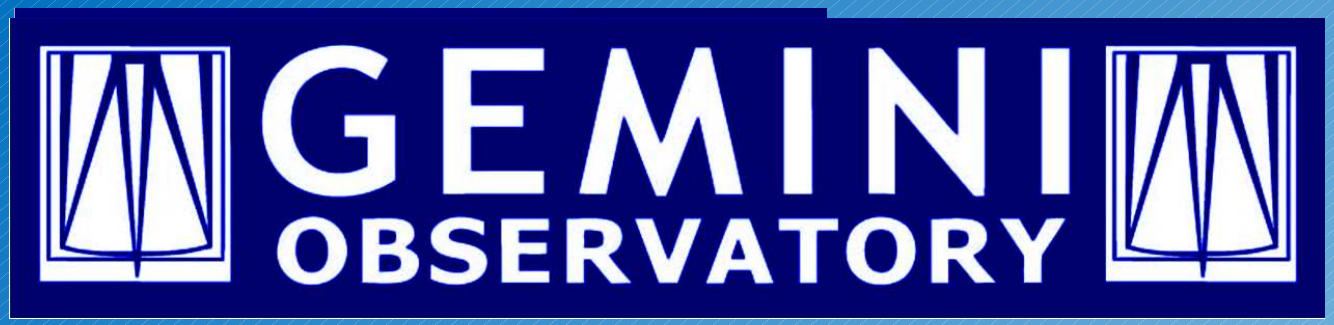


Gemini Queue Operation

From Phase I to Archive

OPD, SOAR, Gemini – Brazil
2010-03-09

Introduction

- Proposal preparation and submission – Phase I Tool
- Queue Construction – TAC/ITAC process
- Programme Definition – Observing Tool, NGO/Contact Scientist checks
- Programme execution – queue coordinator and staff observer
- Data distribution – data quality checks and Gemini Science Archive

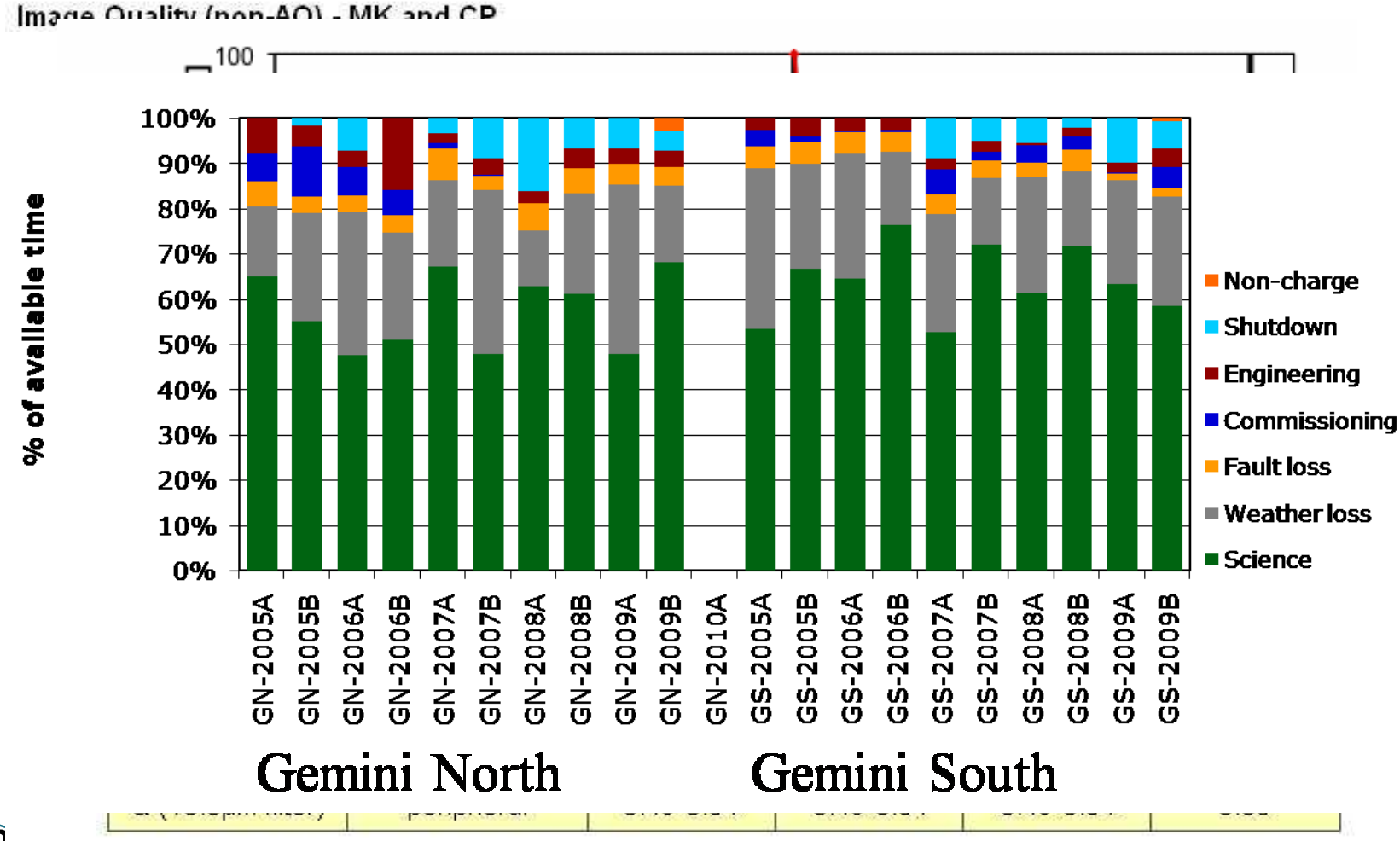
Phase I process

- PhaseI Tool
  - Science justification
  - Instrument configuration
  - Target list
  - Technical Justification
    - ObsTime and Conditions are proxy for the actual metrics (S/N, depth, etc) □ integrating for the requested time under the requested conditions will result in the requested metrics.
    - Observing time and worse possible condition constraints so the data will achieve proposed science goals
    - But… what do these condition constraints really mean?

Observing Constraints

- There are four observing constraints:
  - **Cloud cover** (sky transparency)
  - **Image quality** (delivered EED)
  - **Sky background**
  - **Water vapour content** (sky transparency)
- Must also consider airmass (zenith distance) as it affects some of the above.
- Some of those are **wavelength dependent** (eg water vapour content).
- Given in **percentiles**: IQ =20%, 70%, 85%, Any
  CC=50%, 70%, 90%, Any
  SB, WV = 20%, 50%, 80%, Any

Observing Constraints



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Cloud Cover

- CC=50% – photometric or cloudless stable flux (usually monitored using the guide star counts).
- CC=70% – patchy clouds. Transparent patches among thicker clouds and/or thin cirrus variable flux, loss of transmission by 0.3mag relative to nominal extinction. In practice, 25% flux variation.
- CC=90% – cloudy. All sky covered with clouds, transmission poorer by 2mag relative to nominal, and variable. Stable guiding may be dificult. Background too high for thermal IR.
- Any – whatever else while we can still guide. For the ITCs, 3mag loss of transmission relative to nominal.

Image Quality

- Values are for the **telescope pointing at zenith**. So, 70% of the time the IQ=0.8″ or better in I-band at zenith.
- But if the target is at AM=1.5, delivered image quality for 70% is **IQ=1.02″** or better
- Performance degradation is taken into account in the ITCs as a **dependence of wavelength and airmass**
- In the mid-IR, bins are defined as percent of the time IQ is within 10/20/50% of the **diffraction limit** at 10□m.
- If programme requires absolute image quality, remember to **take into account the elevation** when selecting the IQ bin or request an elevation constraint.

