITC also talk to the auto guide star service? For example, sometimes an observation is not possible because of the lack of guide stars in a given condition. It will be good to know early on. (pages 5 and 11)

Answer: Explore will give a warning if a guide star is not available in the worst allowed conditions. AGS will select the best guide star for the current conditions.

- [10] SX: How is the "Catalog" for "Auto Guide Star" difference from "SIMBAD", "Horizons" for Target? (pages 5 and 11)

Answer: The Auto Guide Star service will use the GAIA catalog. SIMBAD is used for target coordinate resolution. Horizons is the provider of non-sidereal target ephemerides.

- [11] JW: Will observations be defined at the time of proposal submission, and refined, if needed, after the proposal has been accepted? (I got my answer as I kept reading. I had the current Phase 1 and a Phase 2 procedure in my head when I started to read the document, so it would be good to explain these changes somewhere early on.) (page 10)

Answer: That is correct. Although we emphasize the point here because it is different, the casual user may not notice that observations have been generated at Phase-I.

- [12] BG: Is there an explanation of the difference between proposals and programs? Are programs proposals that have been accepted? (page 12)

Answer: That is correct, programs are accepted proposals, and the text has been updated accordingly.

- [13] AB: How much is user collaboration supported? Can CoIs concurrently edit proposals/programs? If so how is that controlled? Must it always be the PI who edits/submits? (page 12)

Answer: We plan to support collaboration, and any user with sufficient privileges may edit proposals and programs. This is related to whether the editing is "live" or via a "save" button.

- [14] IJ: On your last question - I think not. A CoI has to be able to submit both proposals and prepared observations on behalf of the PI. The latter is used extensively now where somebody else than the PI prepares the observations for execution. (page 12)

Answer: Co-I's will be able to submit if granted submit privileges by the PI.

- [15] IJ: I think this should also include finding proposals (to be submitted or already submitted) to which they have been granted access. We will want the collaborators to work together within the software to develop their proposals. (page 12)

Answer: Agreed. The text has been updated to include proposals.

- [16] JW: Having messages between PIs and contact scientists all in one place would be helpful, especially if multiple people (within Gemini and outside of Gemini) are involved, or if people are brought into the conversation at different stages of program planning or execution. (page 12)

Answer: Agreed, we are exploring options for user communications.

- [17] IJ: Doesn't it also contain the equivalent of the current ObsLog? Can we make that clear in this text? (page 12)

Answer: Agreed. The text has been updated.

- [18] AB: This sentence is a little convoluted. I assume it means that the human user is allowed to enter their own forecast of possible upcoming conditions. (page 12)

Answer: Yes, that is correct. The text has been updated to make it clearer.

- [19] JW: Does this mean weather information at the time of observation will be recorded and accessible to the PI after the observations are complete? (Okay, I got my answer much later in the document. This is great and much appreciated!) (page 12)

☺

- [20] AB: I know that a long-term scheduler is not in scope, but isn't this feature similar? Could it be adapted? (page 13)

Answer: They are related. At first, the simulations will be used by the QCs to pick the best components. We will then work on algorithms for the scheduler to recommend component changes.

- [21] AB: What do non-first time users see? (page 14)

Answer: Non-first time users who have not yet registered will be taken to where they left off, where possible. Registered users will be directed to "Dashboard" where they can select which of their proposals or programs to view, or create a new proposal.

- [22] SX: Would it include the visiting instruments? Does it mean we will have ITC for instruments on exchange partners (Subaru, CFHT) too? (page 14)

Answer: Explore will know about exchange partners and visiting instruments, although without integration time calculators it may not be able to calculate integration times. In these cases the user will need to use methods provided by the visiting instrument team to estimate integration times and enter those times into Explore.

- [23] AB: This description of the lifecycle is useful, but it comes with a description (and illustration) of the UX part too, which I found a little confusing because it is in advance of the description of the Observations View. I think it would read better if the UX part was described later, probably in the Observations View. (page 15)

Answer: Thanks; we have reorganized this as you suggest. See sections 3.1 and 3.3.

- [24] AB: I'm not sure how visually obvious this is without an indication of what "7 bars" means. Without reading the test I might wonder if it meant I had 7 steps to complete an observation description. I'm sure users will quickly get used to it, but then I am not sure what it adds to the drop down indicator. (page 15)

Answer: Thanks for the feedback. We'll look at this carefully during user-testing. We are trying to avoid the situation in the current OT where each observation status has a different color but it is not intuitive what those colors mean or in which order they progress. Another option we are considering is setting the color of the progress bar to match the status color in the OT to provide some continuity for previous users.

- [25] SX: I don't think the progress bar is that useful either... maybe use different colors to indicate different stages? (page 15)

Answer: Thanks; we agree that the progress bar may not be the optimal solution. The goal is to show the progression of observations through their lifecycle. This will be determined during prototyping.

- [26] SX: Is "ready" the new word for "prepared"? (pages 5 and 15)

Answer: These two are equivalent, and either term could be used. "Ready" was used originally and then the term "Prepared" was added later for technical reasons. We can do some user testing to determine which is preferred or clearer.

- [27] BG: What if the proposer has, say, 20 targets, and the TAC allows them time to observe half, but the TAC does not care which half? (page 14)

Answer: ITAC software should pick targets that fill the RA bins, then remaining targets will have a status of "approved" and the PI may choose which to prepare. The scheduler will observe them until the time is used up.

- [28] JW: From the description, it sounds like some targets might not be approved as part of a program. Is that decision made by the TAC, or is the decision made at a higher level due to the RA demands of other approved programs? If it is the later, is it possible for a PI to specify alternative targets that fulfill their science goals as backups or specify some kind of priority list? (page 14)

Answer: That is correct, the TAC or ITAC may reject targets that cannot be scheduled due to RA overfilling or conflicts with other programs. PIs may submit additional targets in the proposal, for example using the "OR" group illustrated in Figure 3.11 to request N observations from the group. PIs may also request target changes after the program has been approved (§3.10.3).

- [29] BG: Is there an ID assigned when submitted? Maybe there is, but it is not the program ID. Until the user logs in, or if the user has multiple programs, how does Explore know which program title and ID to display? (page 14)

Answer: Yes, proposals will be assigned an ID when they are submitted. If the proposal (or program) is not specified in the URL then explore.gemini.edu will redirect to the dashboard where the user may select which proposal or program to open or to create a new proposal.

- [30] SX: What are groups? (page 15)

Answer: This refers to observation groups which are logical associations used by the scheduler (§3.7.1).

- [31] JC: I see one is a “trash” icon. If that deletes a target or group, there definitely needs to be “undo.” It is very close to the copy and paste, and there could be plenty of mis-clicks that could cause headaches. (page 15)
Answer: Agreed - there will either be a confirmation or undo functionality.
- [32] JW: What does the Overview View look like? All the other views (Observations, Targets, Constraints, Configurations) are discussed below. (Okay, later on page 34, the Overview View is described. Maybe make a note here that you’ll be coming back to discuss the Overview View later.) (page 15)
Answer: Thanks; the text has been updated.
- [33] SX: My understanding is that this is still for “Phase I”, do we need this during Phase I? (page 15)
Answer: You are correct, and the “Note for Observer” could be hidden at Phase I.
- [34] BG: Are you missing epoch and equinox? (page 15)
Answer: The target epoch is in the lower-level “Target details” section (§3.4 and Figure 3.7). Non-J2000 equinox was dropped from the OT several years ago and we are not planning on supporting non-J2000 equinox in GPP.
- [35] IJ: Is this required? Thinking of my GMOS MOS observations of very very faint objects, which may or may not be what I think they are. (page 17)
Answer: Automatically generated sequence require either a source brightness (where the number of steps are calculated automatically), or one may change the “Exposure Mode” in the Advanced Configuration panel (Figure 3.3) and specify the exposure time and number of exposure manually.
- [36] BG: Have you considered emission-line objects? In this case, the desired S/N may be in terms of line flux, rather than a S/N per pixel or per Angstrom. (page 17)
Answer: The Integration Time Calculators currently support integrated fluxes over a single emission line. A future ITC improvement will be to calculate a mean or integral S/N over some wavelength range.
- [37] JW: I assume it is possible to upload an emission-line spectrum or specify fluxes of lines for use with the ITC. It might to be good to explicitly say that. (page 17)
Answer: Yes, that is correct - users may upload their own SED or specify emission line parameters. The text has been updated.
- [38] BG: This is presumably for long slits. What about imagers? Can Explore suggest an optimal field angle? Or is this done in the Visualization step? (page 17)
Answer: That’s a good suggestion - Explore should be able to suggest a PA to reach the best guide star (brightest with minimum vignetting). The text has been updated.
- [39] IJ: How does that work for MOS? (page 17)
Answer: The visualization tool will attempt to make it clear that there is a MOS mask in the beam without obstructing the background image.
- [40] JW: Can the user hover their mouse over the image and get RA and Dec information anywhere within the image? (page 17)
Answer: Yes, we will be using Aladin Lite and the RA/Dec at the pointer will be available, and the text has been updated.

