Quality Assurance at the VLT
Real-time assessment and closed loop

Steffen Mieske

(Head of Paranal Science Operations)

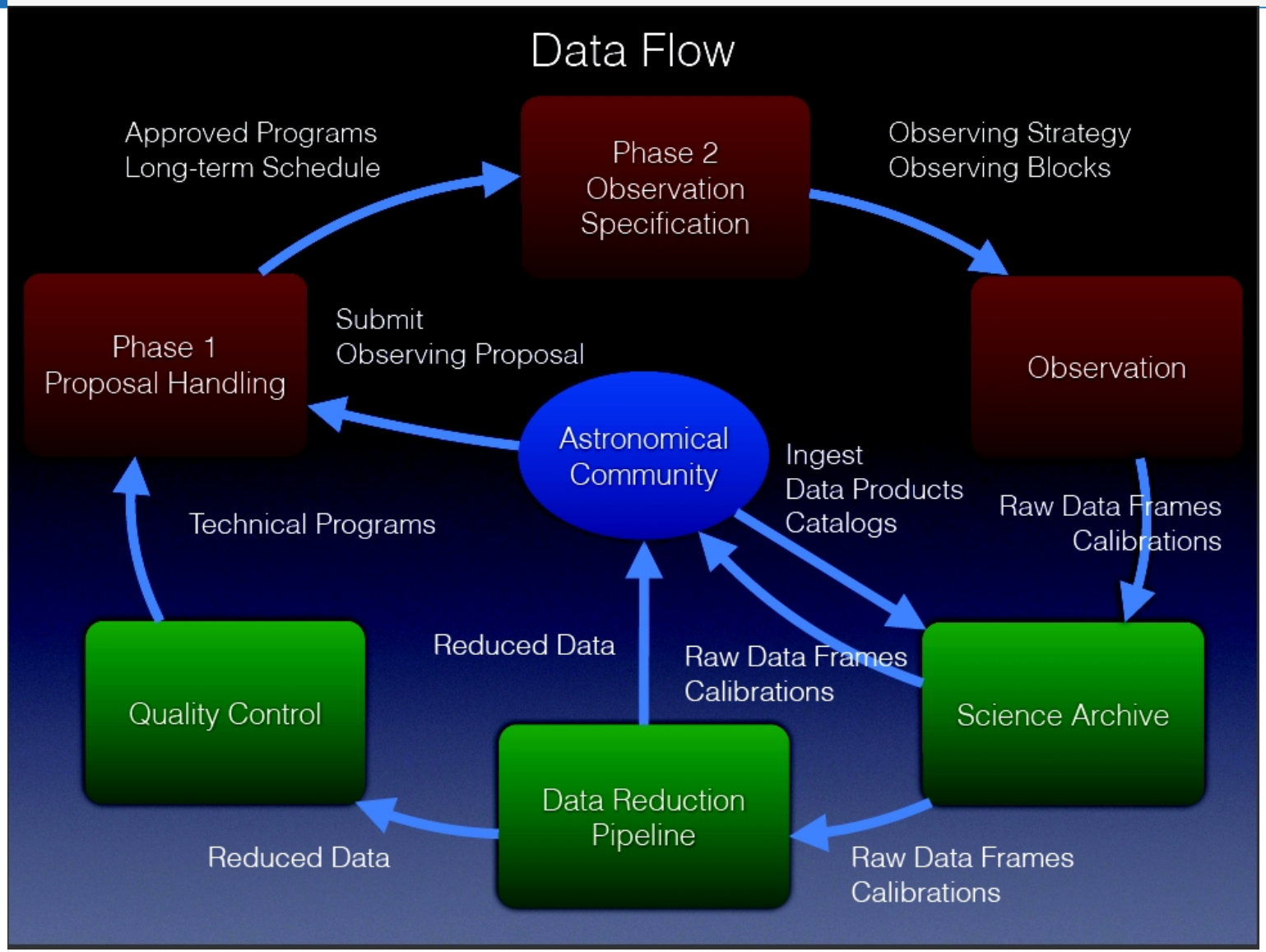
Real-time quality control of Scientific Data

