GEMINI OBSERVATORY

Exploring the Universe, Sharing its Wonders

Overview of the Gemini science user experience

(as seen from a full partner)

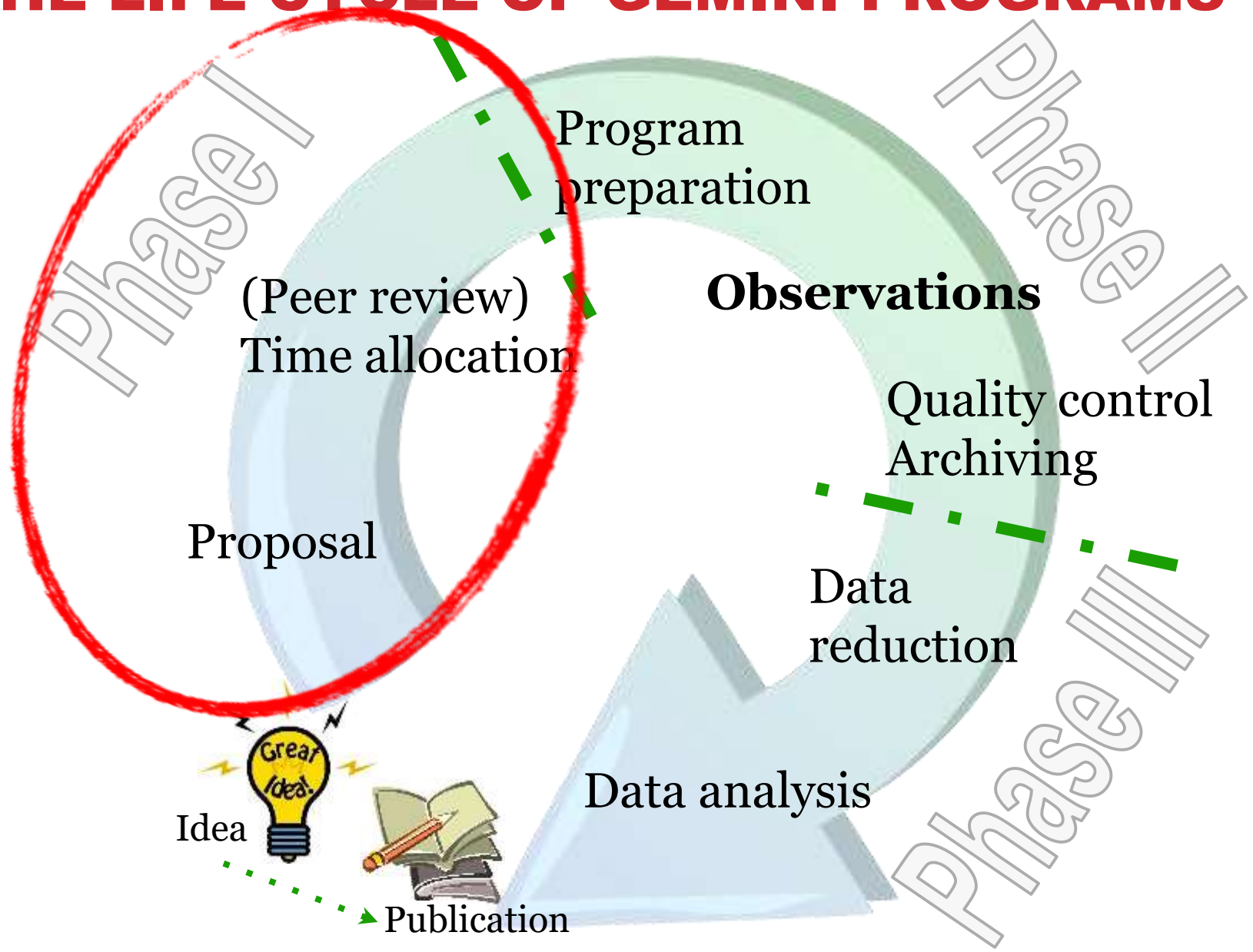
André-Nicolas Chené for the

Gemini Science User Support Department

The differences between limited and full partnership as seen by the user

- Queue and classical programs instead of mini-queues
- Full range of programs
- Different expectations
- Different timing and workflow

THE LIFE CYCLE OF GEMINI PROGRAMS



There are many ways to get time because there are many ways we do research!

"Regular" programs

Large and Long programs

Fast Turnaround programs

Discretionary Director's Time programs

Poor Weather programs

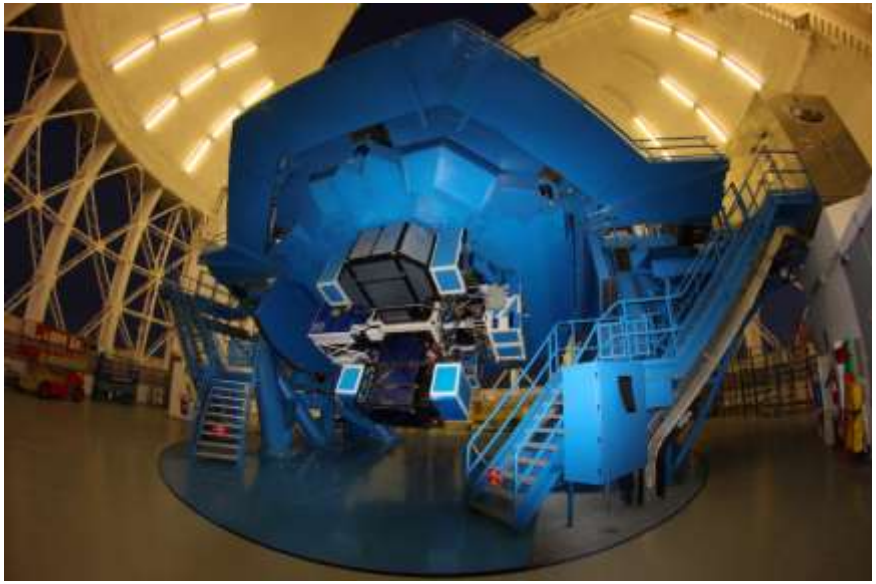
For “regular” projects

- Submitted during the **Calls for Proposals** (CfP):
  in *October* (A semester) and *March* (B semester)

- Programs lifetime is **6 months**:
  Feb-Jul for A semester and Aug-Jan for B semester

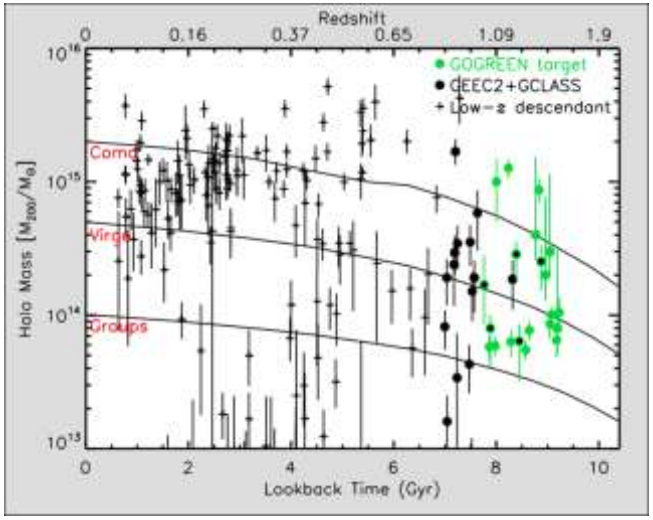
- Full access to all capabilities

- Classical or Queue



For projects that require 100s of hours and/or several semesters

- For participating partners (have to reserve 20% of their time)
- Letter of intent required in **February**, and proposal submitted with the **B semester CfP**
- Can stay active for up to **3 years!**



24 publications so far since 2015 on:

Exoplanets	Lensed galaxies
Asteroids	Low-mass galaxy evolution
Kuiper Belt objects	Faint Halo objects
Supernovae	Quasars

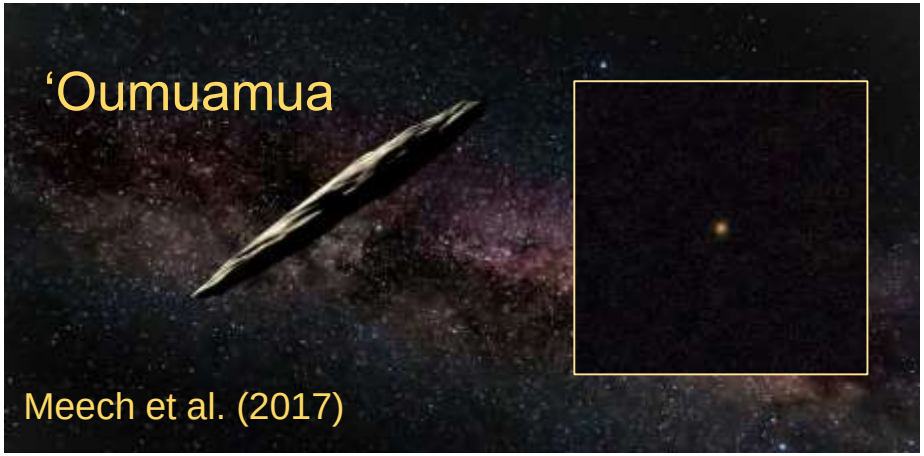
For rapid response

- Submitted **every month** (e.g., 26 Feb)
  - Evaluation starts the first of the following month (e.g., 1 Mar)
  - Answer sent the 3rd week (e.g., 15 Mar)
  - Program starts the next month (e.g., 1 Apr)
  - Program ends after 3 month (e.g., 30 Jun)
- All proposers serve as referee
- Limited access to Visiting Instruments

24 publications so far since 2015 on various topics!

For extraordinary opportunities

- Submitted directly to the **Chief Scientist** (John Blakeslee)
- **High priority** programs
- Report on work progress 4 months after observations
- Oversubscription “auto-regulated”



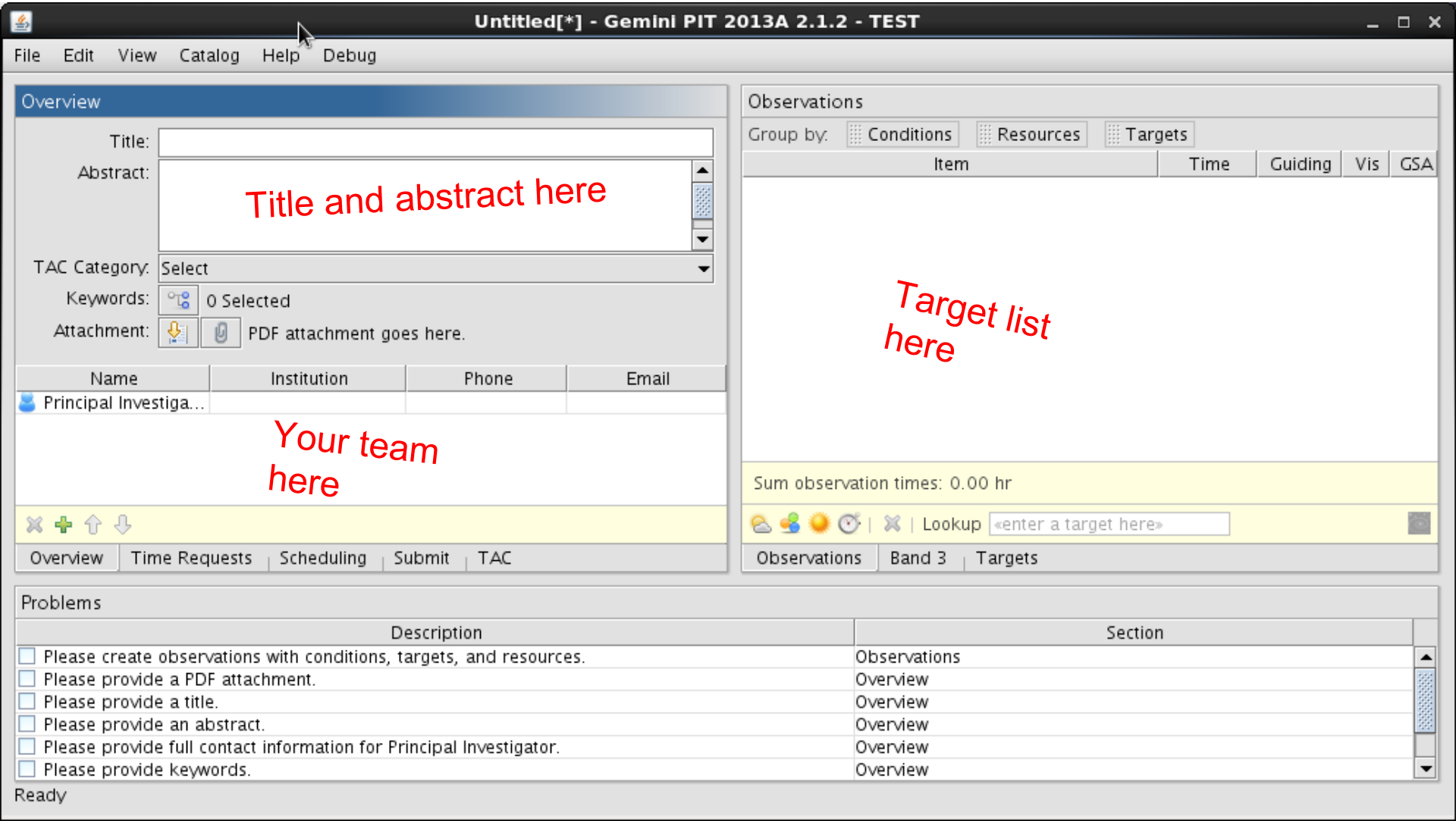
For when we open on cloudy nights

- Submitted directly to the **Head of Science Operation**
- For **bright targets** (typical 2-4m telescope projects)
- For poor seeing (1”) and/or thick clouds (extinc. > 1mag)
- Approved based on schedule
- Best effort basis

There are many ways to get time because there are many ways we do research!

	Regular proposal	Large & Long programs	Fast turnaround	Director Discretionary Time	Poor Weather
When	Once per **semester**	Once per **year**	Once per **month**	Anytime	Anytime
Refereeing	National Allocation Committees	LLP Program Time Allocation Committee	Peer reviewed! (**No TAC**)	**Chief Scientist** (John Blakeslee)	**Head of Science Operation**
What for?	"Business as usual"	**Ambitious** large or long projects	**Immediate, short and/or follow-up**	Special opportunities	Typically for 2-4 meter-class
Over-subscription	2	5	2	<2	N/A
	65%	20%	10%	5%	weather loss

All the proposals are prepared the same way!