[41] JW: This part isn't clear. What is "here"? Isn't "here" the Visualization module? (page 17)

Answer: Thanks for pointing this out – this was supposed to say “the system will recommend the use of a blind-offset star, and the user may add it here or in the Target View (Figure 3.7).” Although this mockup of the Target view does not yet illustrate a blind offset star.

[42] SX: Does it mean the system is built on Aladin? It will be good if it can automatically save a finding chart. (page 17)

Answer: Yes, we are planning on using Aladin Lite for our field visualization feature. It will be possible to export the image to a file. We would need to build support for marking up the image, if that is required.

[43] IJ: This should be disabled for MOS acquisitions. And possibly most direct imaging as well. (page 17)

Answer: That's a good point. The text has been updated accordingly.

[44] AB: Is the image saved too? (page 17)

Answer: In this case we would store any markup or annotations and reapply them, but the image itself will be fetched from an astronomical survey.

[45] BG: Something like this would be useful as an ensemble of all program targets. For example, how many targets are available on any given night (for at least as long as their exposure time). (page 18)

Answer: That's a good idea – we'll look into this during the construction phase.

[46] IJ: Just remember the vast majority of Gemini observations are taken in queue, so it is not a program limitation which targets are available a given night. (page 18)

Answer:

[47] JW: Will users be able to expand the visibility plot? A larger view would help users correctly read off information from the plots. Can multiple targets be added to the same visibility plot? (page 18)

Answer: There's no technical limitation that I know of to adding these features. If they are needed, they can be prioritized and added.

[48] JW: Can some of the constraints be pre-populated based on other information the user has entered? For example, if a user has already specified an LGS AO observation, can the elevation automatically be set to be > 40 deg. Or, if a user has selected a faint tip-tilt star for LGS AO observations, can the sky background be automatically set to gray. A brief note explaining why an entry has been pre-populated would help too. If that is too complicated, at least provide some guidance to the user by having links to relevant webpages. (page 18)

Answer: That's a good suggestion, and this is something that we will try to implement.

[49] BG: ...incomplete thought here. "Percentage" maybe? (page 18)

Answer: Yes, thanks - this has been corrected to say “% signal loss”

[50] JW: The rest of this item is missing. (page 18)

Answer: Thanks - this has been corrected to say “% signal loss”

- [51] BG: The concept of bright/gray/dark has evolved from classically scheduled telescopes. Does it at some point get translated into actual sky brightness (e.g. close to a quarter moon may end up being "bright")? (page 18)

Answer: Yes, behind the scenes these represent percentile limits for sky brightness and they will be converted to mag/arcsec² for the relevant band.

- [52] JC: This will only be offered for Gemini North observations? There is no way to measure this at Gemini South. (page 18)

Answer: At the moment that is true. We are working on being able to measure water vapor for Cerro Pachón, perhaps in collaboration with the Rubin Observatory. If we are not able to do that then we should disable water vapor constraints for Gemini South observations (e.g. fix them at WVAny).

- [53] BG: Spectral resolution (e.g. in Angstroms) or spectral resolving power (ratio of wavelength to resolution)? (page 19)

Answer: Thanks for pointing this out. This was intended to be resolving power "R". However, the goal is to allow the user to specify what resolution they need in the terms that make the most sense for their science - this could be resolving power ("R"), spectral resolution, or velocity resolution. Figure 3.2 has been updated to indicate that there is a pull-down menu that will allow users to select which they prefer.

- [54] IJ: I find this very confusing. If you use resolving power, you also have to define the wavelength at which that applies. Velocity resolution becomes even more convoluted, especially for high-redshift objects. (page 19)

Answer: The goal is to allow the user to specify what resolution they need in the terms that make the most sense for their science - this could be resolving power ("R"), spectral resolution, or velocity resolution. And you are correct that the wavelength must be specified, as this will be used by the ITC to calculate the S/N.

- [55] BG: Velocity resolution is essentially the same as resolving power. (It is just the speed of light divided by the resolving power.) Different types of dispersers tend to have either more or less constant resolving power with wavelength (prisms) or constant spectral resolution with wavelength (gratings). But my point is that what is called spectral resolution in the mock-ups is really spectral resolving power. (page 19)

Answer: Understood.

- [56] JW: In Fig 3.2, this item is listed as 'Resolution'. This should be made more clear by saying either R (for resolving power) or by saying velocity resolution with units (e.g., km/s) after the entry box. (page 19)

Answer: Thanks, this was unclear. The figure has been updated to show a drop-down menu which allows selecting either resolving power ("R"), spectral resolution, or velocity resolution.

- [57] IJ: I hope that is not required. Again thinking of the very faint exgal objects for which the desired S/N is accomplished over 20-60 hours of open shutter time over many nights. (page 19)

Answer: PI's must justify their time request, and this is typically done using the ITC to estimate how much time is required to achieve some S/N. The difference here is that this desired S/N value can also be used to automatically generate the observations - even observations that are 60 hours

long. We think that we will be able to handle this use case but we will need to confirm this with early testing.

- [58] JW: Can a majority of the fields be left blank and will all the matching configurations be displayed? That would allow a user to explore capabilities as a first pass through before setting up observations in earnest. (page 19)

Answer: Yes! The user may specify a few required parameters (mode, wavelength, FPU) to get an initial list of “Matching Configurations” and then specifying additional parameters will further narrow the list. The text has been updated to say this.

- [59] BG: Will guidance be provided if there are no matching configurations? For example, someone who wants AO image quality (specified in the Constraints section) and a 10 arcminute field of view? (page 19)

Answer: If there are no modes that meet the specified science requirements the list of “Matching Configurations” will be empty with a message that there are no instruments that provide the requested configuration.

- [60] BG: Presumably this includes the Constraints (since that is where you would effectively select AO or seeing-limited observations). “Science requirements” here is a little vague. (page 19)

Answer: You are correct that the IQ, Strehl, and Contrast are included, and the term “science requirements” has been removed.

- [61] SX: I think this should be more like “minimum science requirement”, which includes minimum wavelength coverage, spectral resolution etc... (page 19)

Answer: Thanks; this was not very clear and has been reworded.

- [62] SX: It will be good to separate between configurations that are easier to change (like grating) and configuration that are hard to change (like instrument exchange) (page 19)

Answer: Explore can flag less-common configurations.

- [63] BG: Nice touch! (page 19)

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- [64] BG: This also makes me feel a need for an ensemble “efficiency” calculation. Assuming a proposer does not want inhomogeneous data from two different instruments at G-N and G-S, it would be useful to have a metric that tells them which would be a better choice, like total time over the target set for each possible instrument. (page 19)

Answer: That’s a good suggestion, but probably for a future upgrade. If you’re just trying to decide between a small number of configurations, a workaround would be to define those configurations and then import all the targets into each and compare how long Explore predicts for each set of observations.

- [65] BG: Again, resolving power. (page 19)

Answer: Text and Figure 3.3 have been updated.

- [66] IJ: Same comments as above, is this at the wavelength specified? Can you just give the resolution in nanometers, or give both. (page 19)

Answer: Yes, this is at the specified wavelength, and it will be possible to specify either the resolving power (“R”), spectral resolution, or velocity resolution.

[67] IJ: How does that handle extended objects (not in any catalog)? (page 20)

Answer: If the target SED and morphology cannot be deduced from a catalog it will be up to the PI to specify them. We will supply a user interface that provides all the options in the current ITC, roughly mocked up in the “Source” section of Figure 3.7.

[68] IJ: Or when there is simply no way of knowing, or there are many targets, e.g. MOS of very faint targets. (page 20)

Answer: If there are many targets the PI may specify the SED and morphology of a “representative” target. If the target SED and/or brightness is unknown, e.g. rapid ToOs, Explore will not be able to automatically generate the observation based on S/N. However, Explore supports alternate “Exposure Modes” (Figure 3.3) where the user may instead manually specify the exposure time and the number of exposures (and then Explore can automatically generate the observation).

[69] GG: When is this expected to happen? (page 20)

Answer: We expect each instrument mode to be developed in close collaboration with the appropriate instrument scientist. At that time the rules for generating automatic sequences and validating manual sequences should be provided. It is expected that new rules that would be helpful will be discovered over time and added as well.

[70] IJ: How does one define a set of dithered observations with GMOS interspersed with matching flatfields - and with wavelength ”dithers” to cover the CCD gaps? This is a common observing sequence with GMOS. Or is that all done automatically as your next example seems to indicate? (page 20)

Answer: This will be done automatically.

[71] BG: Can the user name a custom pattern? (page 20)

Answer: We hadn’t anticipated naming and sharing offset patterns but it is certainly possible and sounds like a good idea. Depending on user feedback, it might be a feature that would appear after the initial release.

[72] JW: It would be helpful to provide a link to an example input file with the correct format. (page 20)

Answer: The input file format has not been decided (probably just absolute P,Q offsets in arcseconds), but example files will be provided to users.

[73] BG: Why are there no times for flats? (page 20)

Answer: That’s a mistake. Thanks for pointing it out. The figures have been updated.

