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Gemini's Science Productivity and Impact

INTRODUCTION

- Papers in refereed journals are the key product of modern observatories
  - Papers represent their contributions to knowledge (and justifies their large operating budgets)
- Gemini, and other observatories, carefully track publications based on data from their telescopes
- The number of publications is a measure of the productivity of an observatory
  - But how relevant/important is the work?
- Citation counts are a standard measure of the impact of paper, i.e., the more citations the more relevant the work
- The number of a citations is a measure of the impact of an individual paper

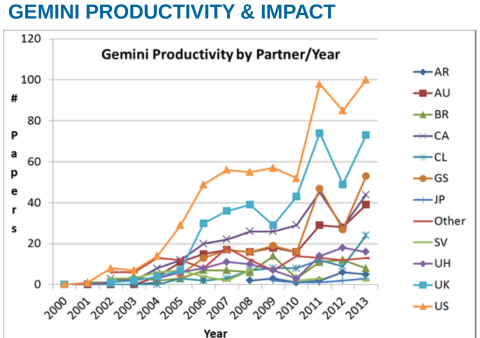
WHY IS THIS IMPORTANT?

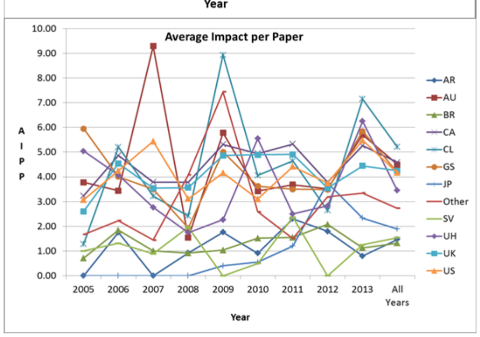
- Increased demand for accountability
  - Significant budgets required to construct and operate telescopes
  - Significant scientific results are needed to justify the budgets
- Citations can be used to track the impact of countries, telescopes,, …
  - How does the impact of science from the VLT compare to US large telescopes?
- Publications and citations can also be used to understand the performance of individual instruments
  - Information that can be useful when deciding whether or not to decommission an instrument

DATA SOURCES AND METHODS

- List of papers retrieved from observatory websites or obtained from observatory librarians (Thanks!)
  - **No checking of these lists – trust observatory judgment on what constitutes an observatory paper**
- One of use (XZ) maintains the Gemini database
- The basic criterion for including a paper - *"A paper based on data acquired at the observatory"*
- Astronomy librarians have produce a *Best Practices* document http://adsabs.harvard.edu/abs/2015ASPC..492...99L
- Many papers based on data obtained from more than one observatory
  - Give each observatory full credit for these papers
- Citations for each paper retrieved from ADS
- Need to wait at least a year since publication of paper before citation count is meaningful
- Raw citation counts need to be adjusted if comparing papers of different ages
- Citations counts grow as a paper ages
- Need a standard citation (impact) metric that allows comparison of papers of different ages
- **Use the median citation count for AJ papers of a given year as a standard measure**
- ***Impact*** is defined as the ratio of the citations of a paper to the median # of citations for AJ papers of the same year

GEMINI PRODUCTIVITY & IMPACT



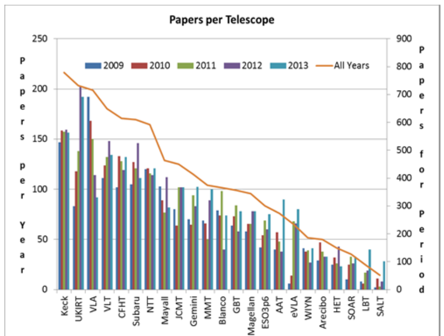


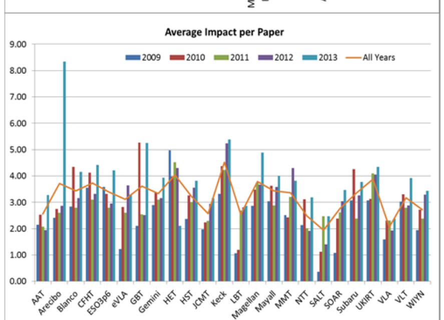
GEMINI COMPARED TO OTHER TELESCOPES

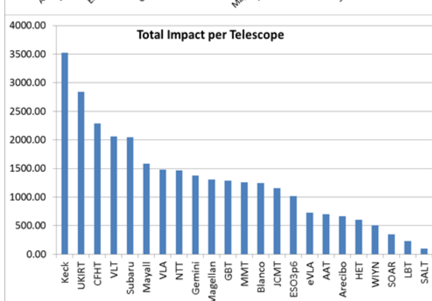
One of us (DC) maintains a database of publications from a significant number of large optical telescopes as well as a number of radio telescope.

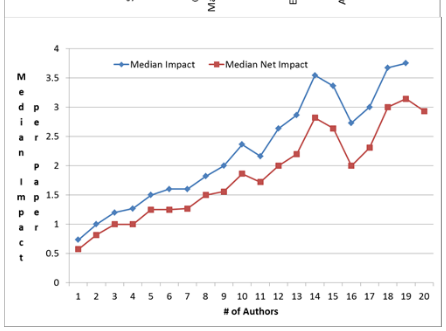
The first figure below shows the number of papers per telescope (some observatories have multiple telescopes , e.g., Keck, VLT) for the period 2009 - 2013. (Note that HST is not included as it would distort the scale – it produced 3827 papers over this 5-year period.)