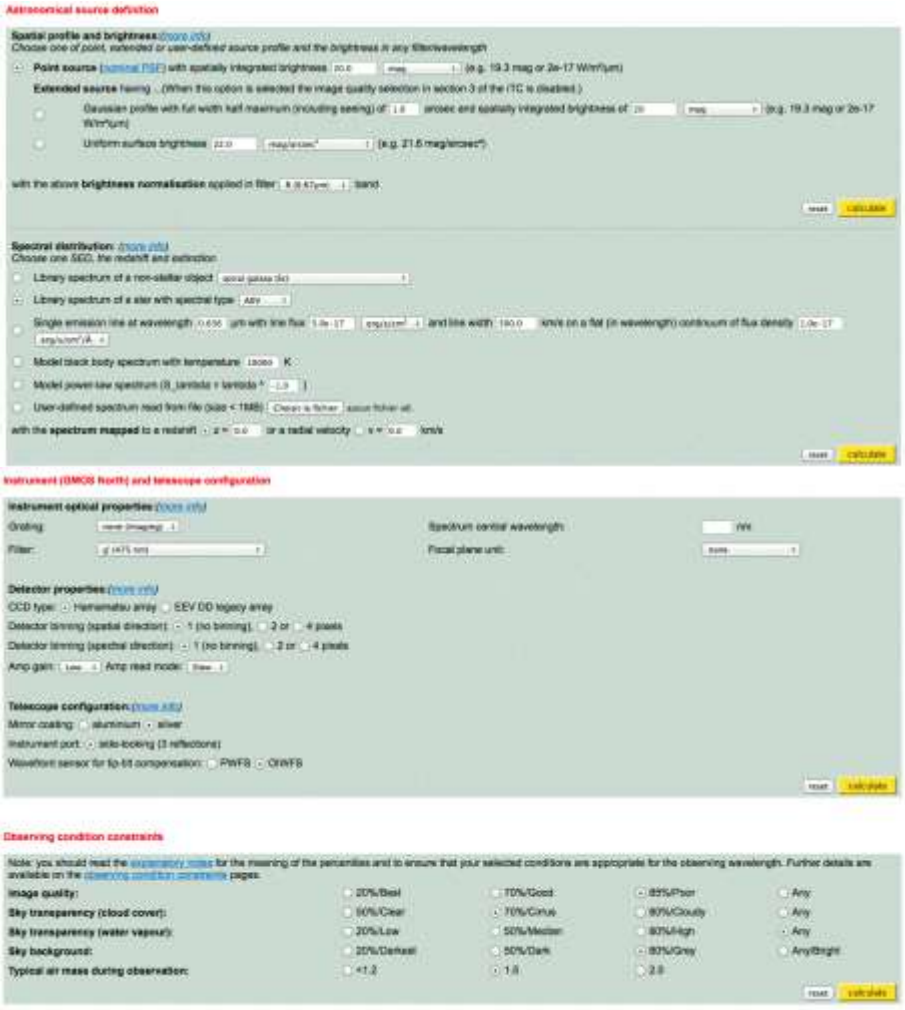
Proposals must contain:

- Team members information (Name, email, phone)
- Title and Abstract
- Science Justification
- Experimental design
- Technical Justification
- Target list
- Instrument set-up
- Weather constraints
- Time requests
- Scheduling notes

www.gemini.edu/PIT-tutorial

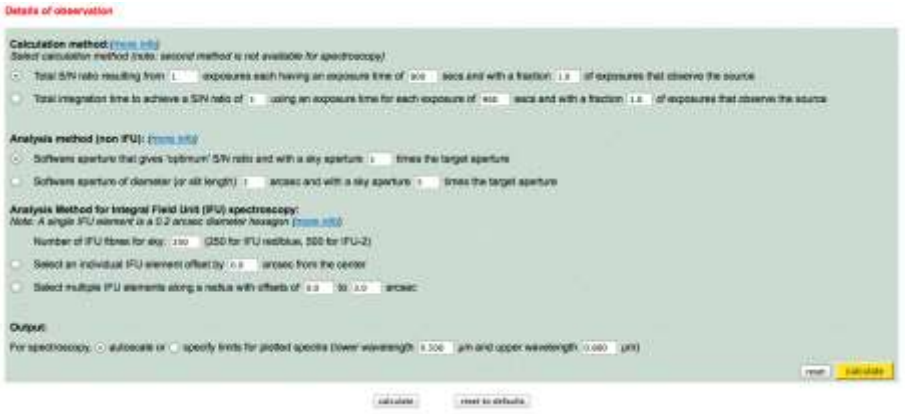
Proposals must also contain a prediction of the Signal-to-Noise ratio

https://www.gemini.edu/sciops/instruments/integration-time-calculators

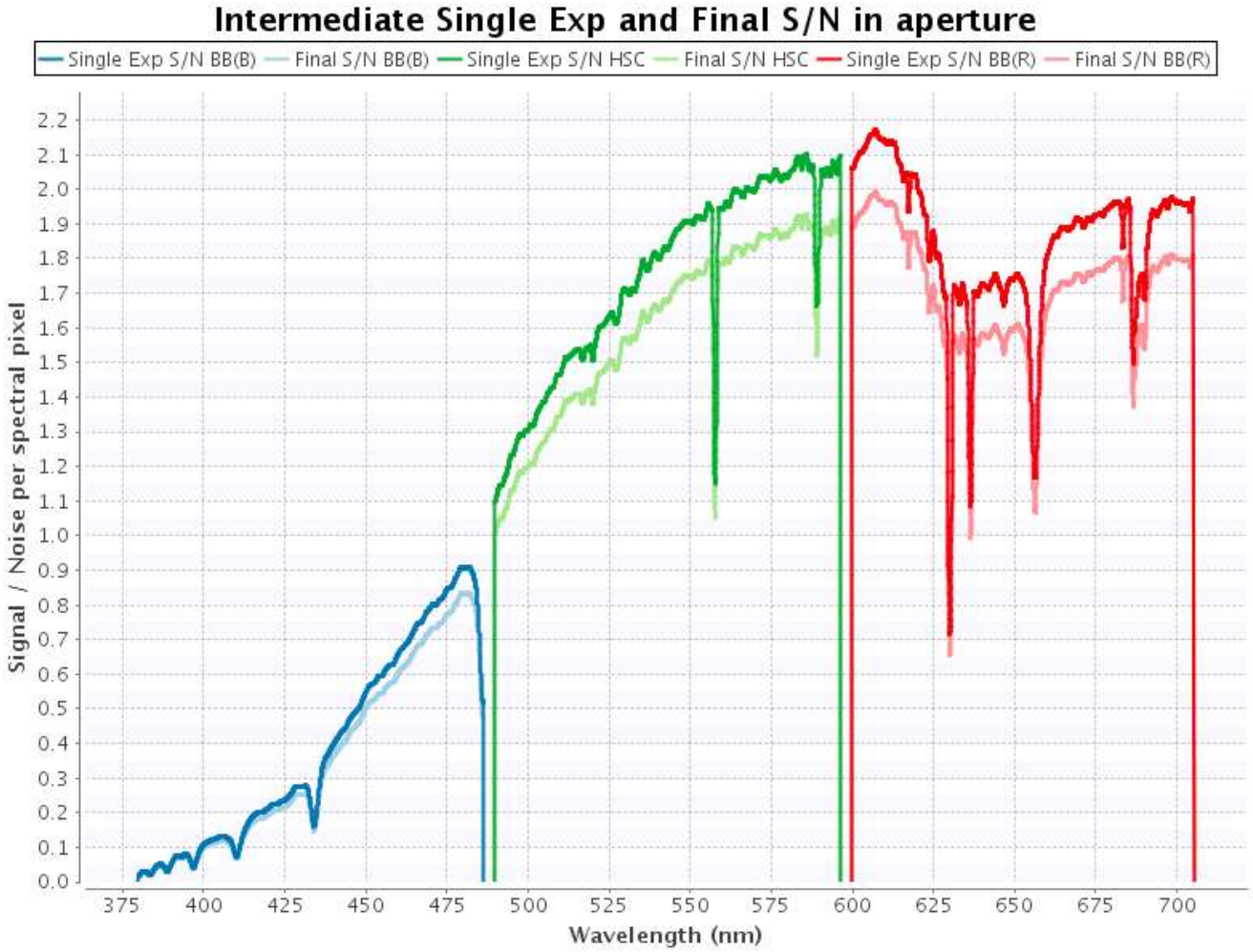


You “play” with:

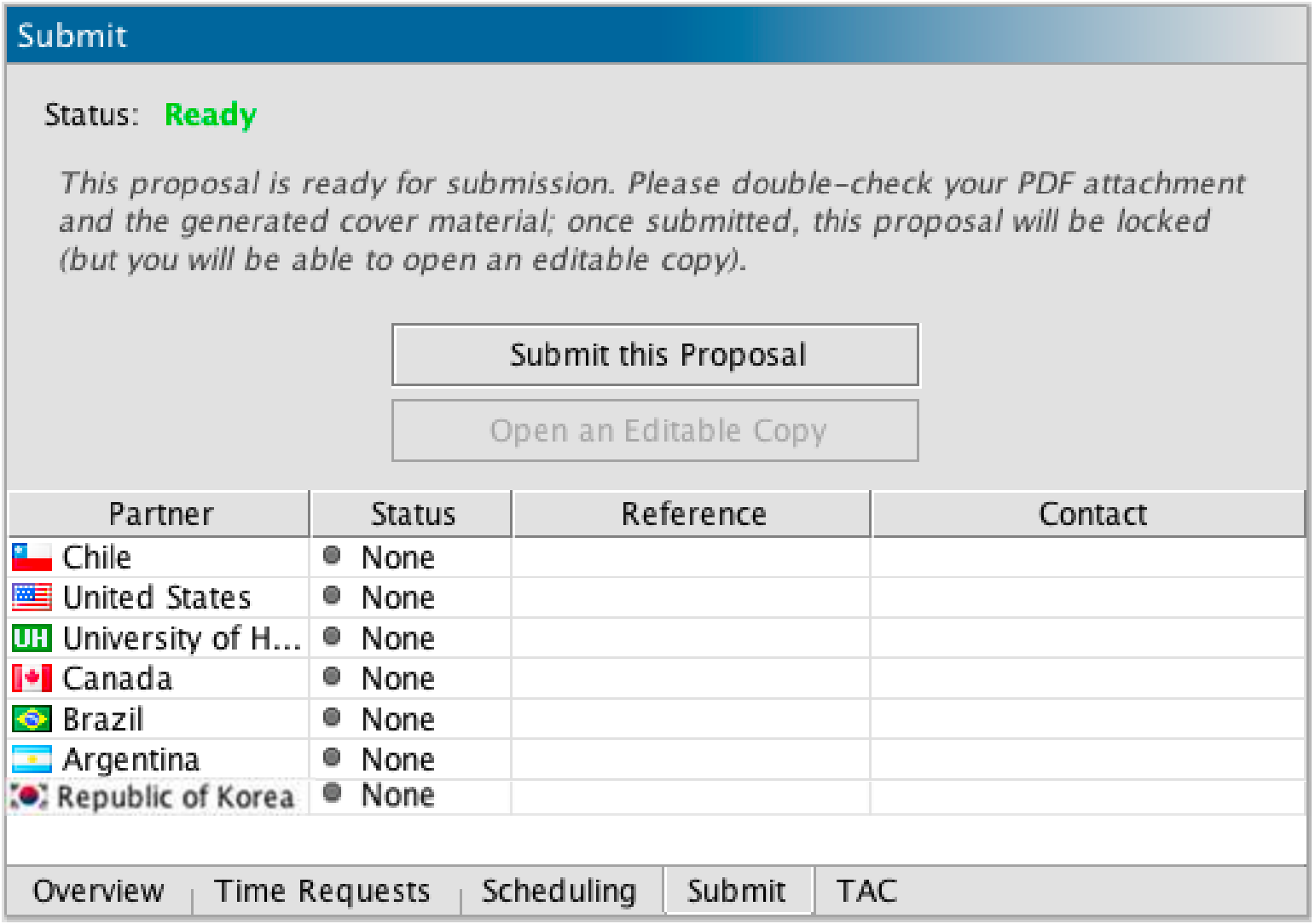
- Brightness
- Spectral distribution
- Instrument set-up
- Weather constraints
- Exposure time
- Aperture (depends on mode)



And you get a preview of the expected S/N



"Submit this Proposal" button sends the proposal to the right place



... then you wait about 3 months...

- For Queue and LLP proposals -

Proposals go from the proposer:

- to the National Time Allocation Committee (NTAC)
- to the International TAC
- to the Gemini Observatory

Answers and feedback sent back to proposers about 1.5 months before the start of the semester

… or wait 2 weeks!

- For FT proposals -

Proposals go from the proposer:

- to “competing” proposers
- to the Gemini Observatory

Successful programs start 1 month later.

... or do not wait at all!

- For PW or DDT proposals -

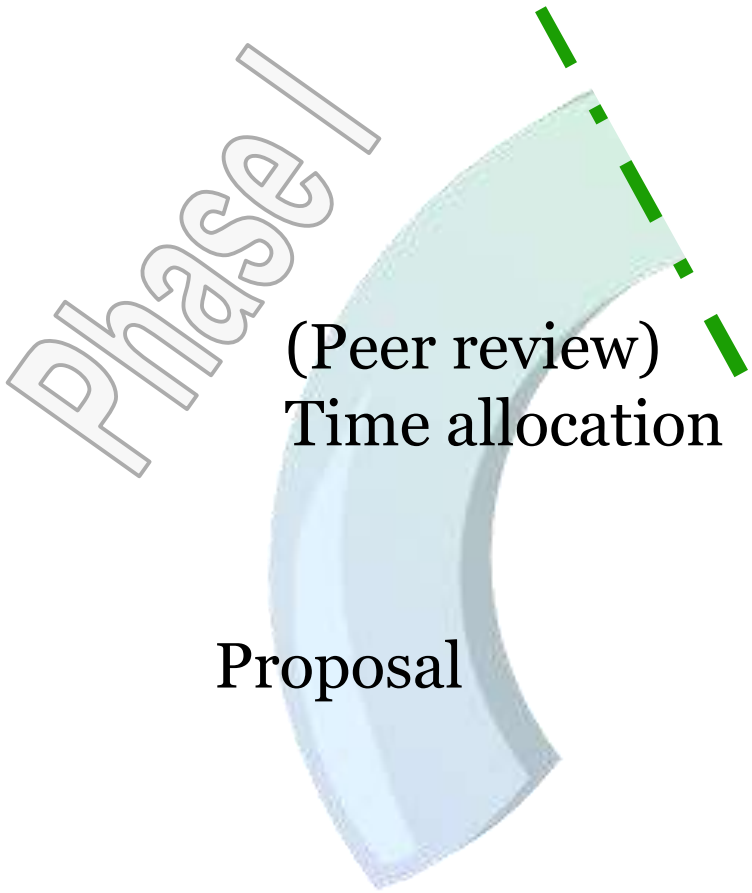
Proposals go from the proposer:

- straight to the Gemini Observatory

Successful programs could start on the same day!

Or the longest wait should not be longer than 1 week.

Any question about Phase I?