Water Vapour

- Sky transparency in **thermal IR** (L,M and mid-IR).
- Atmospheric absorption is strongly wavelength dependent.
- ITCs use **model transmission spectra** with 0.04nm resolution.
- **Not relevant** in the optical!
- In the near-IR (JHK) only relevant between bands in lower resolution or if feature of interest near strong H2O band in higher resolution

Sky Background

- In the optical, created by moonlight and zodiacal light.
- In the near-IR, by OH airglow and thermal background emission. It is colour dependent, but **assumed constant.**
- Only relevant for **optical observations.**
- roughly speaking, Moon is below the horizon half the time in queue mode. Thus SB=50 is dark time.
- for queue scheduling purposes, the computed background on a given night takes into account relative position of target to the Moon, and the Moon phase.

Phase I Constraints

- **Airmass restrictions** must be clearly stated in PhaseI or will require approval from the corresponding site Head of Science Operations.
- Airmass/Elevation constraints are used to preserve delivered IQ or reduce atmospheric diffraction effects.
- **Improving** constraint bins also require approval. Relaxing constraints do not (check your science!)
- Classical programmes with restrictive conditions are required to submit a backup programme and targets in case of poorer conditions, or time reverts to queue.
- **Guide star brightness** must be appropriate for conditions.

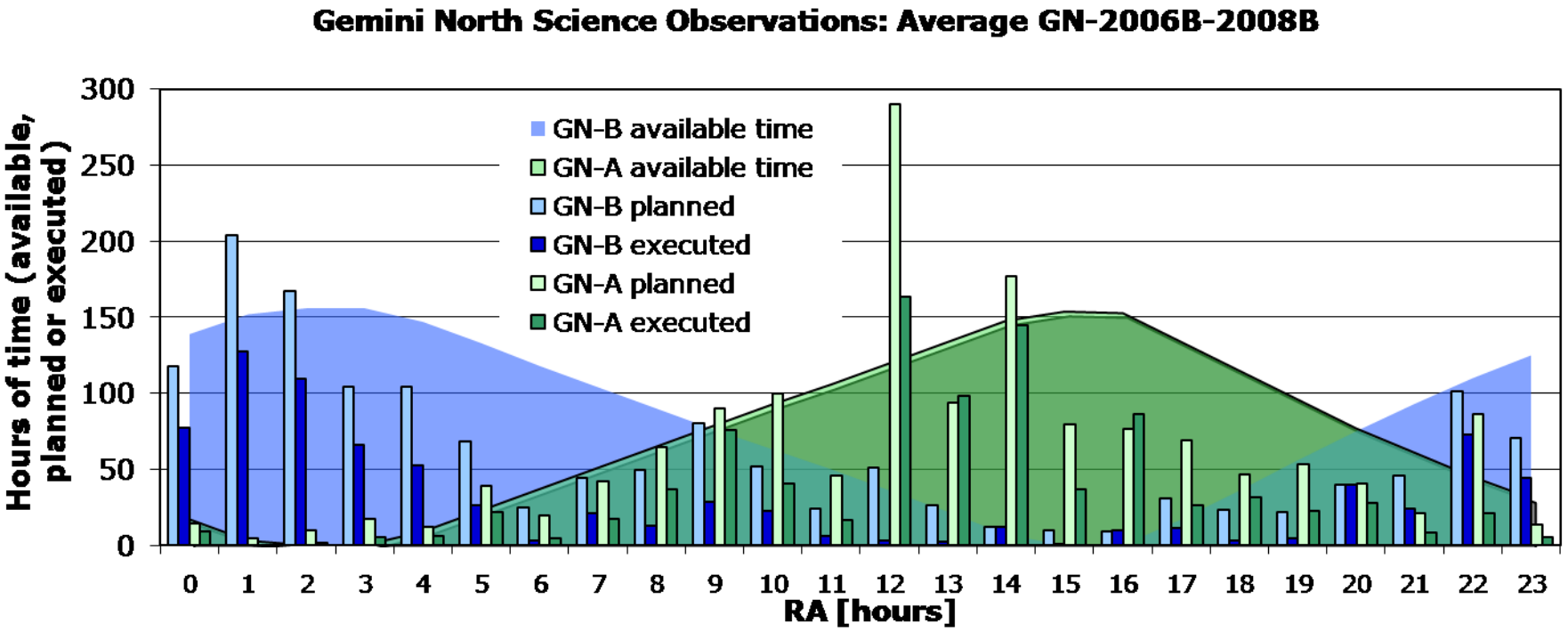
Time Allocation

- Proposal preparation and submission – Phase I Tool
- Queue Construction – TAC/ITAC process
- Programme Definition – Observing Tool, NGO/Contact Scientist checks
- Programme execution – queue coordinator and staff observer
- Data distribution – data quality checks and Gemini Science Archive

Time Allocation

- National TACs review all submitted proposals for technical feasibility, then grade on science merit.
- The graded list is passed to the International TAC.
- ITAC "merges" the queue:
  - merging sequence: one programme per partner for a default of three hours (adjusted by imbalance)
  - cycle through the sequence as many times as needed until all time for each parter is allocated
  - available time for each condition constraint is updated after each allocation. When a bin runs out of time, all subsequent programmes requiring that constraint are skipped.

Science Bands



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Programme Definition

- Proposal preparation and submission – Phase I Tool
- Queue Construction – TAC/ITAC process
- Programme Definition – Observing Tool, NGO/Contact Scientist checks
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Phase II begins

- Defining the observations: Observing Tool
- Observing constraints in the OT are the ones used to create the nightly plans/evaluate observability/ do the data quality assesment.
- Timing and elevation constraints can be defined for each separate observation.
- Observations are executed with minimal intervention by the observer:
  - instrument configuration and changes, offsets, calibrations within the sequence, exposure times are all read from the OT sequence and passed by software to instrument and telescope.

Phase II process

- Very important to setup the programme correctly, so you get what you want, not just what you asked for.
  - Observations start at “PhaseII”, where the user can modify as needed
  - When set to For Review and stored, NGO is notified and will do the first round of checking.
  - After some more interaction with user if needed, observations are set to For Activation and stored.
  - Gemini Contact Scientist is notified and will do the second round of checking.
  - After repeating the process as needed, observations are set to Ready and made available to be scheduled in the queue.

Phase II Changes

- Once an observation is set to “Ready” it cannot be modified by the PI or NGO.
- However, no observation is totally frozen:
  - Minor changes (small changes in central wavelength, exposure times, filters) can be done by contacting the Gemini CS and the NGO so the programme can be set back to PhaseII
  - Major changes (improving condition constraints, change of targets) need approval by the Head of SciOps of the respective site.
- Programme can be fetched at any time from Observing Database to check on progress.

Feedback

reinserted in the queue within the same band as originally.

