

Observing at ESO

Service vs Visitor Mode
Data-flow services and tools at your disposal

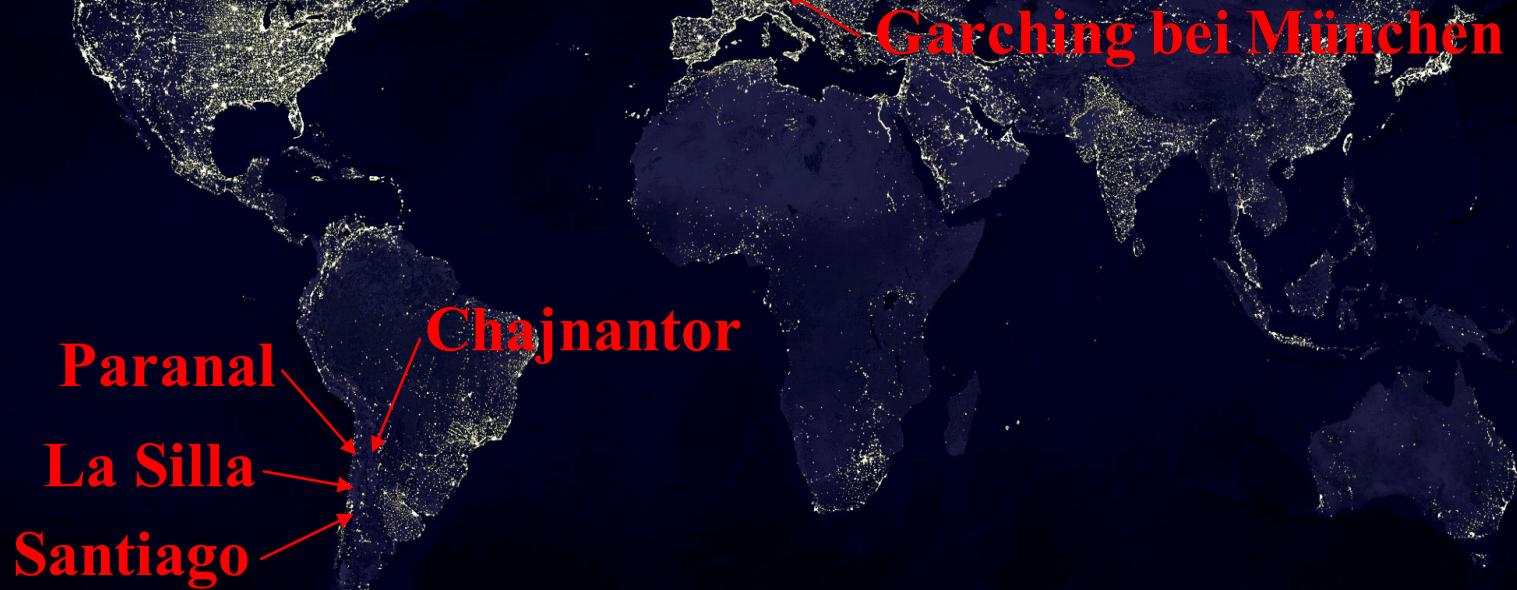


Marina Rejkuba

Observatories



ESO's sites

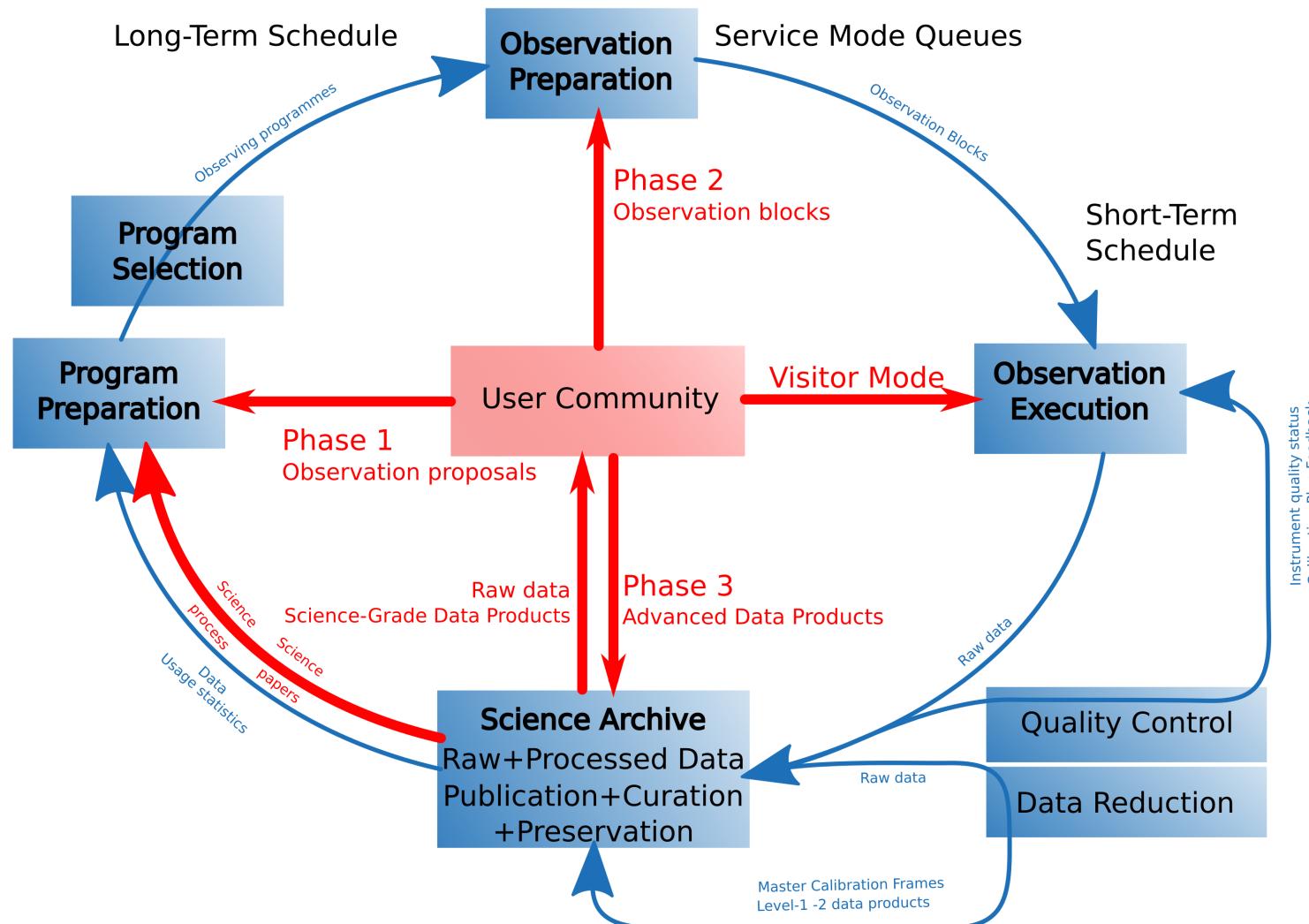


Earth at Night
More information available at:
<http://antwrp.gsfc.nasa.gov/apod/ap001127.html>

Astronomy Picture of the Day
2000 November 27

<http://antwrp.gsfc.nasa.gov/apod/astropix.html>

VLT end-to-end system



Observing Modes and Programme Types

■ Different observing modes

- (designated) Visitor Mode
- Service Mode

■ Different programme types

- Normal Programmes
- Large Programmes
- Public Surveys
- Calibration programmes
- Monitoring programmes
- Target of Opportunity (ToO)
- Rapid Response Mode (RRM)
- Guaranteed Time Observations (GTO)
- Director Discretionary Time (DDT)

Following the OPC recommendations

■ Visitor Mode

■ Service Mode Programme Ranks

➤ Scientific prioritization

- A: highest priority (possibly carried over) ~ $\frac{1}{2}$ of the time in Service Mode
- B: medium priority ~ $\frac{1}{2}$ of the time in Service Mode
- C: low priority/filler → on top of A+B rank class

■ Adaptation to changing atmospheric conditions

Data flow end-to-end tools

Proposals handling & Long-term scheduling

APPLICATION FOR OBSERVING TIME
PI: [REDACTED]

Instrument Name: [REDACTED]

Number of observations: 1000 hours

Estimated effects on the evolution of planetesimals: [REDACTED]

1. Number of observations: 1000 hours

2. Duration / Total Time Required: 1000 hours

3. Observing Strategy: [REDACTED]

4. Number of nights: 1000 hours

5. Estimated time required for the project:

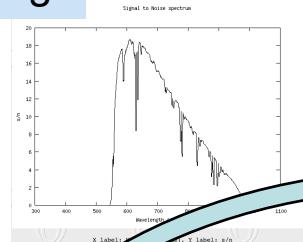
6. Principal Investigator: [REDACTED]

7. Co-Investigators: [REDACTED]

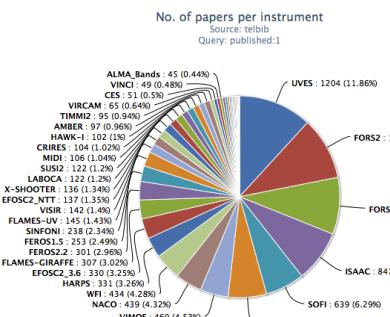
8. Observing Site: [REDACTED]