Proposal types:

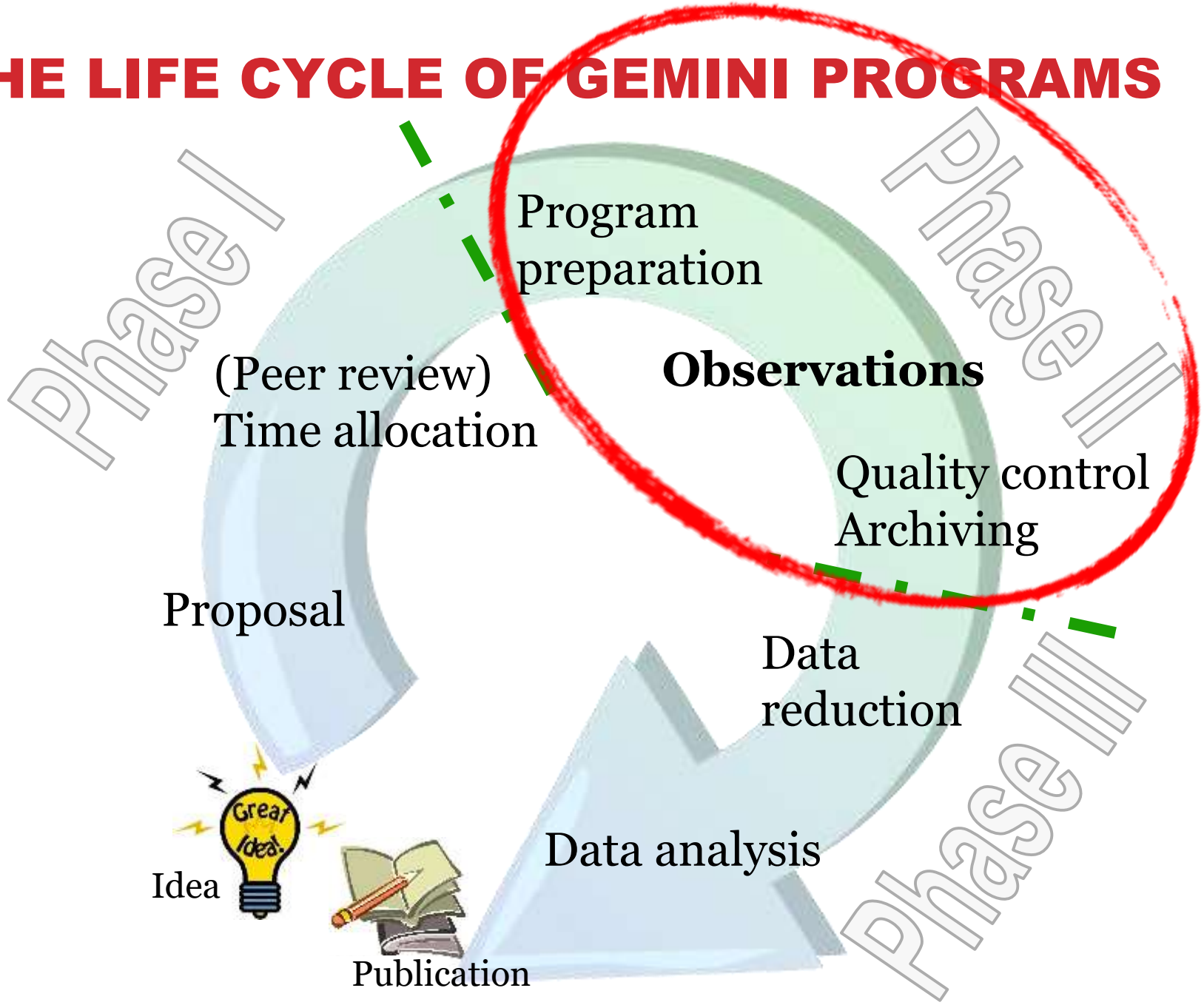
- Regular
- Large & Long
- Fast turnaround
- Director Discretionary
- Poor Weather

ITC

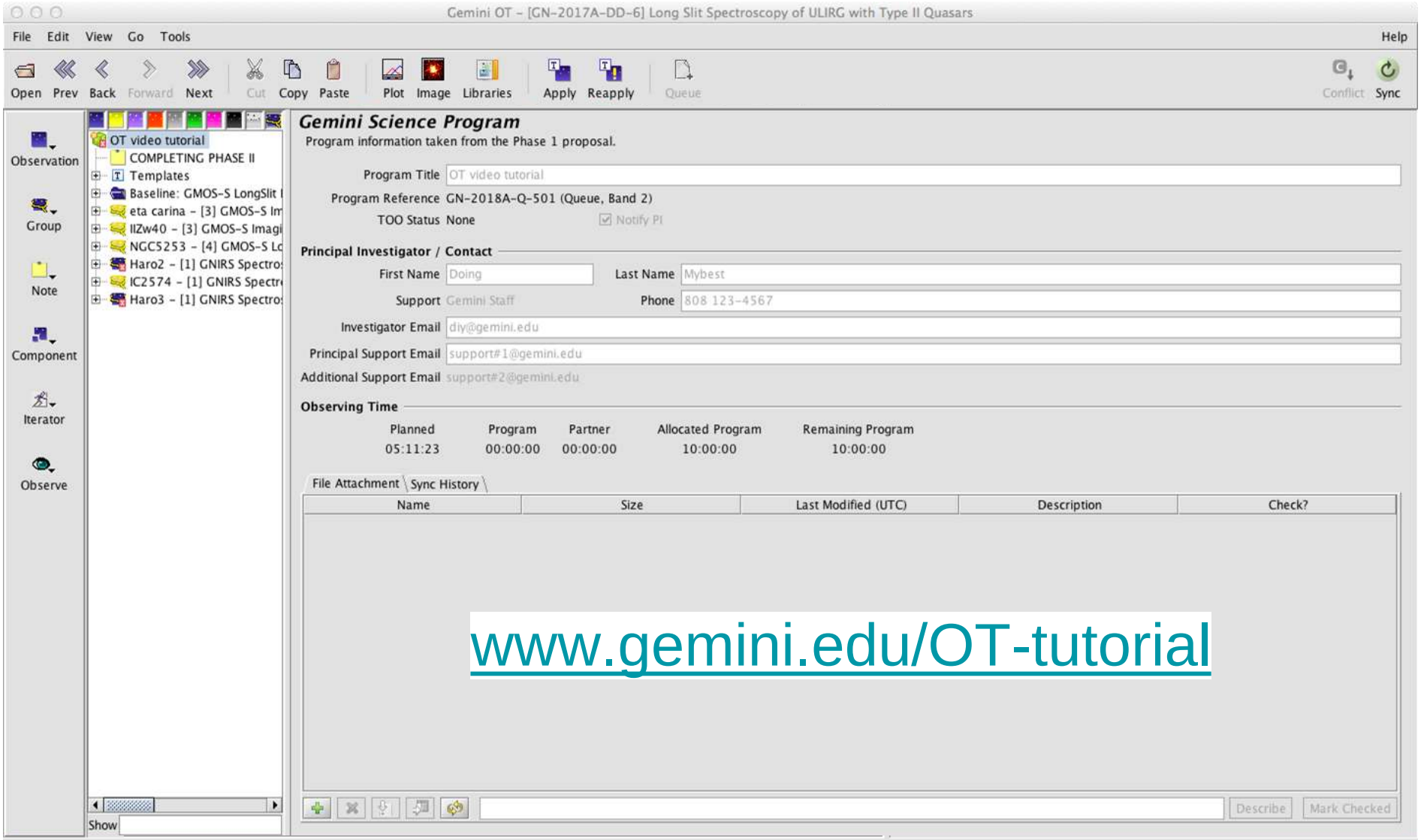
PIT

Time allocation

THE LIFE CYCLE OF GEMINI PROGRAMS



Programs are prepared using the OT



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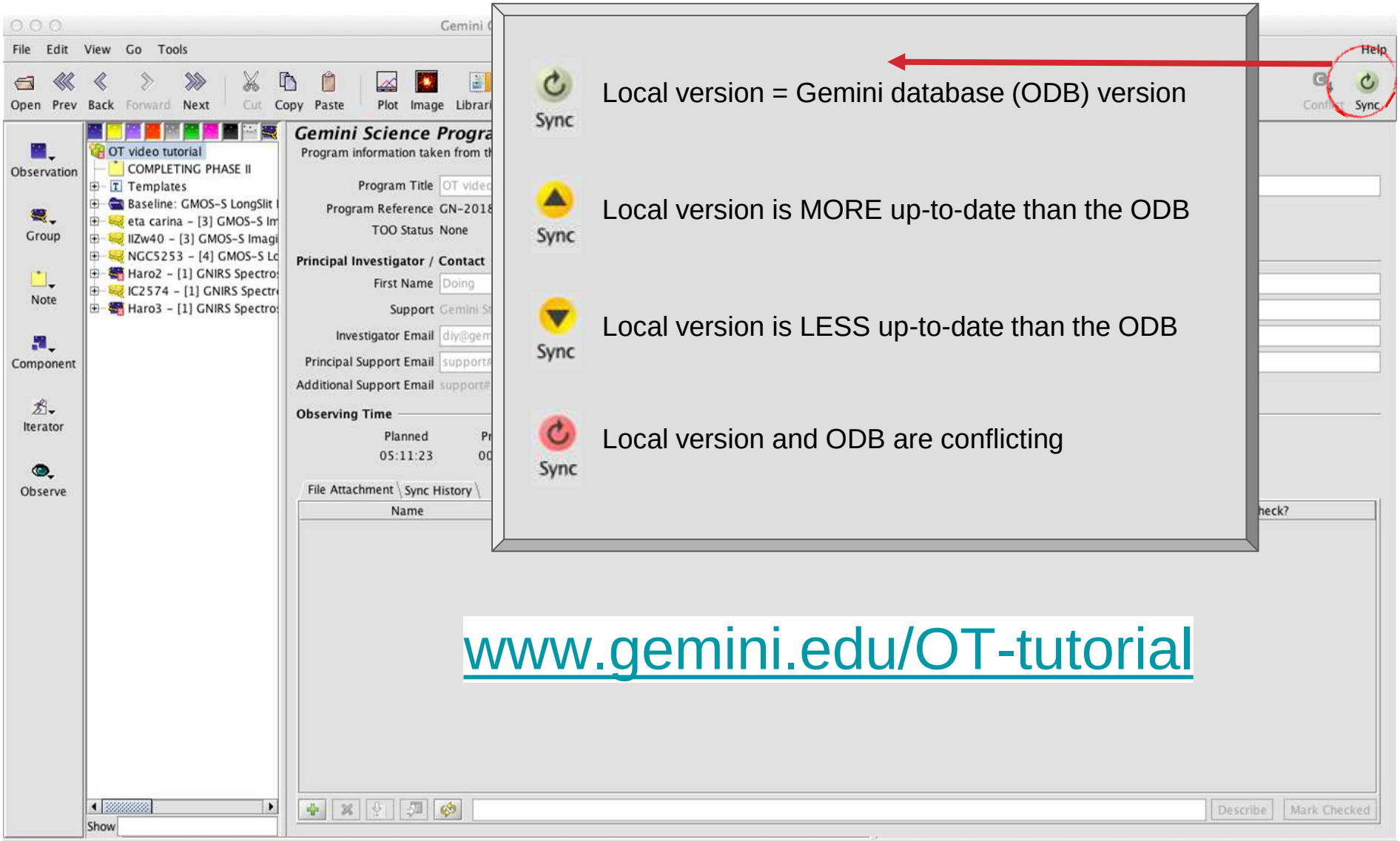
Local and Gemini versions are “Synced”



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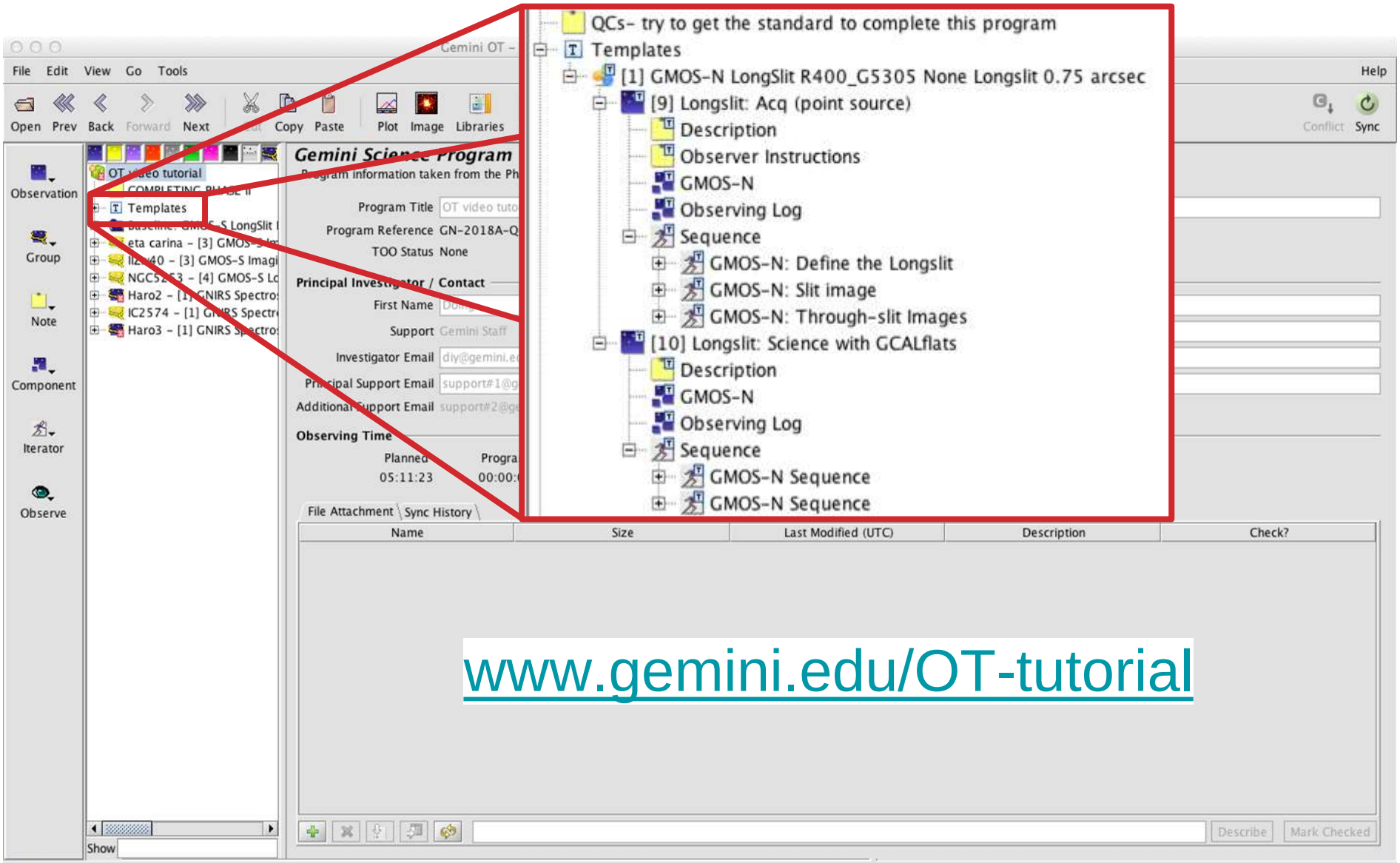
The OT templates give the threads to use...