Programme Execution

- Proposal preparation and submission – Phase I Tool
- Queue Construction – TAC/ITAC process
- Programme Definition – Observing Tool, NGO/Contact Scientist checks
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Queue execution

- All “Ready” observations are available from the observing database.
- Each observation has a weight defined by the SRB, observability window, PI priority, programme status (started or not), target of opportunity, etc.
- **Completion rate requirements and goals endorsed by the Gemini Board and the Operations Working Group**
- Focus on high completion of Band 1 & 2 programs
- Focus on delivery of useful datasets:
  - Complete started Band 2
  - Reach PI min or complete started Band 3

Completion rates

- Requirements
  - Band 1: 90% **completion** rate after rollover period
  - Band 2: 75% **completion** rate
  - Band 2: 85% **of started** programs should have 75% of data taken
  - Band 3: 80% **of started** programs should have 75% of PI defined **minimum** data taken
- Goals
  - Band 1: 100% **completion** rate after rollover period
  - Band 2: 90% **completion** rate
  - Band 2: 100% **of started** programs should have 75% of data taken
  - Band 3: 80% **of started** programs should have 100% of PI defined **minimum** data taken
  - Band 3: 80% **of started** programs should have 75% of all data taken

Queue Management

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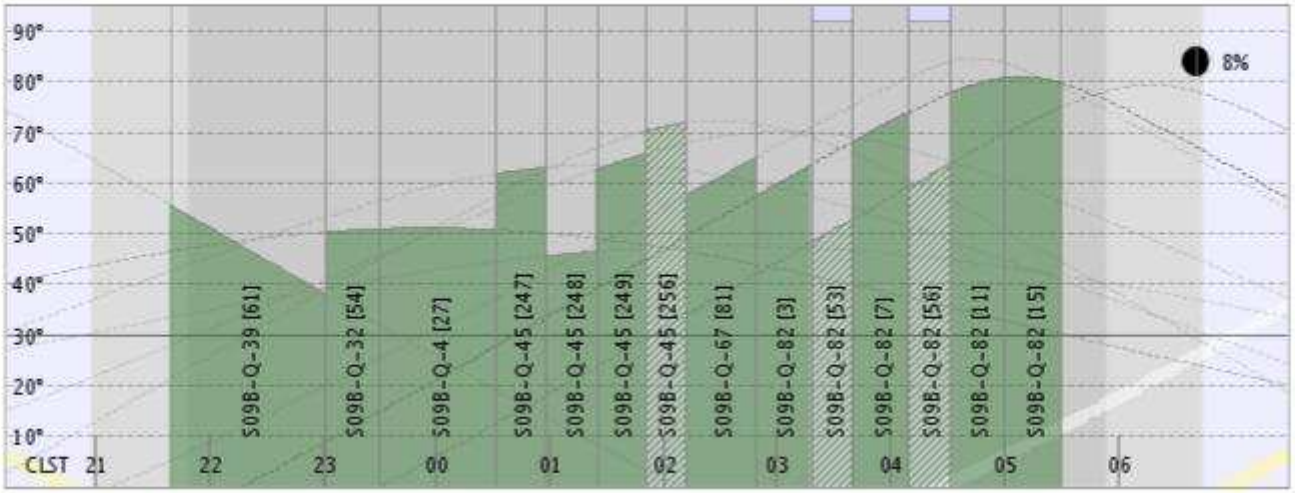
Nightly Plans

Photometric, Good Seeing, Wet : CC50 IQ70 WVA
SB = unconstrained / CC = 50 / IQ = 70 / WV = any

Photometric, Poor Seeing, Wet : CC50 IQ85 WVA
SB = unconstrained / CC = 50 / IQ = 85 / WV = any

Patchy Clouds/Thin Cirrus, Good Seeing, Wet : CC70 IQ70 WVA
SB = unconstrained / CC = 70 / IQ = 70 / WV = any



Observing

- Staff observer every night, even during classical runs (revert to queue if conditions not appropriate and no backup programme defined).
- All available instruments may be scheduled during any single night.
- Change between instruments takes a couple of minutes.
- Rapid response for Target of Oportunity.
- Standard set of calibrations defined with the programme, and taken as part of observation or at the end of the night.

Visitors

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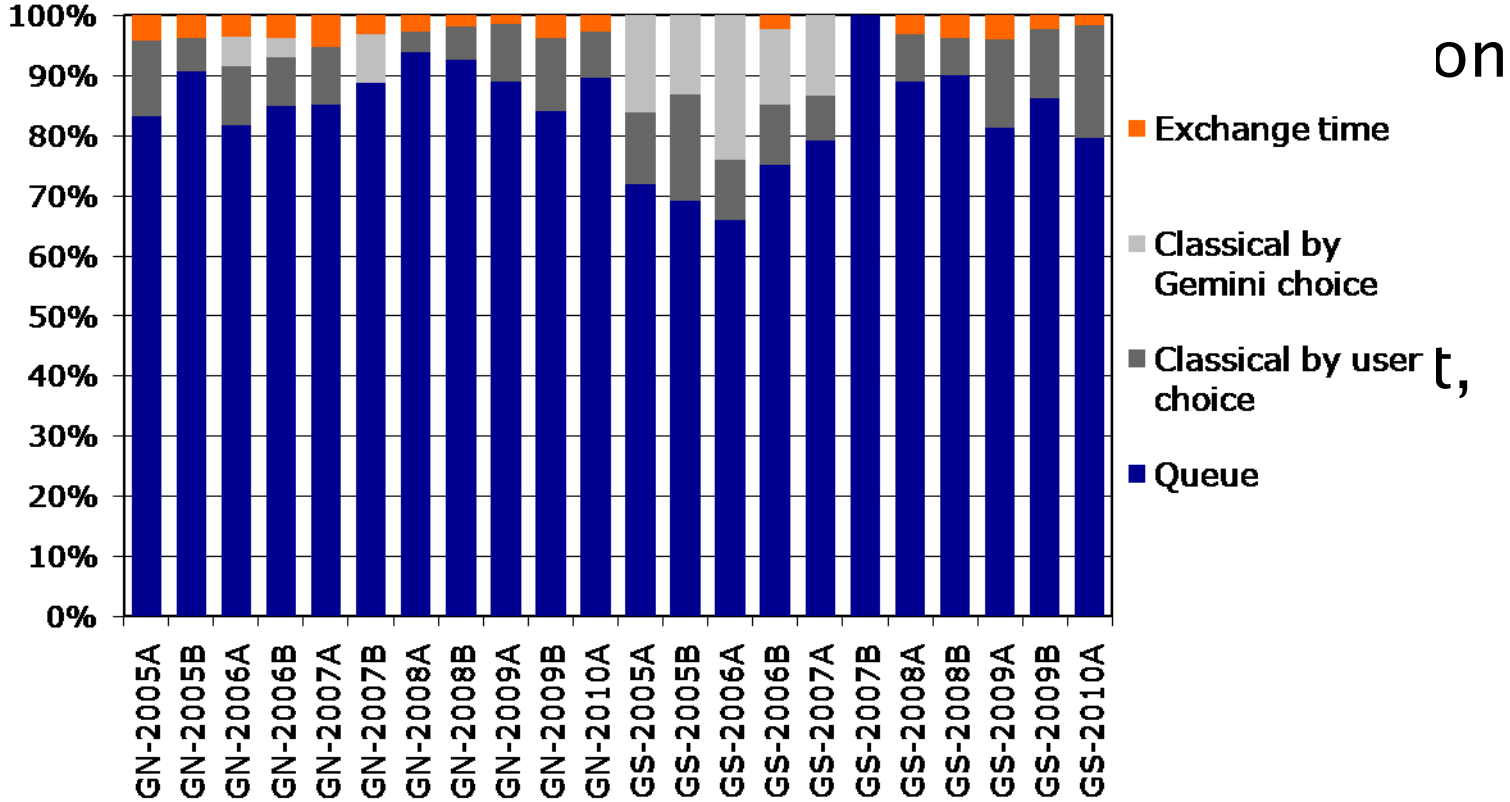

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Classical by user choice is on average 9.1%

Data Distribution

- Proposal preparation and submission – Phase I Tool
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Quality Assesment