[74] GG: Is the Acquisition defined only once? (i.e. irrespective of whether the science sequence is split?) (pages 5 and 21)

Answer: That is correct - additional acquisitions (and re-acquisitions for long sequences) will be automatically added as they are needed.

[75] SX: Is this still phase I? Is it a bit too much? (pages 5 and 21)

Answer: Most observing sequences will be automatically generated based on the input parameters, so there is no additional work required by the PI, and we don’t encourage PIs to fiddle with the sequence details at Phase 1. However, if the PI wants to customize the observing sequence, say use a sequence from a previous semester, they may do so.

- [76] JW: Will the above note change so that a user knows they have (purposely or accidentally) modified the standard sequence and that any changes made to the configuration will not update this sequence? (pages 5 and 21)

Answer: Yes, that's a good question. Edited sequences will have this note at the top: "Manually Edited - This sequence has been edited and will no longer reflect changes to the observation configuration. Press Reset to discard changes and restore the link to the configuration." This has been added as Figure 3.6.

- [77] BG: It would be more work, but a visualization of the sequence on a background image of the sky could be useful. (pages 5 and 21)

Answer: The visualization (Fig X) will illustrate FPU and offset positions.

- [78] AB: I could not see where the overheads come into the calculations - or does this mean calibrations? Where would slew time come in? I'm not sure how Gemini's charging model works so this may or may not be relevant. (page 22)

Answer: Overheads have not been discussed, but all overheads are included in order to accurately predict how long observations will take. This includes acquisition (slew + start guiding + center target) and for each step the detector readout, file write time, telescope offsetting, and instrument reconfiguration. The number of acquisitions will be estimated from the total length of the observation and conditions constraints.

- [79] BG: "for execution" or "to be executed" (page 22)

Answer: Yes, thank you - the text has been updated.

- [80] JW: Is there a check at any point by Gemini if default settings are used? Or will there be a technical review as part of the TAC process? (page 22)

Answer: Manually edited sequences are flagged for human validation if awarded time, and PIs may only set them to "For Review", in contrast to automatically generated sequences which PIs may promote from "Approved" directly to "Ready."

- [81] AB: This is potentially dangerous for the user, so there should be a clear warning of the possible consequences. (page 22)

Answer: That's correct, and a "Manually Edited" sequence warning message will appear in this case (see Figure-3.6).

- [82] JC: Where? on the sequence editor? On the top-level instrument configuration? (page 22)

Answer: Thanks - that was not clear. This is now illustrated in Figure 3.6.

- [83] BG: Good concept and implementation. (page 22)

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- [84] BG: A dither pattern may involve changing guide stars for different positions. Has this been given consideration? (page 22)

Answer: We currently don't support changing guide stars mid-observation due to limitations in the Telescope Control System (TCS) and the positional accuracy of the guide probes. The Automatic Guide Star service will select a guide star that is reachable at all (guided) offset positions.

- [85] JW: Is there a way for users to get an idea of how easy or hard it is for their observations to be scheduled based on how they have set up their MSUs? (This was answered later on as I kept reading, and it is a good feature!) (page 22)

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- [86] JW: I'm not sure if I'm following the next paragraph. It's not clear how observations get associated with targets. In the Observation View, the user sets the target and the observing configuration. When clicking on the Target View, the user sees the target and the observation on the left. Can the user create a new target in the Target View and then, also in the Target View, copy the observation box from the first target to the newly defined target? Likewise, in the Observation View, could the user define several observation configurations only, then set up targets in the Target View and somehow associate a certain observation with a particular target? (page 22)

Answer: That's correct! You may completely set up observations in the "Observations View" and then sort, organize and perform bulk edits to Targets in the Targets View (and similarly by constraints in the Constraints View, or by configurations in the Configurations View). Alternatively you may separately define the targets, e.g. by importing a target list, the constraints, and the configurations, and create the observations.

- [87] AB: I like the idea of a "Targets View" complementing the "Observations View". (page 22)

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- [88] IJ: Seems we are missing a description of the finding chart capability. Fig 3.7 looks like the user can upload finding charts and have them displayed, but I cannot find a description in the text. (page 23)

Answer: Thanks for pointing that out. We have added a brief description of the finding chart capability at the end of section 3.4.

- [89] SX: As suggested earlier, would it be possible to feed this into the ITC? (page 23)

Answer: That's a good suggestion for future improvements when we can rewrite the ITCs. We will need to include the wavefront sensors like other instruments. For now we will need to rely on our empirically generated lookup tables.

- [90] JW: It would be helpful to provide an example CSV list with the correct format. (page 23)

Answer: Our existing Phase I Tool permits uploading a target list in CSV (comma-separated), FITS table, TST (tab-separated), and VO Table (XML). That seems like a good starting point but we can adjust as necessary during development and testing. You can see examples of the existing file format here: http://files.gemini.edu/~software/phase1/target_file_examples/.

- [91] AB: Is "better" the correct word? "Better" for whom? Perhaps something like "increases the constraints beyond those approved"? (page 23)

Answer: Agreed – the constraint is not better; the conditions are. Perhaps the correct phrase is "more restrictive." This would apply to less extinction, smaller seeing values, darker sky, and lower water vapor. The text has been updated using this phrase.

- [92] JW: Will there also be a message explaining that the better conditions require approval? (page 23)

Answer: Yes, thanks for pointing that out. The text has been updated accordingly.

- [93] BG: Would "Review" be better, once the program has passed through the TAC process? (page 23)

Answer: While it's true that some of the observation parameters are already approved by the TAC, in this case the target, the issue is that the PI is requesting conditions that are not TAC-approved. This observation must therefore go back to the starting state (New) and be submitted for approval (Table 3.1).

- [94] BG: Very nice. (page 23)

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- [95] BG: Is there an option for tracking strictly at the parallactic angle? (page 26)

Answer: This is not something that we currently support, but it should be possible when guiding with the peripheral wavefront sensor. This is not possible with GMOS and F2 on-instruments wavefront sensors (OIWFS) due to their anti-backlash movements.

- [96] GG: Perhaps quoting (e.g. between parentheses) the required resolution next to the actual one? (pages 5 and 27)

Answer: That's a good suggestion to make it clearer which requirement is not met. There wasn't much room on the line with the resolving power in Fig 3.9, so the warning message has been expanded to give more details. This might also be beneficial in cases where multiple requirements are not met.

- [97] BG: How would you handle "custom" calibrations? As an example, some observers flat-field on Keck's HIRES instrument by looking at lamps shining off the closed metal grating cover. (page 26)

Answer: This would need to be a manually defined observation, at least until it becomes popular enough to be define it as a standard configuration.

- [98] IJ: Good wavelength calibration for GMOS in the far red, requires CuAr taken without a longpass filter in place, to mix first and second order lines. Thus, the instrument configuration for these CuAr does not match the science. I personally think it should be default to do it like this, but is it at least available as an option without making everything manual? (page 26)

Answer: Thanks for mentioning this case. What you describe is certainly possible, however, allowing the user to decouple the instrument configuration in the science and in the daytime calibrations opens the door for accidental misconfigurations. A better solution would be for the instrument team to decide how the calibration should be configured and then all automatic sequences would use that configuration, and alternate configurations would use a manual sequence. That said, creating a new arc observation should be fairly straight-forward; just copy the automatic arc and edit the GMOS configuration.

- [99] IJ: And nighttime flats (for GMOS)? (page 26)

Answer: Nighttime calibrations are built into the science sequence following rules defined by the instrument teams. The "associated" calibrations mentioned here are observations that have traditionally been separate observations that must be kept synchronized with the instrument configuration of the science observation.

- [100] SX: This is great! I want to know more about the calibration service. (page 26)

Answer: The calibration service determines which calibrations are required for a given observation and computes necessary daytime calibrations. It maintains a database of existing calibrations to

support cases where existing calibrations can be reused (e.g., longslit baseline standards, twilight flats, biases, etc). Finally it provides software endpoints so end users and client applications such as Explore and Observe can query required calibrations.

[101] BG: Is the name of the chosen star shown, to allow confirmation that it is adequate? (page 26)

Answer: The standard star will not be selected until the observation is scheduled. That said, there will only be a few candidates for each observation, so they probably could be displayed if that is deemed important. However, it might be better to provide the calibration service with a list of calibrators that everybody will be happy with and a process by which people can suggest changes.

[102] JW: That's useful! (page 26)

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[103] JW: Will there be more specific options - like an A0 V star instead of any A star? Or can the user type in the spectral type instead of selecting from a pull down menu? (pages 5 and 28)

Answer: That's a good suggestion – it should be possible to select a range or list of acceptable spectral types.

[104] BG: Is it possible to nest these? For example, "Observe targets 1 and 2, and any four of the other ten targets?" (page 26)

Answer: Yes! See Figure 3.12 for an example of nested groups.

[105] SX: This is very useful. But I'm wondering how to keep track of the total time used on the program versus the allocated time... Maybe there should be a notification when the time is used up? (page 26)

Answer: The time usage statistics (Allocated, Planned, Used, Remain) are displayed in the "Program Details" section of the "Program View" (Figure 3.14). We can look into sending "Program Complete" notifications.