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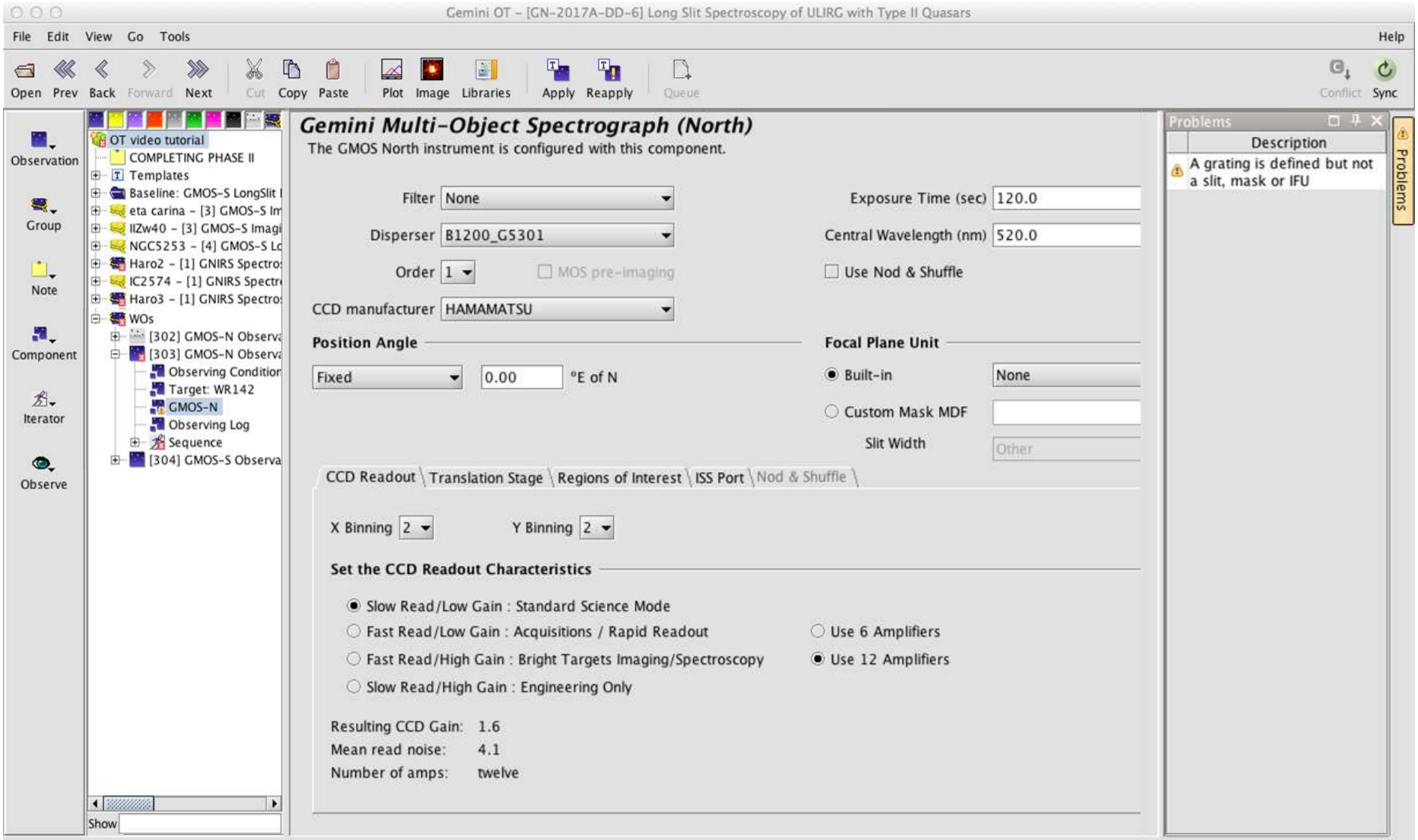
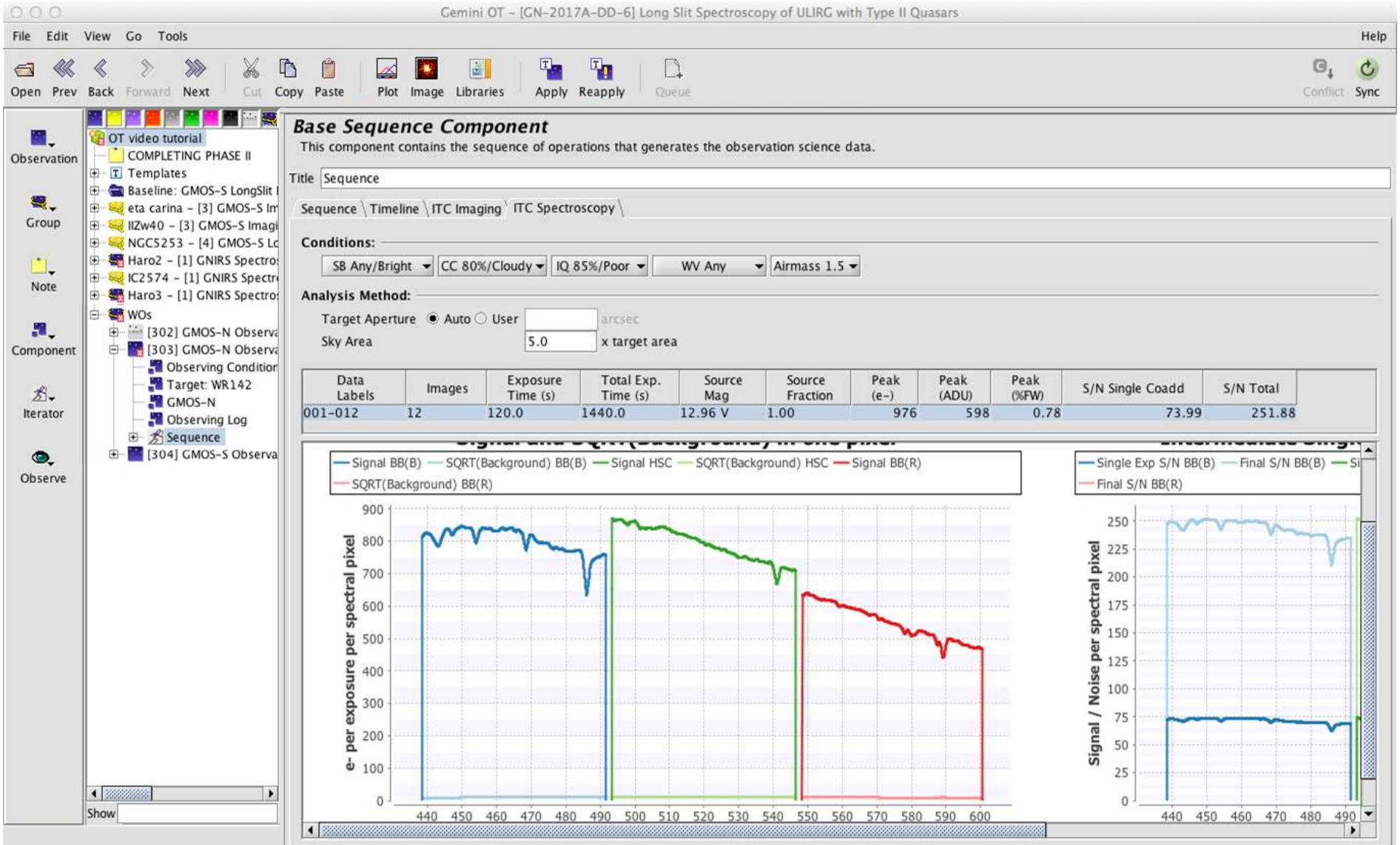
Phase II: Program preparation → OT

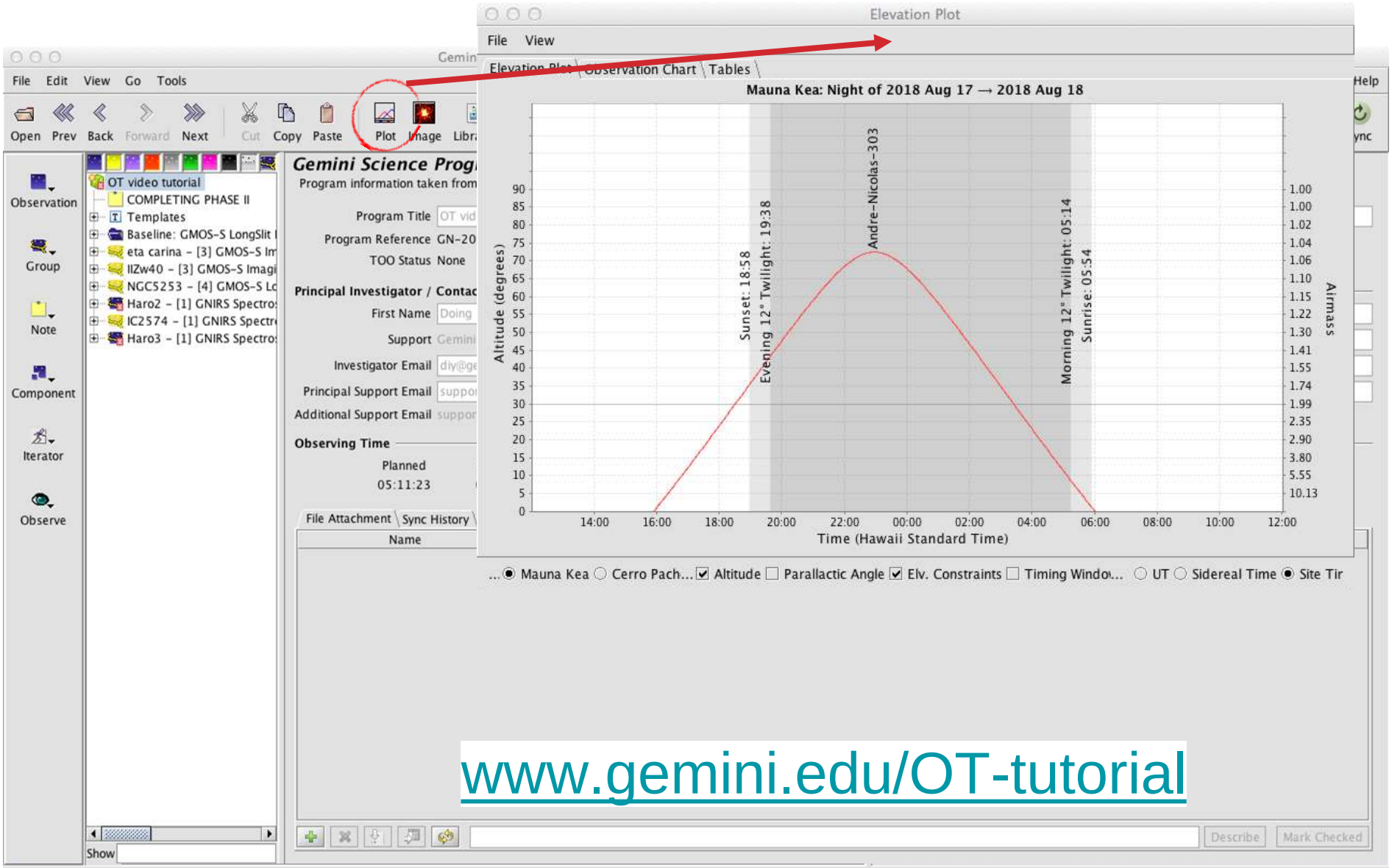
… so you can apply them to targets



The OT has an embedded ITC!



OT Elevation curves



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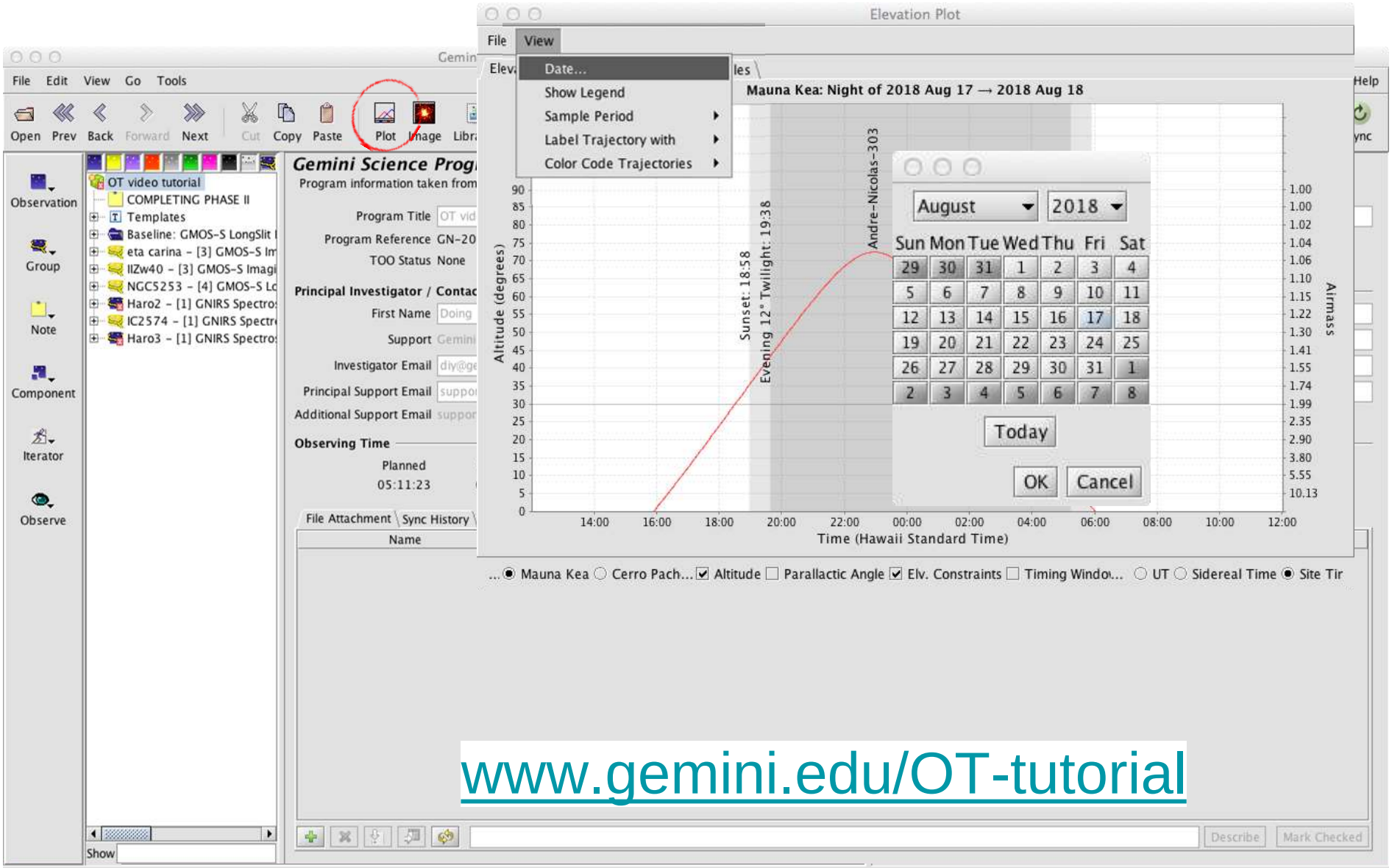
OT Elevation curves for any time of the year



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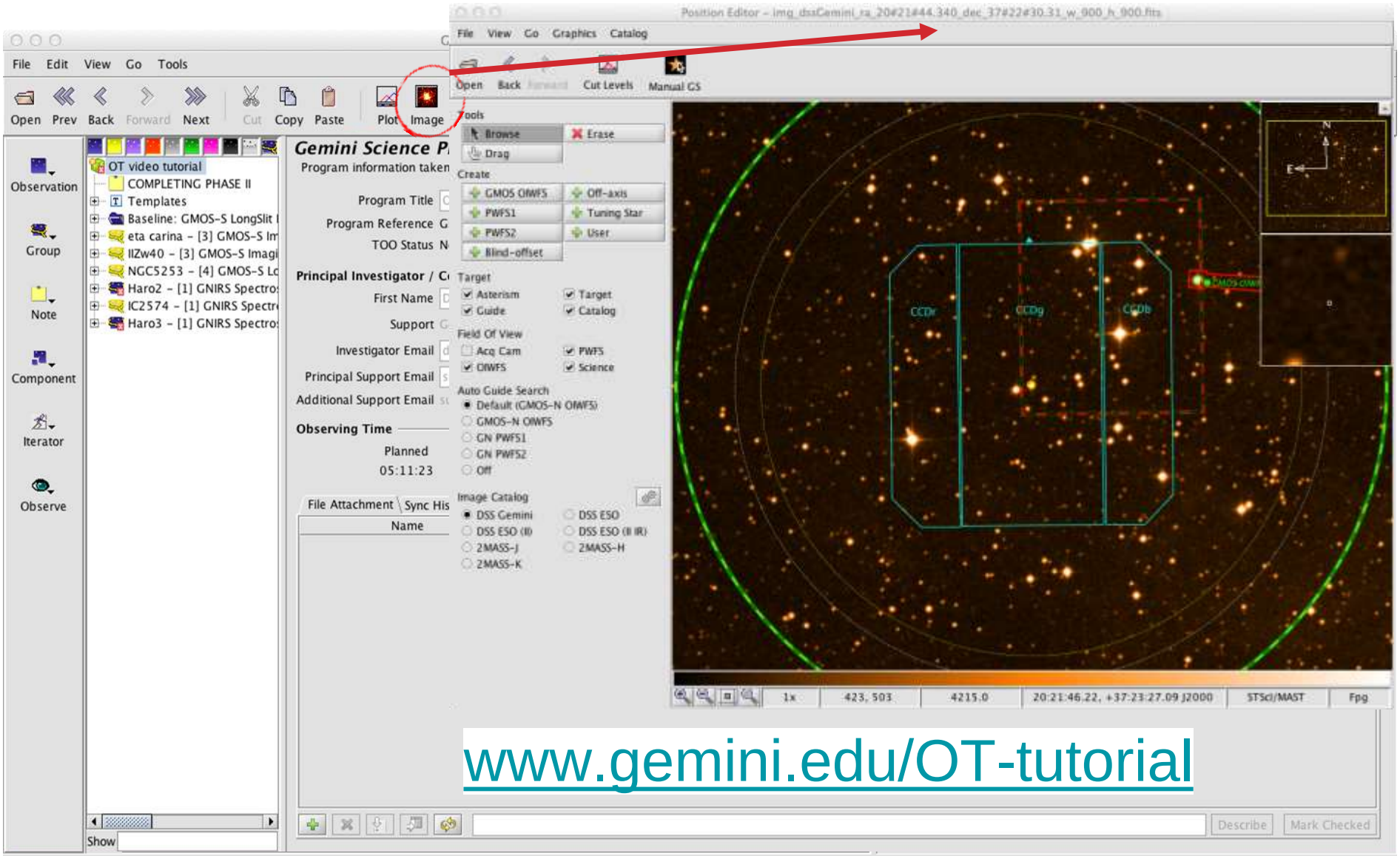
OT position editor