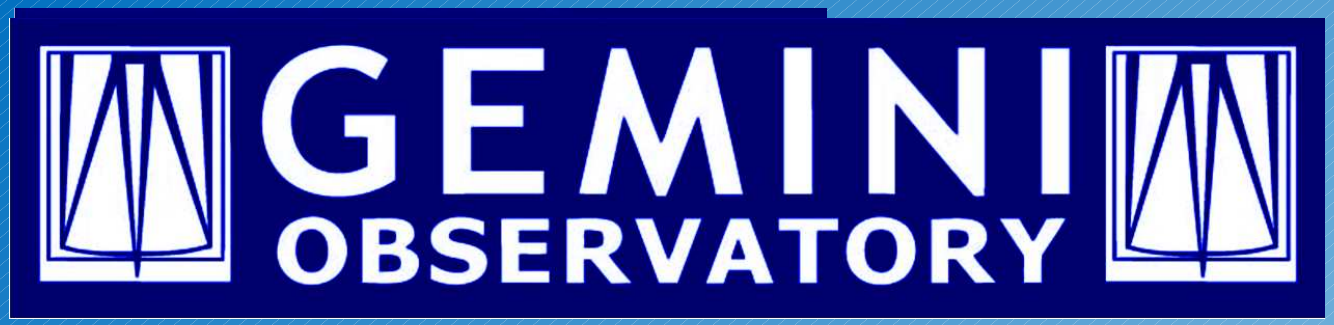
- By the observer during the night: inspection of calibrations (saturation/faint arcs and flats), check of data integrity, monitoring of weather conditions (seeing, cloud cover, sky background, water vapour).
- By the Data Analyst Specialist the next day: check instrument configuration, check IQ from the data when possible, check flux level when possible (CC). Check calibrations and request repeat of any that may be missing.
- Processing of GMOS pre-imaging – distributed to users for mask design.
- No general processing to check for achieved S/N.

Data Distribution

- "Raw" (not QA-ed) data are transferred to the Archive in real-time (as observation progresses).
- Transfer time varies between 2-10min (dependent on transfer speed between sites and CADC in Canada)
- Once data checked and properly flagged as PASS (charged) or USABLE (not charged), are re-transferred to the Archive with updated headers.
- Pre-imaging also distributed from the Archive, and users notified by e-mail.
- Once a week, new data are "packaged" and a notification sent to the Principal Contact.

GEMINI OBSERVATORY

Questions?



The Gemini Science Archive

OPD, SOAR, Gemini – Brazil
2010-03-09

Introduction

- Hosted by CADC in Victoria, Canada.
- Released September 2004
- Gemini North data from May 2000
- Gemini South data from October 2001
- E-transfer started October 2005 – automatic transfer from sites to CADC.
- Active transfer from sites to archive as observation progresses.

Data and Content

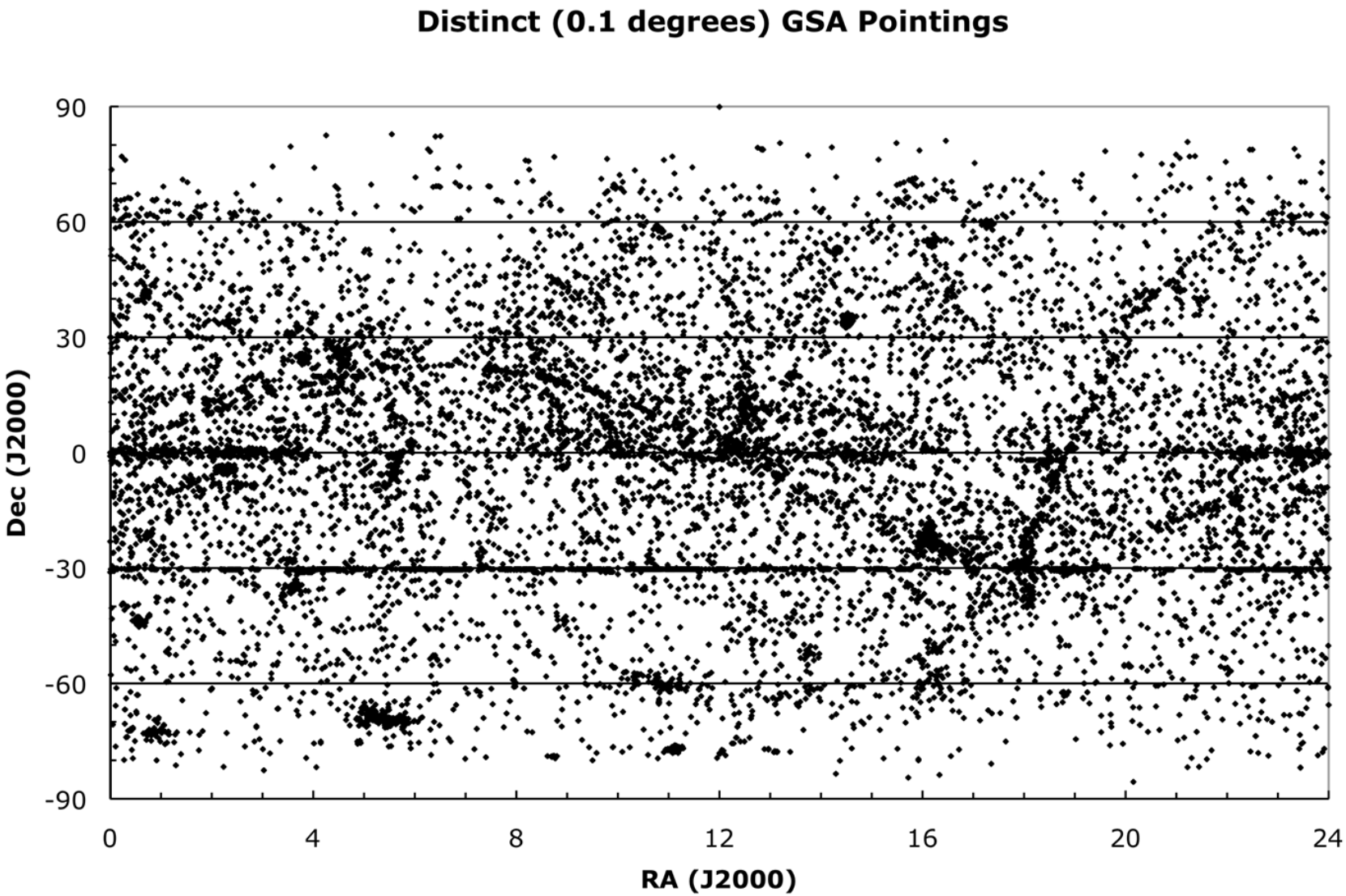
FITS Science	473973
Calibrations, other	682160
Logs	21787

Science Programme GMOS N/S, NIRI and Phoenix observations dominate the collection in terms of individual pointings

Instrument	Files	Pointings (0.1 deg.)	Ratio
BHROS	401	56	8:1
FLAMINGOS	7,680	69	112:1
GMOS-N	32,493	2,670	13:1
GMOS-S	32,551	2,431	14:1
GNIRS	18,220	597	31:1
HOKUPAA+QUIRC	33,582	750	45:1
HRWFS	70,788	35	2023:1
MICHELLE	3,026	518	6:1
NICI	11,510	150	77:1
NIFS	8,779	284	31:1
NIRI	187,972	2,580	73:1
PHOENIX	53,828	1,688	32:1
TEXES	3,173	97	33:1
TRECS	9,970	732	14:1
Total	473,973	12,657	38:1