[106] SX: This feels more like Constraints to me... Is there a way to incorporate this into constraints part? (page 30)

Answer: You are correct that AND Groups incorporate relative timing constraints. In the constraints view (Figure-3.8) when a particular observation is selected (as in the figure), any relative timing constraints in which the observation also participates will be shown with a link to the appropriate editor.

[107] BG: When you authenticate, will your current work still be available? Will you land on the same page you were working on before authentication? (page 30)

Answer: Yes, taking you to a different view after authentication would be frustrating.

[108] AB: From this description I assume Gemini is requiring users to have ORCID accounts? And that is how verification of users is done? What about users without such accounts? (page 30)

Answer: The current plan is to require all users to have ORCID accounts, so users without them will have to obtain them. These are easy to get and have multiple uses (see below), so the burden should be low.

[109] SX: Why specifically ORCID? It looks like a good choice to me. I think successful proposals should link to ORCID, with title and abstract. Maybe future publications can be linked too? (page 30)

Answer: Most users will already have ORCID accounts since they are required for submitting to many journals, including AAS journals. They are easy to get and an ORCID is useful for tracking publications that are derived from the programs, as you say. So, it seems better to use ORCID rather than have require a separate Gemini/NOIRLab account.

[110] SX: I know ITAC software is not part of GPP. But I am wondering how would this interact with ITAC? (page 31)

Answer: ITAC will read proposals from the observing database and return information about how much time each proposal has been awarded along with the list of approved targets and conditions.

[111] BG: Could this end in one GMOS-N and one GMOS-S observation? Is it possible to require that once the first observation is made, the same instrument must be used for the second? (Observer Notes is one way.) (pages 5 and 30)

Answer: Yes, what you describe could be achieved by nesting OR groups. This would be similar to the example illustrated in Figure 3.12, except the top-level group would also be an OR group, and one of the nested groups would contain only GMOS-N observations and the other nested group would contain only GMOS-S observations (see Figure 3.11 for an illustration of OR group details).

[112] AB: Is this word or character limited? (page 31)

Answer: We currently limit the abstract to about 200 words, but it is not strongly enforced. We can support any changes in policy.

[113] BG: It sounds like this does not allow for LaTeX or even any Symbols, like for alpha, beta, etc. (page 31)

Answer: We will investigate the feasibility of supporting, at least, LaTeX math symbols. Unicode math characters in general will be supported.

[114] SX: Would it be possible to copy this cover sheet over for other proposals? (page 31)

Answer: Yes, and we have added a new section (§3.9.1) describing how this could work.

[115] BG: If you want to edit or update a proposal, do you simply "Retract," make changes, and then "Submit" again? (page 31)

Answer: That's correct, and we have added a new section (§3.9.1) describing this.

[116] AB: And if that is the sequence does it retain the same ID? (page 31)

Answer: Yes. We have added a new section (§3.9.1) describing this.

[117] JW: Does this mean the user would have to click on "Submit Proposal" again to re-submit an updated proposal? Who can make changes to the proposal and the planned observations? Just the PI or can the PI add others with editing privileges? (page 31)

Answer: Correct, and we have added a new section (§3.9.1) describing this. The PI may share the proposal and give collaborators edit and/or submit privileges.

[118] BG: Rather than a partner split in hours, would percentage be easier? It is likely more stable across changes that would change the total time. (pages 5 and 32)

Answer: That's a good suggestion that we will look into.

[119] JW: What does the TAC see? Everything? Just the proposal, targets, and requested time? (pages 5 and 32)

Answer: This remains to be determined by the upcoming Proposal Evaluation System Project. We expect that any national proposal system will be able to extract the data that they need using an API. We expect that we will need to create PDF documents of the proposals for the TACs that include observations, time requests, and science and technical justifications.

[120] JC: Will there be a "+" or "add" button to create a new Program Note? (page 33)

Answer: The current plan is to provide a single "General Note" and a "Special Requirements" note at the program level. There will also be a single "Observer Note" field in each observation, e.g. Figure 3.16.

[121] BG: Are the rules for this determination well-defined? (page 33)

Answer: Yes, they are already encoded as errors in Gemini's existing Phase 2 tool and will be ported to the new software.

[122] JC: Is the only way to add a change request? Is there no "+" or "add" button in the Change Requests box to create a CR? (page 33)

Answer: That is what we propose, as it avoids a complex user interface to fully describe the desired change and provides a direct link between the change request and the observation.

[123] SX: Would this go into our helpdesk system or would this be a different system? (page 33)

Answer: Change requests will go to the Head of Science Operations via the "Admin" interface described in section 11. The text has been updated to better explain this.

[124] JC: This figure is the Overview view, not the Change Request panel (which the very next sentence says is not illustrated in the mockups). (page 33)

Answer: Thanks; the reference has been updated to point to Figure 3.14 which includes a placeholder for the Change Request Panel.

[125] SX: Can we separate warning and error? My guess is that we can ignore warnings but not errors. Maybe also separate things for PI and for Gemini staff? (pages 5 and 36)

Answer: Warnings and errors could be separated if that makes things easier to use. We could also sort them separately so that the errors are at the top and the warnings are at the bottom (and each is sorted by observation ID).

[126] IJ: Does this warning show up whenever there is no finding chart? Even if a finding chart is not needed? (page 35)

Answer: This is just a list of all the observations that makes it easy to see which have finder charts and which don't. It will be up to the contact scientist to review the list and decide if there are observations that should have a finder chart which don't.

[127] BG: Will the PI be able to request review explicitly? They may not be able to represent what they want to accomplish within the existing structure, hence triggering an automated review. (Example of flat fielding off a grating cover above.) (page 35)

Answer: One of the goals is to provide an integrated communication mechanism. We can investigate ways to initiate that communication.

[128] JW: Is this done using the Explore application or some other way? (page 35)

Answer: Yes, we envision there will be a mechanism for PIs to say “I think this is okay - please check” and a communication will be sent to their contact scientists.

[129] GG: There needs to be a log of these actions for reference, specially to have a record of the reason behind the override (page 35)

Answer: Agreed. This information will be available in Chronicle, and you are correct that we will also need to store an explanation of why the override happened. We expect that this information will reveal flaws in the implementation of the automated checks that can be perfected in subsequent updates.

[130] SX: What does “send to observe” mean? (pages 6 and 38)

Answer: Good eye! We did not discuss it, however, the “Send to Observe” is one of our ideas on how to manually send observations to the Observe application for execution. This could be used by classical PIs or engineering observations which aren’t included by the scheduler. This option would only appear for users who have appropriate permissions.

[131] SX: In display, what is “current” and “original”? (pages 6 and 38)

Answer: The database makes a snapshot of the sequence when the status is changed to “Ready.” This allows comparison of what was requested with what was delivered. One can switch between the original and current sequences using the “Current’ / Original” toggle switch).

[132] JC: What do these mean? (“[aa][ab][ac][ad]”) (page 37)

Answer: Thanks for pointing those out - they are accidental left-over text from importing the original document and they have been removed.

[133] GG: This is very good. (page 37)

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[134] JC: In order to fulfill P-3 and P-4 of the Operation Concept Document, Undo seems really critical. At least version history associated with each user as listed in P-4 should be part of the Explore. (page 37)

Answer: Changes will have timestamps and usernames associated with them. Explore will also take a snapshot of each observation when it is set to “Ready” (§3.12).

[135] SX: Undo is hard, is it possible to do some sort of version control? I guess it would require Internet to access all this. Can we work on it offline? Is there a way to save a local copy? (page 37)

Answer: Explore will take a snapshot of each observation when it is set to “Ready” (§3.12) so that we can compare the sequence that the PI signed off on with the sequence that was executed. Explore is a web application and requires internet access, so no working offline. It is possible to download a PDF of the proposal, but not the observing sequences.

[136] BG: This is important, as it may influence decisions of implementation fairly deep in the software. This is also an area in which external testing will be useful. Master users will likely not make many mistakes, but novices can come up with all sorts of errors. (page 37)

Answer: Agreed.

[137] AB: I agree full undo support is tricky. It may be worth considering if there are specific areas where it will be very valuable - e.g. with respect to custom sequences where a user may “reset.” Another approach is to allow versioning and/or some level of user tagging. (page 37)

Answer: That’s a good point, though versioning relational database tables brings its own challenges.

[138] SX: Should there also be a phase 3? After the program is completed or terminated? (page 39)

Answer: We could change the status to “phase-3” when program reach their end-of-life (Figure 4.1), however, it might be awkward for programs that only received a small fraction of their data. In practice GPP is only planned to be used through Phase-2, although Explore and Chronicle will provide links to download data from the Gemini Observatory Archive. Phase-3 is open-ended and we want to indicate when the program done from the GPP perspective.

[139] JC: What does this parameter tell us? How does the user determine this - based on the QA state? (page 39)

Answer: “Useful” is a PI-declared value requested on the phase-1 proposal form as a way for the TAC to judge how much “useful” data a proposer has received recently.

