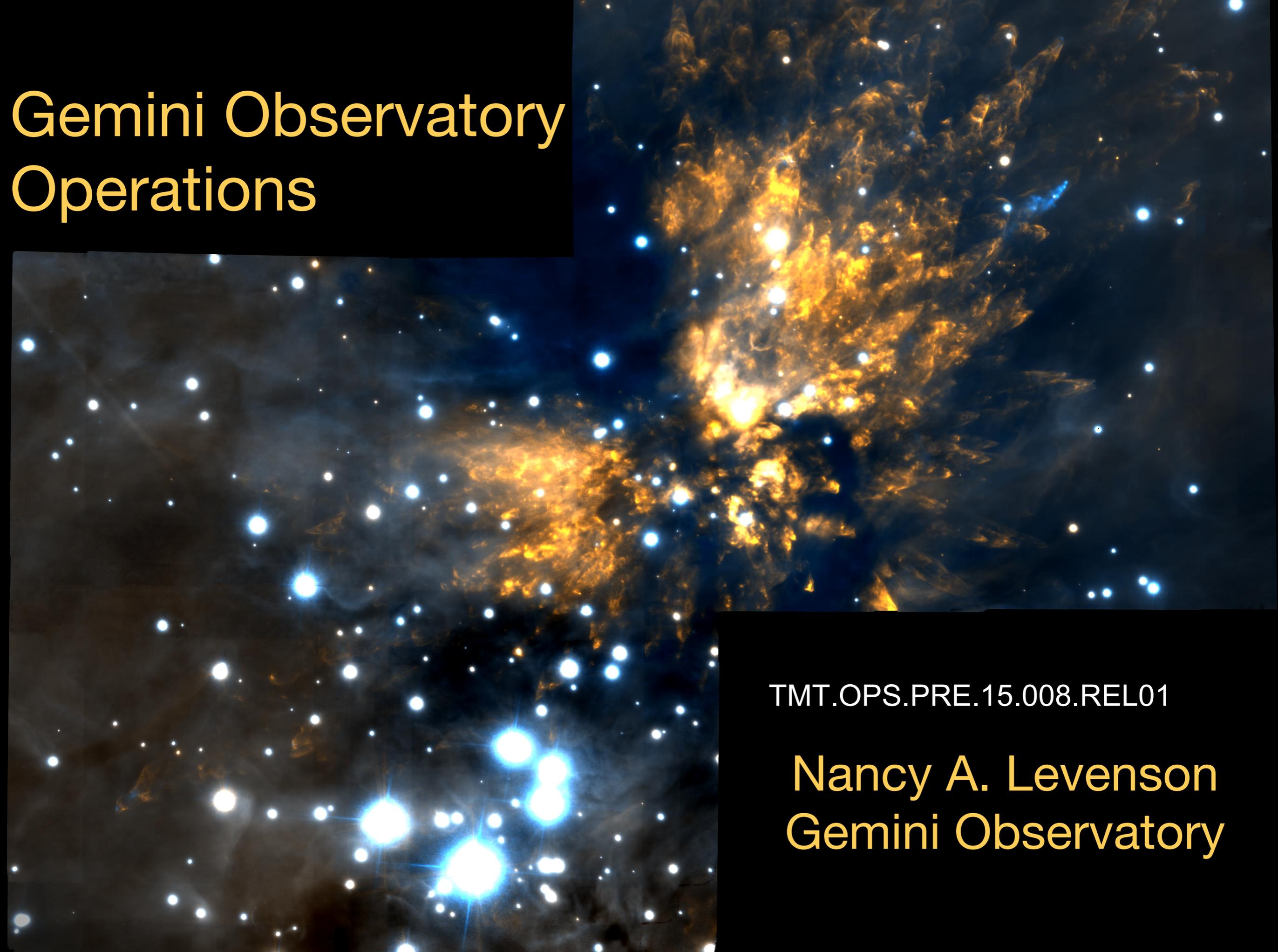


Gemini Observatory Operations

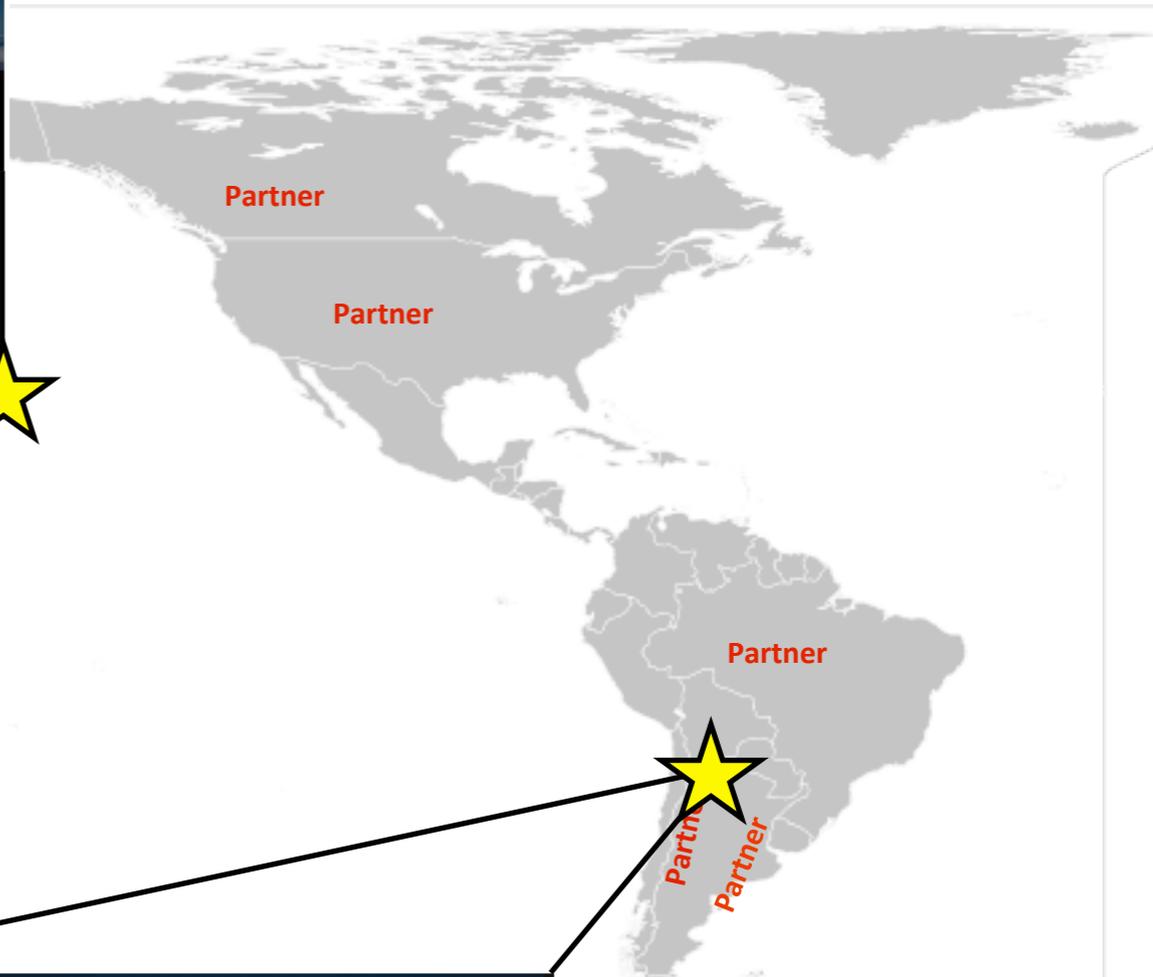


TMT.OPS.PRE.15.008.REL01

Nancy A. Levenson
Gemini Observatory

key threads

- maximizing scientific return
- utilizing strengths of scientific community



Operating two twin 8.1m telescopes on Maunakea and Cerro Pachón providing access to the entire sky