Burkhard Wolff

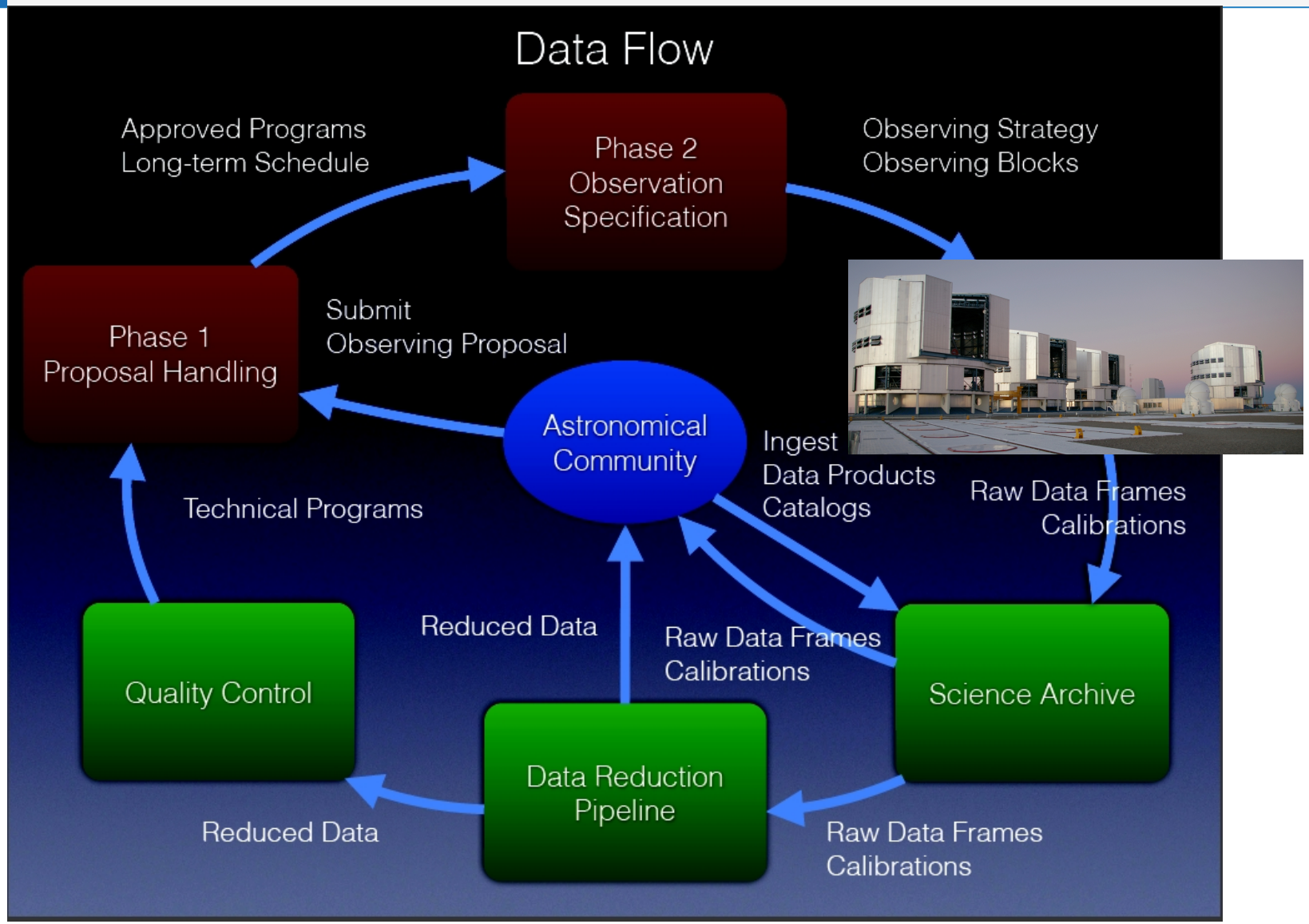
(Data Processing & Quality Control Group Garching)