www.gemini.edu/OT-tutorial

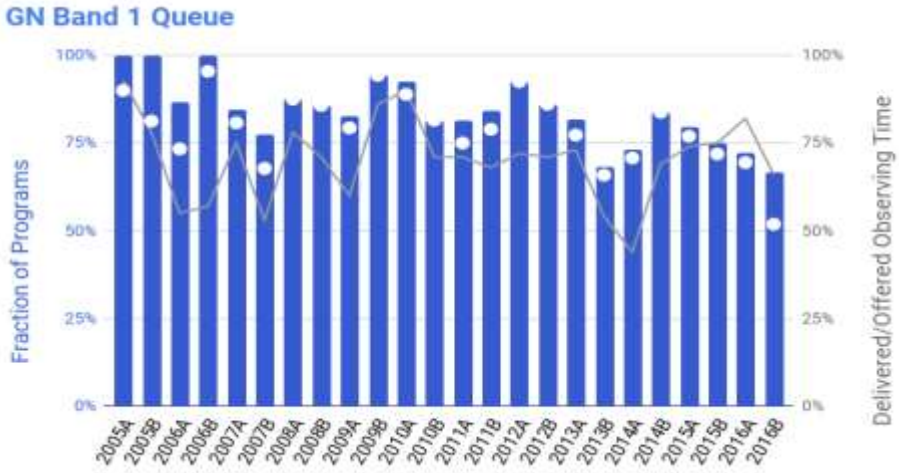
I have got a program (in queue mode)! So what?

- Will I get data?
- What should I do now? And when?
- What if something is wrong?
- What if there is something I don’t understand?
- What if there is something I don’t like?

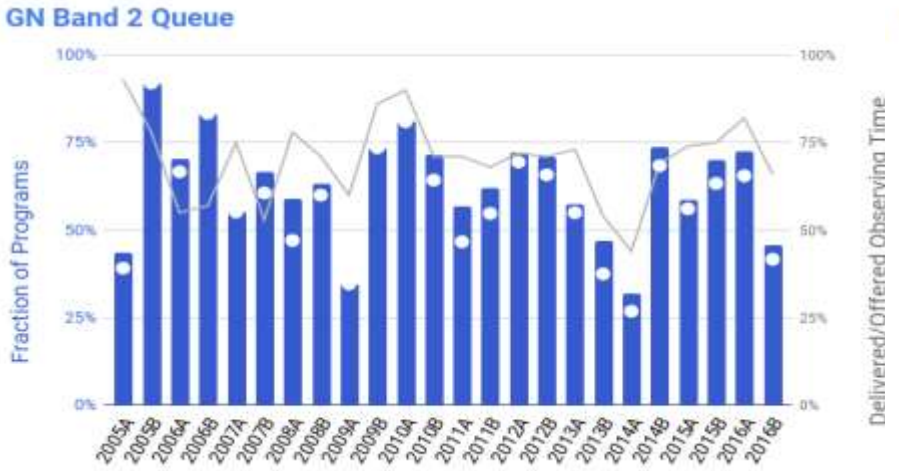
The likelihood to get data (in queue mode) depends on:

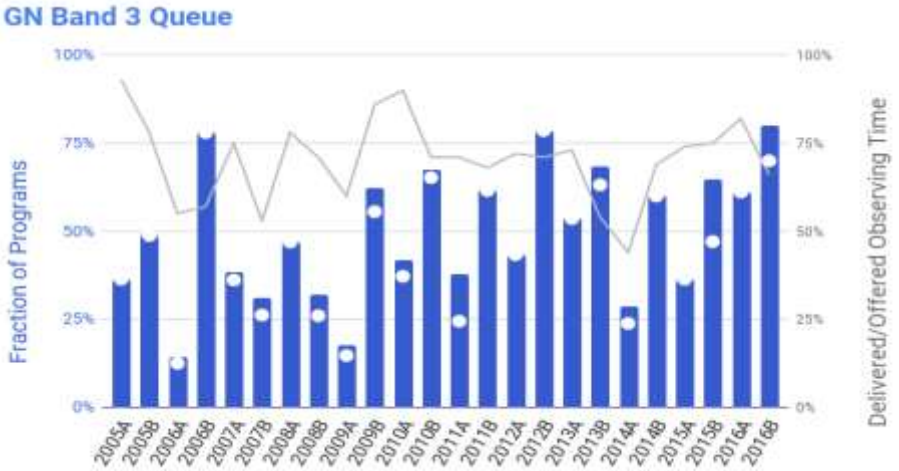
1. Program Band (1, 2, 3)
2. Program type (Q, LP, DD, FT, PW)
3. Program restrictions (timing windows, weather, frequency)
4. Program status (ToO, started, intru. configuration, ...)

The likelihood to get data depends on 1. the Band



- **Band 1** has absolute priority
- **Band 3** are “fillers”
- **Band 2** are successful when the semester goes well





The likelihood to get data depends on 2. the program type

(Priority increases from bottom to top)

DD	FT	Q	LP	Others
Band 1				
	Band 1	Band 1	Band 1	
Band 2				
	Band 2	Band 2	Band 2	ENG
		Band 3		
				Band 4 (PW)

NOTE: this is a methodology

The likelihood to get data depends on 3. the program restrictions

- **Timing Windows**: Timing windows matter, and observations can be scheduled in better conditions than requested if needed to try and meet a timing window.
- **Time frequency**: Same as for Timing Windows, time frequency requirement is followed (after the priority based on the Bands has been considered).
- **Weather constraints**:
  - *Best weather conditions* (IQ20%, CC50%) happen 10-15% of the time.
  - Execution in better than requested conditions will on average lead to lower completion rates!
  - *Water Vapor* and *Sky Background* restrictions are taken into account.

NOTE: this is a methodology

The likelihood to get data depends on 4. the program status

- **Standard ToOs**: Submitted during the day and need to be done before their windows end. You need to do a best effort to get these, but there is some flexibility.
- **Rapid ToOs**: Take absolute priority at the moment they are triggered (after the priority based on the Bands has been considered).
- **Current completion:** At equal priority level otherwise, programs that have been started should get priority. However, QC can give a near 80% complete program higher priority than a >80% complete program.
- **R.A.**: Earlier targets take priority if we are about to lose them (after the priority based on the Bands has been considered)
- **Instrument configuration**: Between two equivalent programs, one can take priority if it needs the same configuration as a higher priority program.
- **Known thesis projects**: They are completed first

NOTE: this is a methodology

Queue mode VS Classical mode

Queue

- Scheduled on daily basis
- Multiple programs per night
- 3 instrum.+AO each night
- Ran by staff
- Flexible with weather

Classical

- Scheduled ahead of time
- 1 program at a time
- 1 (or few) instrument(s)
- Ran by the research team
- No control on weather

NOTE: both are prepared with the same Observing Tool

Or a mix of both? PRIORITY VISITOR mode

Priority Visitor Observing mode is a scheduled visit to:

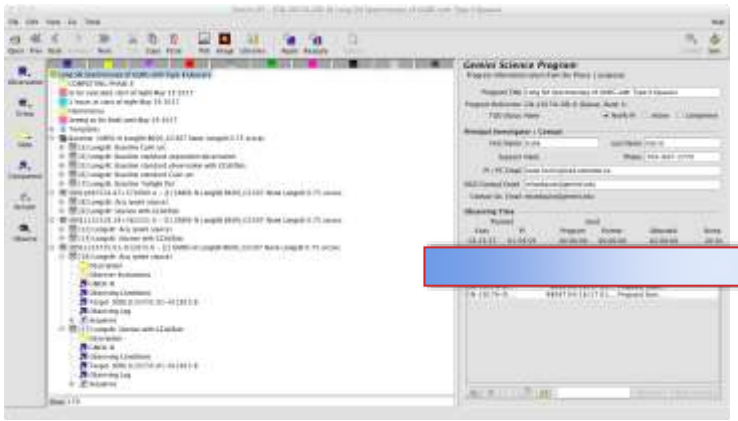
1. Run your program (would conditions allow)
2. Run the queue (if not your program)

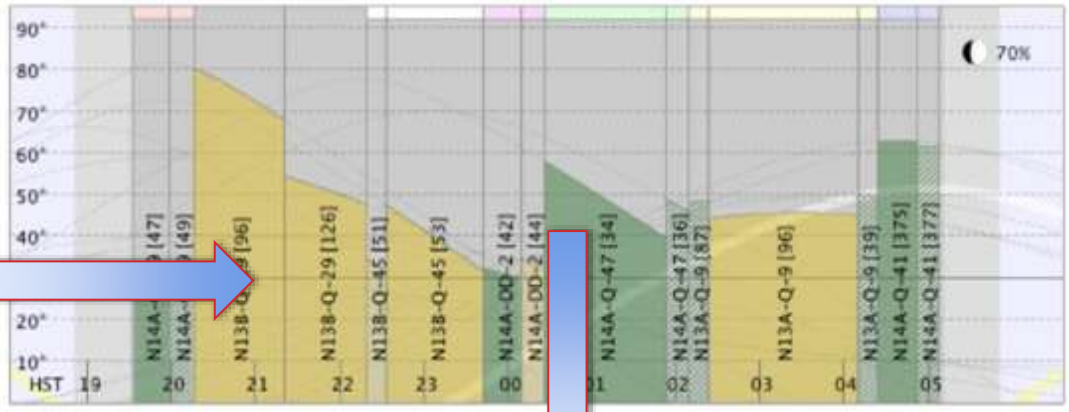
- Same expectations as for Queue, but you get the "Classical" experience.

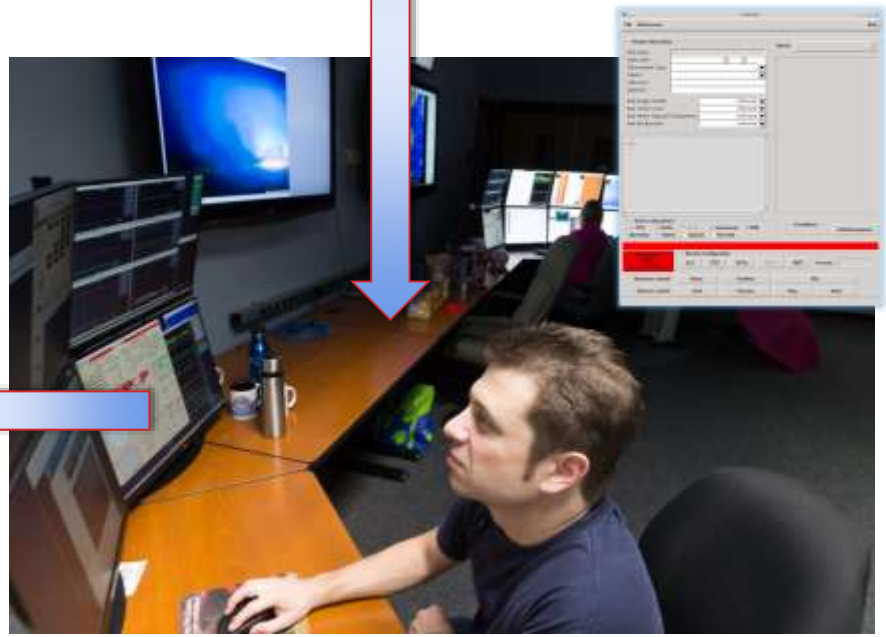
Bring One, Get One! Gemini subsidizes US$2000 for student coming with You!

First 'BOGO', Allison Noble (U. of Toronto), at Gemini South

And magics happens at night!







Cloud-based archive

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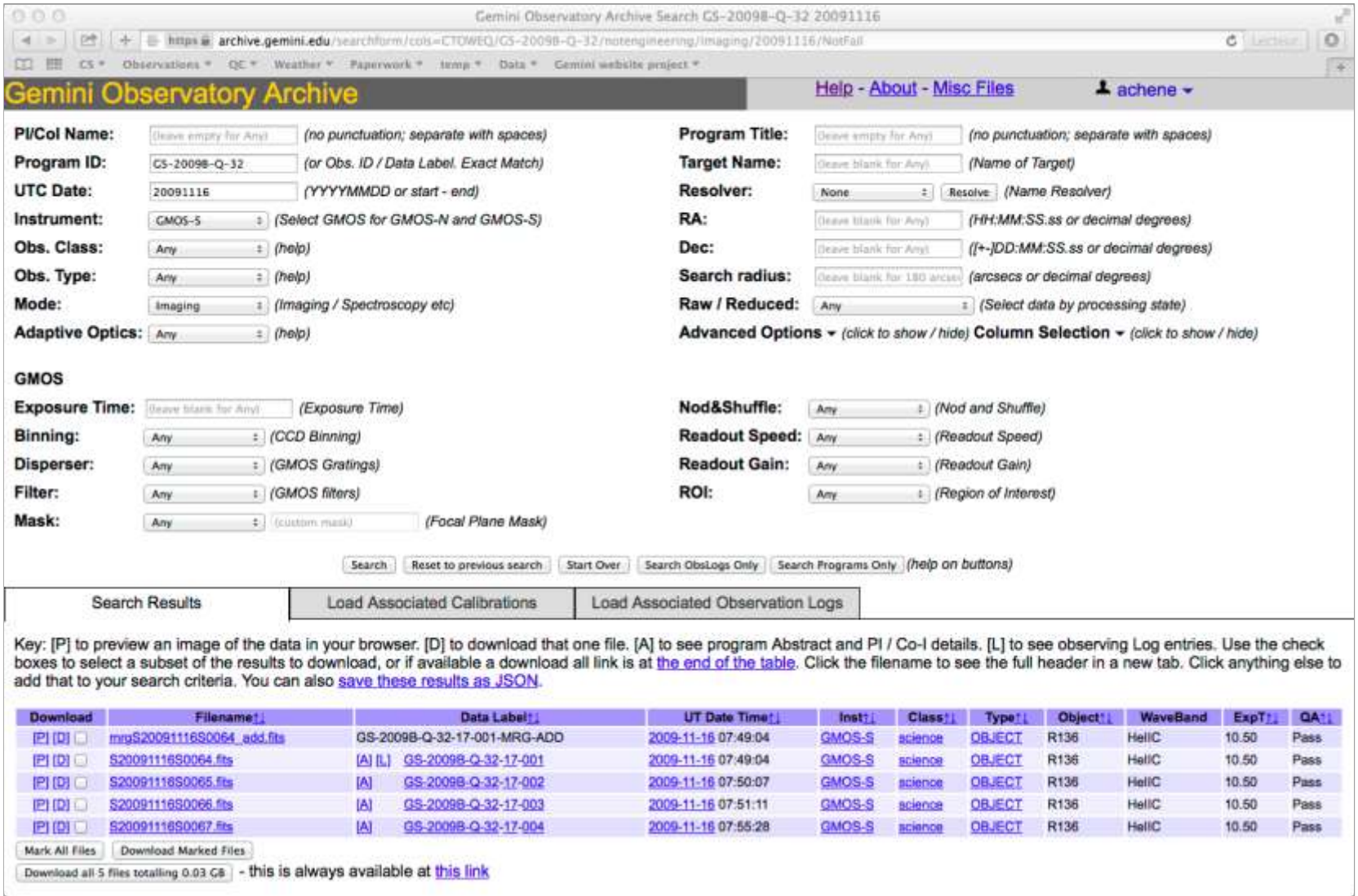