Gemini Partnership

Gemini is managed by  on behalf of the  for an international partnership:



out in 2016+

Shares 2013-2015

| | |
|----|---------|
| US | 65.50 % |
| CA | 18.65 % |
| BR | 6.53 % |
| AU | 6.21 % |
| AR | 3.11 % |

Next: 2016-2021

Annual contributions 2013-2015:

- \$27M for operations (~20% less than <2013)
- \$TBD for instrumentation (best effort)



now open to new partners (long term or limited term)

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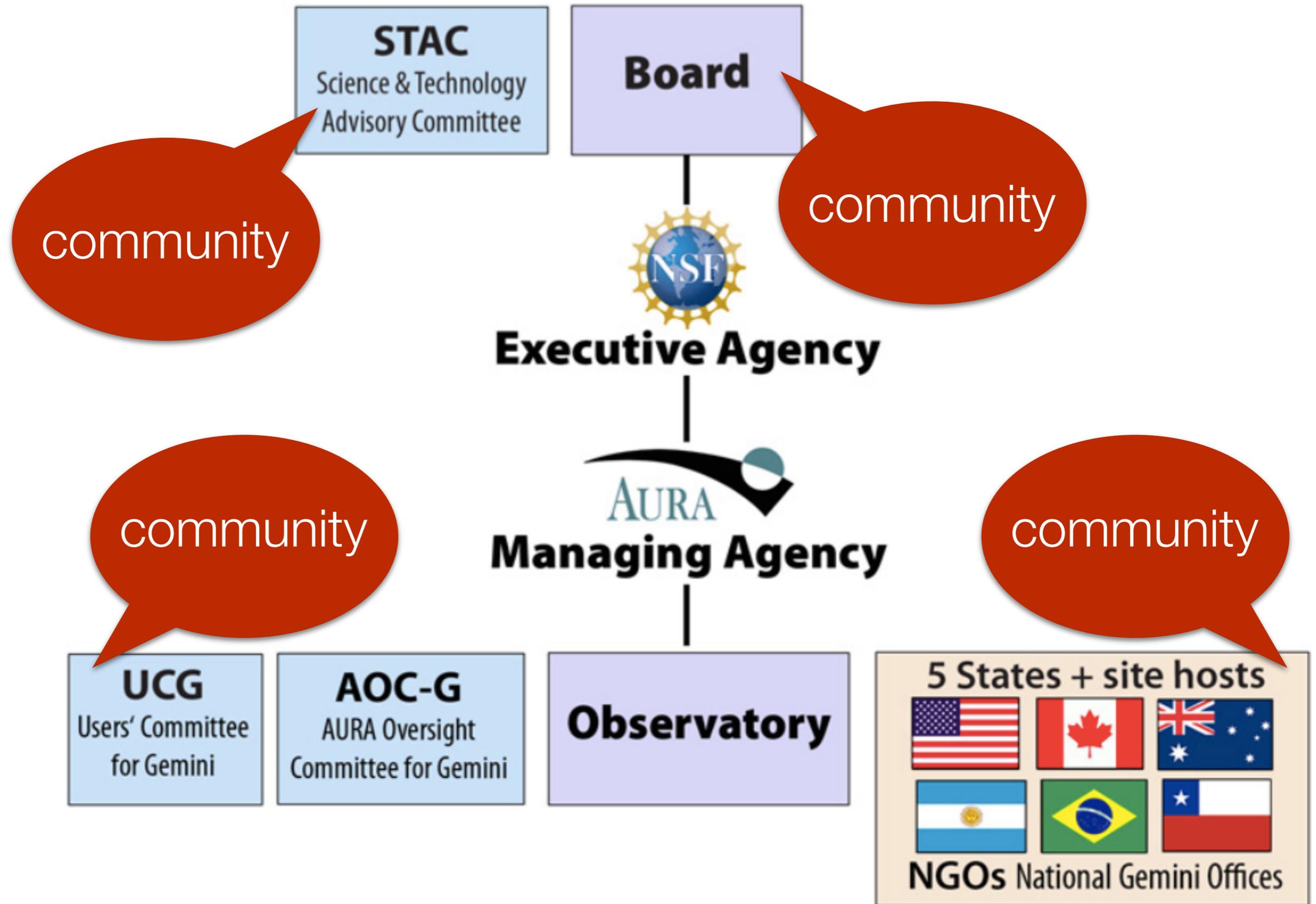
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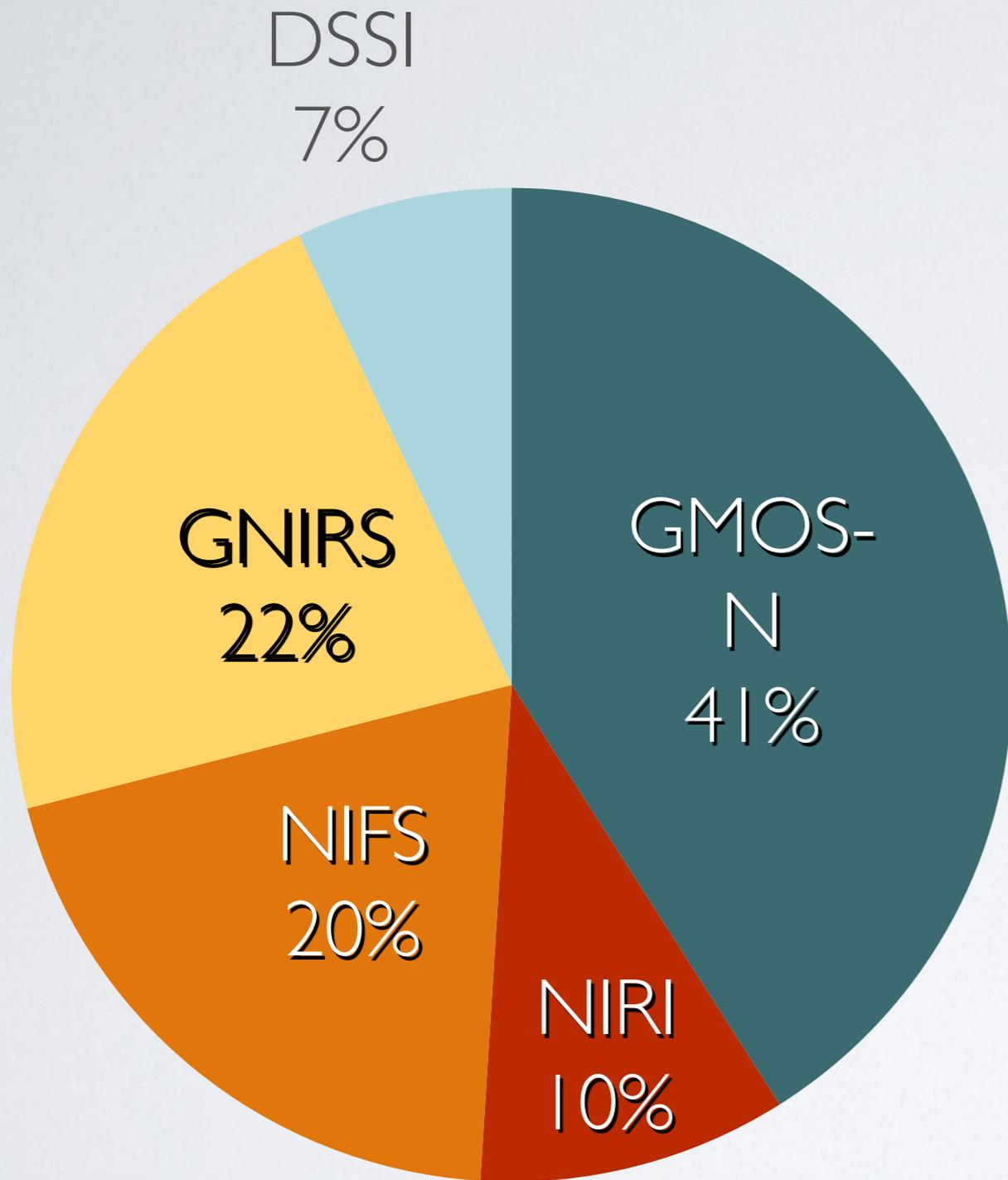
Gemini organization