Closed Loop Monitoring of Calibration Data

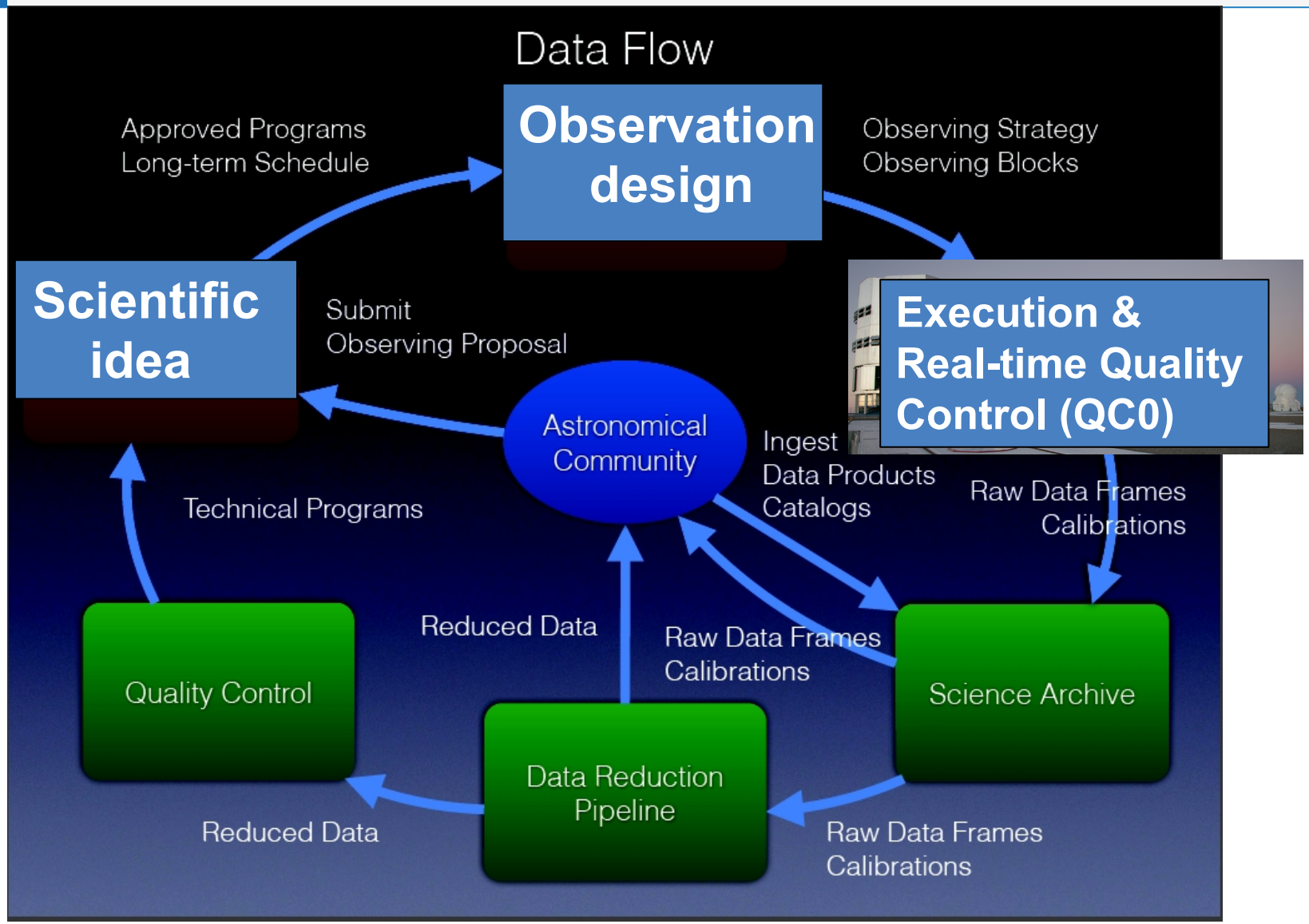
End-to-end data flow at ESO



End-to-end data flow at ESO



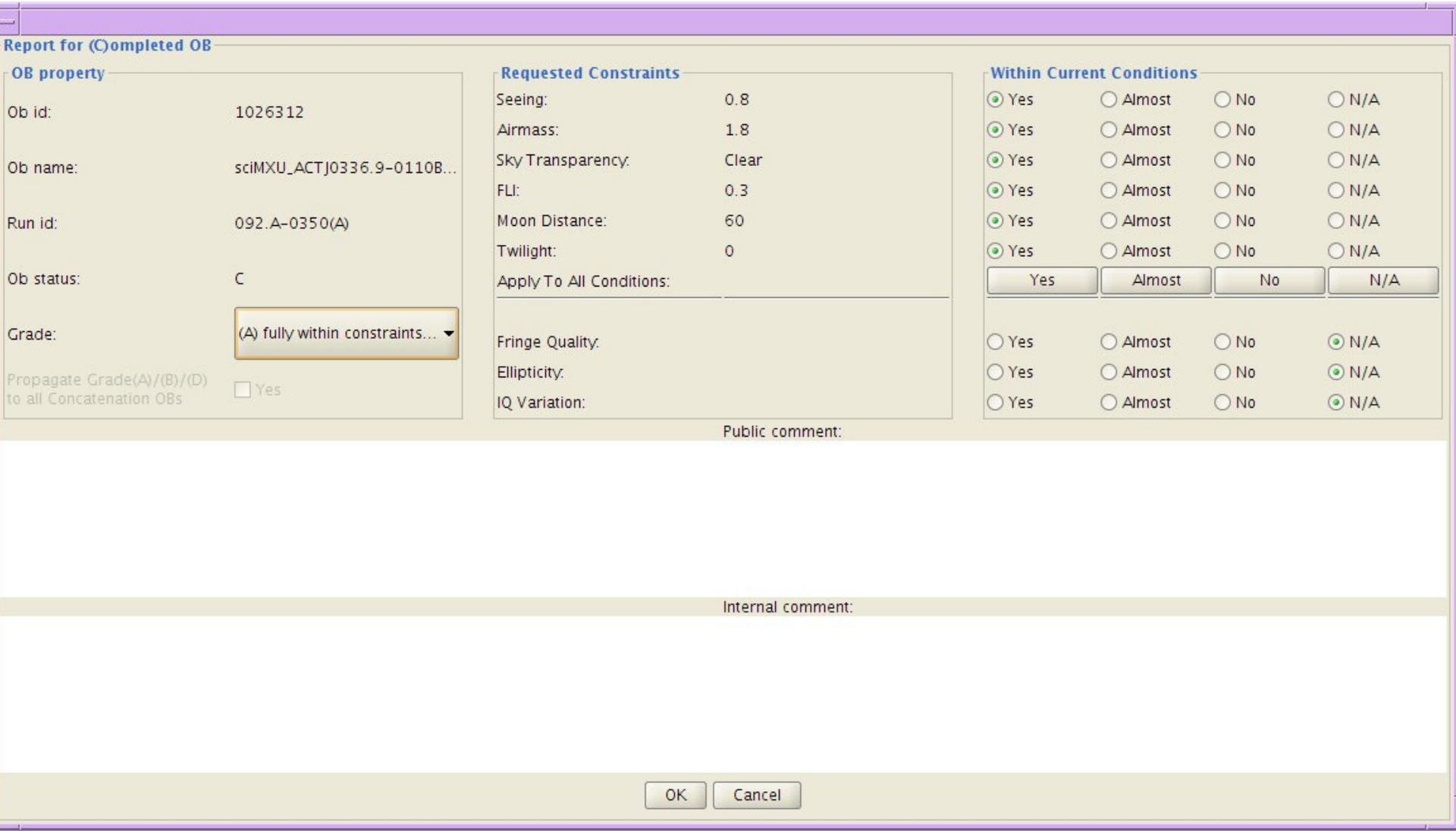
End-to-end data flow at ESO



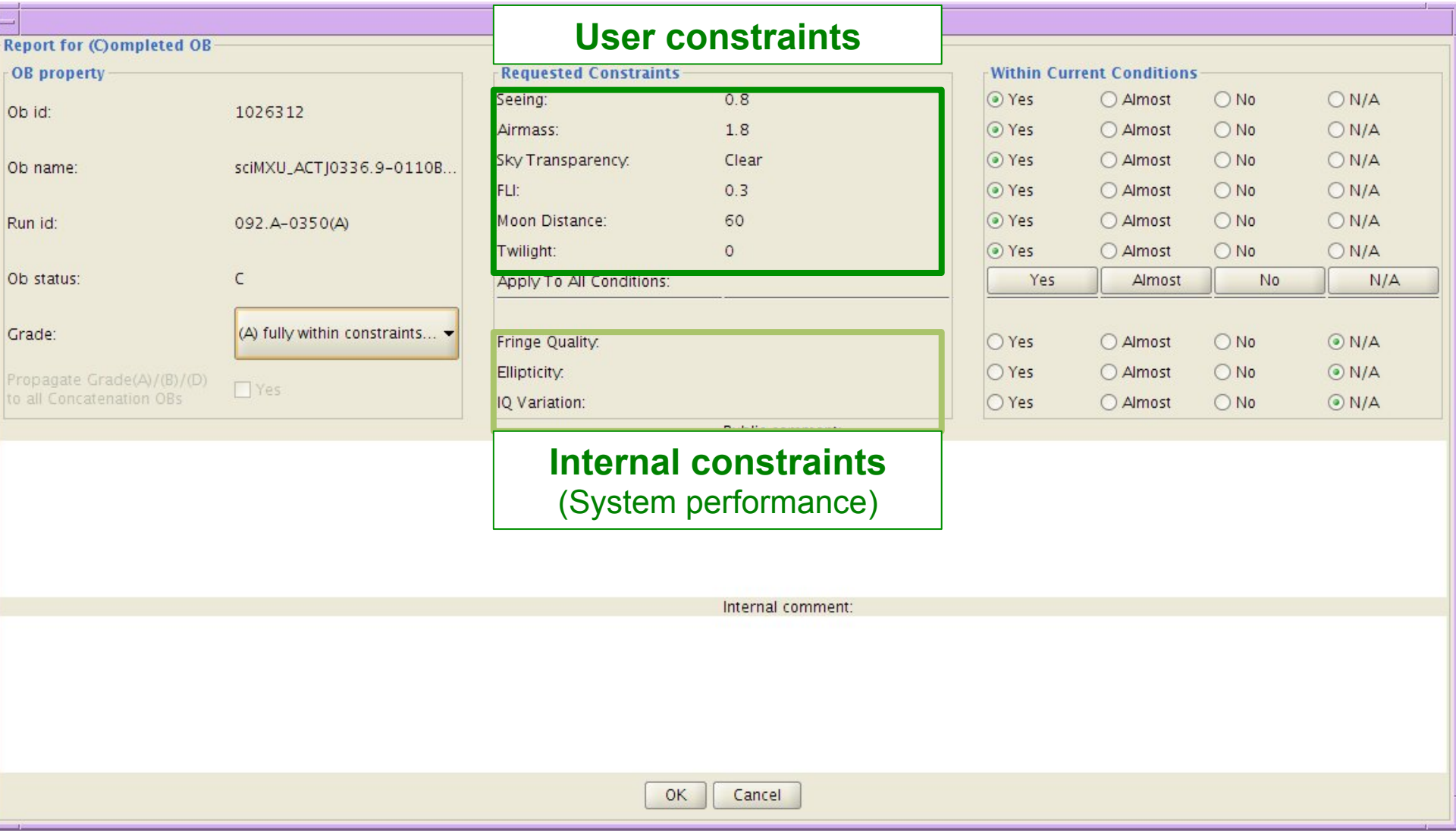
Main goal of QC0 on Paranal

- Check whether the science data taken meet the <u>observing condition constraints defined by the user</u>
  - **Image quality** (usually FWHM of PSF or LSF)
    - Strehl ratio / Coherence time for AO instruments
  - Sky transparency (photometric / clear / thin cirrus), PWV
    - Determined with standards and all-sky cameras
  - Airmass, Moon illumination and distance
    - Fully deterministic – fulfillment ensured by short-term scheduling
  - N.B.: S/N in science data is not an official QC0 criterion
- Verify basic instrument performance
- Check that nighttime calibration data taken for the user comply with our guaranteed quality levels