The second plot below show the average impact per paper (AIPP) for all telescopes including HST. The third plot below shows the total impact of each telescope over this 5-year period. The bottom plot shows the median impact (and median net impact after correcting for self-citations vs / of authors



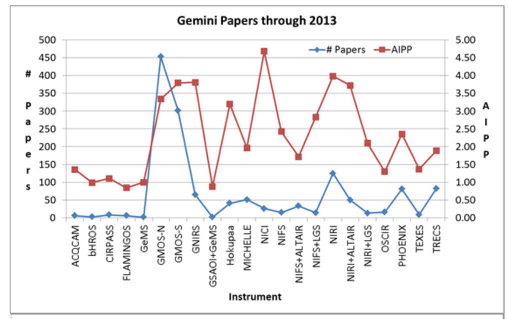


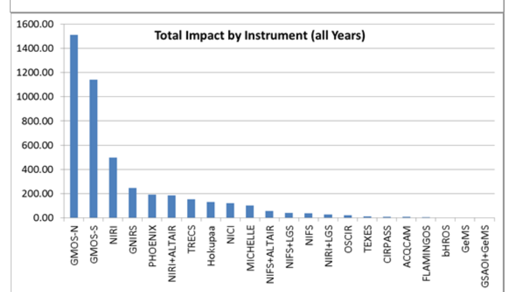


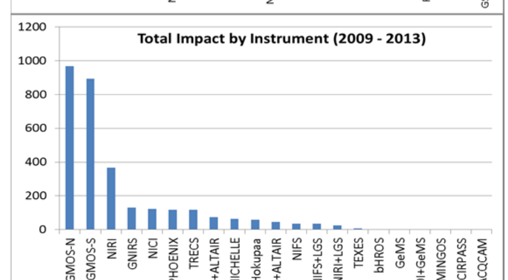


INSTRUMENTS AND PARTNERS

The Gemini database maintained by XZ includes information on the instrument(s) used and the partner countries of the authors (non-partner countries denoted as Òther`)
The firrst plot below shows the total number of papers and the average impact per paper (AIPP) by instrument for all papers published through 2016. The 2nd and 3rd plots show the total impact by instrument, first for all years and then for the period 2009 – 2013.







The table below shows the percentage of partner's papers that are based on data from each instrument. The final column is the overall % of papers based on data from that instrument. Cells in red indicate a percentage higher than the overall percentage

	AR	AU	BR	CA	CL	GS	JP	Other	SV	UH	UK	US	Total
ACQCAM	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.5%	0.7%	0.3%
bHROS	0.0%	0.5%	1.3%	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%	0.2%	0.2%
CIRPASS	0.0%	0.5%	3.8%	0.0%	0.0%	0.0%	0.0%	2.3%	0.0%	0.0%	0.3%	0.0%	0.4%
FLAMINGOS	0.0%	0.0%	0.0%	0.4%	0.0%	0.5%	0.0%	0.8%	2.5%	0.0%	0.5%	0.2%	0.3%
GeMS	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.0%	0.0%	0.0%	0.0%	0.0%	0.2%
GMOS-N	45.5%	31.6%	40.5%	38.5%	10.5%	31.8%	55.6%	16.7%	22.5%	69.1%	40.1%	33.9%	35.1%
GMOS-S	36.4%	36.8%	24.1%	34.0%	67.1%	22.9%	0.0%	12.1%	10.0%	12.4%	25.3%	21.1%	25.7%
GNIRS	0.0%	3.6%	3.8%	3.0%	10.5%	3.7%	0.0%	2.3%	10.0%	2.1%	4.9%	4.4%	4.2%
Hokupaa	0.0%	1.0%	5.1%	0.8%	0.0%	0.9%	0.0%	8.3%	7.5%	3.1%	0.3%	2.6%	2.1%
MICHELLE	0.0%	0.5%	0.0%	0.4%	0.0%	3.3%	0.0%	9.8%	2.5%	1.0%	1.3%	4.6%	2.7%
NICI	0.0%	3.6%	0.0%	4.5%	3.9%	5.6%	11.1%	0.8%	0.0%	0.0%	2.3%	2.1%	2.7%
NIFS	0.0%	0.5%	1.3%	0.0%	0.0%	0.5%	0.0%	1.5%	2.5%	3.1%	1.3%	0.3%	0.8%
NIFS+ALTAIR	0.0%	3.6%	6.3%	0.8%	0.0%	0.9%	0.0%	0.8%	20.0%	0.0%	1.6%	0.3%	1.6%
NIFS+LGS	0.0%	0.0%	1.3%	1.1%	0.0%	0.5%	0.0%	0.0%	2.5%	0.0%	0.8%	0.8%	0.7%
NIRI	9.1%	11.4%	2.5%	7.5%	2.6%	16.4%	0.0%	13.6%	0.0%	7.2%	9.8%	8.5%	9.3%
NIRI+ALTAIR	0.0%	1.6%	0.0%	6.4%	0.0%	4.2%	0.0%	5.3%	10.0%	1.0%	5.4%	4.1%	4.1%
NIRI+LGS	0.0%	2.6%	0.0%	0.4%	0.0%	1.4%	0.0%	0.8%	0.0%	0.0%	0.5%	0.3%	0.7%
OSCIR	0.0%	0.0%	1.3%	1.5%	0.0%	0.0%	0.0%	0.8%	0.0%	1.0%	0.3%	1.3%	0.8%
PHOENIX	4.5%	1.6%	5.1%	0.8%	3.9%	2.8%	0.0%	9.1%	0.0%	0.0%	1.8%	7.0%	3.8%
TEXES	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	7.5%	0.0%	0.0%	1.0%	0.5%
TRECS	4.5%	0.5%	3.8%	0.0%	1.3%	4.7%	33.3%	9.1%	2.5%	0.0%	3.1%	6.5%	4.0%