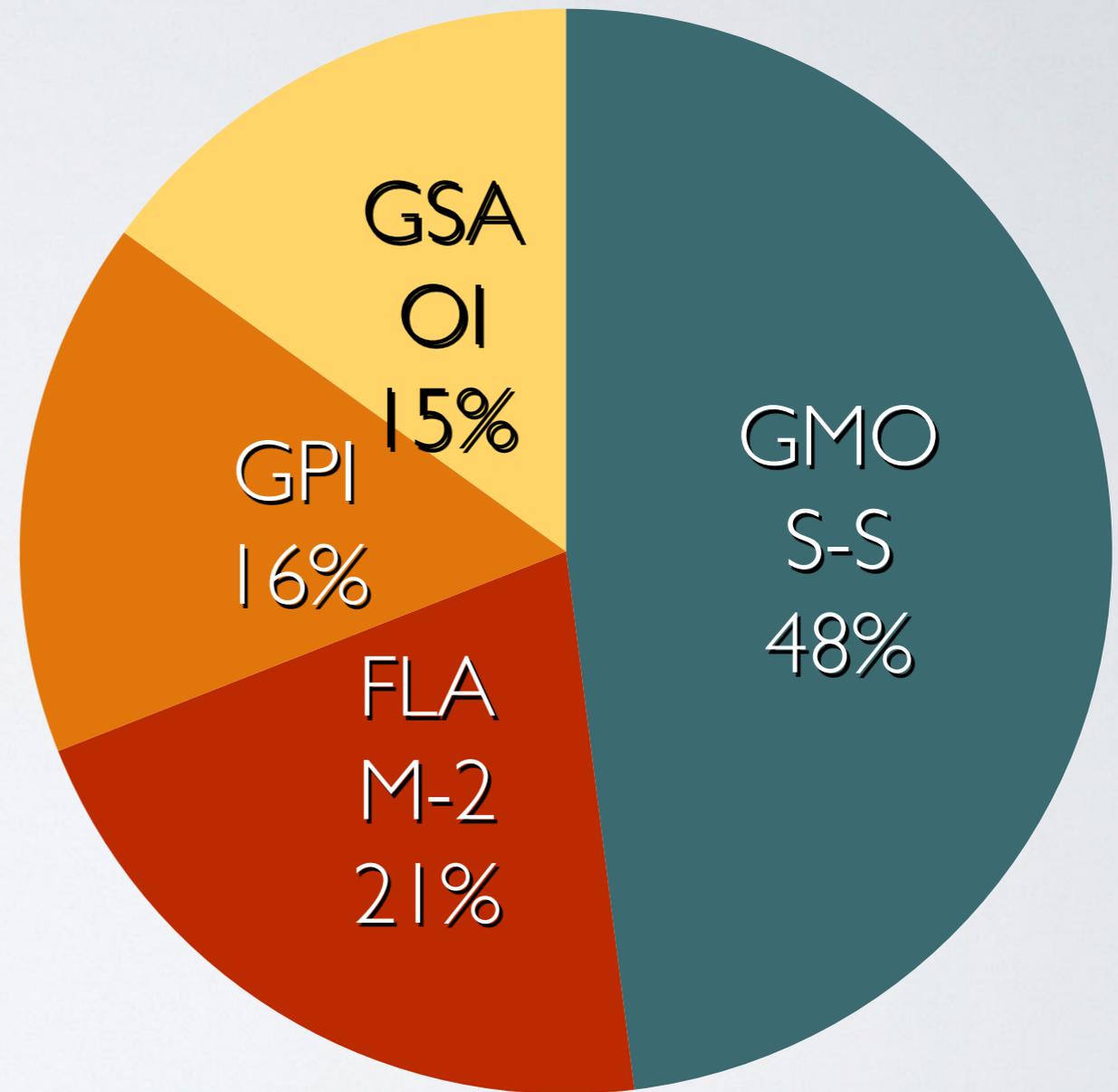


3 instruments + AO mounted simultaneously
swap for 4th facility or visitor instrument