9. Observing Conditions: [REDACTED]

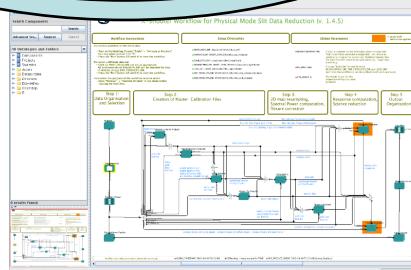
10. Acknowledgements: [REDACTED]



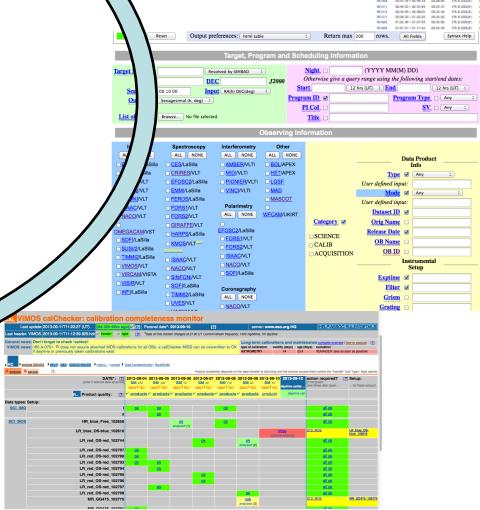
No. of papers per instrument



Science return: Data Products & Publications



Observation preparation, execution & reporting



Post-observation: archive, quality control, data reduction pipelines



User Portal: your entry to ESO

European Southern Observatory

ESO — Reaching New Heights in Astronomy

Flags of member states

[ESO Home](#) [Science](#) [Contact](#)

Science Users Information > ESO User Portal > Home Page

Marina Rejkuba | Logout

ESO User Portal Services

Phase 1	Phase 2	Phase 3
Download the proposal form Submit an observing proposal Check the time allocation information	Download P2PP Submit a target or set-up change request Check the status of your observing runs Delegate Phase 2 tasks	Download the Science Data Products Standard Submit data Check your Phase 3 submission status Delegate Phase 3 tasks

Archive Services

Query the Archive for	Check your Archive requests
La Silla Paranal raw data La Silla Paranal reduced data APEX reduced data Phase 3 Catalogs Delegate proprietary data access rights	Access other Archive services Access ALMA data ↗

Help

Ask for help Find User Portal Information and FAQ Check the Data Reduction Forum Check the data reduction FAQ
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Phase 2 Instrument Overview Table

Public	Science	User Portal	Intranet	Contact	Site Map	Search	Go!
Science Users Information > Observing with ESO Telescopes > Phase 2 Preparation > Phase 2 Instrument Table							09 May 2016

Phase 2 Preparation							
Observing conditions							
Service Mode Philosophy							
Service Mode Policies							
Phase 2 Instrument Table							
Service Mode Guidelines							
Special Procedures							
Phase 2 Submission							
Visitor Mode Guidelines							
The P2PP Tool (version 3)							
P2PP for La Silla							
Other Tools and Services							
Run Progress Report							
Post-observation Support							
Phase 2 Users Workshops							
The User Support Department							
Phase 2 Instrument Overview Table							
For information, please follow the links in this table. If one instrument has special requirements, this is visualized in the relevant row of the table. A summary table of the main characteristics of all instruments is available here .							
Instrument	Policies	Change Requests	FC/README	Documentation	Tools	FAQ	
General information valid for all instruments							
Paranal instruments	SM specifics OB naming	Constraints Calibrations	Waivers / Change Requests	Finding Charts README	P2PP version 3 Manual Generic P2PP3 tutorials	Exposure Time Calculators Observability	FAQ
Instrument-specific information							
AMBER	SM specifics OB Naming	Constraints Calibrations	N/A	Finding Charts README	User Manual P2PP Tutorial	-	FAQ
CRIRES	SM specifics OB Naming	Constraints Calibrations	Waivers	Finding Charts README	User Manual P2PP Tutorial	-	FAQ
FLAMES	SM specifics N/A	N/A Calibrations	Waivers	Finding Charts N/A	User Manual P2PP Tutorial	FPOSS	FAQ
FORS2	SM specifics OB Naming	N/A Calibrations	Waivers	Finding Charts N/A	User Manual P2PP Tutorial	FIMS	FAQ
GRAVITY	SM specifics OB Naming	Constraints Calibrations	Waivers	Finding Charts README	User Manual		FAQ
HAWK-I	SM specifics N/A	Constraints Calibrations	Waivers	Finding Charts README	User Manual P2PP Tutorial	GUIDECAM	FAQ
KMOS	SM specifics OB Naming	Constraints Calibrations	Waivers	N/A README	User Manual P2PP Tutorial	KARMA	FAQ
MUSE	SM specifics OB Naming	Constraints Calibrations	Waivers	Finding Charts README	User Manual -	-	FAQ
NACO	SM specifics OB Naming	Constraints Calibrations	Waivers	Finding Charts README	User Manual P2PP Tutorial	NAOS PS	FAQ
OmegaCAM	SM specifics OB Naming	Constraints Calibrations	Waivers	Finding Charts README	User Manual P2PP Tutorial	SADT	FAQ
PIONIER	SM specifics	Constraints	Waivers	Finding charts	User Manual	CalVin, SearchCal (JMMC)	FAQ
	OB Naming	Calibrations		README	P2PP Tutorial	VisCalc, Aspro (JMMC)	
	SM specifics	Constraints		Finding Charts	User Manual		

Service vs Visitor Mode

■ Service Mode

- Maximize the **science efficiency**
 - ✓ Highest priority programmes have the execution priority and are executed under optimal (required) observing conditions
- Maximize the **operational efficiency**
 - ✓ Sharing the calibrations between the programmes
 - ✓ Optimization of the observing time between different programmes
- Maximize the **scientific use of telescope time** under any condition
- Maximize the **scientific productivity** via uniform datasets

■ Visitor Mode

- Real-time decisions: optimization of observing strategy & overheads

Service Mode Rules

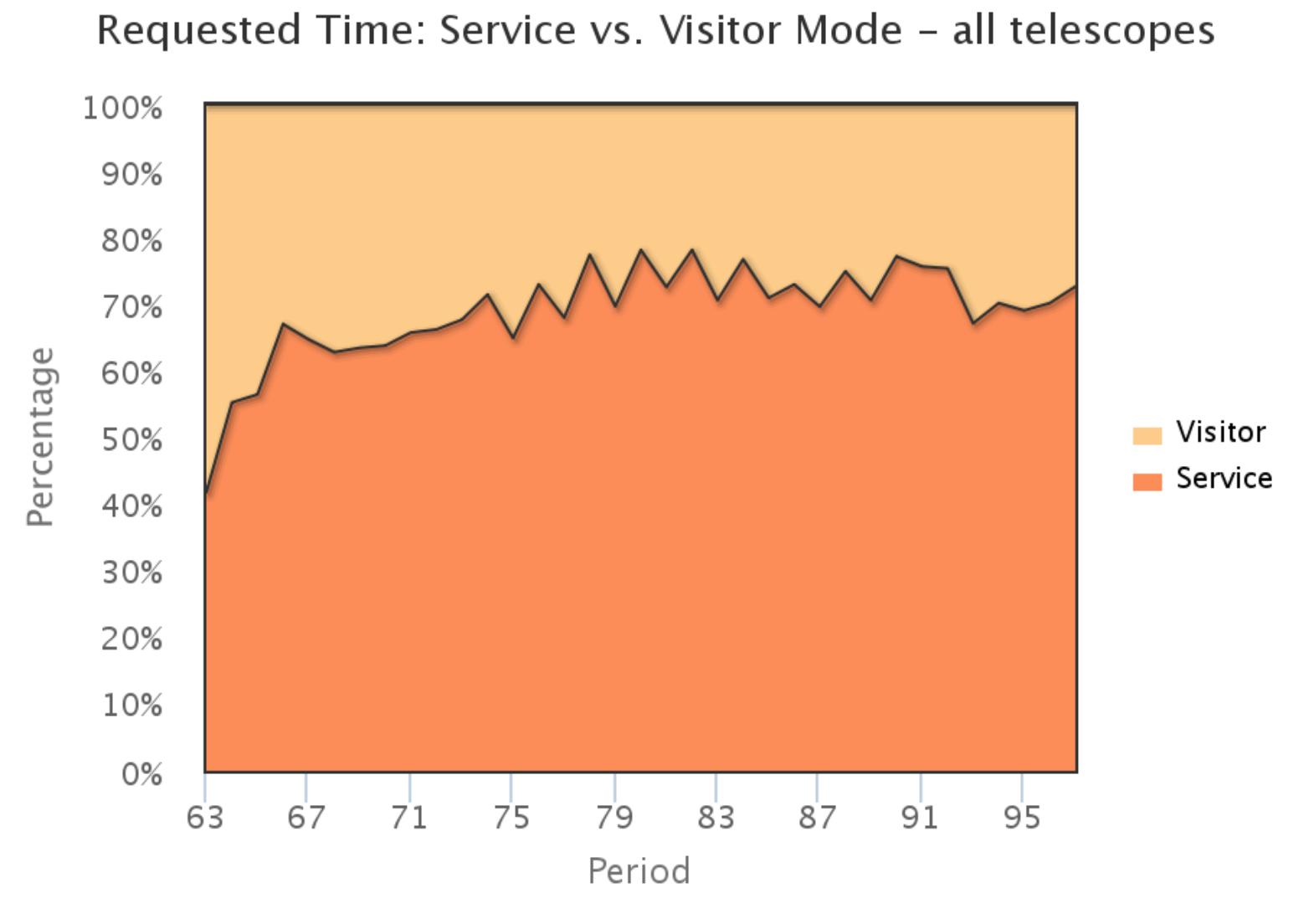
See Call for Proposals & Phase 2 SM Policies webpage:

<http://www.eso.org/sci/observing/phase2/SMPolicies.html>

- Phase 1 observing constraints are binding
- Phase 1 Targets & Instrument setup are binding
- Total execution time = Total allocated time
 - No saving of overheads by skipping allocation
- Observations are self contained units (OBs)
 - 1h maximum OB length → flexible scheduling
- Time critical observations can **EXPIRE!**

- **Exceptions that confirm the rule: waiver request**

Service vs Visitor Mode Request

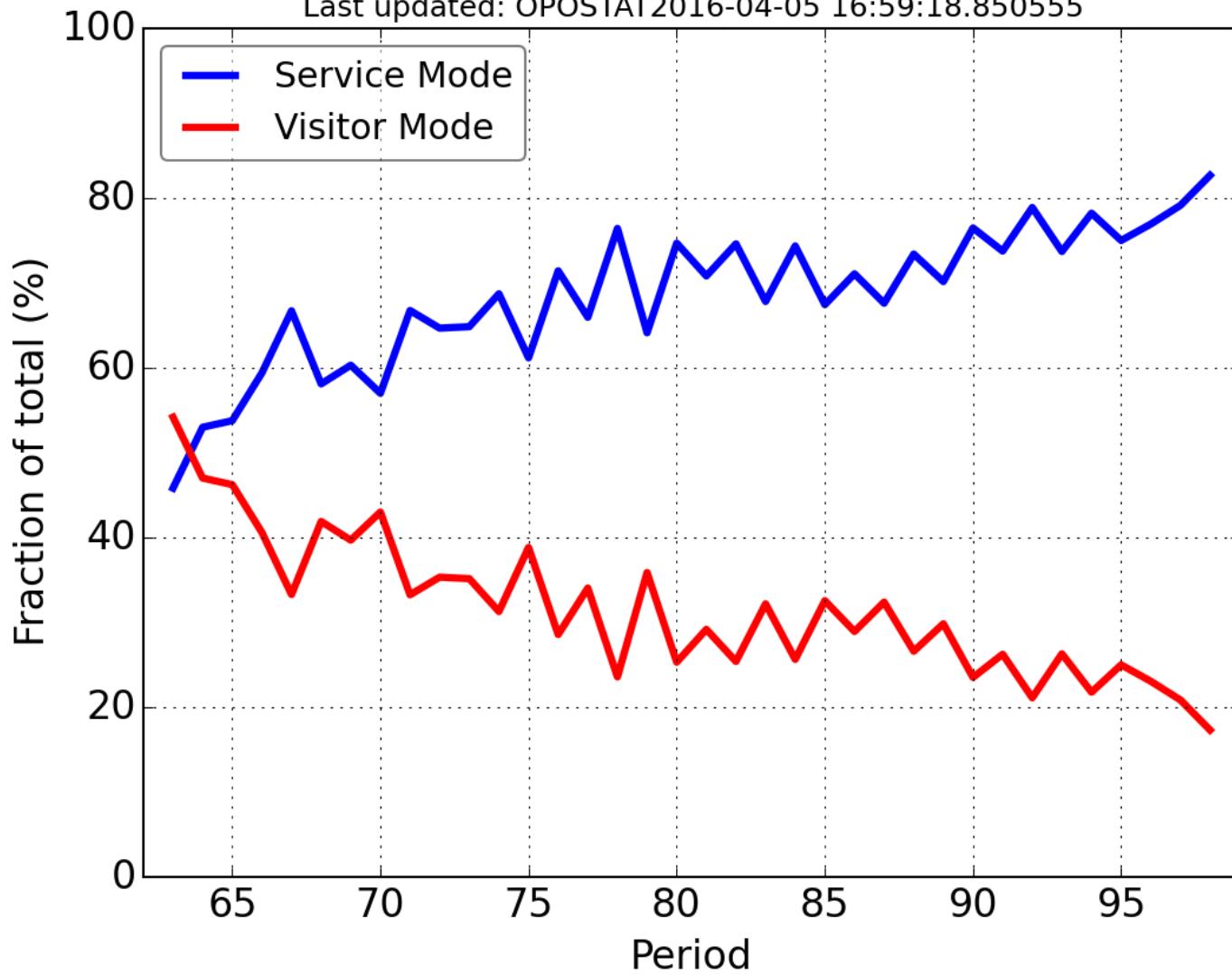




SM-VM [un-]balance

Service/Visitor request (Normal, UTs only)

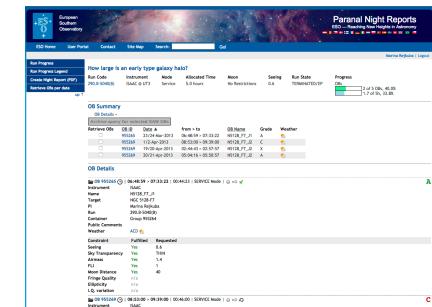
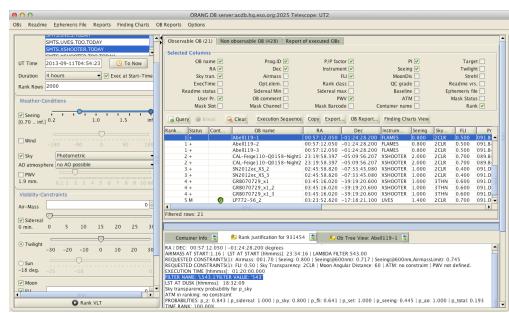
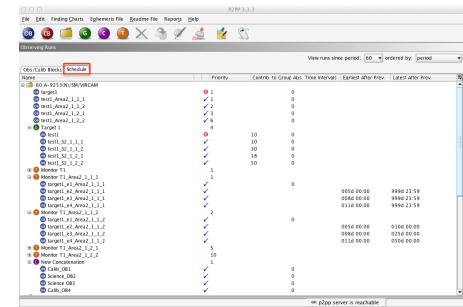
Last updated: OPOSTAT2016-04-05 16:59:18.850555



Paranal Phase 2 tools

- Development driven by VISTA & VST Public Surveys (2009, 2011)
- Deployment on VLT and VLTI (2012)

- Observation preparation tool: P2PP3
 - Design of computer literate observing strategy
 - Phase 2 delegation
- Observation Tool for Service Mode: OT3
 - Effective ranking engine
 - Laser collision prediction
 - Integrated reporting
- Observation Tool for Visitor Mode: vOT
- Observation reporting tool: NLT & gNLT
 - Automatic harvesting of observation slots
 - Subscription to observation notification



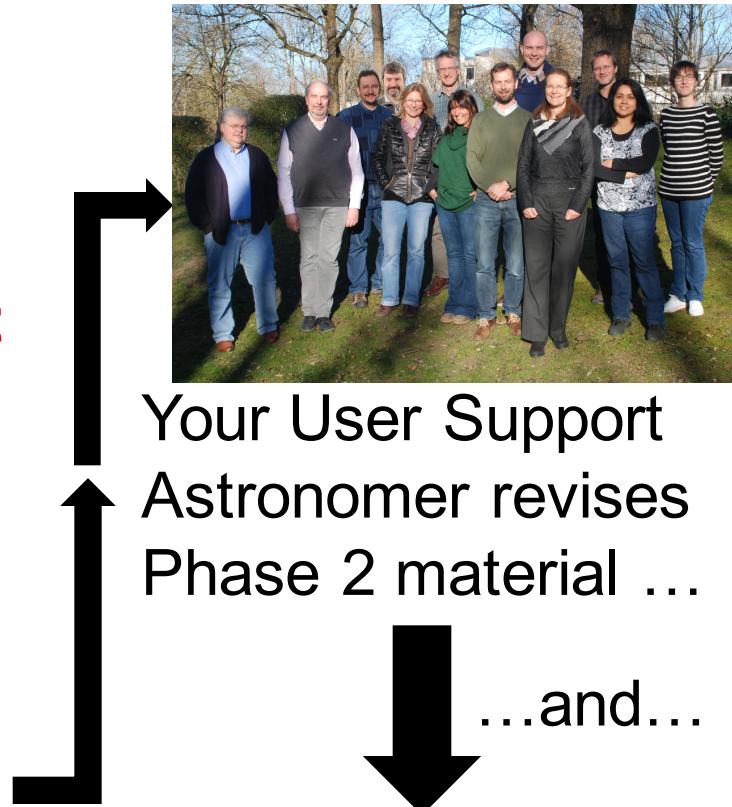
What happens after the whistle?