Brazil 2010-03-09

Data and Content



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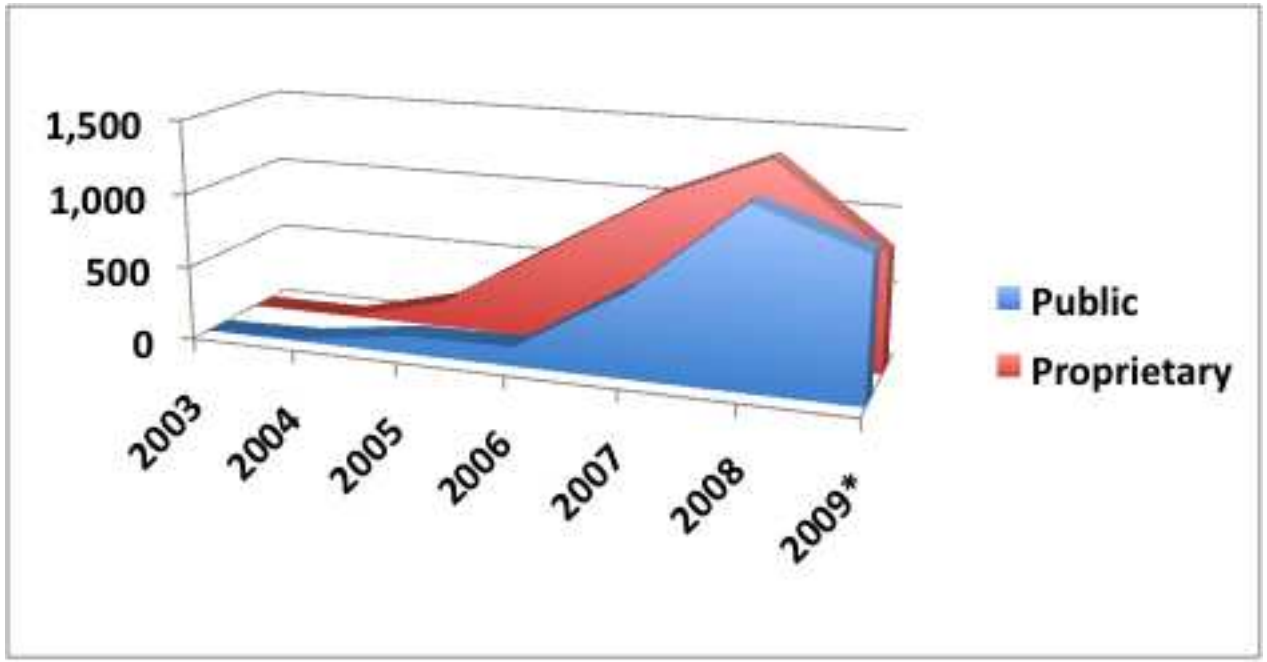
Data Ingestion



As of Dec 09:

- ~7Tb of data
- ~7Gb transferred per night per site
- 1.27M FITS files
- Ratio of Public to proprietary science files is now 1.3

Gigabytes	2003	2004	2005	2006	2007	2008	2009*
Public	2	22	122	132	575	1,198	950
Proprietary	0	1	181	617	1,042	1,345	788
Total	2	23	303	749	1,617	2,544	1,739

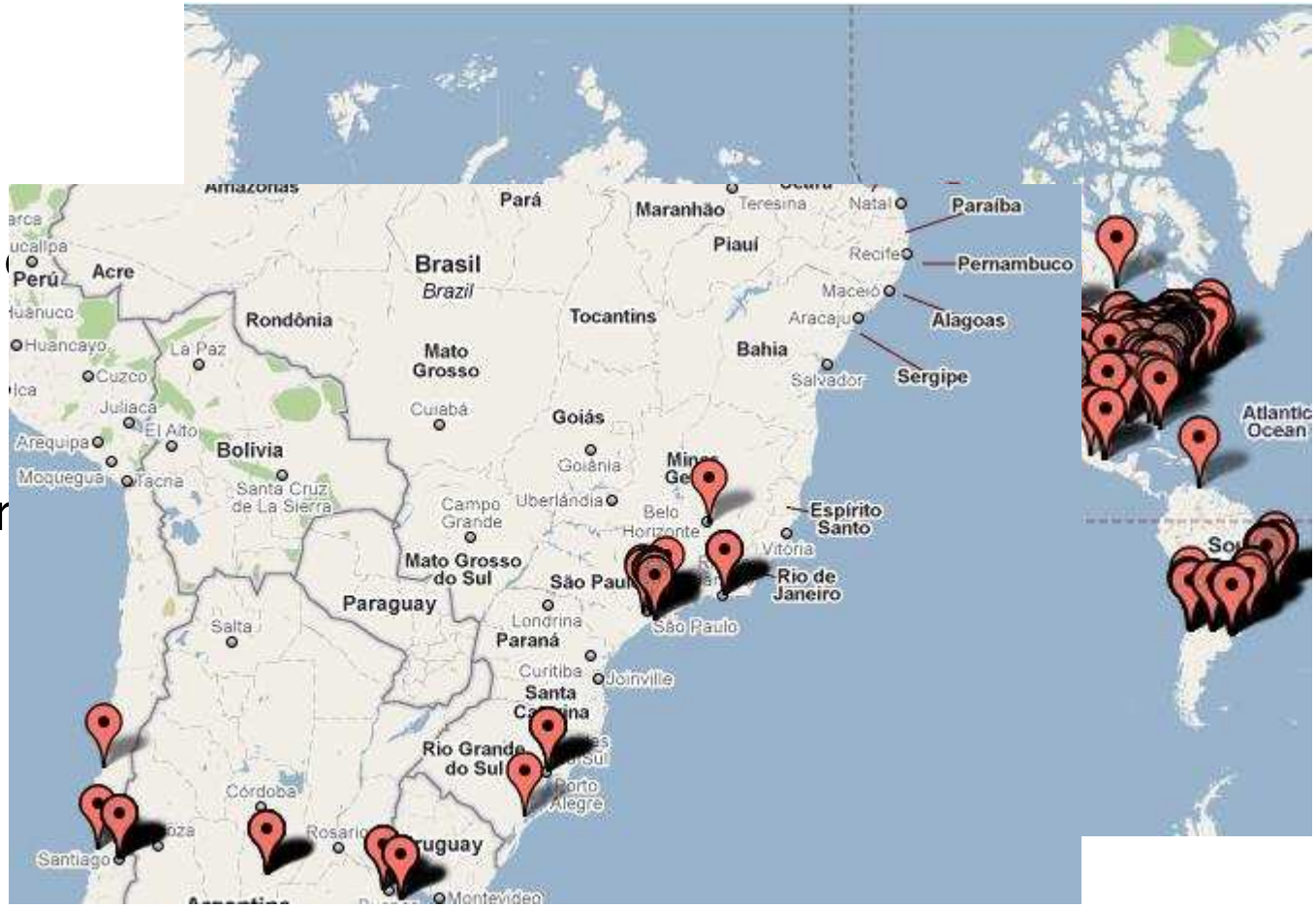
* As of Dec09

OPD, SOAR, Gemini – Brazil 2010-03-09

Data Distribution

During 2009

- 451 distinct us
- 920 registered users from 31 countries
- Average deliver ~9Gb/day