demand by instrument, 2015A



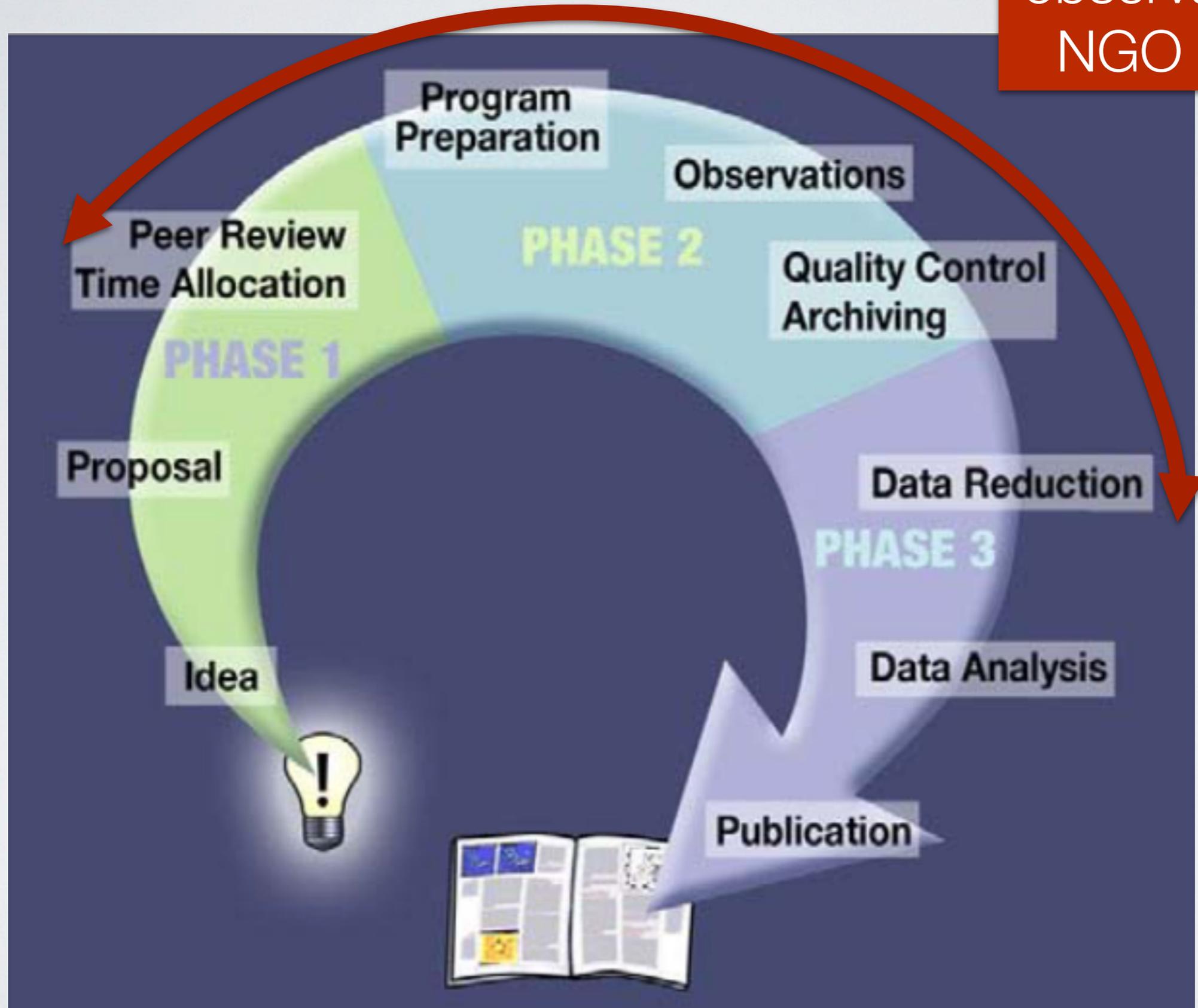
Gemini North



Gemini South

science “lifecycle”

observatory and
NGO support

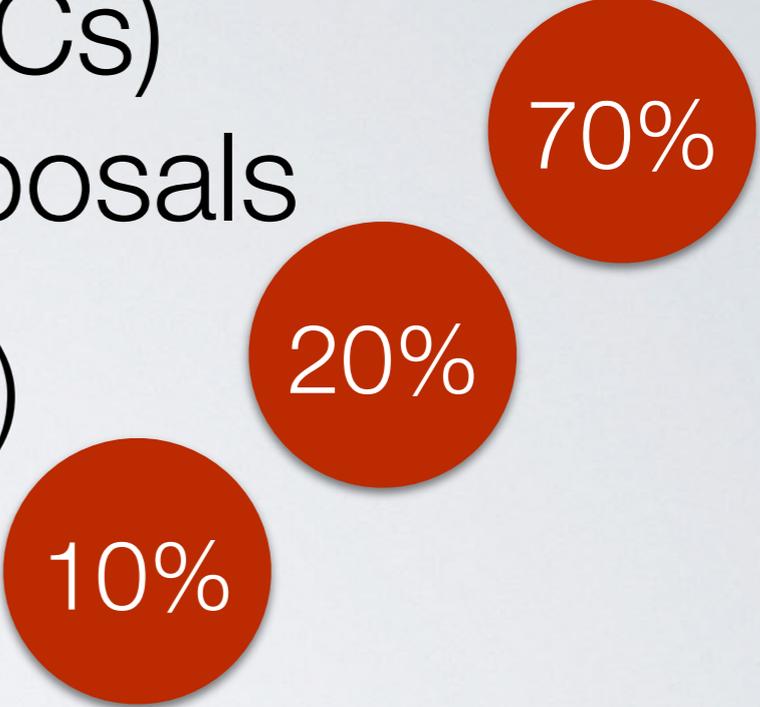


science “lifecycle”



proposal modes

- semester allocations (national TACs) including joint (multi-partner) proposals
- large and long programs (LPTAC)
- fast turnaround (peer review)
- director's discretionary time
- poor weather proposals