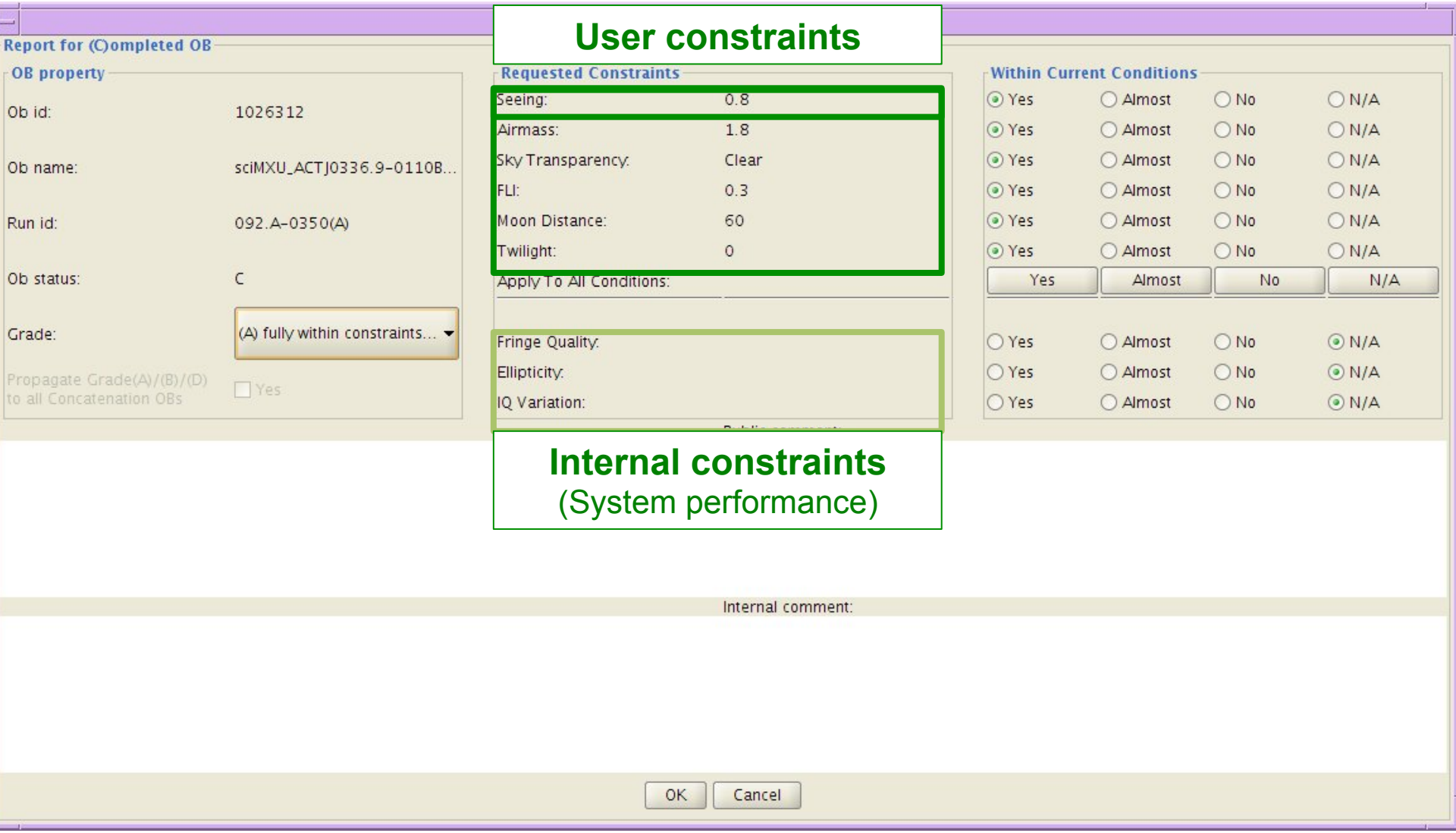
QC grading panel



QC grading panel

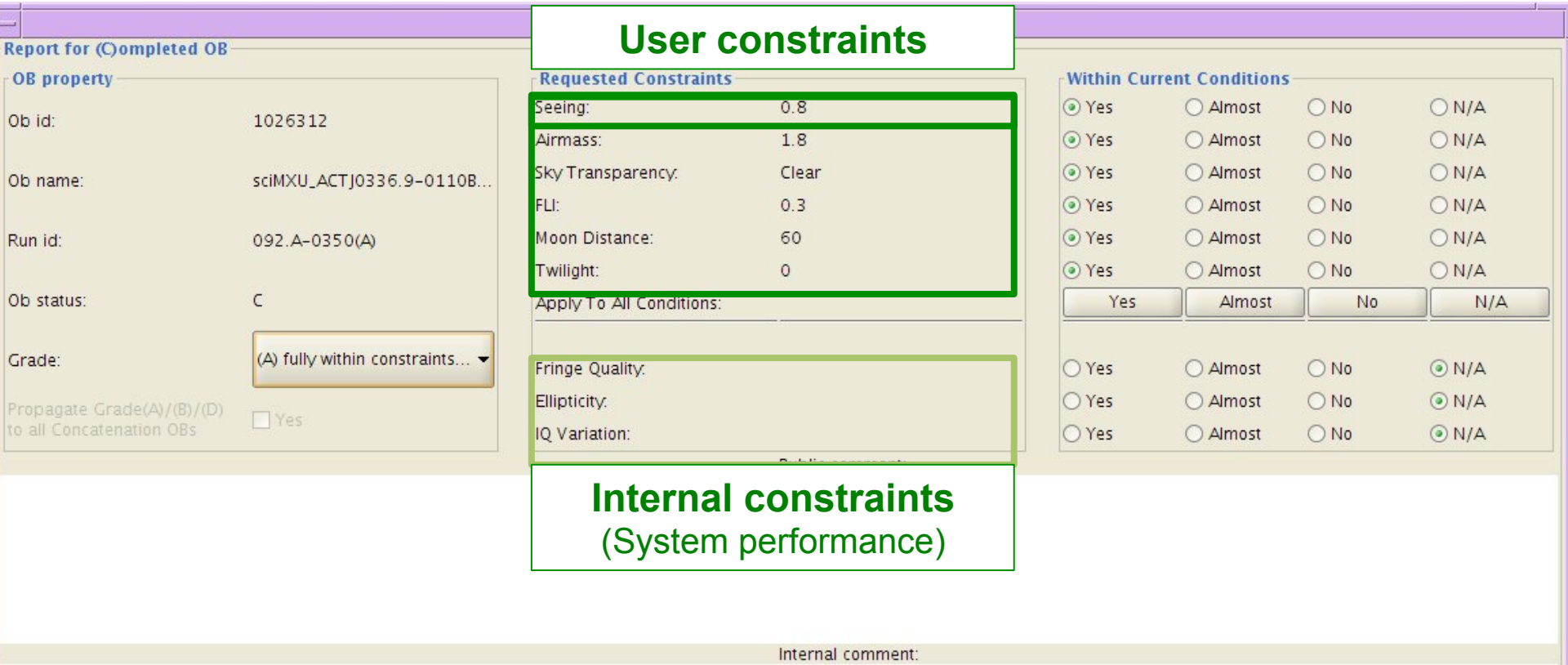


QC grading panel



Internal constraints
(System performance)

QC grading panel



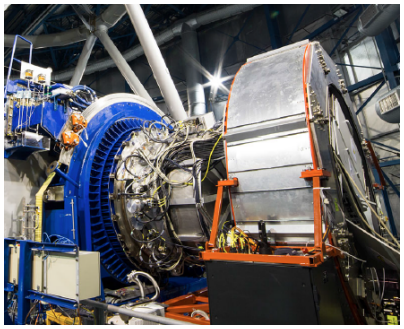
S/N in the data is monitored for some instruments (e.g. UVES), but it is not part of the user constraints. Physical modelling of our systems is assumed accurate enough to rely on ETC for exposure times that ensure required S/N.