[140] JC: Is this shown in this mock-up? (page 39)

Answer: There is a column with check-boxes labelled “Shared.” Enabling sharing (via the checkbox or the “Share” button at the bottom) will open the sharing dialog (Figure 4.2) which allows adding collaborators and assigning privileges.

[141] SX: How would the system handle it if multiple people are editing a proposal at the same time? (page 39)

Answer: All of our applications will be implemented to work with multiple simultaneous users. The application registers itself with the database service and receives events whenever the portion of the proposal that it is editing is updated by another user. If two users change the same data simultaneously, the updates will be serialized and the last writer will win. We developed the precursor of the Observe application, the “Web Seqexec, to handle multiple simultaneous users in this way.

[142] AB: This partly answers my earlier question. But is the “control” (coordination of editing and submission) simply left to the investigators (which could be fine)? (page 39)

Answer: Yes, that is correct. If multiple users have submit privileges then any one of them may click the “Submit” button.

[143] BG: Will the collaborator need their own account, and if so, will the system try to determine whether they already have one, and if not, create one for them? (page 39)

Answer: Each collaborator will need an account in order to work on a proposal. We can determine whether the collaborator email is associated with an existing account and tailor the message they receive accordingly. Whether to create the account before or after sending the invitation will be decided during the construction phase.

[144] BG: That’s nice. (page 39)

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[145] JW: Nice! (page 39)

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- [146] JW: What about the announcements that currently appear on the science operation announcements webpage (e.g., a bug fix in a data reduction package for a specific instrument, or a certain instrument or system like Altair is experiencing problems, etc.) (page 39)
- Answer:** These all seem like good candidates for being included in the “Announcements” section.
- [147] JC: Will this be by email? Or just sent to the dashboard? (page 39)
- Answer:** Phase-1 reminders will be distributed via email. Once time has been awarded reminders and notifications will be distributed via a yet-to-be-decided communication system that will end up in user’s email inbox but will also be available to the program’s contact scientists.
- [148] JC: It will know the deadline of the partner to which the submitter belongs? (page 39)
- Answer:** Yes, the system will know the deadlines of all the partners and which partner(s) have been included in the proposal.
- [149] JC: It sounds more like the current OT Browser than the ”Open” dialog. (page 41)
- Answer:** The difference is that the OT Browser is used to search for observations, while Browse is used to search for programs. For example, in Figure 5.1 Browse lists all the 2022A programs where the program ID matches Q-10? and includes GMOS or GNIRS observations, but it will not tell you any details about the observations themselves.
- [150] JC: The ”Application Programming Interfaces” chapter? I don’t see an ”Advanced Queries” section. (page 41)
- Answer:** Yes, thanks for pointing that out - the text has been updated.
- [151] JC: What is ”Home”? Should this be Dashboard? (page 41)
- Answer:** Yes, that’s correct and the text has been updated.
- [152] JC: Is it possible to make the URL human readable? The URL for the Gemini Archive and fits server make it very clear what the search parameters are, and can be edited later. (pages 6 and 43)
- Answer:** The UI will make use of a GraphQL API that users may take advantage of as well to perform either one-off queries via a generic interface like GraphQL Playground or via their own scripts. We agree that human readable URLs are useful though and will make the query transparent and editable in the URL itself.
- [153] JW: Is there any time period beyond which proposals/programs will disappear from the Dashboard automatically (not because the user hit the delete button)? (page 39)
- Answer:** No, we plan to provide persistent, permanent proposal/program storage. Older proposals can be sorted to the bottom in the listing though.
- [154] SX: What’s the difference between ”completion” and ”useful”? (pages 6 and 40)
- Answer:** “Completion” is just the fraction of used time to allocated time (with a maximum of 100%). “Useful” is PI-declared value that describes what fraction of the data were useful, and this is requested in the phase-1 proposal form as a way for the TAC to judge how much “useful” data a proposer has received recently.
- [155] JW: How are permissions set and changed, and by who? In other words, how does the system know who is a PI and who is an operator, or that a contact scientist is also acting as the queue coordinator for some time period? (pages 45 and 125)

Answer: The details will be worked out in the construction phase, but we anticipate a standard role-based access control system wherein users are assigned one or more roles and specific permissions are associated with the roles. A user with sufficient permission to assign roles will grant and revoke temporary roles for other users.

[156] IJ: I cannot find any place where it explains what is exported and stored in GOA with the science data for the archive users to access and download with the data. (page 45)

Answer: Unless there is a change of policy the information in the GOA will not change. The GPP will continue to provide an API for the GOA to extract the information that it needs, including title, investigators, and abstract.

[157] AB: Given the wide variety of users I assume some operations are controlled by permissions/authorizations. (page 45)

Answer: Correct, specific roles and permissions will be worked out during the construction phase. Operations staff in general will have broad privileges to update time accounting information, quality assessment, etc. See also [Q155].

[158] AB: OSC used here before it is expanded. And not in the acronym list. (page 45)

Answer: Thanks. The Operations Support Center (the Gemini ticket system for tracking fault reports) has been added to the acronym list.

[159] AB: Not in the acronym list (page 45)

Answer: Thanks. Science Operations Specialist (staff who observe, operate the telescope, and verify data quality) has been added to the acronym list.

[160] BG: Does this open up ambiguity as to where the Night Crew should look for information? Would a centralized repository be better? (page 45)

Answer: see next question.

[161] IJ: Seems to me that we should plan to retire the transition wiki at GN completely, and not use plan for the week for transition notes - once the Chronicle is fully operational. (page 45)

Answer: see next question

[162] SX: agreed! I don't think we will need the plan for the week or transition wiki any more...? (page 45)

Answer: Thanks for your input. The goal is to consolidate information and reduce the number of tools that staff need to use. It seems like Chronicle is a good candidate for the single location for recording daily activities, but we will discuss this with the staff at each site to better understand how the current tools are used and what new features Chronicle might need to replace them.

[163] SX: what is that? is it some sort of version control? (page 46)

Answer: The idea is that Chronicle will record changes made to programs, along with the time and user who made the changes. This is briefly mentioned in section 6.10.

[164] AB: Is much of this info automatically harvested from the control system (events/logs)? OK, this seems to be answered later. (page 46)

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- [165] SX: Would it be possible to get some information about what other telescopes on the mountain are doing? It might be a specific case but it definitely has happened to me several times when I was doing high resolution spectroscopy with Keck and Gemini/Subaru were using the laser. I got strong Na D lines in my data and I thought I found some alien signatures... (page 46)

Answer: The Laser Traffic Control System (LTCS) is used by telescopes on Maunakea to automatically communicate where each telescope is pointed and which telescopes are propagating lasers in order to prevent the contamination that you describe. It might be interesting to check the LTCS logs from the time of your observation.

- [166] JC: So, it seems "Home" does mean dashboard. But the chapter title is "Dashboard." I think it should be more consistent. (page 46)

Answer: Agreed - the text has been updated.

- [167] JC: Why have another communication medium? Applies also to section 6.1, under "Day Crew, Day SOS. . ." It should be one or the other. I don't have a preference, but there should only be one official place to make transition notes to the night crew. (page 47)

Answer: see next question

- [168] JW: This is the second time the Transition Wiki at GN and Plan for the Week at GS has been mentioned. Is this something that could be incorporated into the GPP? (page 47)

Answer: It does seem like Chronicle is a good candidate for the single repository or information that is currently stored in the Transition Wiki and Plan for the Week, so we will discuss this with the staff at each site to better understand how the current tools are used and what new features Chronicle might need to replace them.

- [169] BG: Is the daycrew expected to use this interface, or does the daycrew entry come from some other source? (I am thinking that the daycrew will have a separate interface that manages maintenance work, daycrew staff assignments, etc, that may be a more natural interface for them.) (page 47)

Answer: The daycrew currently use the Transition Wiki at GN and the Plan for the Week at GS. We will work with the daycrews at both sites to make sure that the Chronicle interface is easy to use and fits their needs.

- [170] JW: What is the type column? (pages 6 and 48)

Answer: The "Afternoon" view includes primarily calibrations, and the "type" is either flat (F), arc (R), dark (D), or bias (B). The icons used in Figure 6.1 are just an idea, and if there is sufficient space it may make sense to just spell out the words.

- [171] SX: It's a personal preference but I prefer to have a bit more structure and fewer free style text. For example, DaySOS should be able to select which set of instruments are ready for the night. They only need to type something if there is anything unusual. (pages 6 and 48)

Answer: We will discuss this with the staff at both sites to determine the best way to enter and present this information. In the future, Resource (§9) will allow setting which instruments are available for a given night, making comments like the one at 15:35 in Figure 6.1 unnecessary.

- [172] BG: Are overheads tracked as well? (Slewing, calibration, ...) (page 47)

Answer: Chronicle will track the times charged to "acquisitions", which includes the time for slew and centering the target. However, that's an interesting suggestion to track slews and calibrations independently. We will investigate adding granularity to the tracking during implementation.