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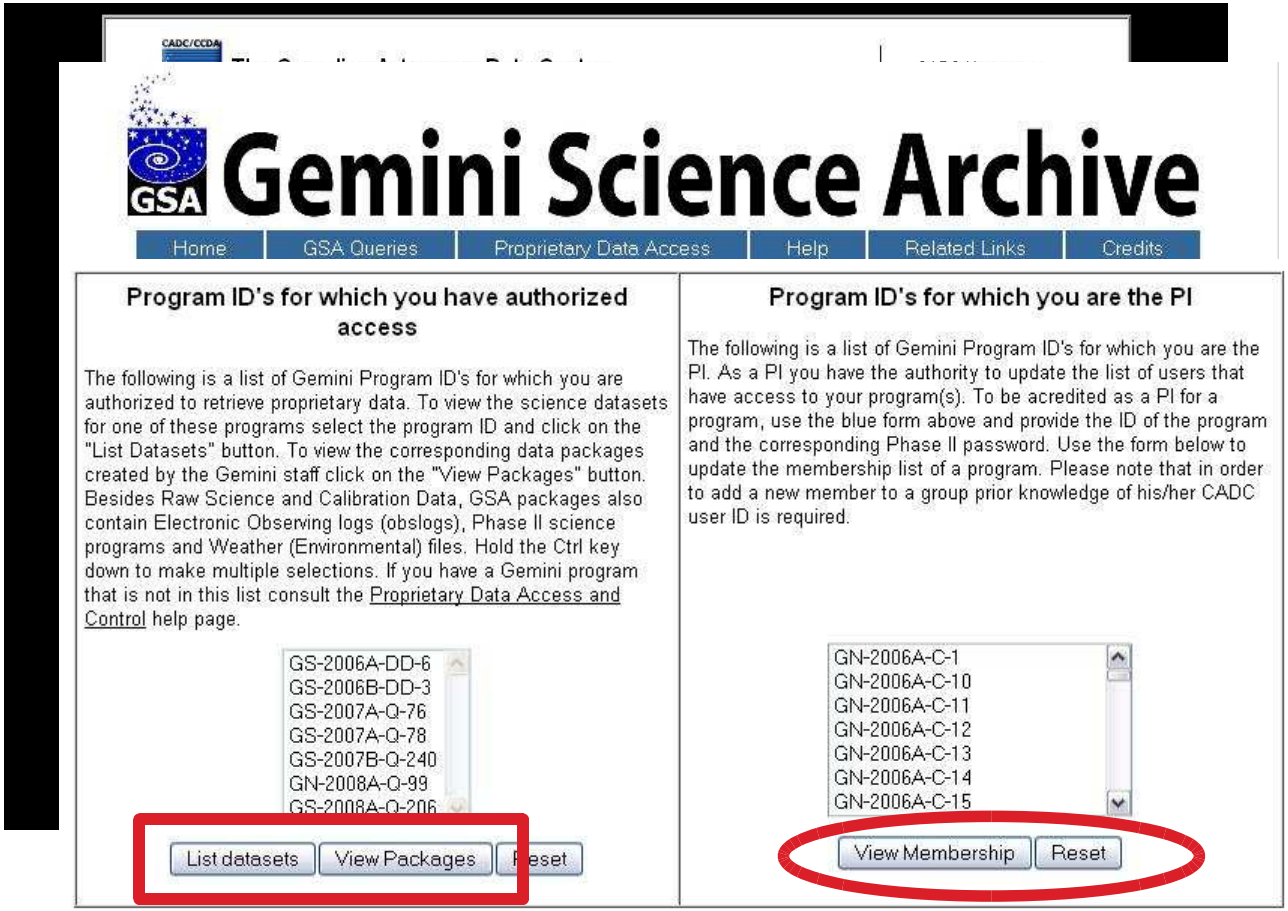
Populating the database

- Database is populated with content of header keywords
- Header content is enforced from the time of ingestion – if a mandatory keyword is absent, the dataset is rejected until fixed
- Metadata related to individual observations is obtained from the Observing Tool – very little information is required to be added by the observer (environmental information in terms of realized percentiles, name of observer/SSA).
- Instrument/telescope related information is passed directly from subsystems to Data Handling System
- Result in complete, stable header content.
- Filename format is fixed and unique (S20100310S0001.fits)
- Each dataset is uniquely identified by a datalabel, containing the name of the programme (GN-2010A-Q-1-1-0001)
- Obslogs are automatically generated as observation progresses, and the observer can add comments, but not change content.

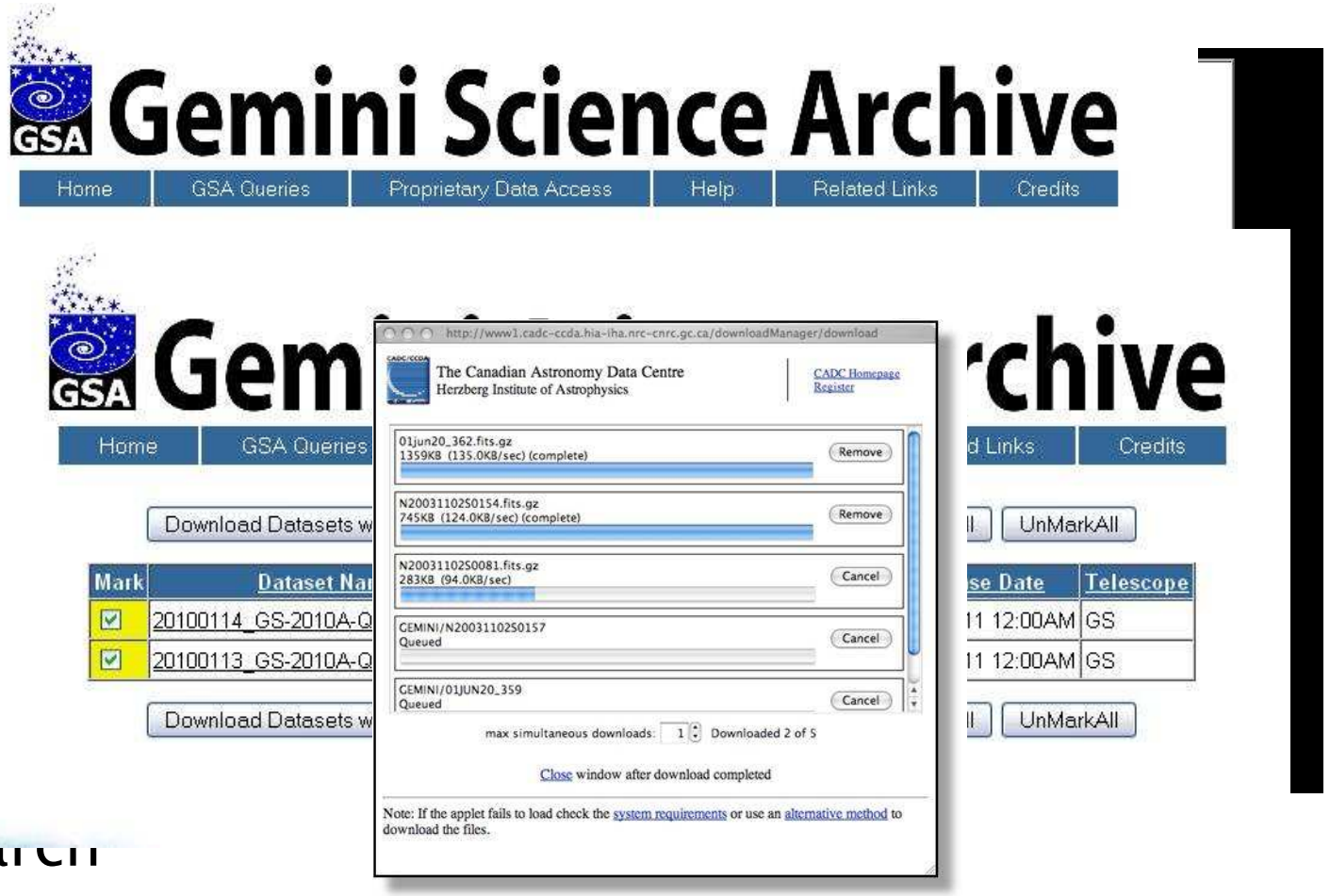
Proprietary Data

- Proprietary period 18 months from date of observation
- CADC registration required
- Access through Phase II passkey
- Authorize other users without releasing Phase II key
- Download datasets any time or “packages” when available