70%

20%

10%

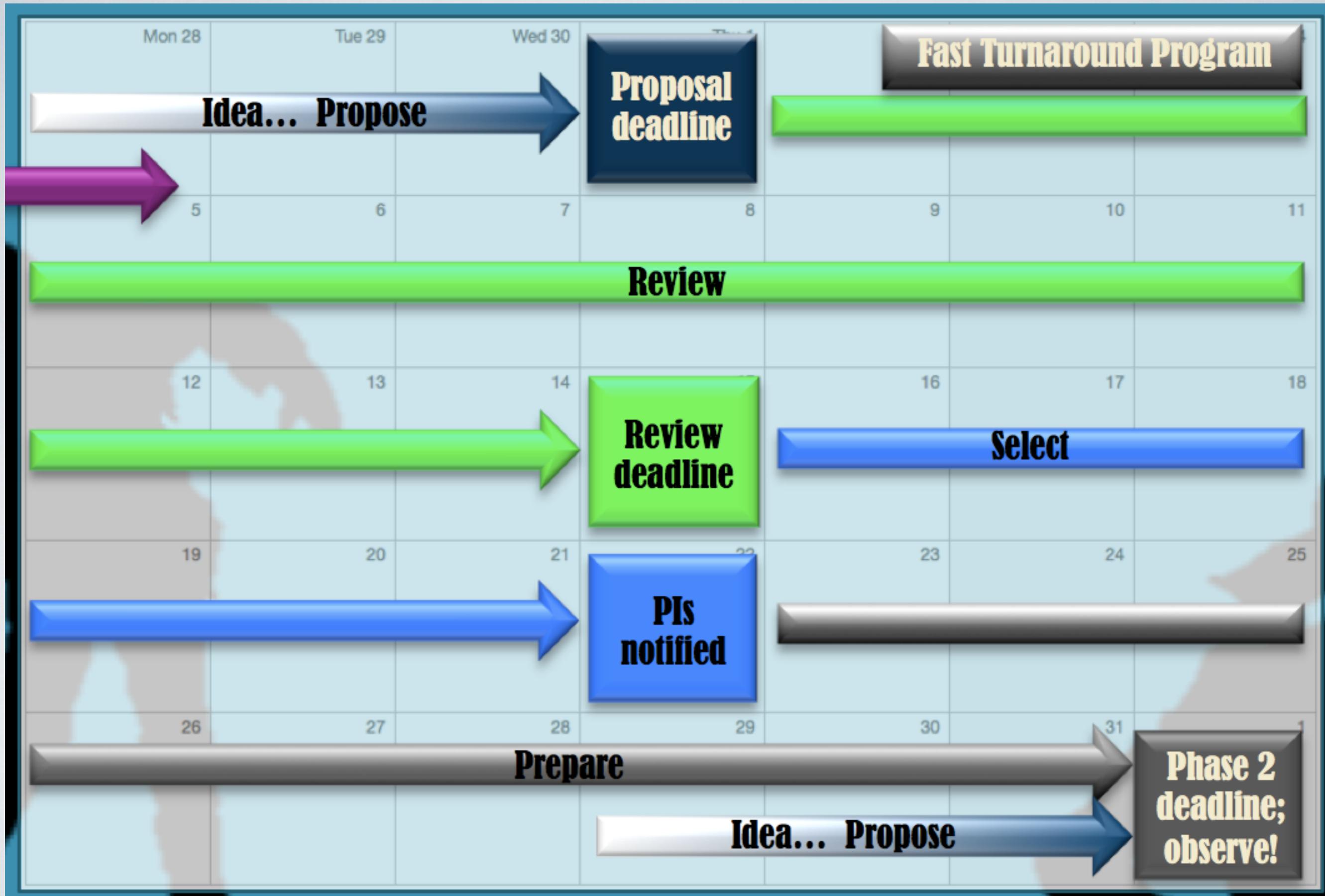
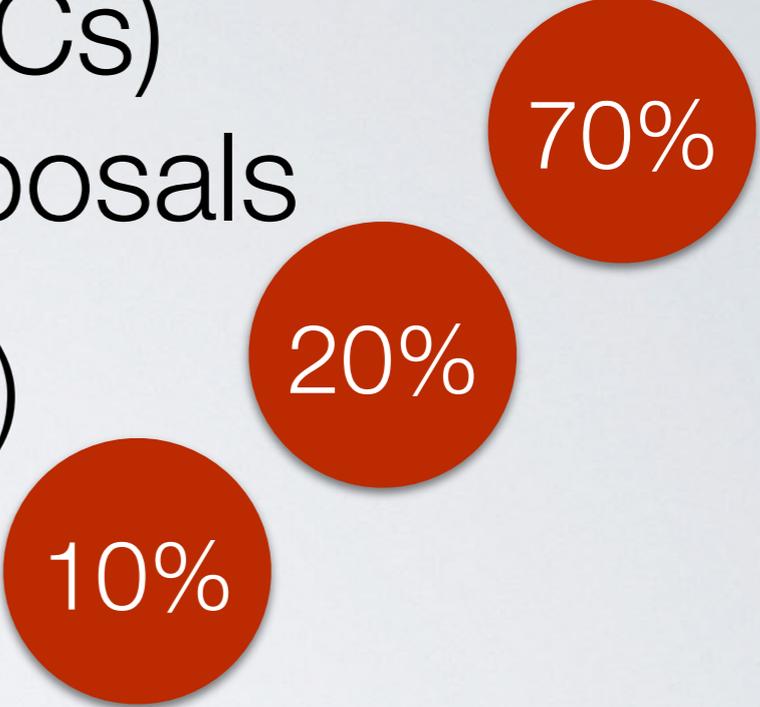


image: R. Mason

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70%

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10%

science “lifecycle”



observing modes

- **queue**
service observing by others;
can supplement with eavesdropping
 - **classical**
fixed dates, observing by science team
 - **priority visitor**
science team observes: their targets if conditions
are good, others' if not;
science targets remain in queue
- + target of opportunity
rapid (within 24 hours) or standard

goal:
75%

goal:
25%

~20%

observing modes - advantages

- **queue**
 - highest-priority science has priority for observation
 - easy access to time domain or scattered targets
 - can accommodate need for exceptional conditions
- **classical**
 - expert observers can make real-time decisions
- **priority visitor**
 - mitigate effects of weather

observing modes - disadvantages

- **queue**
 - staff or other astronomers available to observe
 - scientists must prepare program in advance, comprehensible to others
- **classical**
 - may lose out to weather
- **priority visitor**
 - extra burden on visitors to observe for others

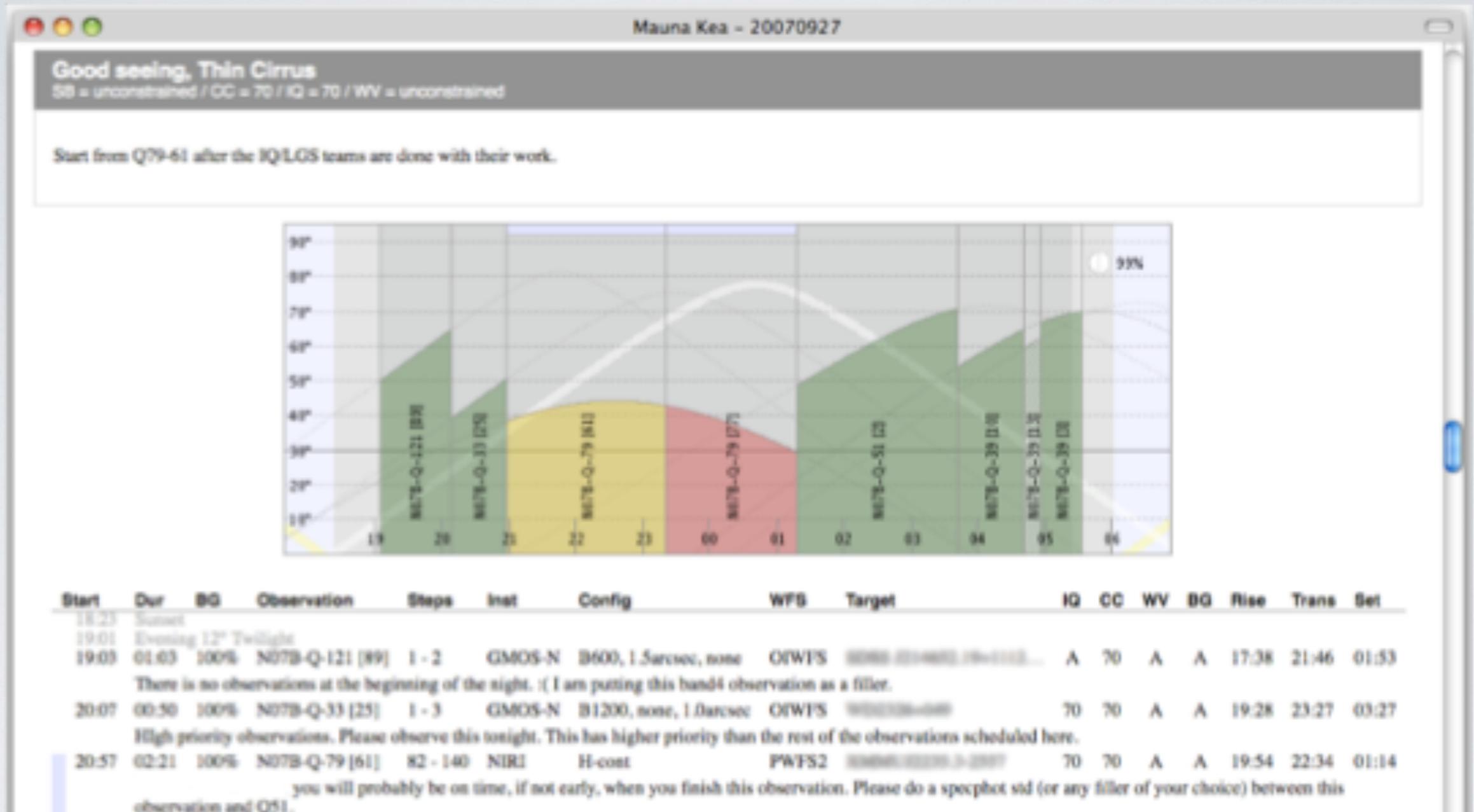
observation planning: program PI

- phase I: proposal
 - observing condition requirements
 - percentile bins of image quality, cloud cover, sky background, and water vapor
- phase II: based on templates
 - define everything that will happen at the telescope
 - checked by observatory or NGO staff