- [173] SX: How would the system know it is closed due to airplane/satellites and not weather? (page 47)
Answer: The Laser Target Tracking System (LTTS) knows when the laser is shuttered due to satellites, and TBAD (Transponder-Based Airplane Detector) and VITRO (Sistema de Visualización de Tránsito Aéreo Oceánico) track shutters due to airplanes. The night crew will be responsible for declaring time lost to weather.
- [174] BG: Does either a weather event or a fault make an assumption that time lost should start at the start of the current exposure? A simple button to do this may be useful. (page 49)
Answer: Yes, if we do time accounting like now, which is the default, then the QA and time accounting is done on the unit of the exposure (while accounting for acquisition and time between exposures). So, if an event happens in the middle of an exposure, then the time for the entire exposure get charged to the event.
- [175] SX: Would "failed" data go to the archive? (page 49)
Answer: Currently failed data is transferred to the archive but they do not appear in normal searches.
- [176] SX: For those PI-readable comments, will they become public once the data become public? Might be useful for future archival users. (page 49)
Answer:
 All observing log comments are publicly available in the GOA and we expect this will continue to be the case with Explore.
- [177] JC: Will the descriptive text be passed on to the Conditions Server? Or only the IT/Extinction entries? (page 49)
Answer: Yes, it could be useful to have the comments in the conditions server, as they might say something about how the measurement was made, e.g. from a spectral crosscut.
- [178] JC: I see 5 buttons. And 5 buttons are listed in the bullet list. (page 49)
Answer: Yes, thanks.
- [179] GG: Five actually? (page 49)
Answer: Yes, thanks.
- [180] BG: Data collected during a fault are considered "Usable?" (page 52)
Answer: see next answer
- [181] SX: I agree that the word choice of "usable" is not very intuitive (page 52)
Answer: see next answer
- [182] BG: "Usable due to weather" seems odd. A state of "Unusable due to weather" makes more sense to me. Should we be reading "Unusable" for "Usable" in this section? (page 52)
Answer: The current description of the QA states is at <https://www.gemini.edu/observing/phase-ii/ot/ot-description/detailed-element-editor>. We need to describe three levels of quality. Pass is clear. Fail is for data that is so bad that they are not useful for anything (e.g. the shutter didn't open, 100% saturated). "Usable" is the term that we came up with for the middle ground. It does not pass, so it will be redone, but we will archive it in case someone might have a

use for it. These terms are written into the FITS headers and users do need to understand them. Maybe we should have chosen better terms originally but we've got 20 years of data using them so it will be hard to change them now. However, we can improve the wording for the reasons why the states have their values. We agree that the current wording could cause confusion. An alternative could be "Not pass due to weather" instead of "Usable due to weather". We will reconsider the phrasing.

- [183] IJ: Usable means the data do not meet PI requirements, but could be used for other purposes. Gemini lingo - sorry. (page 52)
- [184] JC: Why have a new "Usable" QA state? There is rarely another reason to have it "Usable". If it is due to an instrument problem, that is usually a Fail. Are there enough instances of "Usable - not weather" to justify a new category? This will also involve changing the headers since the QA status is currently coded in a bit of a convoluted way. (page 52)
- Answer:** This is not a really a new QA state, but rather a description of why the dataset is Usable rather than Pass so that the system can correctly categorize the time loss. The text has been updated to reflect this.
- [185] GG: Conversely, if the science is usable (or fail) any associated acquisition or calibration should be set usable (except 'shared' calibrations like F2 tellurics for example) (page 52)
- Answer:** Yes, we would follow the policy on this, and the text has been updated.
- [186] JW: So anything with a QA state of pass is charged to the program or partner, and anything with a QA state of usable is not charged time? (page 52)
- Answer:** Correct.
- [187] BG: Another view you might consider would be a timeline over a few years, showing some of the metrics in Fig. 6.7 (perhaps selectable, so the plot does not get too busy). This allows long-term trends in, for example, fault time to be visualized. (page 55)
- Answer:** That's a good suggestion, and the "Custom" time period in Fig. 6.7 will allow arbitrary date ranges. We are also planning on generating semesterly reports of telescope time usage, and longer term reports like you describe may also fit in here.
- [188] JW: How long of a time period can custom be set to? (pages 6 and 57)
- Answer:** There is no limit.
- [189] JW: Is the Summary by program view available to PIs to look at for their own programs? (Actually this was answered later on, and is a great feature.) (page 55)
- ☺
- [190] JC: Will it be possible to see who wrote the comment in this view? It should be obvious to distinguish between the observer and the DaySOS. (page 55)
- Answer:** The author of every comment is recorded. We had not planned on displaying it in this view (Fig. 6.9), but it is easy to add if it will be useful.
- [191] SX: What if it is partially out of constraint? (page 55)
- Answer:** There will most likely be a buffer for each parameter, so that even if one is slightly out of spec the data will still pass (as we do now).

[192] SX: Would there be a way to compare planned time with the actual execution time? It will be helpful to feed into future planning. (pages 6 and 58)

Answer: Yes, this is displayed in the Time Accounting Views (Figures 6.10 and 6.11) under the column headings “Planned” and “Charged.” It will also be possible to query the database to extract, for example, all the GMOS MOS acquisition times.

[193] BG: ...and the comment? If the QA state later changes, does that change propagate into the FITS header? (page 55)

Answer: We currently do not write comments into the FITS header.

[194] AB: Fault Report? (page 60)

Answer: Correct. The acronym list has been updated.

[195] SX: It will be good to have the program ID in the ticket too (pages 6 and 63)

Answer: It should be possible to list the programs affected by each time loss event if that will be useful. Figure 6.12 has been updated to show how this might look.

[196] JC: What kinds of irregularities and discrepancies will it look for? An acquisition that took x% longer than the nominal time? (page 60)

Answer: Chronicle will be able to flag observations where either the total charged time or the acquisition took significantly longer than planned. This will help QCs find over-charges that should be corrected and overheads that are poorly estimated.

[197] JW: I don’t think I see that in Fig. 6.10. (page 60)

Answer: It is not as obvious as it could be – the identity of the editor is “obs_joe” in the column labeled “End”. We will try to make this clearer during construction.

[198] BG: On this view, why does the detector crash at 22:07 not show up in the timeline? What is FR-40936 in the timeline, and how does it relate to the table (23:04-23:30)? (pages 6 and 59)

Answer: Thanks for pointing out those discrepancies; there were some modifications to the table detail to illustrate various features which weren’t propagated into the elevation plot. We’ll try to make these more consistent in future versions of the figures. FR-40936 is a fault report illustrated in Figure 6.12.

[199] JC: From Section 2.1.2 of the Software Conceptual Design, the execution tool could also take input from the observer (weather, comments). Is that all being moved to Chronicle? (page 66)

Answer: At this stage we are planning on entering all time-stamped information into Chronicle, although the Weather application described in section 10 may also be used to enter and access details and predictions about the conditions. This may change as things develop during the construction phase.

[200] JW: Would the manual mode be used for classical and priority visiting nights? Can a user easily switch between the two modes? (page 67)

Answer: That is one option, and it is easy to switch using the toggle button at the top of the Observe interface (e.g. Figure 7.1). However, note that “auto” mode does not mean that the observer must follow the suggested queue plan – the observer is always free to execute any observations they like using the “Send to Observe” button (displayed in Figure 3.16, but not discussed). The scheduler will also know which nights are classical or priority-visitor and will populate the queue plan with

observations from the classical or PV program if the conditions are appropriate. The classical or PV observer may choose to follow the automatic queue plan or execute different observations if they prefer.

- [201] JW: How are the goals defined? For example, maybe an instrument is having issues suddenly during the night and the new goal is to avoid the instrument and complete the highest priority programs. (Okay, I read later about the Resources interface, which would take care of the scenario I described above. But, my general question about how a goal is defined still remains, unless there is only ever one goal and that is to complete the highest priority programs.) (page 67)

Answer: The scheduler algorithm is complex, but the primary goal is to complete the highest-priority programs over the course of the entire semester taking into account all the constraints, the predicted likelihood of conditions, and the overheads associated with splitting observations. The algorithm is under development and will be part of the scheduler review later this year. It will also be reviewed by the STAC and then made public.

- [202] SX: do we need to see the executed observations? The executed observations might not be in this specific variant anyway? (page 68)

Answer: That’s an interesting suggestion. The user may zoom (using the + magnifying glass button at the bottom left of the elevation plot in Figure 7.1) and scroll if they wish to see only the future observations. It may also be possible to allow zooming and auto-scroll (like the LTTS) if that is a desirable feature. Note that there is no “variant” as the scheduler will only pick observations which meet the conditions.

- [203] BG: You might consider being able to collapse the ”Executed” section. (For those forward-looking people who are not interested in history.) (page 68)

Answer: That’s a good suggestion. The current idea is to auto-scroll the detail section while keeping the elevation plot fixed at the top (which will effectively hide the executed section), but we will consider adding a collapse function during construction.