Paranal and its instruments

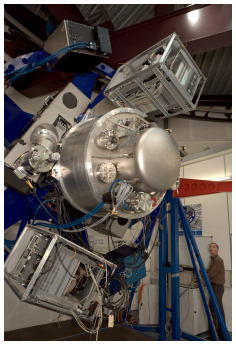
16 instruments in operations in P97

NACO

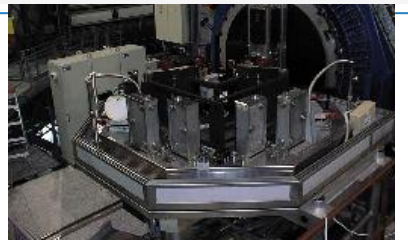
FORS



KMOS

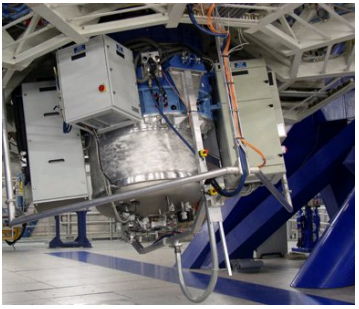


XSHOOTER

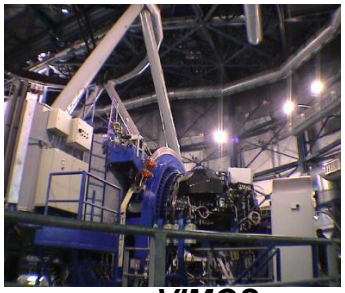


UVES

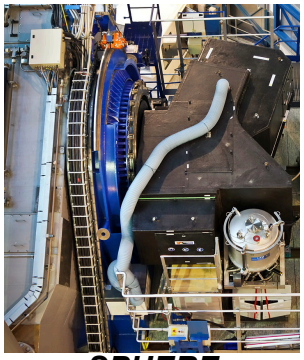
FLAMES



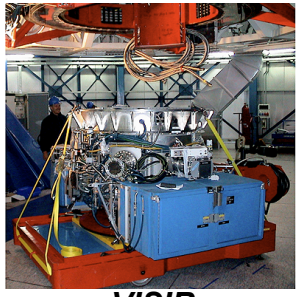
SINFONI



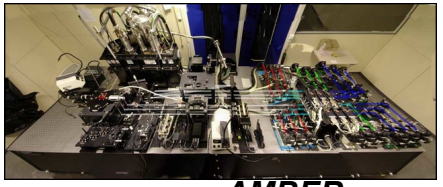
VIMOS



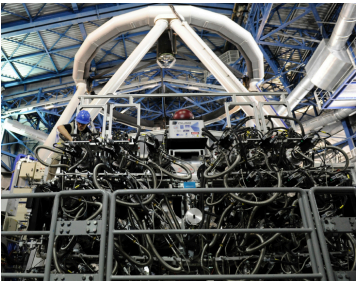
SPHERE



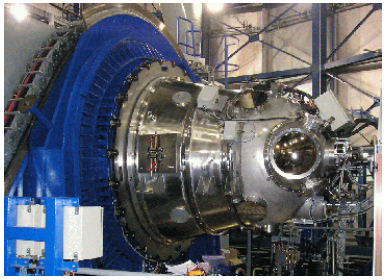
VISIR



AMBER

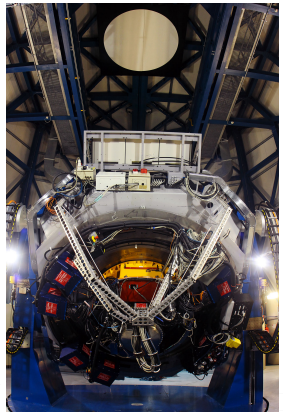


MUSE

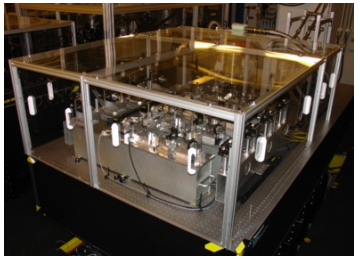


HAWKI

VIRCAM



OmegaCAM



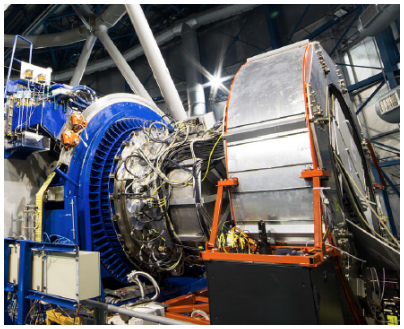
PIONIER

Paranal and its instruments

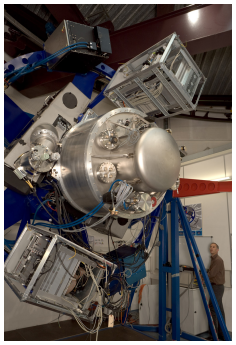