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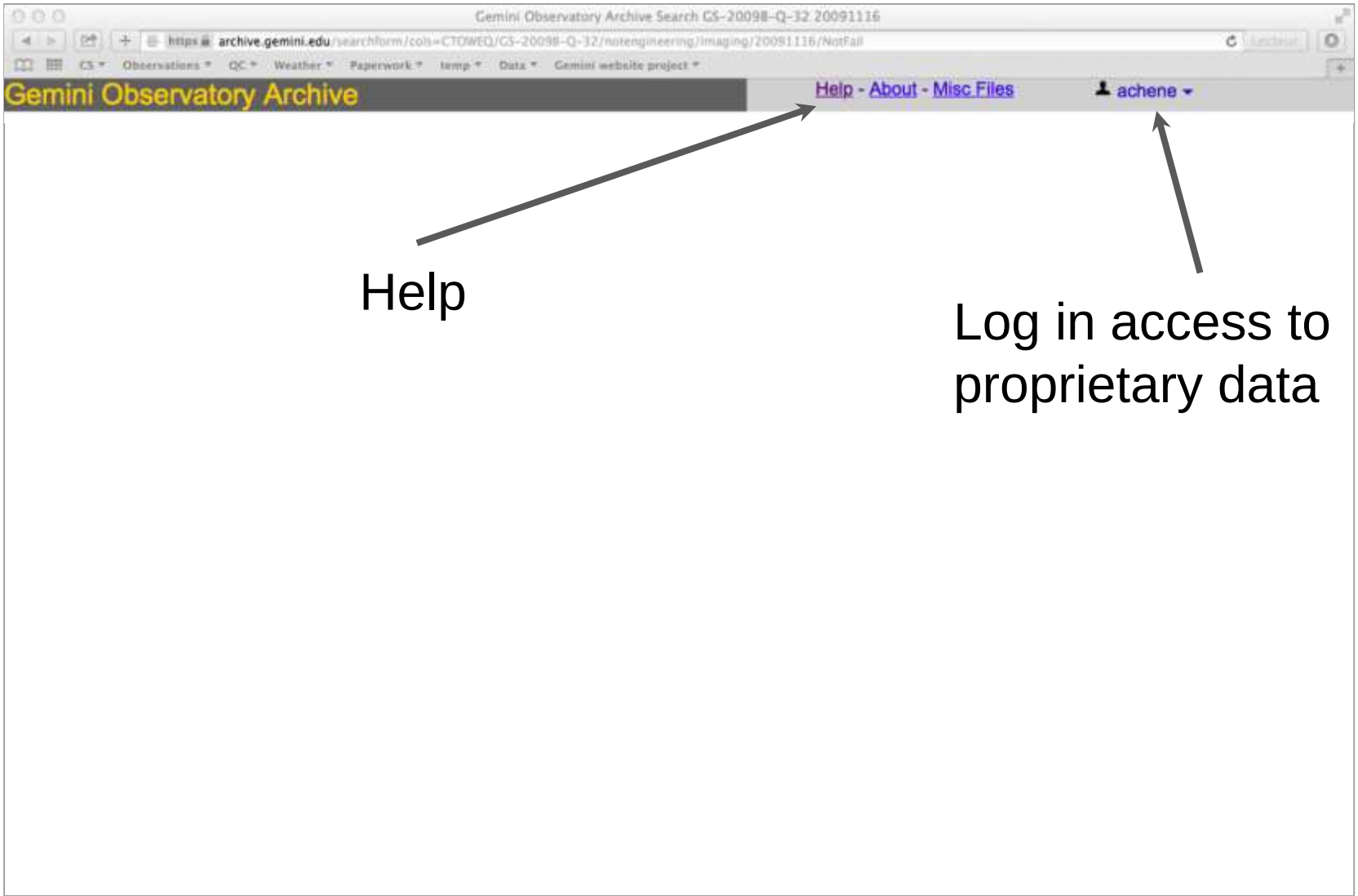

Cloud-based archive

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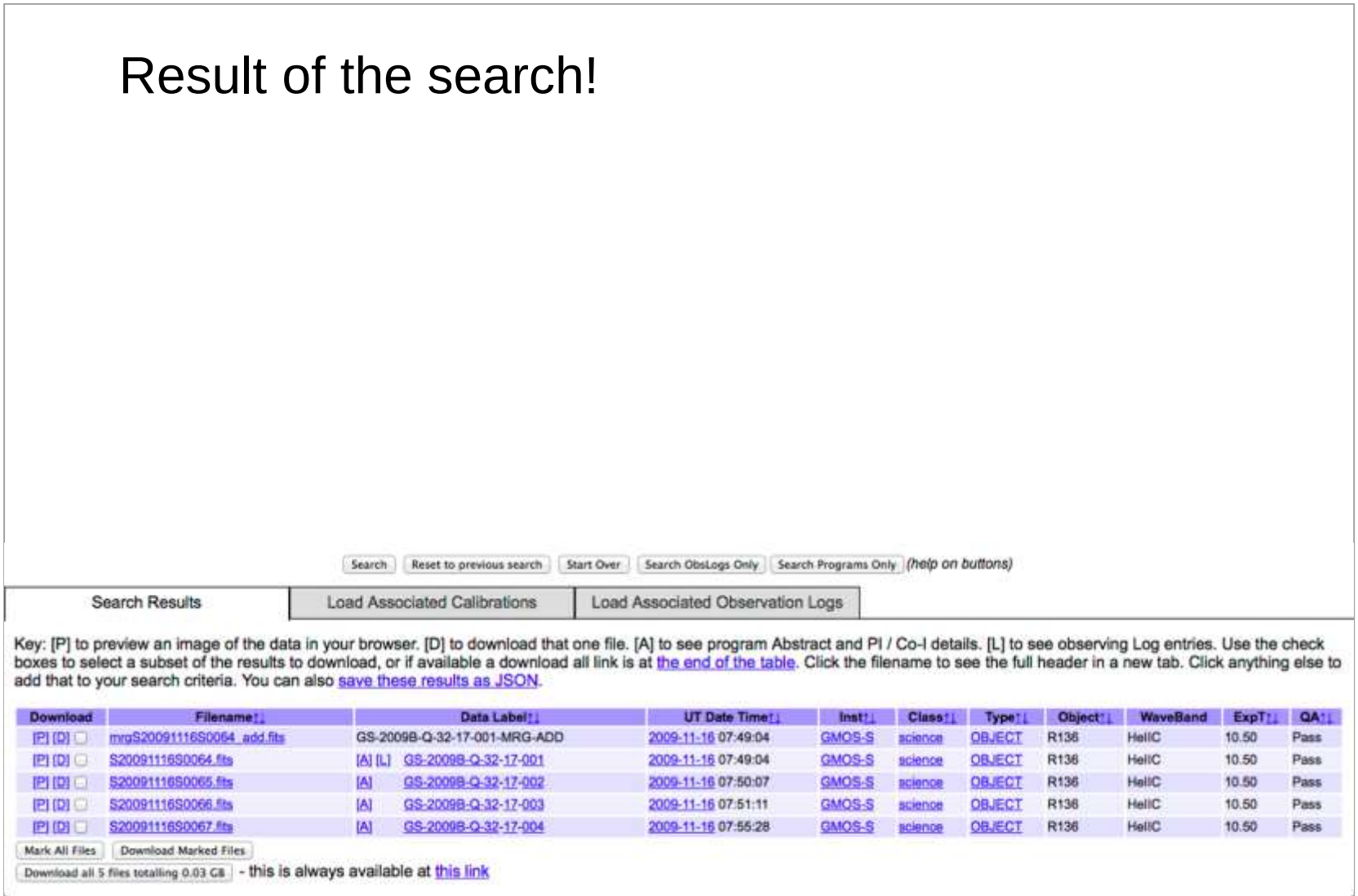
Search by:

- PI name
- Program ID
- Instrument
- Mode
- Observing mode
- Program title
- Sky position
- Target name (can use name resolver)
- etc.

Cloud-based archive

archive.gemini.edu

Result of the search!



Cloud-based archive

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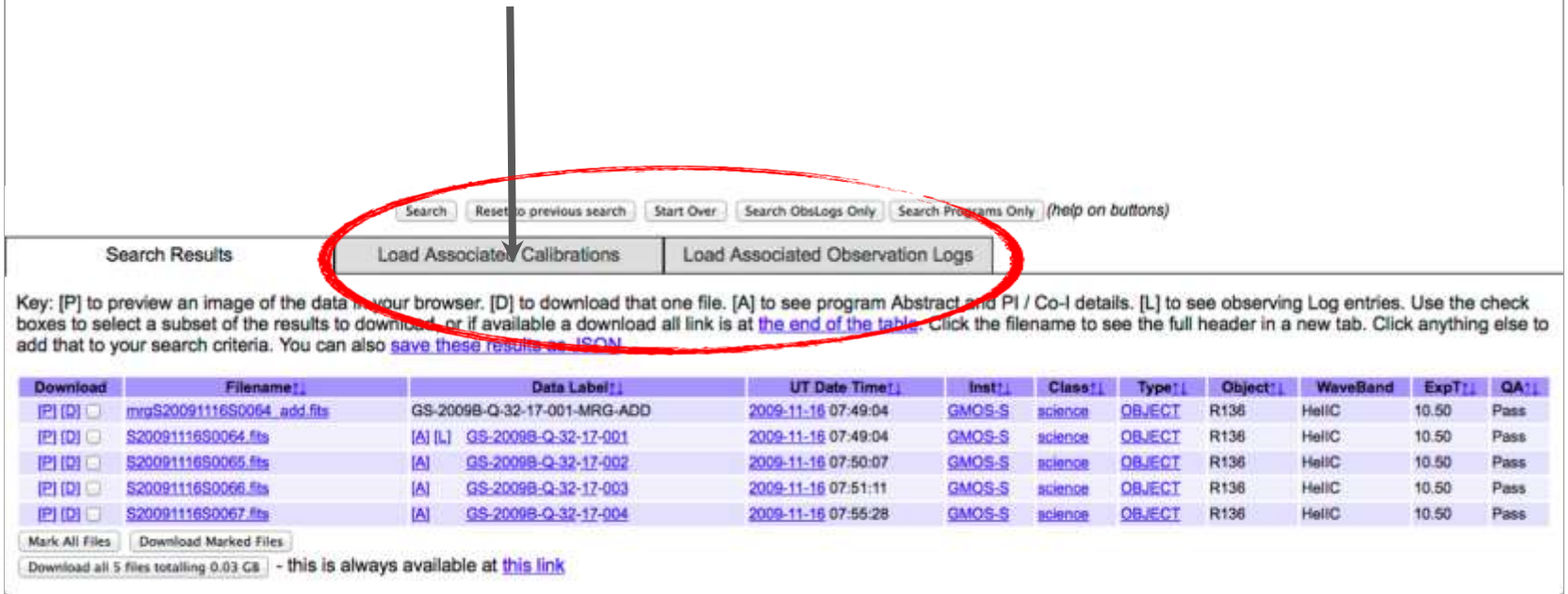
Result of the search!

Calibration and Logs relevant to the observations.

Calibrations association includes all baseline calibrations (e.g., biases, flats, ards, standard star).



Cloud-based archive

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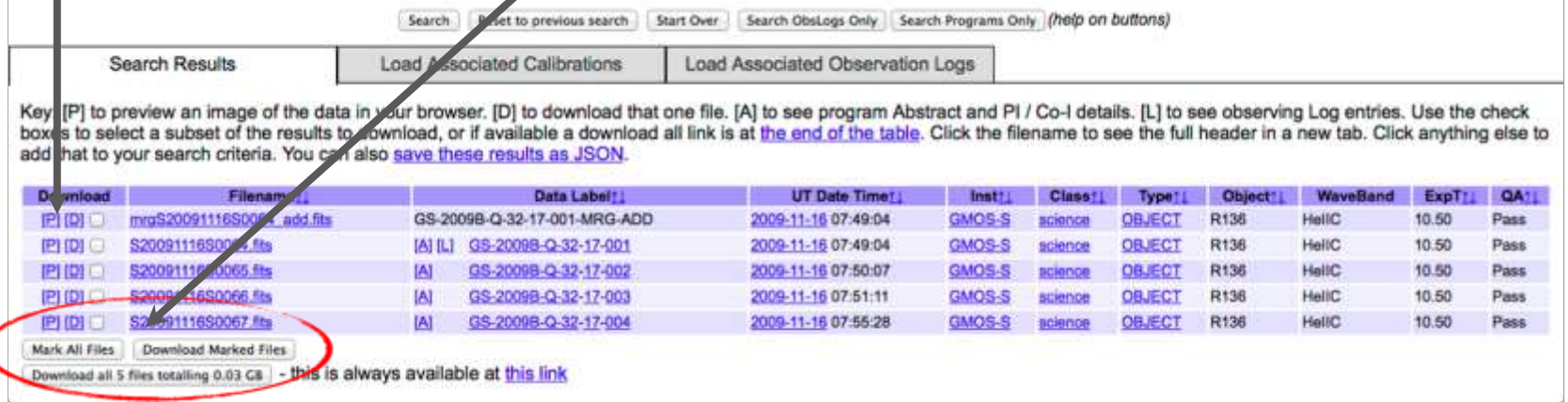
Result of the search!

Buttons to:

- Mark all files
- Download marked files
- Download all

[P] for preview

[D] for download



Cloud-based archive

archive.gemini.edu

About the archive:

- Hosted by Amazon web services
- Data shows up ~**1 minute** after it is observed
- 800 registered users
- Estimated 400 searches per day!

Accessing data with scripts?

- Application Programmer Interface (API) provided for searching the archive and downloading data.
- Results in JSON

Any question about Phase II?