Last step
Blow the whistle
=
click P2PP-submit



notification is sent
to USD indicating
that Phase2
submission is done



..., after approval,
passes it to the
observing queue

Observing Tool: SM on Paranal

The night astronomer sets the current constraints

SMTS.VIRCAM.TODAY

UT Start-time: 2012-01-09T22:41:30

Duration in Hours: 4

Maximum Orang Rows: 200

Weather-Conditions:

- Seeing 600nm Max.: 1.4 (Curr.: 0.9)
- Wind-Direction: 0
- Sky-Transparency: Variable, thin cirrus

Visibility-Constraints:

- Air-Mass(%Tolerance): 10
- Sun Max. Elevation (Deg.): -18
- Twilight(% Tolerance): 0
- Moon-Elevation (Deg.): 0
- FLI(%Tolerance): 0
- Moon Distance(%Tolerance): 0
- Zenith Avoidance: checked
- Exec at UT Start-Time Only: unchecked

Ranking-Algorithm:

- Algorithm: VISTA Survey v0.03
- Rank button
- Re-Load and Rank button

ORANG DB server:acdb.hq.eso.org:2025

Charts OB Reports

Selected Columns: OB name, Dec, Air mass, Opt.elem., Sidereal time s..., Prog.ID, Instrument, FLI, Rank class, Rank, Seeing, Moon dis., QC grade, Baseline, Target, Twilight, Strehl, Readme vrs., Ephemeris file, RA, Sky tran., Exec. time, Readme status, User Pr.

OB ID Status Container Container ID Sched Id OB name

Rank score	OB ID	Status	Container	Container ID	Sched Id	OB name
1	1 559503	+	C	559502	25057896	SMC-CY2_vmc_P87_smc_1_6_5
	1 559506	+	C	559502	25057896	SMC-CK1_vmc_P87_smc_1_6_5
	1 559550	A	T	559537	25057896	SMC-TK5_vmc_P87_smc_1_6_5
2	4 91815	-	T	491815	25056311	SMC-TK1_vmc_survey_smc.xml
	2 492646	M	T	492645	25056311	SMC-TK1_vmc_survey_smc.xml
	3 555329	M	G	555325	25056991	vikingJKH_sgp_m30_1_1_20
	4 596608	+	G	596604	25059255	vikingJKH_sgp_m31e_1_1_1
	4 596650	+	G	596646	25059255	vikingJKH_sgp_m32e_1_1_1
	5 555350	+	G	555346	25056991	vikingJKH_sgp_m30_1_1_23
	5 555235	+	G	555231	25056991	vikingJKH_sgp_m34_1_1_19
	6 596573	+	G	596569	25059255	vikingJKH_sgp_m30e_1_1_1
	6 555221	+	G	555217	25056991	vikingJKH_sgp_m34_1_1_17
	6 555228	+	G	555224	25056991	vikingJKH_sgp_m34_1_1_18
	6 555249	+	G	555245	25056991	vikingJKH_sgp_m34_1_1_21
	6 555256	+	G	555252	25056991	vikingJKH_sgp_m34_1_1_22
	6 555242	M	G	555238	25056991	vikingJKH_sgp_m34_1_1_20
	7 491733	+	C	491732	25056311	Bridge-CY2_vmc_survey_bridge1
	7 491736	+	C	491732	25056311	Bridge-CK1_vmc_survey_bridge1
	8 596622	+	G	596618	25059255	vikingJKH_sgp_m31e_1_1_3
	9 596615	+	G	596611	25059255	vikingJKH_sgp_m31e_1_1_2
	9 596629	+	G	596625	25059255	vikingJKH_sgp_m31e_1_1_4
	9 596636	+	G	596632	25059255	vikingJKH_sgp_m31e_1_1_5
	9 596643	+	G	596639	25059255	vikingJKH_sgp_m31e_1_1_6
	9 596657	+	G	596653	25059255	vikingJKH_sgp_m32e_1_1_2
	9 596664	+	G	596660	25059255	vikingJKH_sgp_m32e_1_1_3

Filtered rows: 146

Container Info Rank Justification for Ob Tree View

The OBs are ranked according to a ranking algorithm (guideline)

Service Mode Ranking

```
Rank_string = <observability_classPP>_  
              <rank_class>_  
              <user_priority>_  
              <inverted normalized group score>_  
              <inverted normalized group contribution>
```

$$\text{observability_class}_{\text{PP}} = 10 * \text{NINT}(10 * R_{\text{time}} * R_{\text{constraint}}) + \text{PP}$$

- Result: 000, 010, 020, ..., 100
- PP – push-pull factor applied to obs_class (-100...0...+100)
in order to reflect rank classes of programmes

Ranking algorithm prefers observations that have low probability to be completed within requested constraints (setting targets, challenging constraints).

Observability class

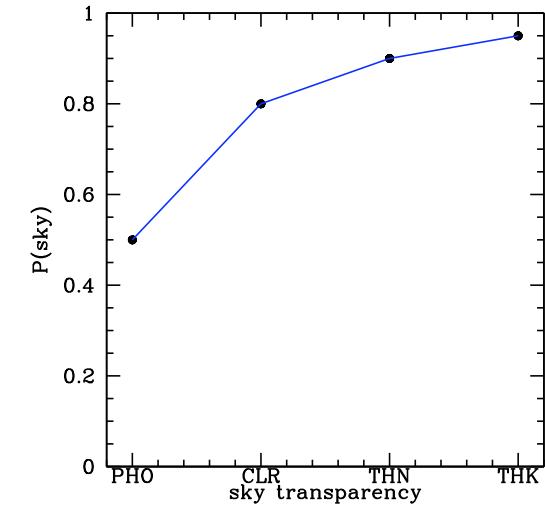
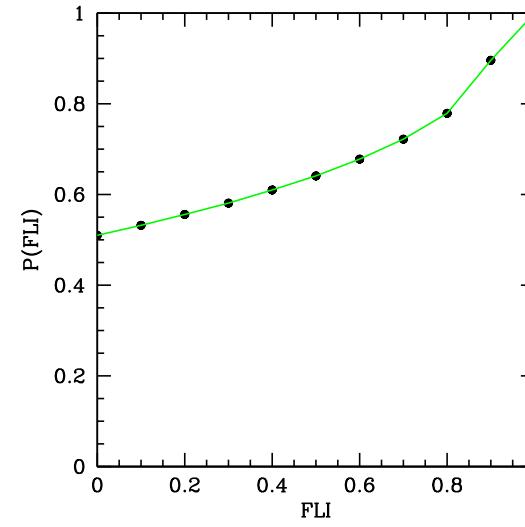
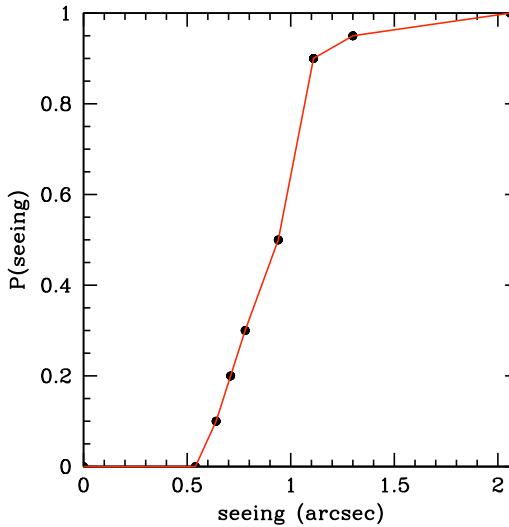
$$\text{observability_class}_{\text{PP}} = 10 * \text{NINT}(10 * R_{\text{time}} * R_{\text{constraint}}) + \text{PP}$$

- Time-Critical OB rank:

$$R_{\text{time}} = \min[1.0, (\Delta t_{\text{TotRemaining}} - \Delta t_{\text{OBexecetime}}) / 30 \text{ days}]$$

- Constraint rank:

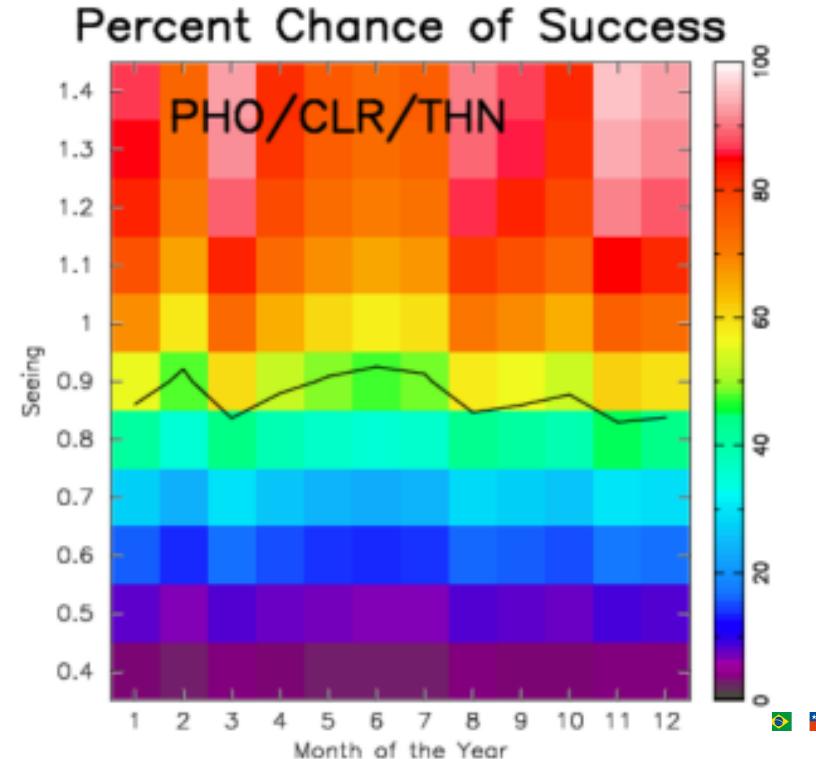
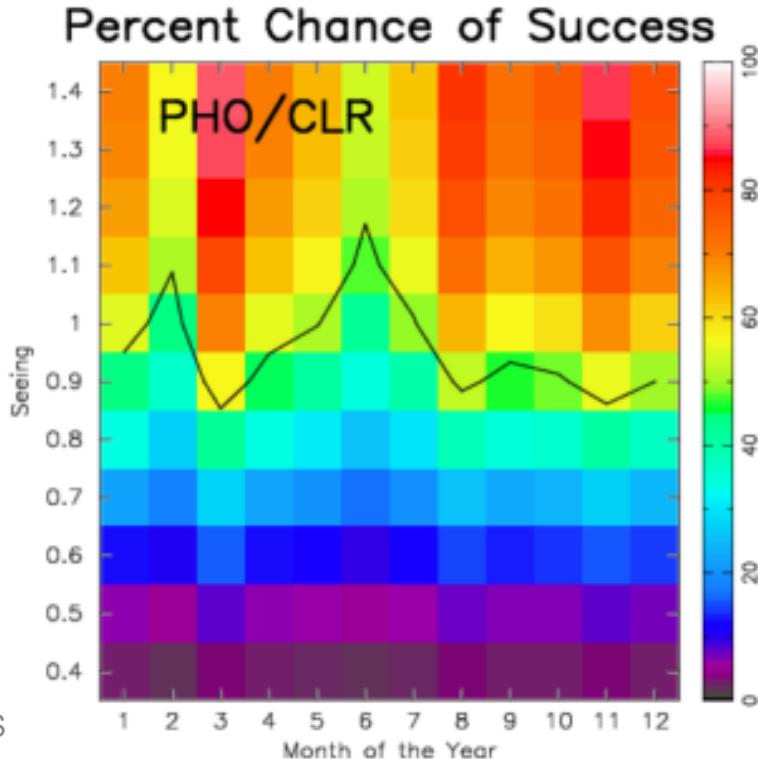
$$R_{\text{constraint}} = P_z * P_{\text{sky}} * P_{\text{FLI}} * P_{\text{set}} * P_{\text{seeing}}$$



Selecting Observing Constraints: sky transparency, FLI, seeing

■ Transparency

- Are photometric conditions really necessary? Do you need flux calibration?
- For spectroscopy often CLR/THN is sufficient...
- Too relaxed constraint may cause loss of guide/reference stars



Seeing vs Image Quality

■ ***Seeing is an inherent property of the atmospheric turbulence, which is independent of the telescope that is observing through the atmosphere.***

➤ @Phase 1: specify seeing (V-band, zenith)

■ ***Image Quality (IQ), the full width at half maximum (FWHM) of long-exposure stellar images, is a property of the images obtained in the focal plane of an instrument mounted on a telescope observing through the atmosphere.***

➤ @Phase 2: specify desired IQ at the observed wavelength and (maximum) airmass

Exposure Time Calculators:

Seeing – IQ calculation

Image Quality

Image Quality FWHM : 0.48 arcsec (to be used for OB constraint set)
 show details of the IQ calculations

The Image Quality PSF FWHM is modeled as the convolution of the gauss-approximated PSFs of the atmosphere, telescope and instrument transfer function, at the wavelength and airmass of observation. See the [helpfile](#) for details.

$$\begin{aligned} FWHM_{IQ} &= \sqrt{FWHM_{atm}^2 + FWHM_{tel}^2 + FWHM_{ins}^2} \\ &= 0.48 \text{ arcsec} \end{aligned}$$

Seeing = $FWHM_{500\text{nm},\text{zenith}}$ = 0.80 arcsec

Atmosphere (see the [helpfile](#))

$$\begin{aligned} FWHM_{atm} &= FWHM_{500\text{nm},\text{zenith}} (\lambda_c/500\text{nm})^{-1/5} \cdot \text{airmass}^{3/5} \cdot \sqrt{1 + F_{\text{Kolb}} \cdot 2.183 \cdot (r_0(\lambda, \text{airmass})/L_0)^{0.356}} \\ &= 0.80 \text{ arcsec} \cdot (2197\text{nm}/500\text{nm})^{-1/5} \cdot 1.20^{3/5} \cdot \sqrt{1 + (-0.991) \cdot 2.183 \cdot (0.666 \text{ m}/23 \text{ m})^{0.356}} \\ &= 0.80 \text{ arcsec} \cdot 0.744 \cdot 1.116 \cdot \sqrt{0.387} \\ &= 0.413 \text{ arcsec} \end{aligned}$$

Telescope (diffraction limited PSF FWHM for the $D=8.200\text{m}$ telescope at observing wavelength $\lambda_c=2197\text{nm}$)

$$\begin{aligned} FWHM_{tel} &= 1.028 \cdot \lambda_c/D \\ &= 1.028 \cdot (2197 \cdot 10^{-9} \text{ m}) / 8.200\text{m} \cdot (180/\pi \cdot 3600) \text{ arcsec} \\ &= 0.057 \text{ arcsec} \end{aligned}$$

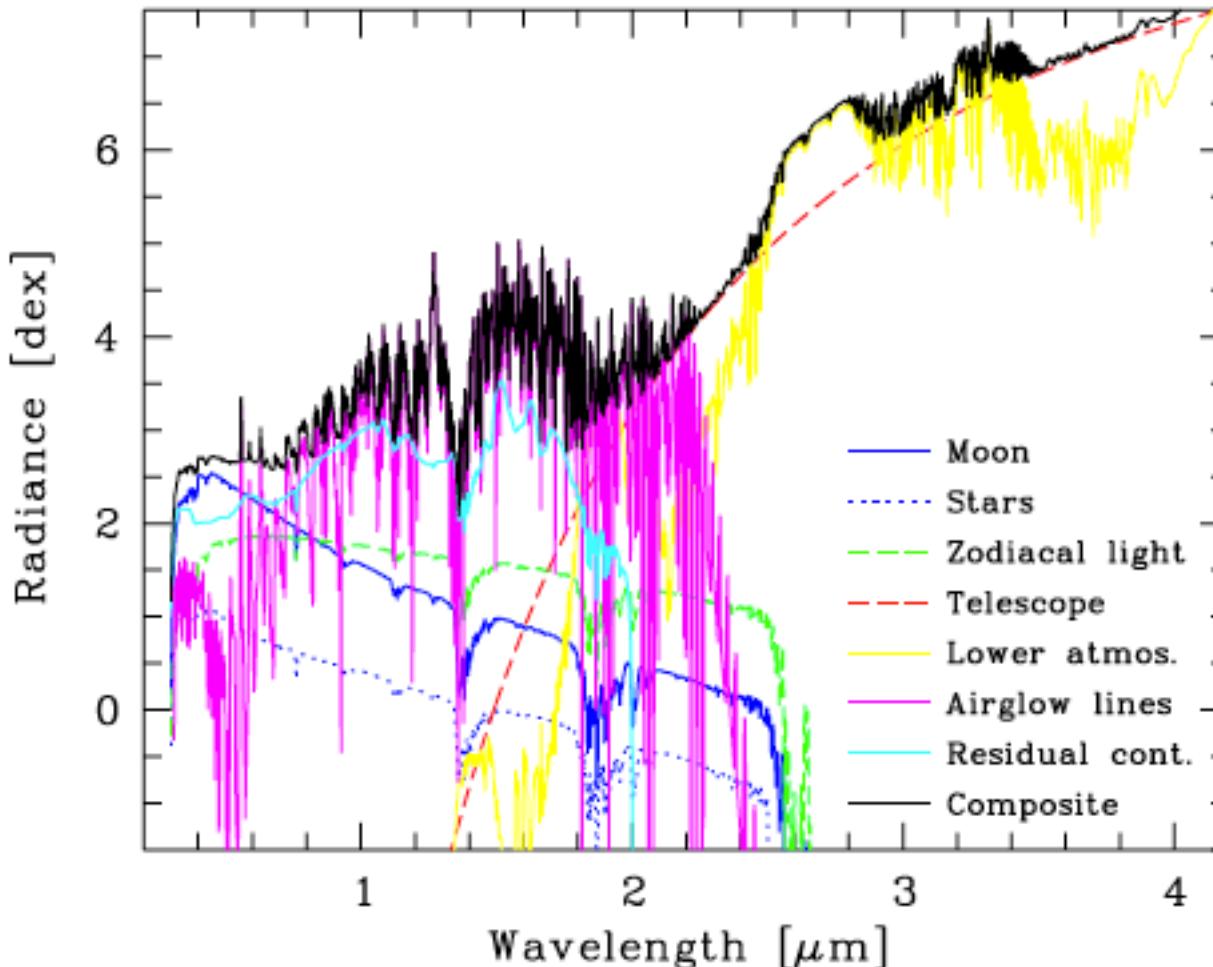
Instrument (instrument transfer function FWHM at observing wavelength)

$$FWHM_{ins} = 0.230 \text{ arcsec}$$

Image Quality

$$\begin{aligned} FWHM_{IQ} &= \sqrt{FWHM_{atm}^2 + FWHM_{tel}^2 + FWHM_{ins}^2} \\ &= \sqrt{0.413^2 + 0.057^2 + 0.230^2} = 0.48 \text{ arcsec} \end{aligned}$$