16 instruments in operations in P97

NACO

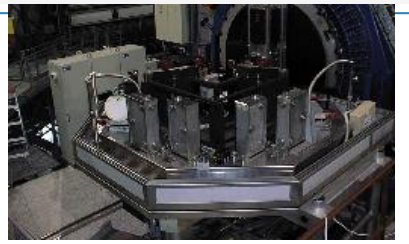
FORS



KMOS

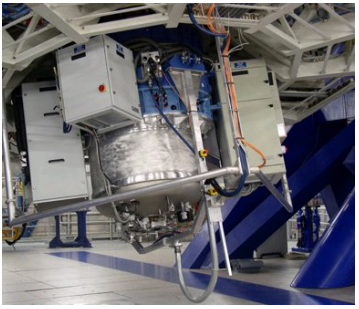


XSHOOTER



UVES

FLAMES

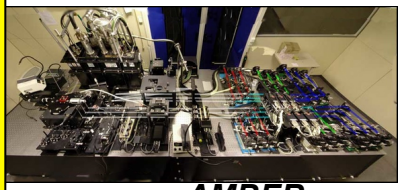


SINFONI

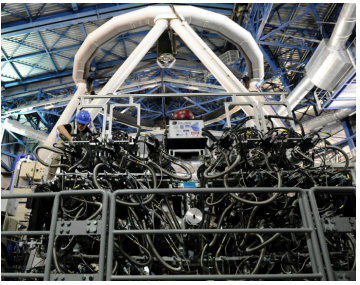
All instruments are prototypes

(IMG/SPEC/VLTI/AO/IR/VIS)

Large range of data types requires individualised quality control procedures

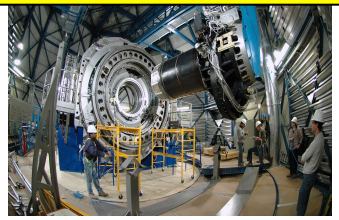


AMBER

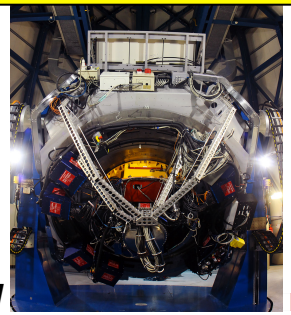


MUSE

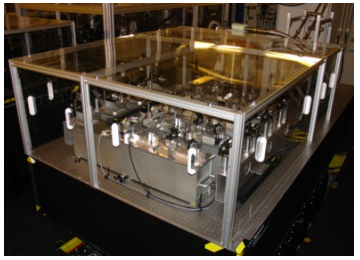
HAWKI



VIRCAM



OmegaCAM



PIONIER

Real-time QC0 on Paranal

Example: Image quality measurement for VIMOS MOS spectra

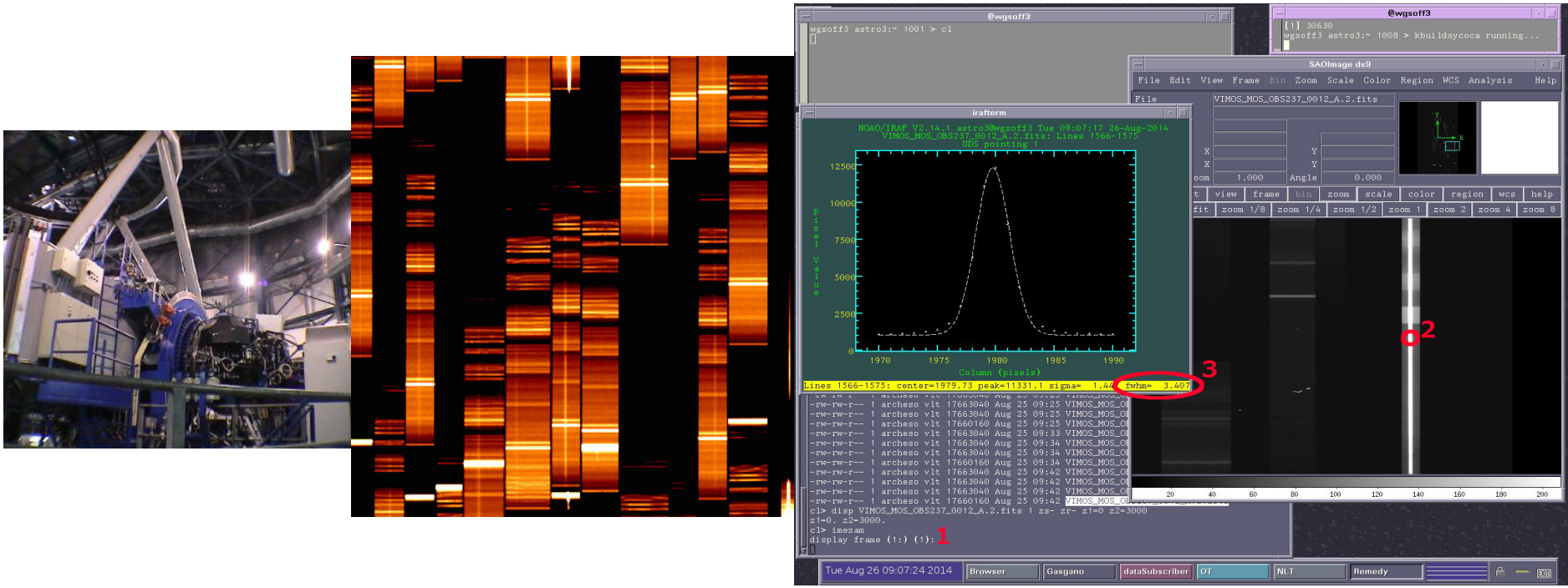
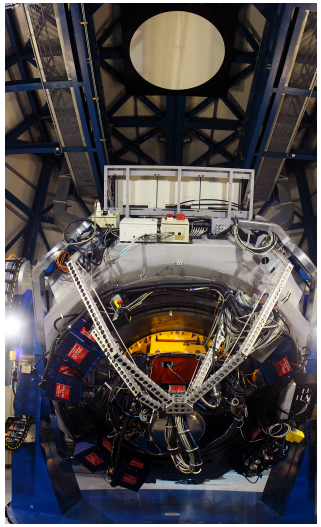
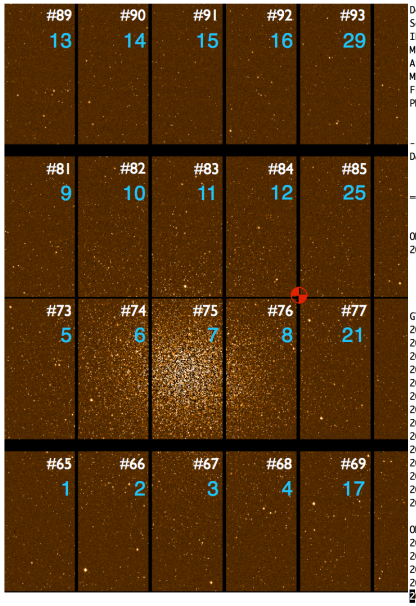