- [204] GG: Would be useful to keep a ’snapshot’ of the plan at the start of night for reference - for example many times there are observations that require several visits during the same night (page 68)

Answer: There will be a record of what was observed in the elevation plot at the top, so the observer can always see what happened, and the scheduler will prioritize observations that require multiple visits. We will consider a snapshot if the QCs and observers find it useful, but the plan may be so dynamic that an initial snapshot might not be that relevant.

- [205] SX: Another idea is that maybe you do not need to populate the whole night. Maybe a plan for the next 2 hours is sufficient (page 68)

Answer: The scheduler algorithm is still in development, but the plan is to optimize the entire semester in order to achieve the best completion over all bands.

- [206] IJ: Or maybe the volatility needs to be addressed to not overcorrect every little change along the way. (page 68)

Answer: Agreed – The scheduler will need to take into account the variability of conditions and execution times. We are evaluating conditions statistics in order to quantify the variability. As you say, we need to make the scheduler sufficiently “conservative” that it isn’t making new plans with every small change. For example, it can use a running average of recent conditions rather than the latest measurement.

[207] JW: Is there a way to dampen the volatility? Regardless of whether the observer needs to explicitly dismiss “new” tags or not, it sounds overwhelming and frustrating to have the plan constantly changing dramatically since observers need time to look over a program’s observing strategy and notes before going to the target. (page 68)

Answer: Agreed – If the conditions are stable and there are no ToOs the plan may not change all night. Alternatively if the conditions are variable with many ToOs the scheduler will need to adapt the plan to compensate. This is better than requiring the observer to figure out how to transition between static plans for different weather conditions, but this is definitely something that we will need to consider in the development of the scheduler algorithm. Also, see the answer to the previous question.

[208] JC: Is there a way to send multiple sequences to the TCC? If the observer just wants to see the sequence steps (without sending it to the Engage), can they only do that in Explore? It seems good to keep the functionality of viewing something without committing to sending it to the operator. (page 70)

Answer: That’s a good question that needs to be decided. One implementation option would be that selecting an observation in Observe will add it to the session queue (like queuing an observation in the OT does now) so that the telescope operator can import it into Engage (if they want).

[209] JC: There was no mention of this in the Explore chapter. (page 70)

Answer: Thanks for pointing that out. The button label has been updated to “Send to Observe” and a brief discussion has been added to section 3.12.

[210] GG: What about the “Override” button? while this is not frequently used, sometimes is useful for engineering. (page 70)

Answer: This is important, and the subsystem overrides are briefly mentioned at the end of the “Daytime View” section (§7.11).

[211] BG: Can you preconfigure an instrument other than the one you are currently using? (Use case: you are going to switch instruments, on the current target [no slew time to cover instrument overhead], after this sequence, and you want to get the new instrument into the correct state.) Related: can you preconfigure a different instrument AND take internal calibrations with that instrument while a sequence is running? (page 70)

Answer: That’s a good idea, but currently no. We are hoping to support running internal calibrations while taking science observations with another instrument in a later version of Observe.

[212] GG: Is the Acquisition defined only once and ‘re-used’? (i.e. irrespective of whether the science sequence is split ?) i.e. what happens when re-acquisition is needed in the middle of the observing sequence, due e.g. to the target drifting off-slit? (pages 6 and 71)

Answer: Acquisitions are automatically placed at the start of every visit. Re-acquisitions will be automatically placed after a specified period of time for the configuration, and the observer may move the re-acquisition steps earlier or later, or even skip them if they desire. Ad-hoc re-acquisitions will probably need to be added using Explore.

[213] SX: In addition to the timing window, I think it will be useful to list the whole time range acceptable for this observation from airmass constraints, SB constraint, etc. similar to the current QPT (pages 6 and 71)

Answer: This is displayed in the Schedule View (Figure 7.1) but could be added to the Nighttime view (Figure 7.2) as well.

- [214] JW: If the observer is just adding more steps to the acquisition, do they need to go to Explore? (This was answered later on too...) (page 72)

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- [215] JC: I don't think this functionality is bad, but I don't see the reason for it. Is the science or on-sky calibration ever different than the acquisition? It is good for Observe to check the status (just like all the other mechanisms) before proceeding. But I don't see much need for Observe to change this. I guess it is good to give Observe control over this just like it can move the science fold and other mechanisms. (page 72)

Answer: The current Tcl and web seqexecs do not consider the position of the M2 baffles, and sequencing the baffles has been a long-standing request. This would greatly simplify taking observations that request different positions inside the science sequence (e.g. K-band + L-band), and minimize instances of taking data with the baffles in the wrong position.

- [216] BG: Good. (page 72)

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- [217] AB: Same as Minimum Schedulable Units? If so would be good to use consistent terms. (page 72)

Answer: Agreed. The text has been updated.

- [218] BG: If you split a set of observations into two, but there is only one calibration exposure, does that calibration get automatically duplicated to be included in both subsets? (page 72)

Answer: The idea behind the minimum schedulable units is that each unit is self-contained, so as long as the observation is split between units all the calibrations are included.

- [219] AB: Be aware of red/green colour blindness (and similar/related conditions, and not just in this case) (page 72)

- [220] BG: "Yellow if too good", but two paragraphs below describe yellow as "degrading conditions." (page 72)

Answer: I see what you mean, and we may need to work on our color scheme. The intention was to use the yellow message background when the conditions have changed for the better or worse (Figure 7.4) and a red background when there is a ToO (Figure 7.5).

- [221] BG: The "Timing window ends" is a nice reminder, but could it use a "Current time is" to compare with? (pages 6 and 75)

Answer: We could display the current time or mark the timing window boundary in the elevation plot / timeline. Also note that if there is any delay that makes it such that this observation cannot be completed by the end of the timing window the scheduler will recalculate the plan and give instructions to stop at the end of the last scheduling unit before the timing window ends.

- [222] AB: I was slightly confused by this statement: I assumed for most rapid ToOs it would already be in nighttime view? (page 74)

Answer: The observer will probably be looking at the Nighttime View. However, for cases where the observer is looking at any of the other views we want to switch so that the rToO alert is visible.

[223] JC: I don't understand this notation. (“[s][t]”) (page 74)

Answer: Thanks, that was left over from importing the original document and has been removed.

[224] SX: Some rTOOs actually can wait a bit. Maybe we should let the rTOO PI specify if they need it asap or it is OK to slew after the current observation finishes (pages 6 and 76)

Answer: Yes, we will be discussing how to redefine the types of ToOs. For certain it will be possible for the submitter to specify explicitly whether an interrupt is required or not. This will be done with the ToO type or a flag, not with notes as is the case now.

[225] JW: Does checking “exclude” mean the observations are deactivated just for that night, or will they remain on the excluded list indefinitely until the issue has been addressed? If it is the later, will the PI automatically receive notification that their observation has been deactivated? (page 77)

Answer: “Excluded” means that the observation was attempted but had a problem that prevented it's execution, and the problem must be addressed before it will be reattempted. A notification will be sent to the contact scientist and/or PI who can resolve the problem and reactivate it. The text has been updated.

[226] JW: Does it keep track of and remove duplicates? For example, if two programs want the same calibrations in the same observational setup is only one set taken? (page 77)

Answer: Yes, Observe will use the Calibration Service to compute the required set of calibrations. If a single calibration can be shared by multiple programs it will not be repeated.

[227] BG: Does it provide an estimate for when the calibrations will be done? This is especially of interest to daycrew, if they are otherwise prevented from starting some tasks. (page 77)

Answer: That's a good suggestion and the text has been updated to include it.

[228] AB: What does ”reserved” mean in this context - controlled or just operational norm? (page 79)

Answer: The intent was that this would be the operational norm. Each “view” is activity oriented, and we are just emphasizing that the Schedule “Tonight” view is meant to provide everything the Queue Coordinator needs, and Observe is meant to provide everything the observer needs.

[229] JC: It would be nice to seem more in depth how this will be handled. Will consider only who is available in the day? or also who is working at night? For scientists and SOS, and GN engineers, the schedules look detailed enough to gather the necessary information. But the GS eng schedule looks pretty sparse. Will this be manually entered? (page 82)

Answer: Currently the staff availability component of Resource is only envisioned as a way to inform the scheduler. For example, Engineering Nighttime Tasks (ENTs) may require the presence of certain staff. If those staff enter their nighttime availability into Resource then the scheduler can include the ENT into the queue plan when all the required staff are available.

[230] BG: Is there a concept of due dates for masks? (E.g. PI-mode night, or last visibility of the field, ...) (page 83)

Answer: Yes, they need to be submitted at least two weeks before they will be used. We can send reminders for classical and priority visitor programs with known run dates.

[231] BG: Presumably this is only useful when the absolute brightness of the target is well known. More likely is that the WFS stars are well known. (page 84)

Answer: The QAP measures the extinction and seeing from catalog stars that are in the imaging field of view. Using the WFS star is another option, but currently we can measure only relative changes to the extinction and seeing.

[232] SX: Right now, QAP relies on imaging observations. What if we don't have any images for this? (page 84)

Answer: We hope to incorporate seeing measurements from the weather tower, but we will need to rely even more heavily on the night crew to extract and input as much information as they can from the sources that they have available, e.g. spectral crosscuts, WFS guide counts, WFS seeing measurements, etc.