Preparation:

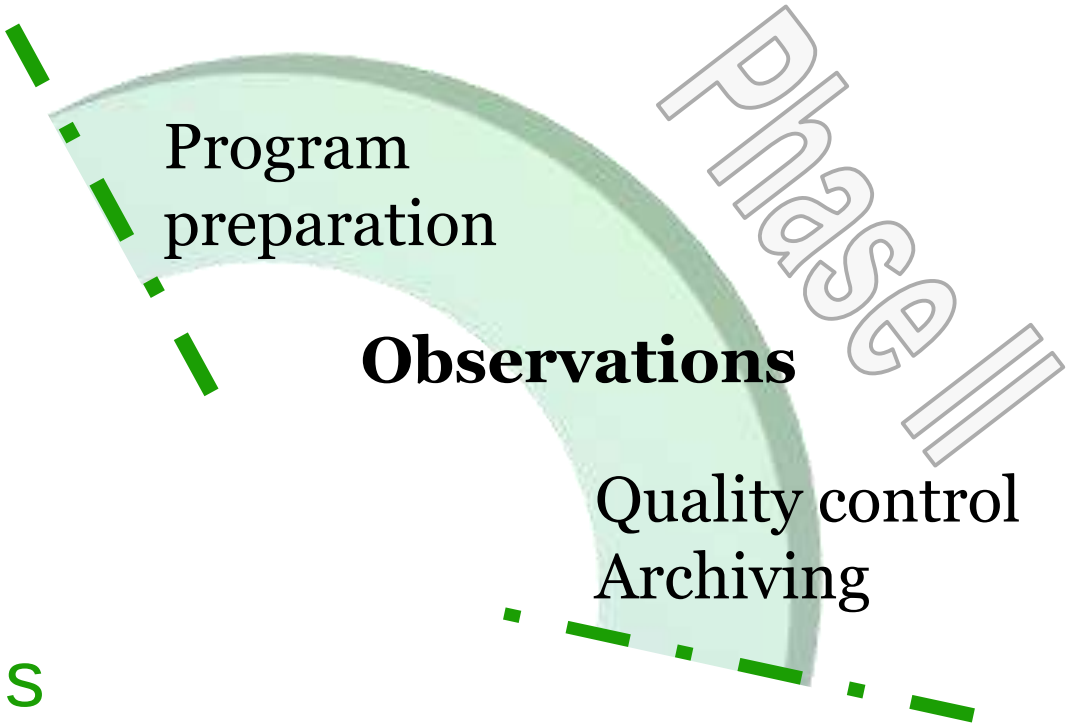
OT

Observations:

Expectations

Modes

Archiving



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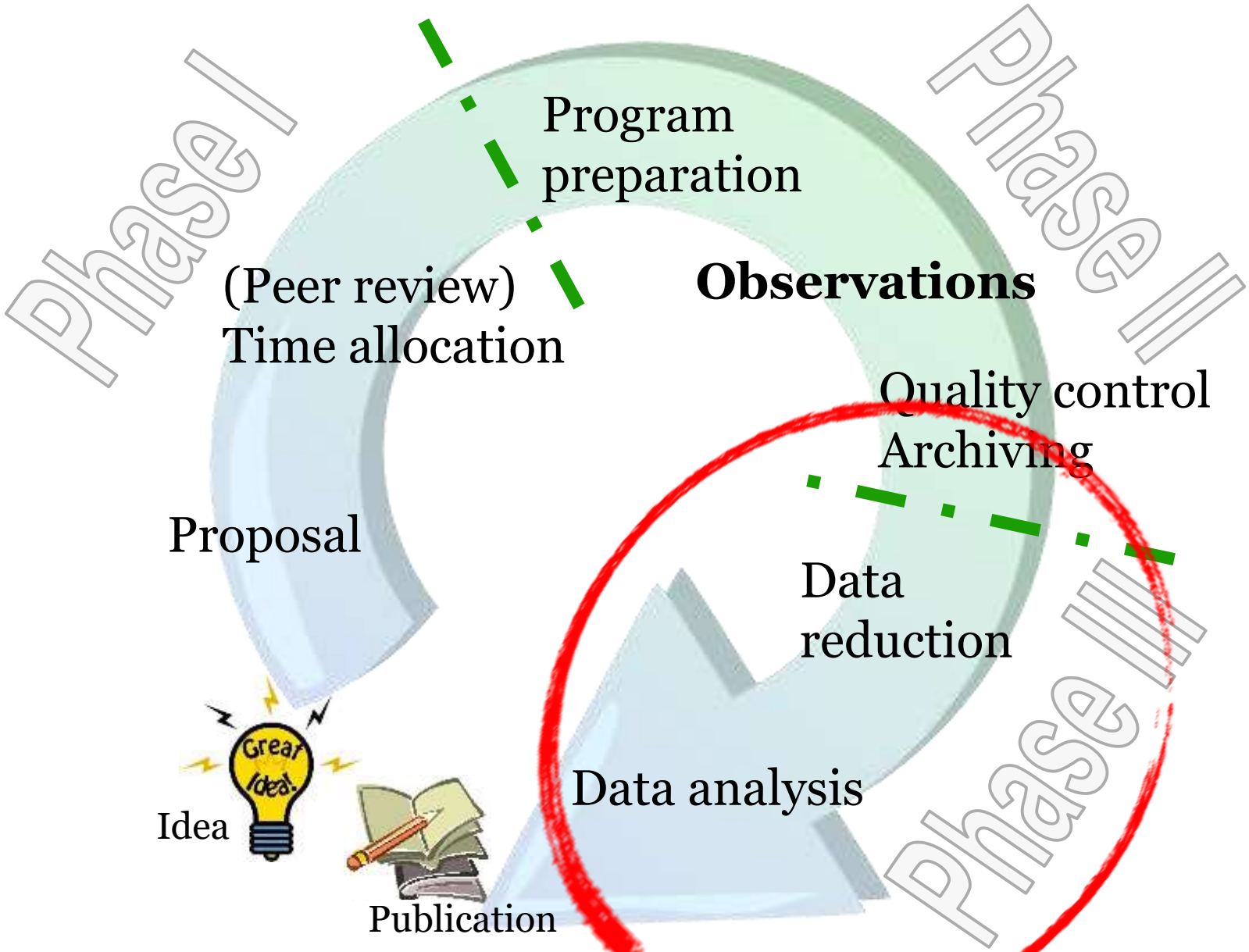
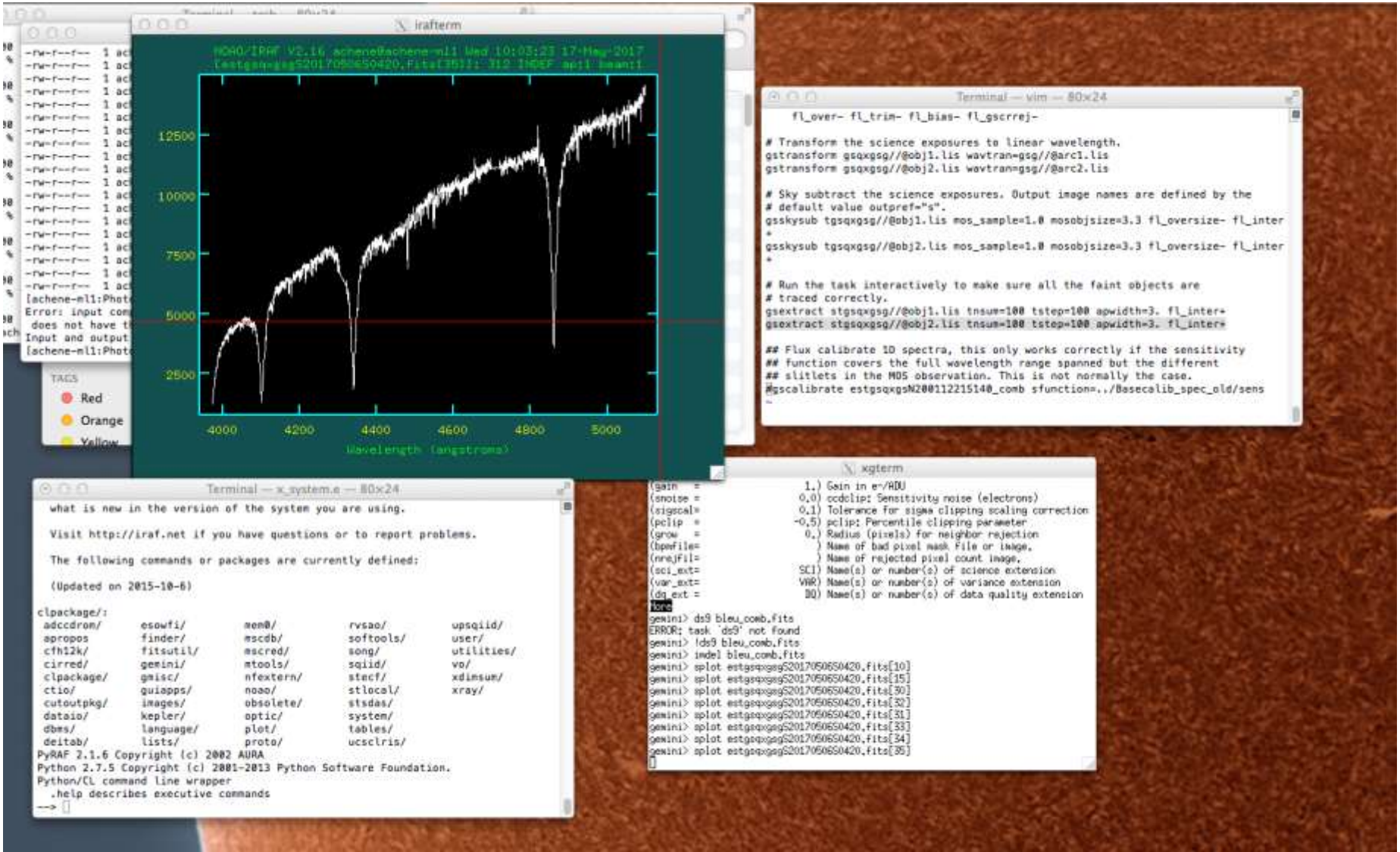


Current data processing based on IRAF



What the software does and does not do:

- **DOES** remove detector, instrument, telescope, and atmospheric effect
- **DOES** process the data in a format ready for science (e.g., raw to x,y,wavelength cube for IFU)
- **DOES** covers all facility instrument, past and present
- DOES NOT include analysis tools

All softwares and packages available through our website

www.gemini.edu/sciops/data-and-results

Using AstroConda installation!

Future of Gemini Data Reduction with Python and Astropy!

- IRAF was first released in 1986, and last full support from NOAO was in 2015
- Astropy is a strong and active community
- DRAGONS:
  - User optimizable data reduction pipeline
  - Modern programing and Open source!
  - New instruments GHOST and OCTOCAM
  - Currently used at Gemini for Data Quality control
  - Public release to come

Do not hesitate to contact us!

- For any issue with the data:
  - gemini.edu/sciops/helpdesk/ - HELPDESK
  - sus_inquiries@gemini.edu - support email
  - contact your **Gemini Contact Scientist** for a phone or Skype/Zoom/telecon call
- To share your experience, or your code:
  - drforum.gemini.edu

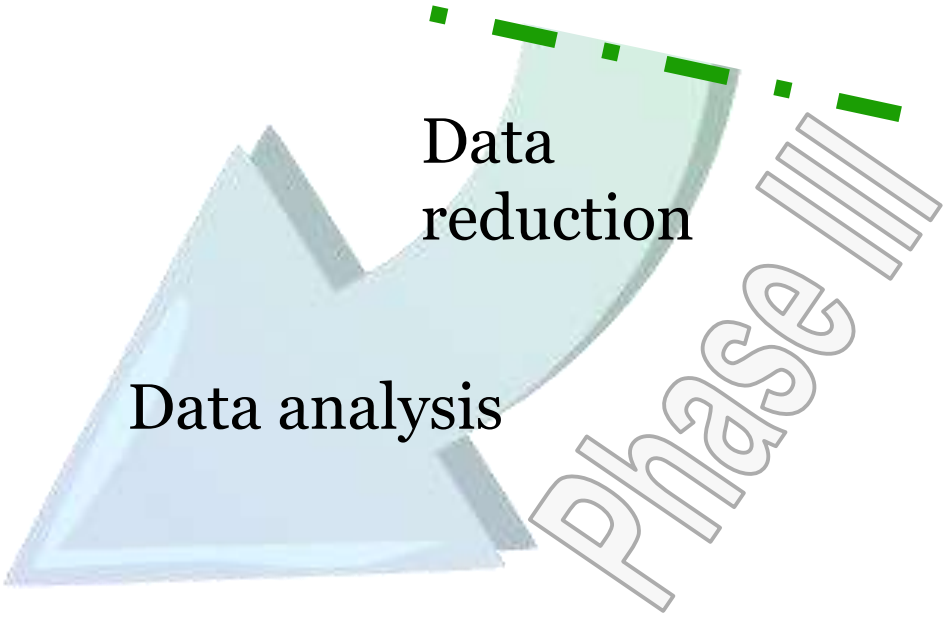
For rapid HelpDesk support, please include:

- System information such as
  - Operating system,
  - AstroConda version,
  - Gemini package version
- List of filename of the minimum data set to reproduce the problem, including calibration files
- The exact command you are issuing
- The full input parameter list (from the lpar dump)

Any question about Phase III?

Data Reduction:

- Current software
- Future software
- Support



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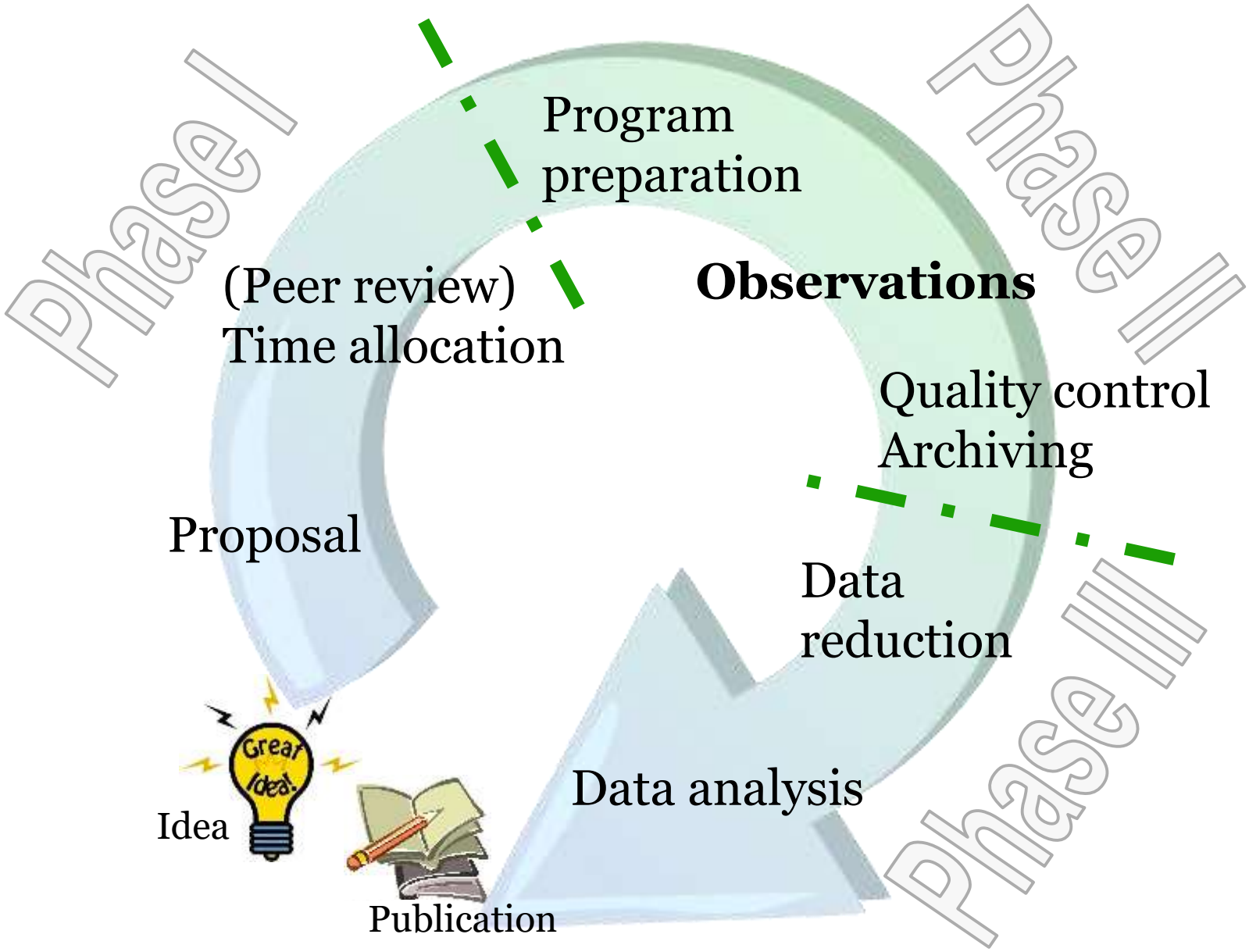
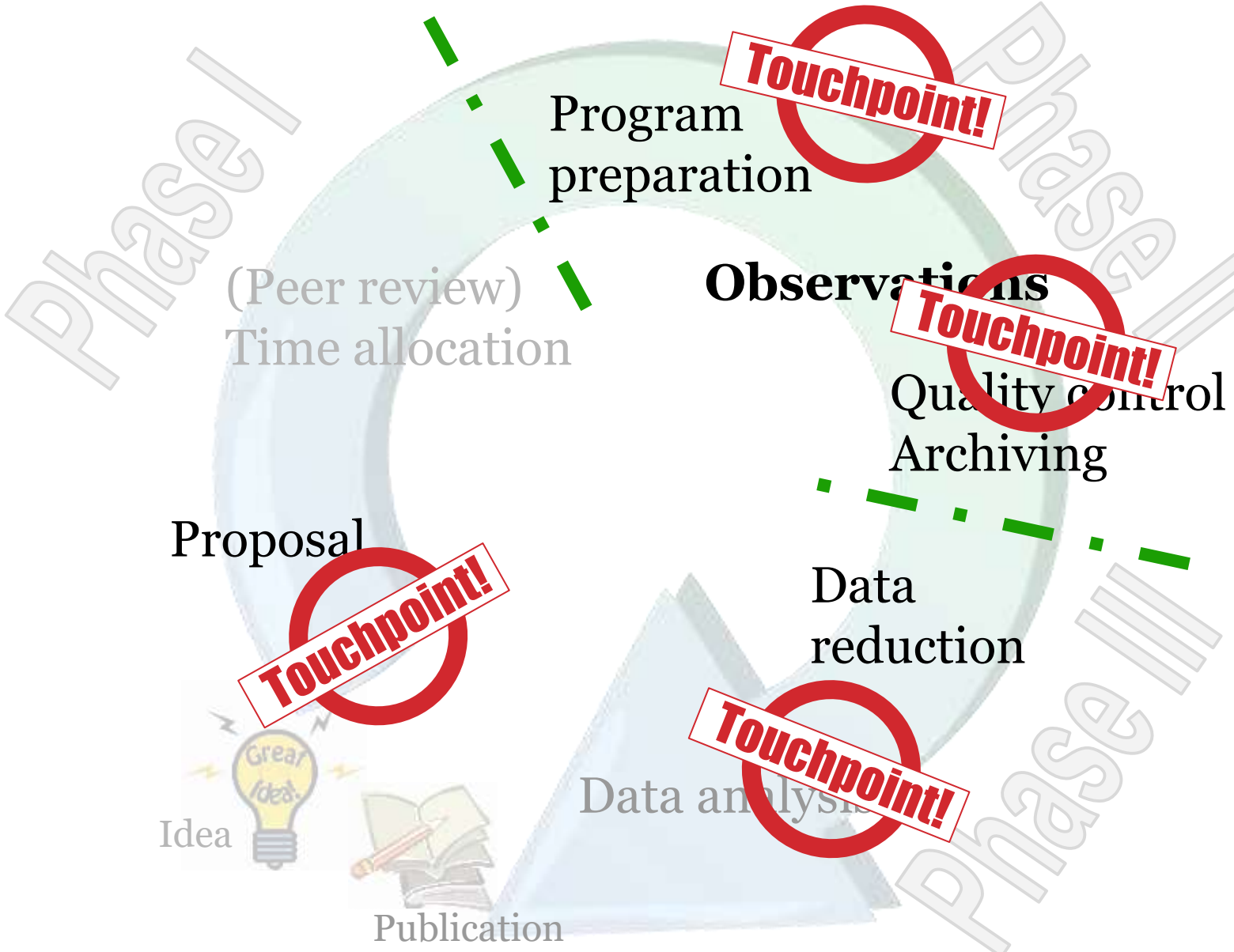