Paranal sky

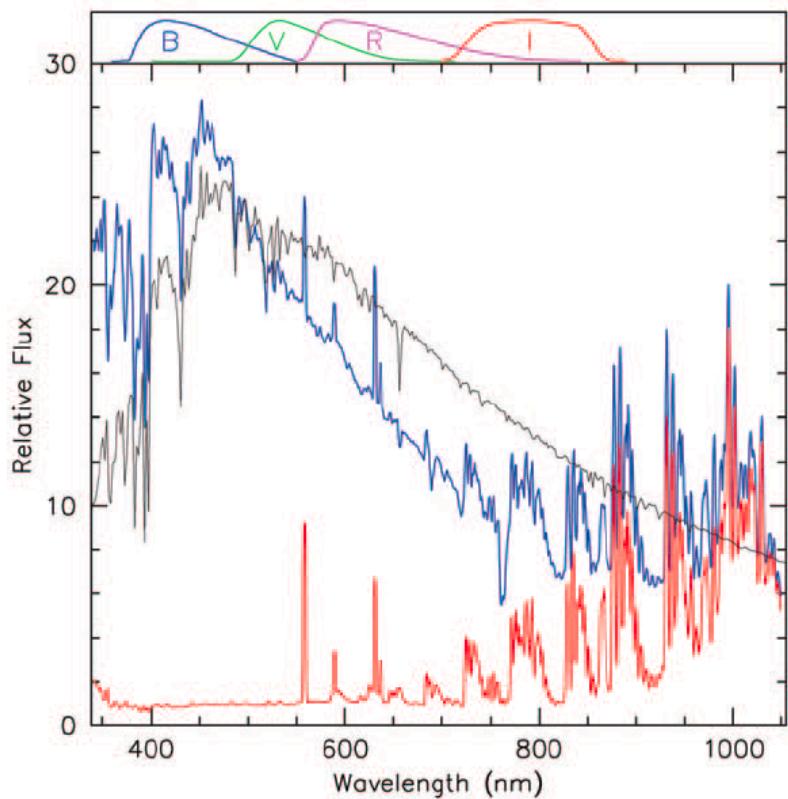


- Moon above the horizon:
- scattered moonlight
 - scattered starlight
 - zodiacal light
 - thermal emission
 - molecular emission of the lower atmosphere
 - airglow emission of the upper atmosphere
 - airglow/residual continuum

Noll et al. 2012

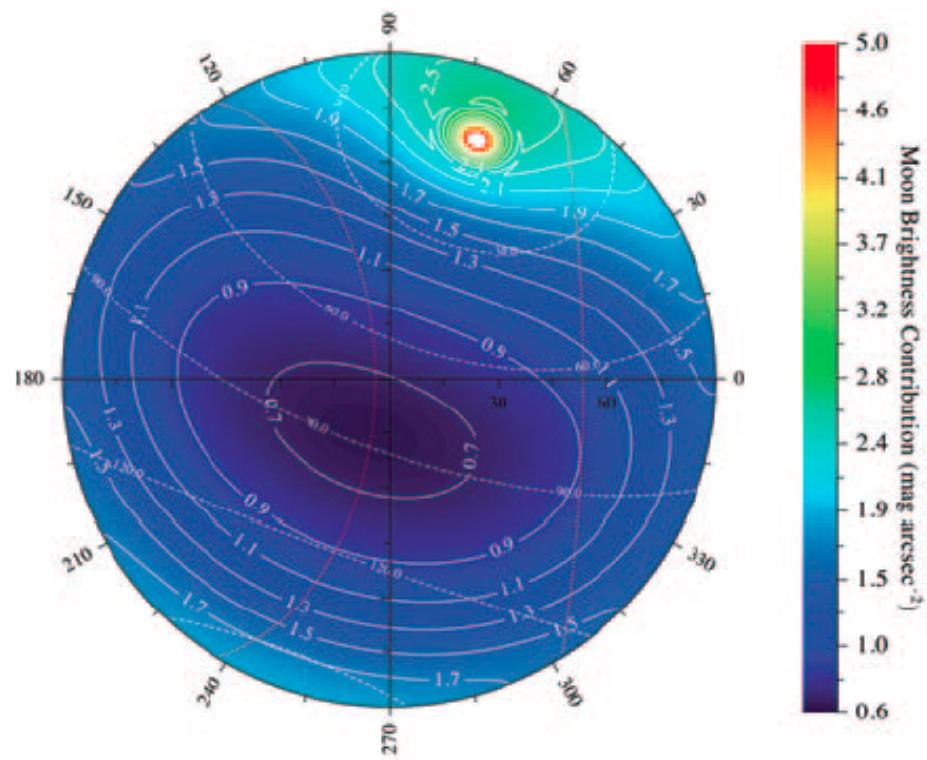
Bright or Dark and how far from the moon?

Patat 2004, Messenger

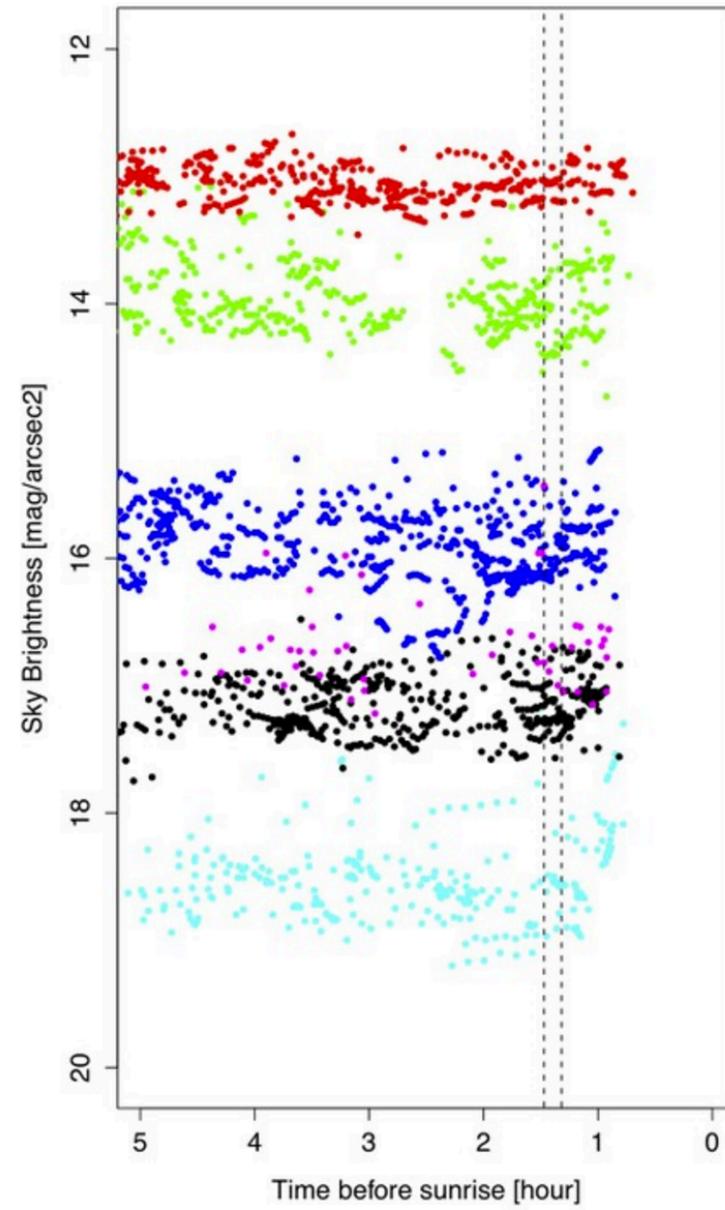
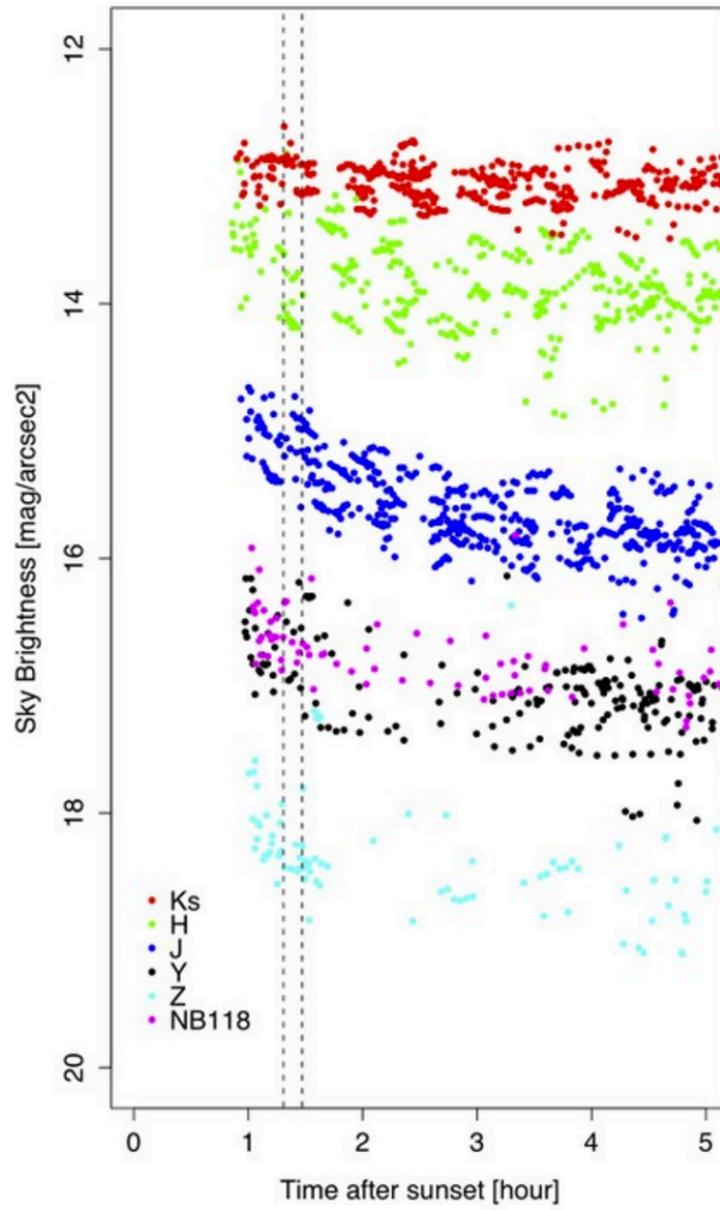