[233] BG: Some of these sound like their import could be automated. (Examples: extinction estimates from WFS, SkyProbe measurements) (page 84)

Answer: These are some of the things that we will investigate during the construction phase.

[234] BG: Cool! (page 84)

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[235] GG: Indeed this is a nice feature (page 84)

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[236] SX: Does it mean the observer will adjust the exposure time? (page 84)

Answer: The observer can adjust the exposure time if needed, but the near-term goal is that the scheduler uses the actual conditions to determine the exposure time for standard star observations. The long-term goal is to support using S/N as a constraint, in which case the scheduler could also adjust the exposure time and length of science observations.

[237] BG: Thank you! (page 86)

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[238] SX: Should we think about collaborating with other observatories on the mountain to share some information? (page 86)

Answer: That would be great if we could collaborate, and this is something that should be looked into during the construction phase.

[239] SX: Would all Gemini staff have access to admin interface or not necessarily? (page 87)

Answer: Only staff with roles that require it, e.g. the designated Heads of Science Operations, will have access to Admin.

[240] BG: At the start of an observing period, how do you assign contact scientists to each proposal? It looks like the Admin view is one proposal at a time, and the Resources view does not seem to offer this capability. (page 87)

Answer: This is currently done as part of the process of importing programs into the database, so there will need to be some mechanism for doing this.

[241] BG: I don't believe anything has been said about how a proposer requests a non-default proprietary period. (page 87)

Answer: It is fairly unusual to request a non-standard proprietary period, but we will look into providing a mechanism for it. Initially the proposer can put this request in the essay section of the proposal or email the relevant heads of science operations. A staff member will be able to update this manually.

[242] BG: Again, would percentage be more useful (and robust, so that if a program only gets 80% complete, the partner percentages remain the same). (page 87)

Answer: Times are displayed per partner, but incomplete programs are charged as you describe (a percentage of the total award).

[243] BG: Is Playground on the server side, or do users need to install something? (page 95)

Answer: There is nothing to install. The user simply points the browser to the associated URL and is presented with a UI for entering queries. You can try it now with a demo service at <https://www.graphqlbin.com/v2/6RQ6TM>.

[244] BG: I love this section. (page 102)

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[245] JW: Will there be some kind of validation check to make sure everything that needs to be set is set before the user is able to click submit? (page 102)

Answer: Yes, the “submit” button will only become active after all the information has been entered and there are no errors detected. However, if subsequent edits introduce an error the proposal will be retracted until the errors are resolved, and this is something that we will need to make clear.

[246] BG: What is or can be in this list? Is target names only OK, but also target names plus RA, Dec, epoch? (page 102)

Answer: This is TBD, but it will probably work similar to the current Phase-I Tool target import¹ where the required columns are Name, RAJ2000, and DecJ2000, and optional columns include proper motion, and brightness. We may be able to support importing a list of only target names if that is desirable.

[247] BG: Do you have the concept of unwrapping the telescope’s azimuth cable wrap? If so, is there a way of recommending when to do this, and to select an “unwrap?” And when an observation will not be able to track long enough to avoid reaching a wrap limit? (page 103)

Answer: Yes, and this is handled by the TCS interface software when slewing to a target.

[248] BG: I’m unclear on what, if anything, changes before or during this added step. Presumably it is not just repeating the previous unsuccessful actions. (page 104)

Answer: Sometimes acquisitions may require a bit of iteration. When the observer replied that the target was not acquired that means that the centering is not good enough and another iteration of measuring and applying offsets is required. The text has been updated to make this clearer.

[249] BG: Should the clouds stall in their approach, is it easy to reactivate the deactivated steps? (page 104)

Answer: Yes, the “Deactivate non-essential steps” button will toggle to “Reactivate steps.”

¹<https://www.gemini.edu/observing/phase-i/pit/pit-description#Targets>

- [250] BG: This means slewing back to the initial target, and possibly reconfiguring anything that was changed to the alternate observation? (page 104)

Answer: The document was trying to describe two different paths (and we have tried to make that clearer): Option A where the target cannot be found and the observer switches to another observation, and Option B where the finding chart is deciphered before the slew and the observer continues. However, you are correct that if the telescope operator has already slewed to the new target then they would need to slew back and reconfigure.

- [251] JW: After getting the warning message, can the observer chose to actually take the calibration? (page 105)

Answer: That’s a good question, and we have followed the use case farther to answer it:

The observer accidentally skips over a Telluric standard and loads the subsequent observation. Observe pops up a message warning that a required observation is being skipped (§13.8). The pop-up has two options: “Load Standard” and “Ignore Standard.” The observer agrees that the standard should not be ignored and observes it next.

- [252] JW: The GPP seems to do everything! Great job. (page 105)

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- [253] SX: How does GPP fit into the NOIR Lab’s vision? Other observatories in NOIR Lab might need similar tools for their operations.

Answer: There have been initial discussions about using GPP for the US ELT projects and as the basis of a general NOIRLab queue system. However, our current project plan does not make any assumptions about these possibilities.

- [254] SX: Generally, it is not clear to me about the transition between Phase I & Phase II. I guess Explore is for Phase I but it seems that we need to put in more information compared to what we do now for Phase I. Then Phase I → II might be a lot smoother/faster if everything is standard?

Answer: Explore is for both phase I and Phase II, and the line between them is being blurred. In the past PIs would need to figure out which instrument / configuration would work best for their science, then enter their target details and instrument configuration into the ITC web form to figure out how much time to request, then select the instrument and mode in the PIT and enter their time request. Explore handles all these steps in one application. The user enters their high-level science requirements (e.g. spectroscopy at 600nm with $R > 1000$ and $S/N > 100$) and Explore will recommend the instrument and configuration and with the target information it will also calculate how much time is required. The total amount of work should be less and the user can then concentrate on writing the science justification. If time is awarded Explore already has all the information it needs to generate observations that are ready to execute if the user is not doing anything fancy.

- [255] SX: Is there a way for staff to access approved but un-observed targets/mode for checking duplications? It looks like the duplication check in the admin proposal view. One other usage is that if there are multiple TOO triggers on the same object, there should be a flag saying that there is a similar observation in the queue already.

Answer: The observation duplication check will be handled automatically when change requests come in, and all targets (observed and active un-observed) will be considered.

The system will need to handle duplicate ToO triggers, and this is something that will require a policy decision. One possible solution is that if two “similar” ToOs arrive the first will go through while the second will be blocked with a message that a similar observation of this target has already been received. The science team will need to define “similar” and how long the block will be in effect.

- [256] SX: Another slightly different usage, when PI submit proposals, they should be notified if their target has existing archival data using the same set-up. They need to justify why additional time is needed.

Answer: Agreed – that might be a good addition to the list of Phase-I “warnings.”

- [257] SX: Would we consider making the phase II files public after the data becomes public? For some specific science cases, it will be useful to see how previous users set up their programs.

Answer: We should not make Phase IIs public in general but we will make public libraries of examples, such as you suggest.

- [258] SX: ”Private Header”: I am not in favor of this idea. I think once a target has been observed, its information should be public. I think that is how HST & ESO handle it.

Answer: This is an existing Gemini policy to prevent high-profile programs or campaigns, such as planet searches, from being scooped.

- [259] SX: Do we still need a queue coordinator after GPP launches?

Answer: We hope that we can merge the QC and core QC roles. Since it will not be necessary to make daily plans, the QC will focus on longer-term strategy. The initial release of GPP does not include support for making long-term recommendations about instrument configurations, so QCs will need to investigate when to install masks, swap gratings, etc. We also expect that in the beginning QCs will be monitoring the automatically-generated plans to confirm that the scheduler is doing what we expect.

- [260] SX: Constraints: good to see that we will move towards using IQ in arcsec and CC in magnitude. I think that makes more sense than percentile. I am wondering about the actual implementation. For IQ, which wavelength would we use? For CC, essentially, we can only measure the extinction at where the telescope is pointing. How do we estimate the global extinction?

Answer: The plan is to use delivered on-source IQ at the wavelength of the observation. At Gemini North we can incorporate CFHT SkyProbe extinction measurements. Using the GAIA catalog with the QAP will make those extinction estimates more reliable. At Gemini South we are working on upgrading the all-sky camera to provide extinction measurements and we will have more conditions information after the Rubin Observatory begins operations.

- [261] SX: Can we also record the type of object that we are observing? For example, asteroids/comets, types of stars, galaxies, galaxy clusters, etc... Then in the filter option for browse, we can also select the type of objects with a given instrument.

Answer: Explore will know the type of every target (sidereal or non-sidereal, morphology, and spectral type), and we can add the target type to the Browse filter list.

- [262] SX: Can we make a distinction between band 4 not-observing and band 4 observing? In my mind, band 4 observing is still doing something useful.

Answer: That’s a good suggestion – we will look into distinguishing between weather-loss and band-4 science. We have been discussing this as part of the scheduler project.