THE LIFE CYCLE OF GEMINI PROGRAMS



Support offered to Gemini science users

A program is a collaborative effort between the PI (and research team) and the Gemini staff.

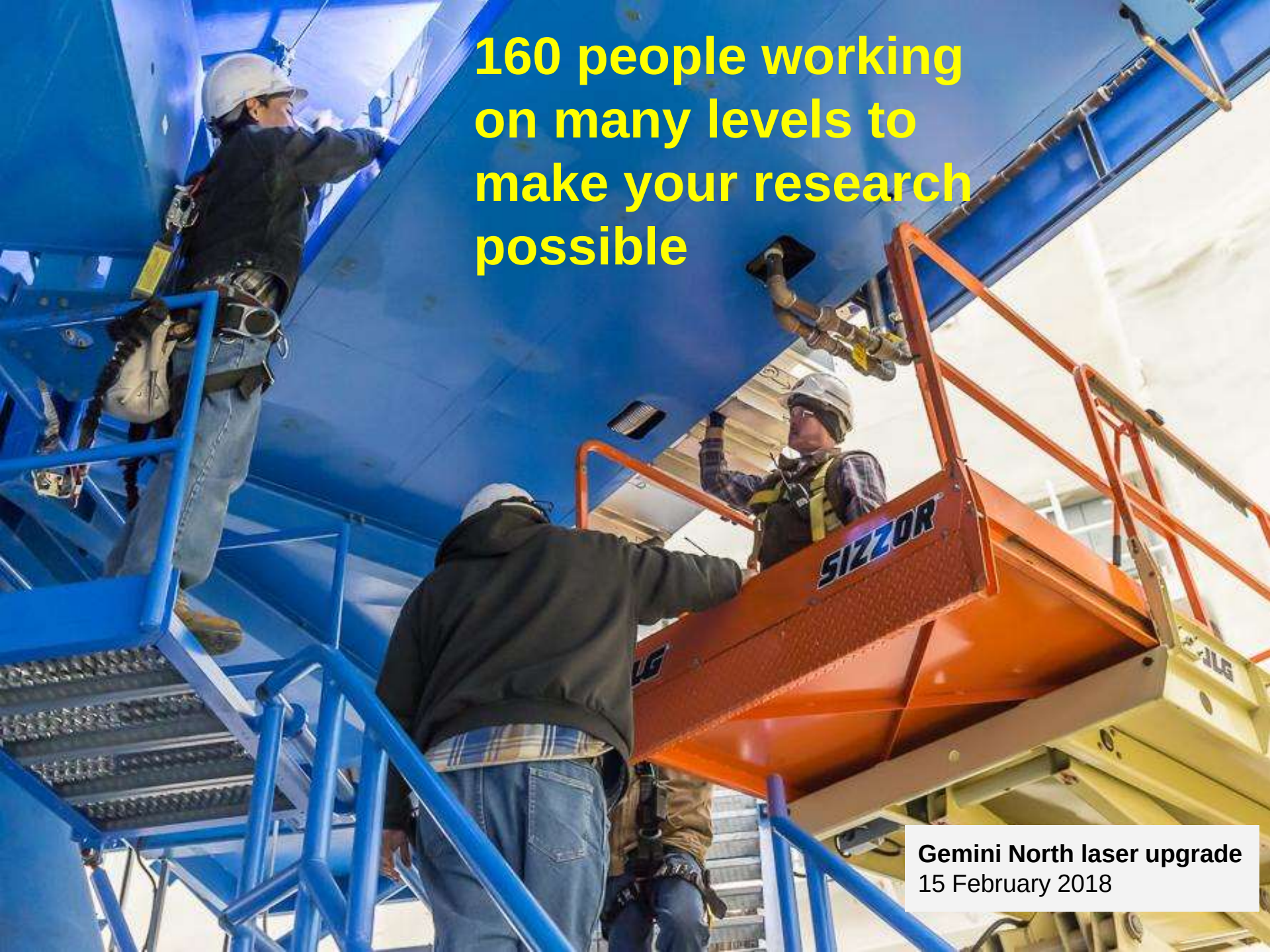
Its success can depends on how we communicate!

So, do not hesitate to :

- Use the helpdesk
- Contact your NGO
- Contact the Contact Scientist
- Contact the Heads of Science Operation
- Answer surveys

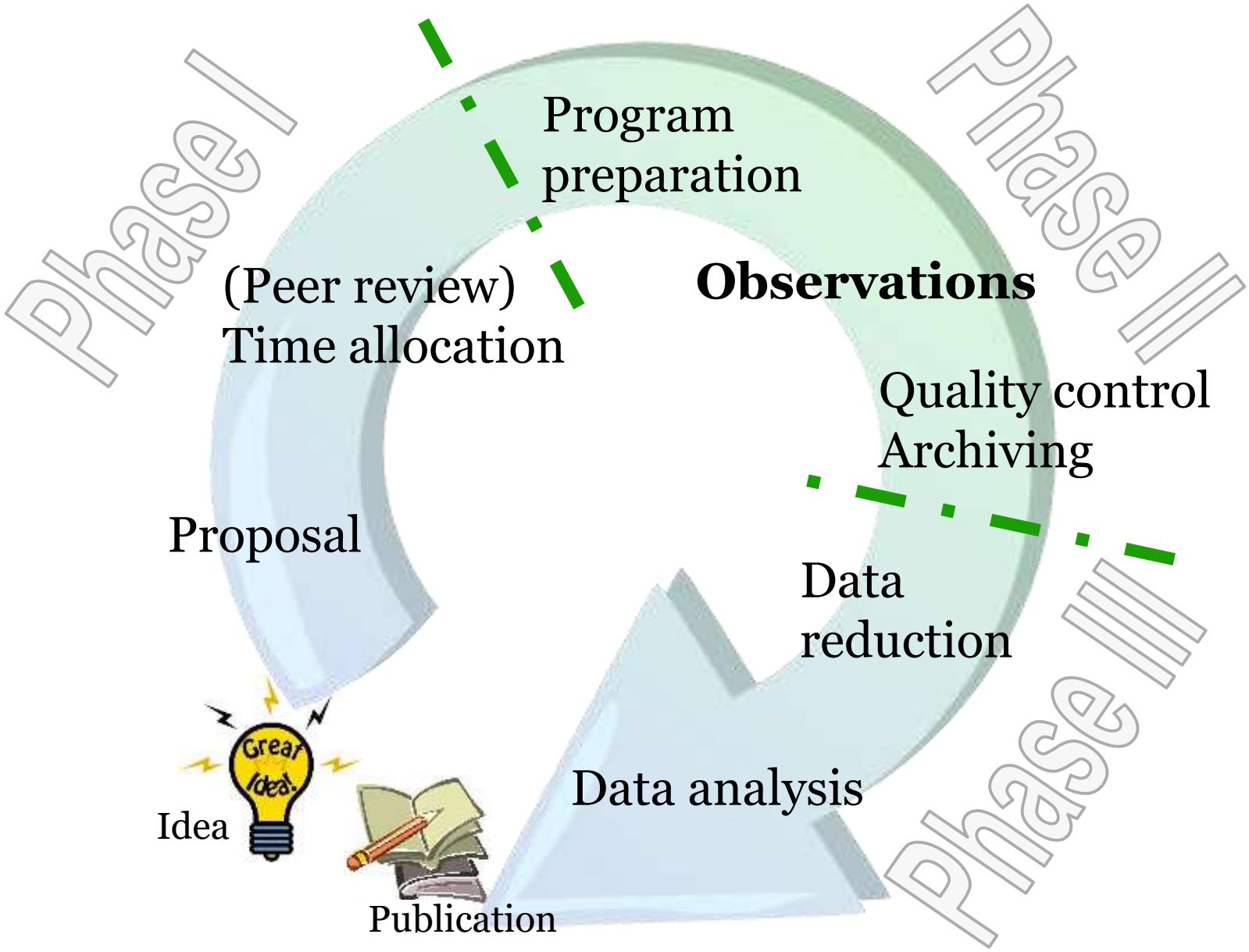
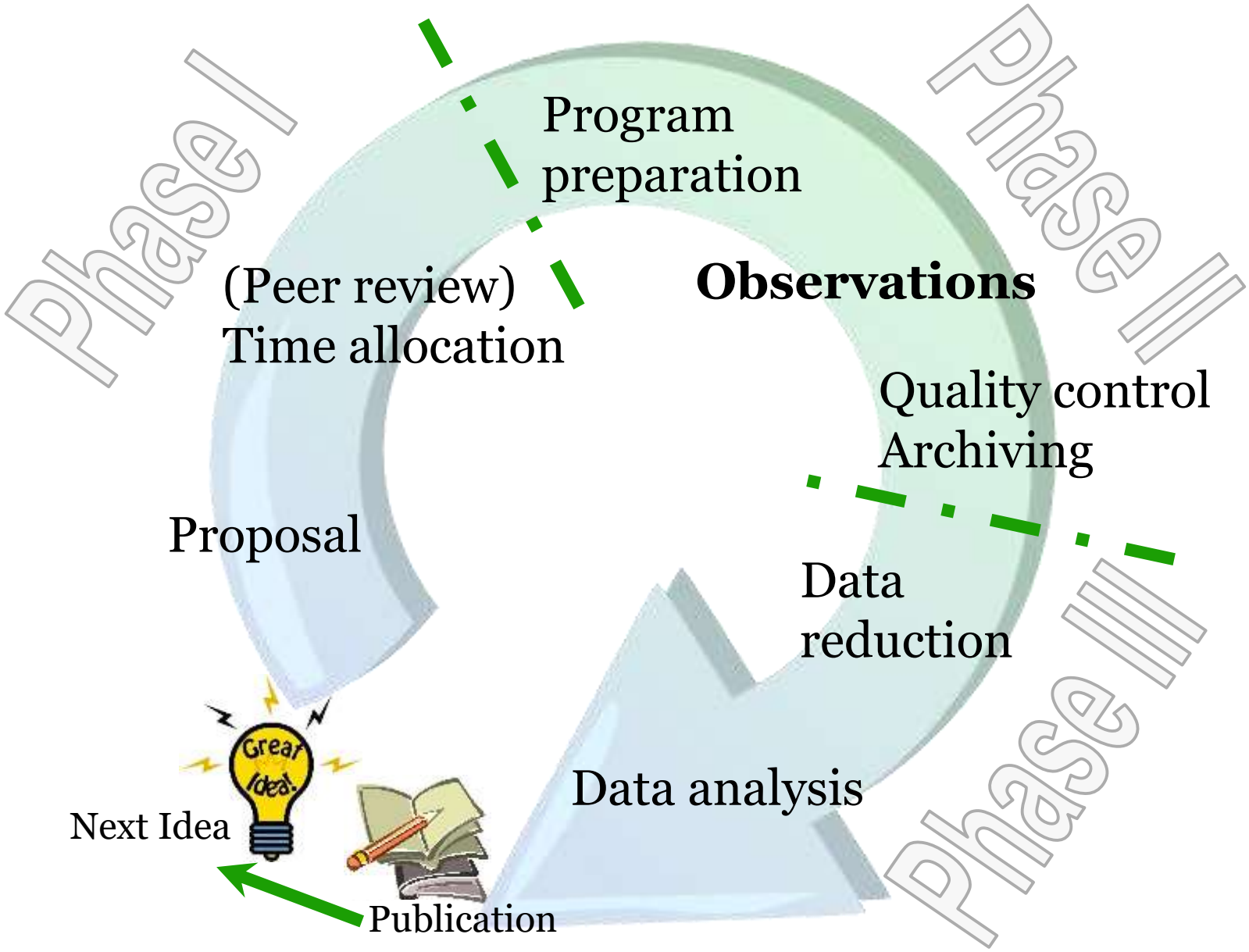
And the “collaboration” goes even beyond!

- Your **science team**
- The members of your **National TAC** and the **ITAC**
- Your **National Gemini Office** (NGO) and **Contact Scientist**
- The **Queue Coordinator** (a trained PhD astronomer)
- The **Science Operation Specialist** (who operate the telescope, observes and checks the data)
- **Engineers teams** and **technical support teams** (checking and fixing instruments and telescope faults)
- The **Data Reduction Software** group
- **Administration team** (who organizes your visit)
- And more...



Gemini North laser upgrade
15 February 2018

THE LIFE CYCLE OF GEMINI PROGRAMS



THE LIFE CYCLE OF GEMINI PROGRAMS