Blue = sky spectrum during bright time
Red = sky spectrum during dark time
Black = model spectrum of a solar-type star

B-filter, FLI=0.5,
moon elevation 20

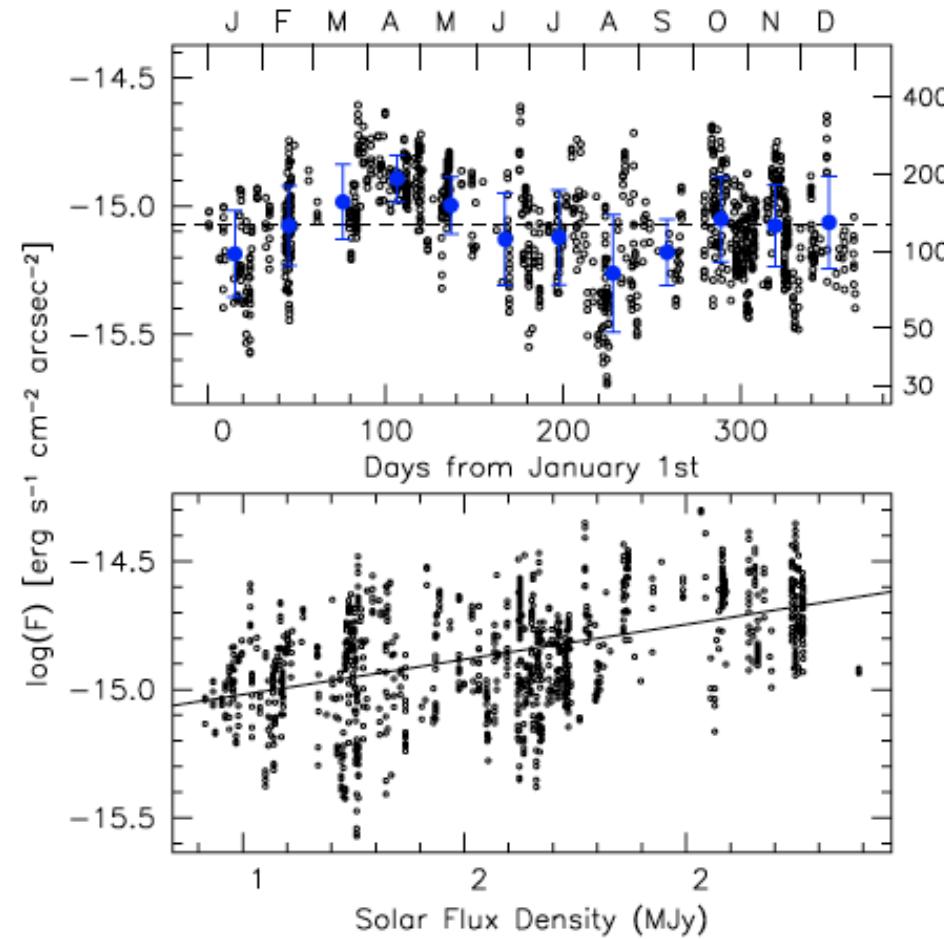


Twilight constraint

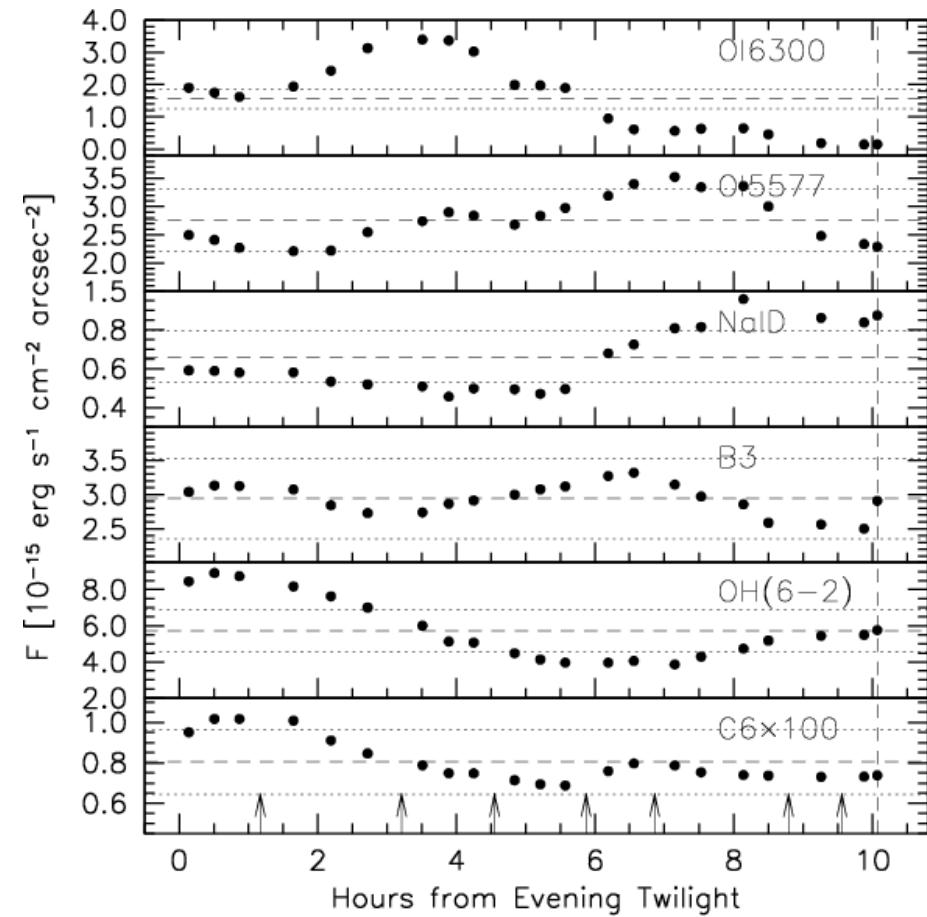


The dancing sky (Patat 2008, A&A)

[OI]5577 line flux seasonal variations



Sky emission variations during one night
FORS1 spectra (2001-04-22)



Calibrations

- Are all calibrations needed part of the instrument calibration plan?
- Calibration accuracy
 - Master calibrations are produced by the Quality Control Group and are available in the ESO Science Archive
 - Trend analysis
- Extra Day-time calibrations – need a waiver but come for “free”
- Extra Night-time calibrations – time taken from the allocated time for the programme

Quality Control: Health Check Monitor

[CAL](#) | [HC](#) | [refs](#) | [QC](#)

HealthCheck Monitor

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[FULL reports](#)

XSHOOTER:

- [score overview](#)

UVB

- [detector: bias](#)
- [detector: parameters](#)
- [distortion correction](#)
- [format stability](#)
- [wavelength calib.](#)
- [lamps: arc & flat](#)
- [efficiency](#)

VIS

- [detector: bias](#)
- [detector: parameters](#)
- [distortion correction](#)
- [format stability](#)
- [wavelength calib.](#)
- [lamps: arc & flat](#)
- [efficiency](#)
- [SNR](#)

NIR

- [detector: dark](#)
- [detector: parameters](#)
- [distortion correction](#)
- [format stability](#)
- [wavelength calib.](#)
- [lamps: arc & flat](#)
- [efficiency](#)
- [SNR](#)

Acquisition Camera

- [detector](#)

QC XSHOOTER

Other HC:

UT1

- [FORS2](#)
- [KMOS](#)
- [NACO](#)

UT2

- [FLAMES/GIRAFFE](#)
- [UVES&FLAMES/UVES](#)
- [X-SHOOTER](#)

UT3

- [SPHERE](#)
- [VIMOS](#)
- [VISIR](#)

UT4

- [HAWK-I](#)
- [MUSE](#)
- [SINFONI](#)

VLT1

[page auto-refreshes after 300 sec] [stop | on] [press Ctrl+Shift+R to enforce refresh of scores, dates and news]