Proprietary data search

- Authorize first
- Use proprie data search enable acce
- Science Cat contains on science data no calibratio
- Use General Catalog to search for calibrations
- Obslogs are proprietary until



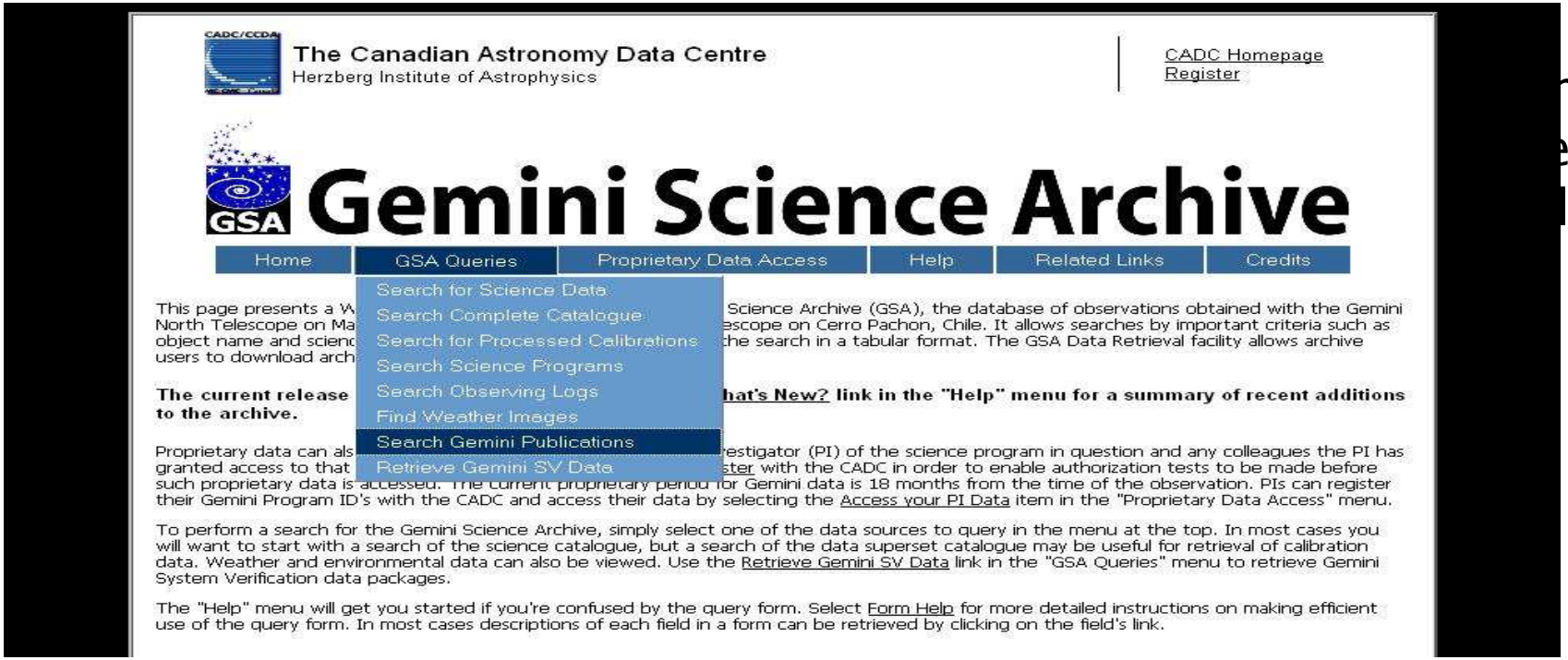
General Searches

Mark	Bibcode	Title	Citations	Impact	Program ID	Telescope	Instruments	Affiliate
☑	2007ApJ...670..959S	Nuclear Spirals as Feeding Channels to the Supermassive Black Hole: The Case of the Galaxy NGC 6951	10	0.50	GN-2006B-Q-23	Gemini North	GMOS-N	Brazil
☑	2008A&A...482...59D	Ages and metallicities of circumnuclear star formation regions from Gemini IFU observations	3	0.25	GN-2006B-Q-23	Gemini North	GMOS-N	Brazil
☑	2009AJ....138..502M	An Optical and X-Ray Study of the Fossil Group RX J1340.6+4018	1	0.00	GN-2006B-Q-38	Gemini North	GMOS-N	Brazil
☑	2009ApJS..185..186W	The Gemini Spectral Library of Near-IR Late-Type Stellar Templates and Its Application for Velocity Dispersion Measurements	0	0.00	GN-2006A-SV-123, GN-2006B-Q-107, GS-2006B-DD-3, GN-2007A-Q-25	Gemini South, Gemini North	NIFS, GNIRS	Gemini Staff, Brazil, Demo Science or SV
☑	2009A&A...503..399U	Cluster and cluster galaxy evolution history from IR to X-ray observations of the young cluster RX J1257.2+4738 at z = 0.866	0	0.00	GN-2005A-Q-9, GN-2006B-Q-38, GN-2006A-Q-4	Gemini North	GMOS-N	Brazil
☑	2009ApJ...698..451G	Measurements of the Isotopic Ratio 6Li/7Li in Stars with Planets	0	0.00	GS-2006A-C-5, GS-2006B-Q-47	Gemini South	GMOS-S	United States, Brazil

☑ **Release Date.....:**

☑ **Observation Type..:** Any

Future possibilities for science usage



with the data. Dataset is linked to programme and programme to publications.

Gemini and CADC

- Canadian Virtual Observatory
- Common Archive Operational Environment
  - CVO developed and hosted at CADC
  - A member of the International Virtual Observatory Alliance
  - Goals
    - Publish data from collections
    - Contribute to IVOA development
  - Activities
    - Develop and implement data models and protocols
    - Transform data collections