observation planning: TAC roles

- phase I: proposal
 - observing condition requirements
 - percentile bins of image quality, cloud cover, sky background, and water vapor
- national TAC evaluation, international TAC allocation
 - considering observing statistics in approvals
 - plan to use 80% (not 100%) of time
- phase II: based on templates
 - define everything that will happen at the telescope
 - checked by observatory or NGO staff

queue planning: observatory



- daily queue planning
multiple options for weather conditions
- long-term planning, to maintain priorities

observing



- normally two people in the Gemini control room
- change in progress: non-research observers
“science operations support” staff trained for both roles; to do 75% of queue observing

base facility operations

2015: observe from Hilo base facility

2016: observe from Serena base facility

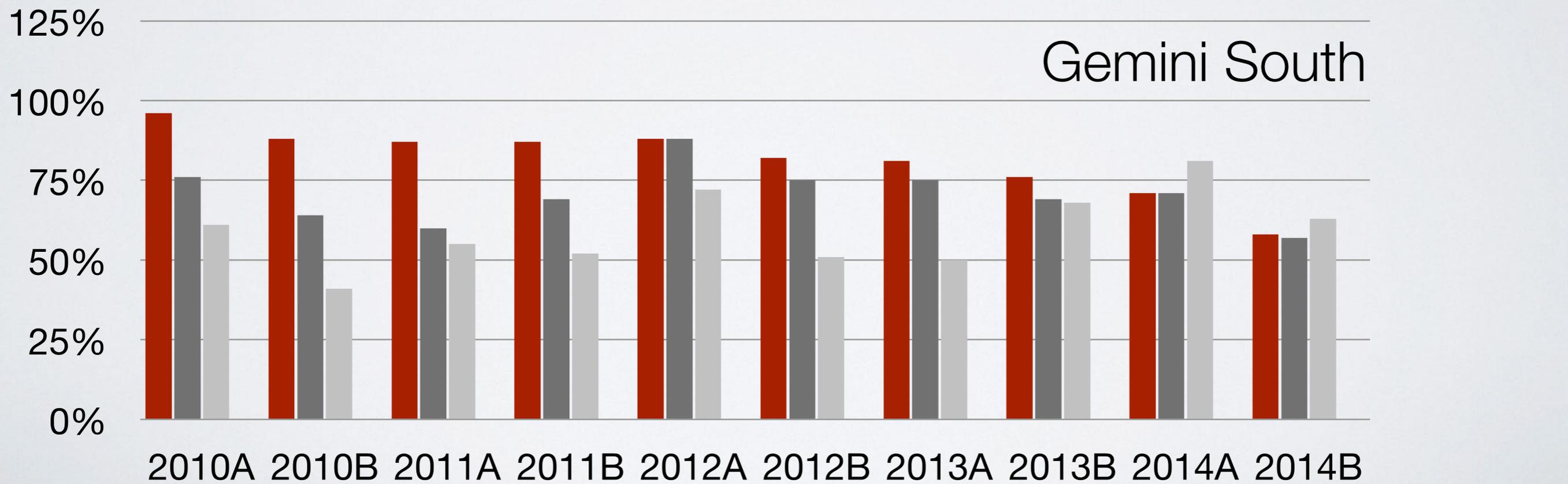
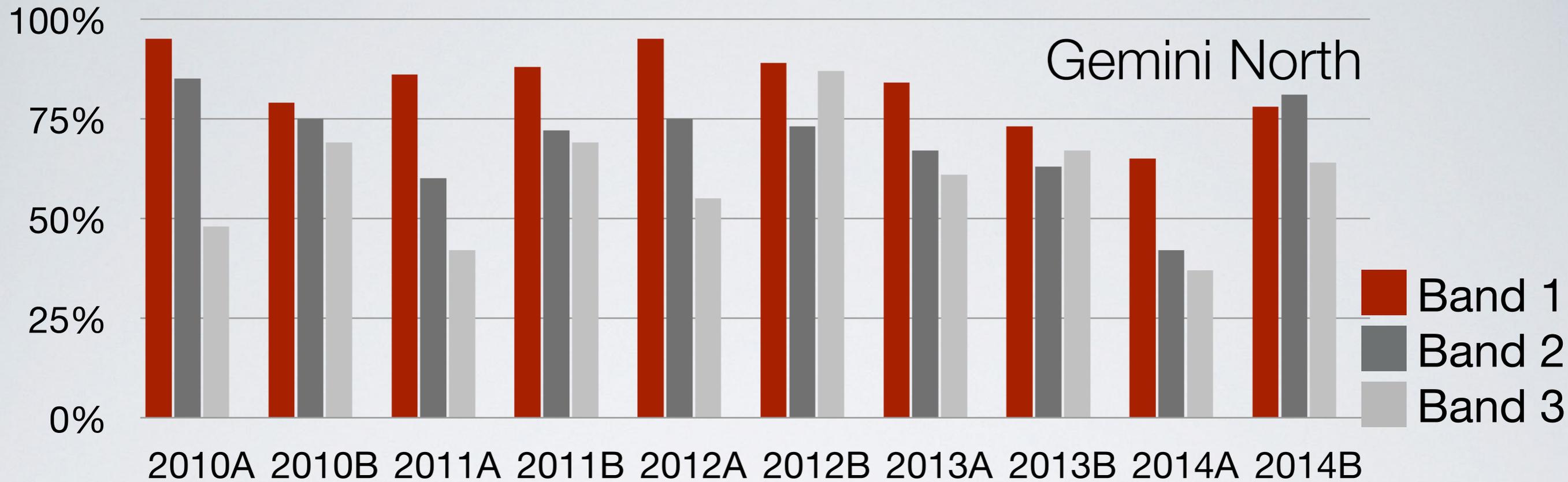
later: extend to remote observing from partner institutions



quality control and archiving at Gemini

- observatory or proposing scientists can verify quality (of queue)
 - ongoing assessment during nighttime observing; Gemini staff check highest-ranked bands in day
- archive
 - archive for PI and public data distribution
 - observations and calibrations available
 - changes in progress, for end 2015:
commercial web hosting + Gemini interface
 - future: to archive pipeline reductions