XSHOOTER trending system: HEALTH CHECK report

Last update: 2016-05-08T22:58:02 (UT) (0d 21h:56m ago) | now: 2016-05-09T20:54:40 (UT)

same group: ● wavecal_slit ● wave_slit_time ● wave_ifu_time

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DATE*: [2] 2016-05-02 2016-05-03 2016-05-04 2016-05-05 2016-05-06 2016-05-07 2016-05-08
[report](#) | [NLT report](#) | [NLT report](#)

r... Raw CAL displays: [raw](#) [raw](#) [raw](#) [raw](#) [raw](#) [raw](#) [raw](#)

P... Product quality: [products](#) [products](#) [products](#) [products](#) [products](#) [products](#) [products](#)

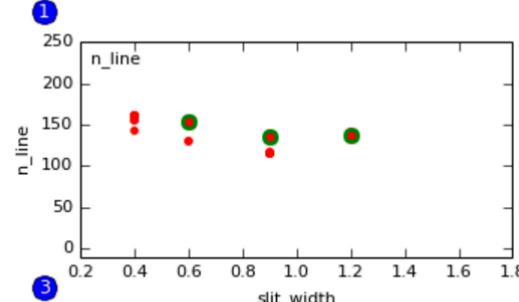
transfer ngas [?] [forced refresh](#)

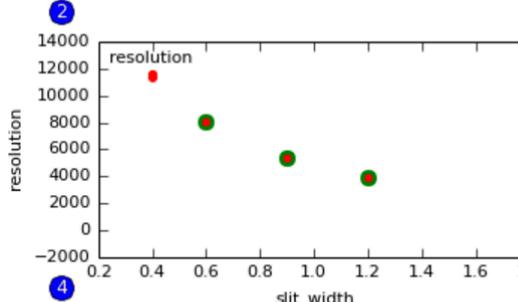
[scores&comments](#) | [history ...](#) | [plot tutorial ...](#) | [contact](#) ● daily/often; important to check [?]

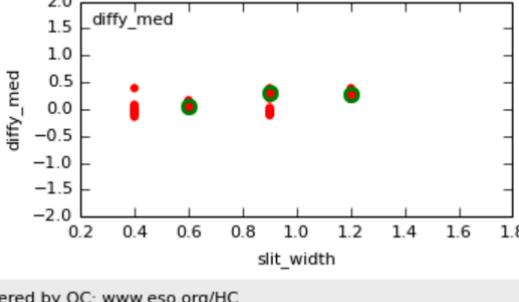
*Date on this monitor changes at 21:00 UT

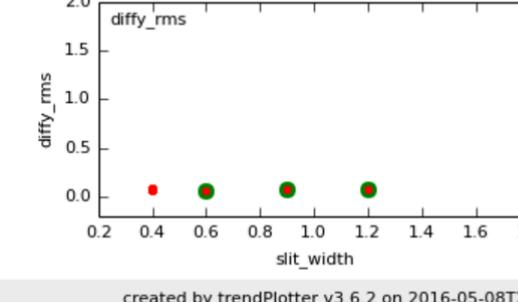
XSHOOTER: NIR ARC_SLIT parameters (last 90 days)

QC data range: 2016-02-09 ... 2016-05-04*

1. 

2. 

3. 

4. 

powered by QC: [www.eso.org/QC](#)

Print: [- png file](#)

Information and research:
[- advanced studies: QC1 browser | QC1 plotter](#)

created by trendPlotter v3.6.2 on 2016-05-08T22:58:00



Quality Control: Known Problems

http://www.eso.org/observing/dfo/quality/XSHOOTER/qc/problems/problems_xshooter.html

XSHOOTER Quality Control: Known Problems

[HOME](#) [INDEX](#) [SEARCH](#) [HELP](#) [NEWS](#)

CAL	HC	refs	QC
QUALITY CONTROL			
HOME			
XSHOOTER QC			
XSHOOTER QC HOME			
TOC			
Trending & QC1			
general info			
trending & QC1			
known problems			
XSHOOTER Health Checks			
Pipeline			
general info			
calib data			
science data			
product names			
reduction cascade			
problems			
Data Packages			
general info			
XSHOOTER			
Data Management			
general info			
QC links:			
QC home			
Data Products			
calChecker			
HealthChecks			
Reference Frames			
QC1 database			
Paranal autrep database			
(ESO internal)			

Problems may also be related to the [pipeline processing](#).

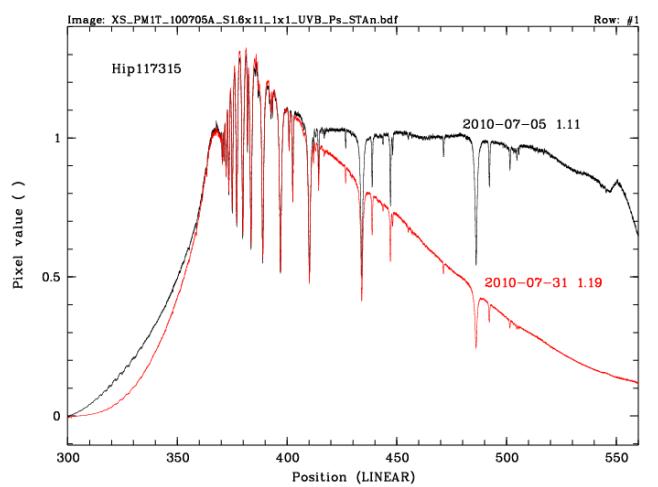
UVB [wrong acq. coord.](#) [UVB ADC stuck](#) [UVB pickup noise](#)
VIS [VIS bias pattern](#) [VIS remittance](#)
NIR [new slits](#) [NIR FF lamp](#) [NIR remittance](#) [K band vignetting](#)

[top](#) Acquisition coordinates wrong for g' prime filter

From April 11 to May 14, 2011, the reference positions for both the g' and the U band filter were wrong. (-1.4 pixels for the g' and -2 pixels for the U band filter.) This not only leads to considerable flux loss for narrow slits, but also to a bad wavelength calibration for wider slits.

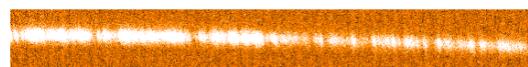
[top](#) UVB Atmospheric Dispersion Compensator stuck

From July 18 to August 2, 2010, the Atmospheric Dispersion Compensator (ADC) of the UVB arm was stuck and did no longer adapt to changes in airmass or observing mode (SLIT vs. IFU). This resulted in strong vignetting of IFU data and in slit losses for SLIT data. Below you find a plot comparing observations of the same telluric standard stars with (red) and without (black) that problem (airmass noted besides date). The spectra were scaled to overlaps between 350nm and 400nm.



[top](#) Pickup noise in UVB data

The UVB CCD sometimes suffers from (horizontal) pickup noise, which is visible in low signal data and shows up in the rectified data as tilted lines. Below you see an example of raw data (rotated by 90 degrees) and merged rectified data. The example shown was observed in nodding mode, which creates the bright and dark region in the merged rectified data.



Instrument News

<https://www.eso.org/sci/facilities/paranal/instruments/kmos/news.html>

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[Emergency Procedures](#)

[Call for Proposals](#)

[Paranal News](#)

[Contact Information](#)

[Paranal Telescopes](#)

[Paranal Instrumentation](#)

[CRIRES](#)

[FLAMES](#)

[FORS](#)

[HAWK-I](#)

[KMOS](#)

[Overview](#)

[News](#)

[Instrument Description](#)

[Manuals](#)

[Tools](#)

[Instrument Operation Team](#)

[Visitor Instructions](#)

[Science](#)

[MUSE](#)

KMOS News

Instrument Status

KMOS is in operation with all 24 arms.

News

- 2015-12-11 Starting from P97, we have included the new keyword NCYCLES in the KMOS_spec_obs_freedither template that can be used to repeat the defined dither cycle including sky observations NCYCLES times. This allows i.e. to stay on a target and take NCYCLES observations, making the design of transit observations easier.
- 2015-12-10 Starting from P97, darks with DITs corresponding to science obersvations, will no longer be taken by default. The 60s darks, that are used by the pipeline for the bad pixel correction will still be taken on a daily basis. This new procedure allows to remove the constraints on the usable DITs making the design of OBs more flexible and time-efficient.
- 2015-06-11 A [facebook group](#) has been created to exchange ideas, methods, software on KMOS data reduction and analysis. We try to add the discussion items of this group to the ESO forum on a regular basis.
- 2015-03-04: After an intervention to upgrade all arms, KMOS was handed back to Science Operation for recommissioning and testing.
- 2015-01-22 Arm 2 was put in simulation
- 2014-12-02 Arm 19 was put into simulation
- 2014-11-21 Arm 8 was put into simulation.
- 2014-11-18 Arm 4 was put into simulation.
- 2014-10-06: Arm 5,6,7, and 16 have been replaced, Electronics of Arm4 were changed. All arms except 11 are back in operation.
- 2014-08-24: Arm 7 in simulation.
- 2014-08-07: Arm 15 has been recoverd and is back in operation.
- 2014-08-06: Arm 5 was put in simulation.

Getting help

- Ask for help link in the User Portal
- E-mail to usd-help@eso.org

ESO User Portal Services

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 <h3>Archive Services</h3> <p>Query the Archive for La Silla Paranal raw data La Silla Paranal reduced data APEX reduced data Phase 3 Catalogs Delegate proprietary data access rights</p>	 <h3>Help</h3> <p>Ask for help Find User Portal Information and FAQ Check the Data Reduction Forum Check the data reduction FAQ</p>	