Gemini and CADC

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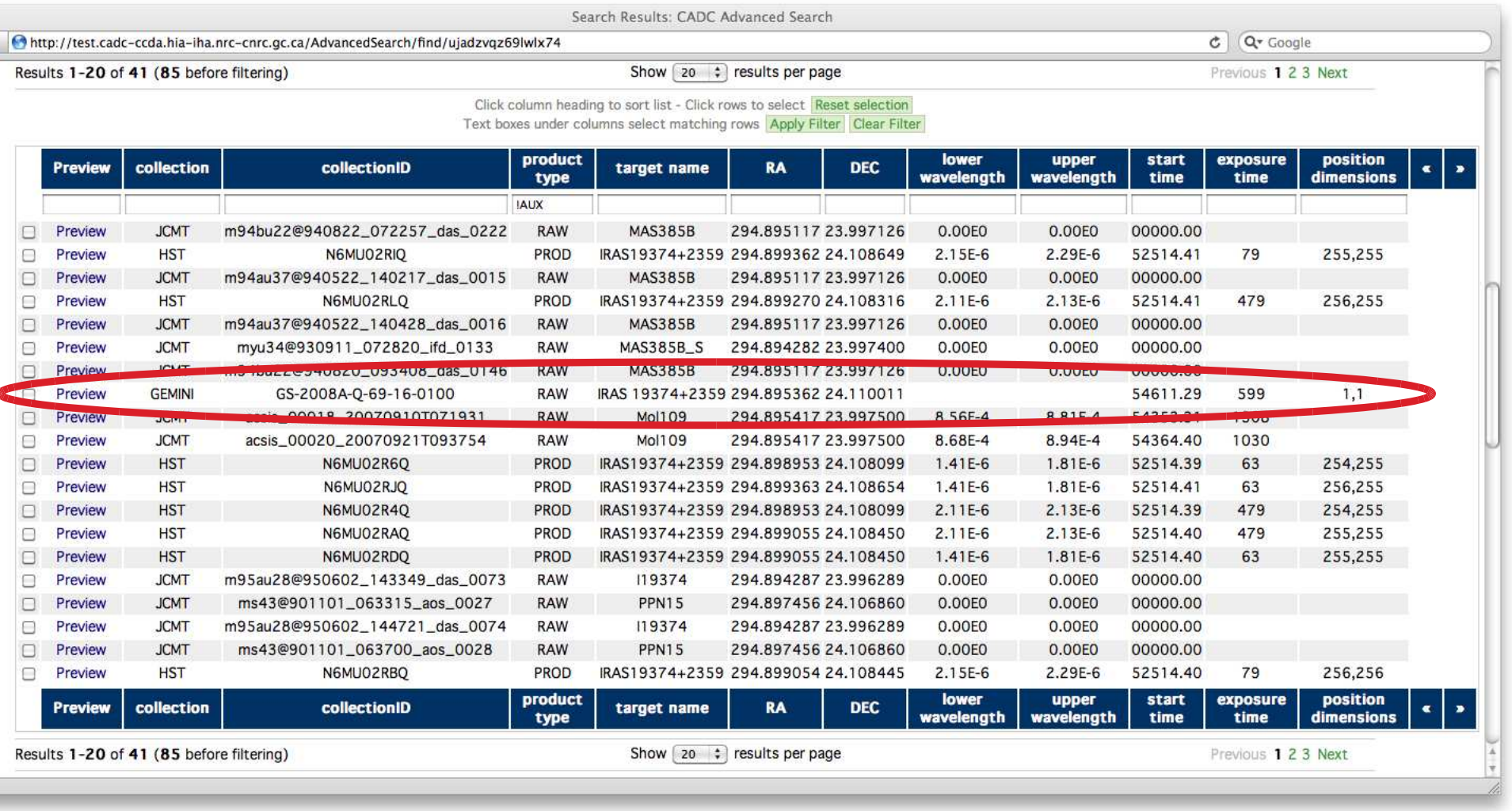
Archive	Files	GB
BLAST	265	1
CFHT	5,012,906	265,341
CGPS	2034	52
FUSE	4,634,138	3,839
GEMINI	2,207,603	9,094
HST	20,669,003	94,137
IRIS	1,720	2
JCMT	941,260	6,169
MACHO	2,229,559	17,038
MOST	570	17
All others	7,444,702	8,389
Total	43,143,760	404,079

End-to-end experiment with Phoenix


Search Results: CADC Advanced Search

http://test.cadc-ccda.hia-iha.nrc-cnrc.gc.ca/AdvancedSearch/find/ujadzvqz69lwlx74

Google

Results 1-20 of 41 (85 before filtering) Show 20 results per page Previous 1 2 3 Next

Click column heading to sort list - Click rows to select Reset selection
Text boxes under columns select matching rows Apply Filter Clear Filter

Preview	collection	collectionID	product type	target name	RA	DEC	lower wavelength	upper wavelength	start time	exposure time	position dimensions
			!AUX								
Preview	JCMT	m94bu22@940822_072257_das_0222	RAW	MAS385B	294.895117	23.997126	0.00E0	0.00E0	00000.00		
Preview	HST	N6MU02RIQ	PROD	IRAS19374+2359	294.899362	24.108649	2.15E-6	2.29E-6	52514.41	79	255,255
Preview	JCMT	m94au37@940522_140217_das_0015	RAW	MAS385B	294.895117	23.997126	0.00E0	0.00E0	00000.00		
Preview	HST	N6MU02RLQ	PROD	IRAS19374+2359	294.899270	24.108316	2.11E-6	2.13E-6	52514.41	479	256,255
Preview	JCMT	m94au37@940522_140428_das_0016	RAW	MAS385B	294.895117	23.997126	0.00E0	0.00E0	00000.00		
Preview	JCMT	myu34@930911_072820_ifd_0133	RAW	MAS385B_S	294.894282	23.997400	0.00E0	0.00E0	00000.00		
Preview	JCMT	m94bu22@940820_093408_das_0146	RAW	MAS385B	294.895117	23.997126	0.00E0	0.00E0	00000.00		
Preview	GEMINI	GS-2008A-Q-69-16-0100	RAW	IRAS 19374+2359	294.895362	24.110011			54611.29	599	1,1
Preview	JCMT	acsis_00018_20070910T071931	RAW	Mol109	294.895417	23.997500	8.56E-4	8.81E-4	54353.31	1508	
Preview	JCMT	acsis_00020_20070921T093754	RAW	Mol109	294.895417	23.997500	8.68E-4	8.94E-4	54364.40	1030	
Preview	HST	N6MU02R6Q	PROD	IRAS19374+2359	294.898953	24.108099	1.41E-6	1.81E-6	52514.39	63	254,255
Preview	HST	N6MU02RJQ	PROD	IRAS19374+2359	294.899363	24.108654	1.41E-6	1.81E-6	52514.41	63	256,255
Preview	HST	N6MU02R4Q	PROD	IRAS19374+2359	294.898953	24.108099	2.11E-6	2.13E-6	52514.39	479	254,255
Preview	HST	N6MU02RAQ	PROD	IRAS19374+2359	294.899055	24.108450	2.11E-6	2.13E-6	52514.40	479	255,255
Preview	HST	N6MU02RDQ	PROD	IRAS19374+2359	294.899055	24.108450	1.41E-6	1.81E-6	52514.40	63	255,255
Preview	JCMT	m95au28@950602_143349_das_0073	RAW	I19374	294.894287	23.996289	0.00E0	0.00E0	00000.00		
Preview	JCMT	ms43@901101_063315_aos_0027	RAW	PPN15	294.897456	24.106860	0.00E0	0.00E0	00000.00		
Preview	JCMT	m95au28@950602_144721_das_0074	RAW	I19374	294.894287	23.996289	0.00E0	0.00E0	00000.00		
Preview	JCMT	ms43@901101_063700_aos_0028	RAW	PPN15	294.897456	24.106860	0.00E0	0.00E0	00000.00		
Preview	HST	N6MU02RBQ	PROD	IRAS19374+2359	294.899054	24.108445	2.15E-6	2.29E-6	52514.40	79	256,256
Preview	collection	collectionID	product type	target name	RA	DEC	lower wavelength	upper wavelength	start time	exposure time	position dimensions

Results 1-20 of 41 (85 before filtering) Show 20 results per page Previous 1 2 3 Next

Future plans?

- Pending contract/budget/resources:
  - Backwards compatibility work.
  - PI packaging replacement:
    - Automatic association of calibration with science files;
    - User configurable notification;
    - File status: Downloaded, Never downloaded, Modified since last download.
  - CAOM, products and VO publication:
    - End-to-end experiment with GMOS imaging.
- Long range plan: input needed from user community – take your requests to the Gemini Science Committee!

GEMINI OBSERVATORY

Questions?