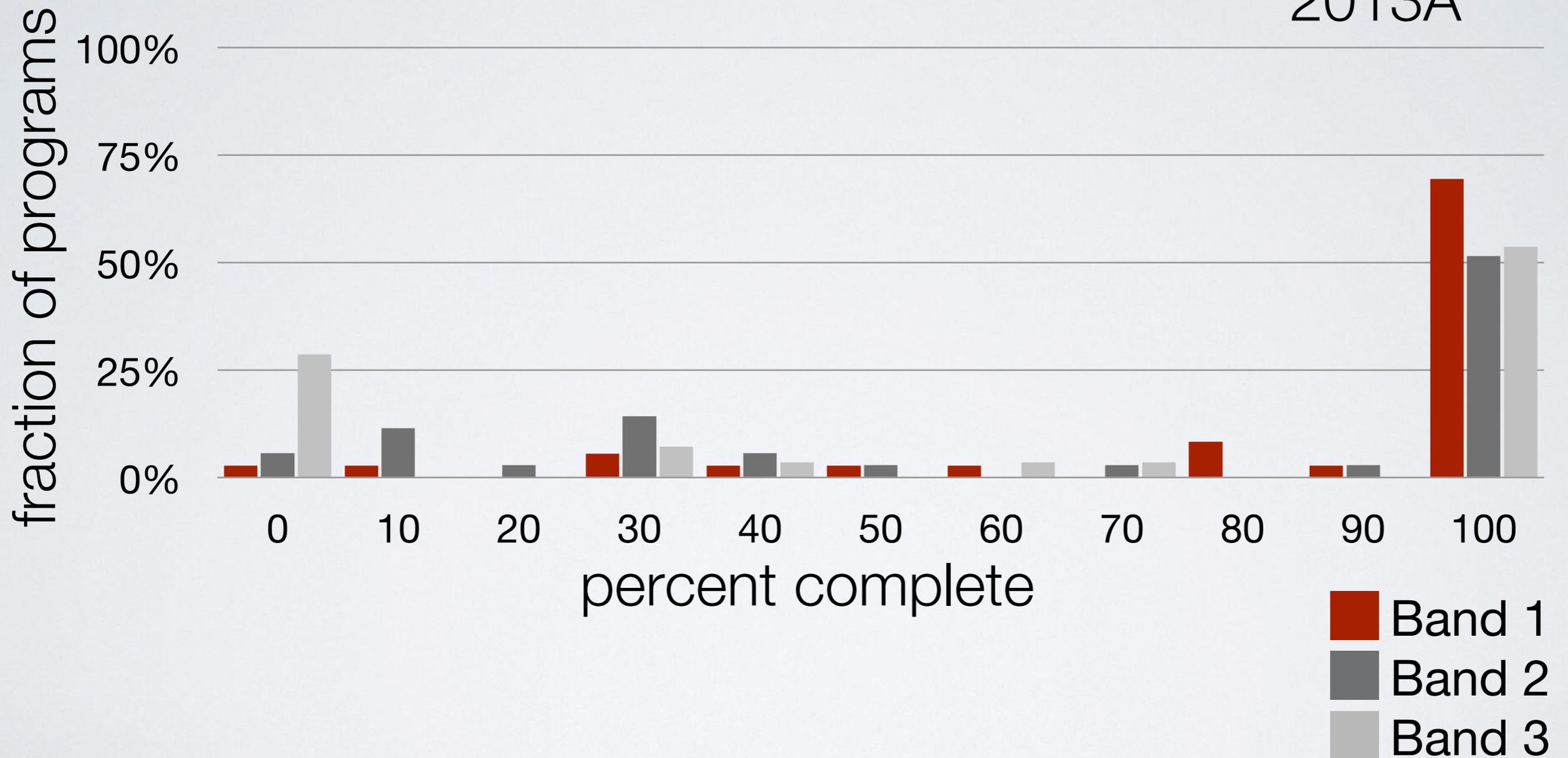
completion rates: average of rates



semester

completion rates: distribution

Gemini North
2013A



science “lifecycle”



post-observing support

- new: Science User Support department

Gemini Data Reduction User Forum

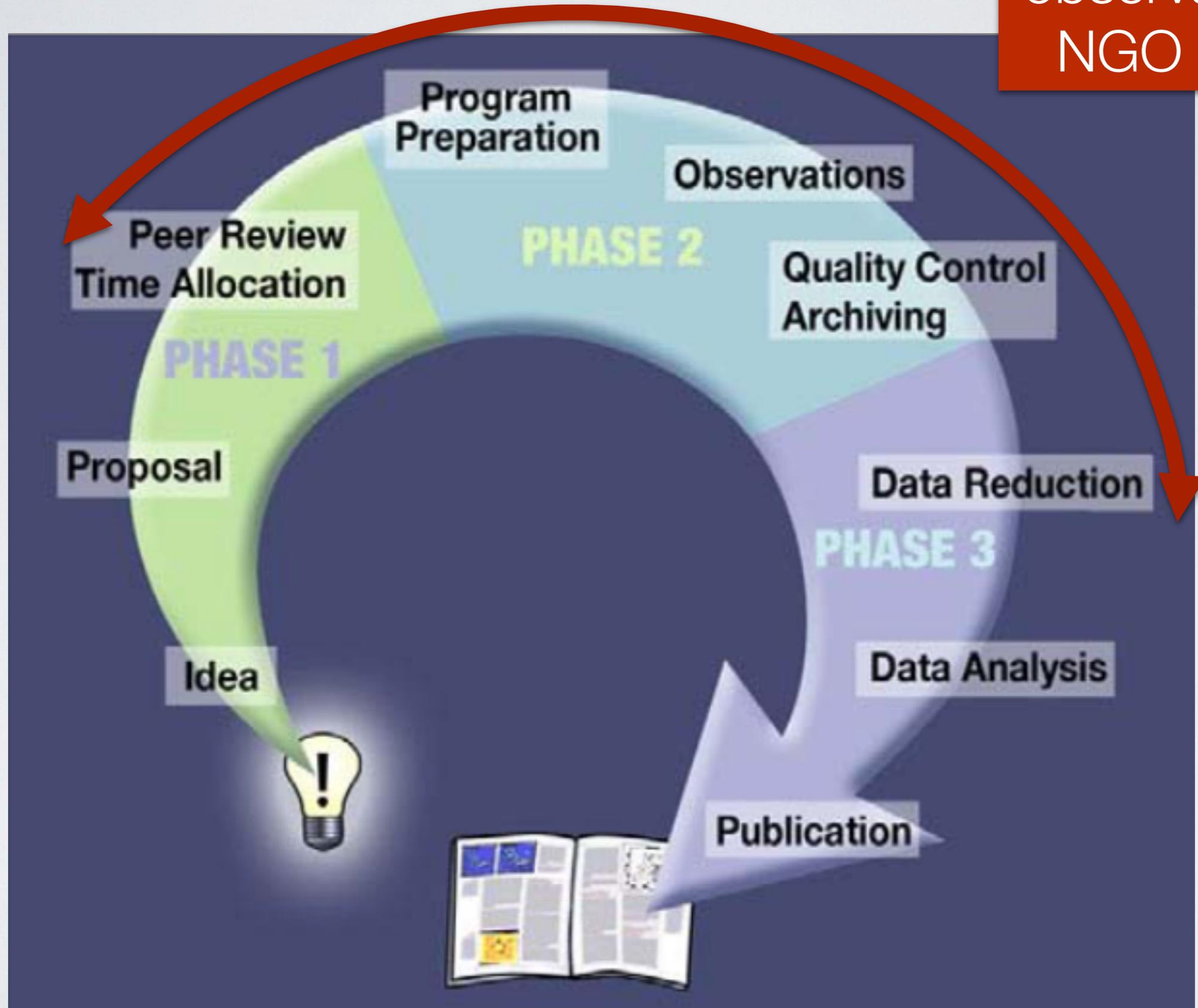


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- data reduction user forum
users help users; responses visible for all

science “lifecycle”

observatory and
NGO support



issues

- engage partner astronomers
 - benefit from their expertise
 - cultivate ownership of observatory
 - help develop a community
- provide support for all users, whether through observatory, national offices, or otherwise
 - many users will be unfamiliar or have limited experience with the facility
- communication will always need attention across a broad partnership with diverse interests
 - need documentation, access to help
 - need to align expectations and return

key threads

- maximizing scientific return
- utilizing strengths of scientific community



backup slides

instruments

| Site | Instrument | Wavelength | FoV, Mode, Resolution | AO Support |
|-----------------|---------------------------|--------------------|---|------------|
| Gemini-N | GMOS-N | 360-940 nm | img 5.5'x5.5' LS, MOS, IFS (5"x7") R:600-4,000 | (ALTAIR) |
| | NIRI | 1-5 μm | img 20"x20" - 120"x120" | ALTAIR |
| | NIFS | 950-2400 nm | IFS (3"x3") R:5000 | ALTAIR |
| | GNIRS | 1-5 μm | LS R:1,800-18,000 (+img) | ALTAIR |
| Gemini-S | GMOS-S | 360-940 nm | img 5.5'x5.5' LS, MOS, IFS (5"x7") R:600-4,000 | (GeMS) |
| | GSAOI | 950-2400 nm | img 85"x85" with MCAO | GeMS |
| | FLAMINGOS-2 | 950-2400 nm | img 6.1' \varnothing LS, (MOS) (2'x6') R: 1,200-3,000 | (GeMS) |
| | GPI | 900-2400 nm | IFU 2.8"x2.8" contrast: 10^7 at 0.4" | XAO |
| | TBC 2018 (<i>GHOST</i>) | 360-1000 nm | 2 IFUs in 7' \varnothing R: 50,000 + 75,000 | (none) |
| Visiting | TEXES (GN) | 5-25 μm | LS R: 4,000 - 85,000 | none |
| | DSSI (GN) | 400-1000 nm | Dual EMCCD imaging, 20 mas resolution@650nm | speckle |
| | (<i>GRACES</i>) | ~600-1000 nm | see CFHT/ESPaDOnS - high-res. spectrograph | none |

observatory and NGO roles

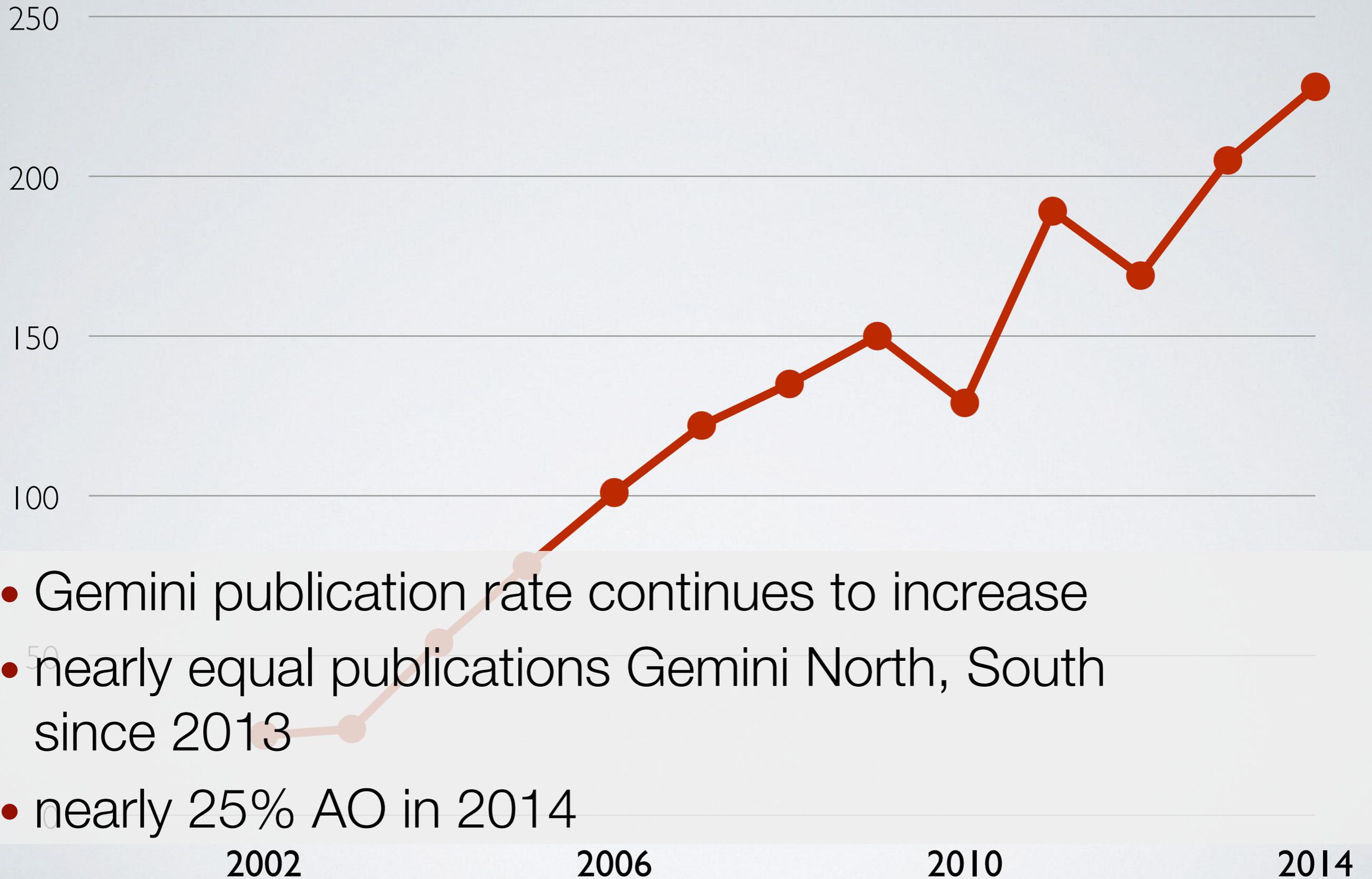
Gemini

- international TAC
- large and long programs
- fast turnaround
- phase II iterations
- in-semester support
- observing
- classical runs
- data archive
- data reduction software
- Helpdesk
- proposal and observing software

NGOs

- general user education
- local web pages
- Phase I support
- national TAC process
- phase II support
- Helpdesk
- post-observing tools

Gemini publications per year



- Gemini publication rate continues to increase
- nearly equal publications Gemini North, South since 2013
- nearly 25% AO in 2014

publication by band

- considering nearly completed programs, through 2013:
 - band 1 publishes relatively more $>1/2$ papers; $\sim 40\%$ observed time
 - director's discretionary time similar
 - hours per paper increases across bands
 - classical like average of all queue
- previous analysis implied higher impact for band 1