Image quality measurement is performed **interactively by the operator**

Real-time QC0 on Paranal

Example: Image quality measurement for OmegaCAM images






```
Description CLASSIFICATION:
Se : Seeing
ID : Image Quality Degradation
ME : Mean Ellipticity
Ai : Airmass
MD : Moon Distance
FL : Moon FLI
PM : Prost Mahlzeit

Date                OBid    Filter     |      ImaQuality    ,    Ellipticity     | N_El |    MeanIQ    | IQ_degr  | MeanELL(%)| msg |      CLASSIFICATION      |   CONCATEN.  IQ  IQ    Degr   Ell
                                       |  Chip65   Chip76   Chip85   Chip96     |      |   Ima  OB/F  | Ima  OB/F | Ima  OB/F |     | Se ID ME Ai MD FL  FINAL |  contain.ID  Req ConcatConcat Concat ORANG
                                       |  (" , %)   (" , %)   (" , %)   (" , %)|      |   (arcsec)   | (%)   (%) | (%)   (%) |

OMEGACAM_Polar_Master_segmented
2015-11-17T01:00:24  200244032  u_g_r_i_SDSS  0.98", 8  1.07",10  1.49",24  1.65",27    15    1.22" 1.22"    1.2  1.2   16.3 16.3         - - - - - -     - STD

  *** Following OB is GTO. Give QC grade D if MeanIQ constraints are not met, BUT ONLY IF OB was started fulfilling the constraint. Classify C as usual for IQ variation or ellipticity ***

GTO_INAF-Sculptor_g_1
2015-11-17T01:09:56  1233967  g_SDSS       0.63", 2  0.62", 3  0.63", 2  0.61", 2    0    0.62" 0.62"    1.1  1.1    2.7  2.7         A  A  A  A  A  A     A GTO  (1233966)  1.1   0.62  1.1  2.7  OT=0.57
2015-11-17T01:11:15  1233970  g_SDSS       0.70", 4  0.68", 5  0.66", 4  0.61", 3    0    0.66" 0.66"    2.1  2.1    3.7  3.7         A  A  A  A  A  A     A GTO  (1233966)  1.1   0.64  1.6  3.2  OT=0.60
2015-11-17T01:12:34  1233973  g_SDSS       0.64", 1  0.63", 3  0.62", 3  0.59", 3    0    0.61" 0.61"    0.2  0.2    2.8  2.8         A  A  A  A  A  A     A GTO  (1233966)  1.1   0.63  1.1  3.1  OT=0.56
2015-11-17T01:13:52  1233976  g_SDSS       0.70", 4  0.62", 2  0.64", 2  0.70", 2    0    0.66" 0.66"   11.0 11.0    2.4  2.4         A  B  A  A  A  A     B GTO  (1233966)  1.1   0.64  3.6  2.9  OT=0.60
2015-11-17T01:15:11  1233979  g_SDSS       0.71", 5  0.65", 3  0.68", 3  0.78", 2    0    0.70" 0.70"   11.7 11.7    2.8  2.8         A  B  A  A  A  A     B GTO  (1233966)  1.1   0.65  5.2  2.9  OT=0.63
2015-11-17T01:16:29  1233982  g_SDSS       0.77", 4  0.69", 2  0.71", 2  0.89", 5    0    0.76" 0.76"   15.7 15.7    3.3  3.3         A  B  A  A  A  A     B GTO  (1233966)  1.1   0.67  7.0  2.9  OT=0.68
2015-11-17T01:17:47  1233985  g_SDSS       0.81", 5  0.69", 4  0.72", 3  0.92", 4    0    0.77" 0.77"   17.5 17.5    3.5  3.5         A  B  A  A  A  A     B GTO  (1233966)  1.1   0.68  8.5  3.0  OT=0.69
2015-11-17T01:19:06  1233988  g_SDSS       0.93", 5  0.90", 4  0.91", 4  1.01", 7    0    0.92" 0.92"    5.5  5.5    5.2  5.2         A  A  A  A  A  A     A GTO  (1233966)  1.1   0.71  8.1  3.3  OT=0.81
2015-11-17T01:20:24  1233991  g_SDSS       0.89", 4  0.81", 2  0.84", 2  1.01", 5    0    0.87" 0.87"   10.4 10.4    3.4  3.4         A  B  A  A  A  A     B GTO  (1233966)  1.1   0.73  8.4  3.3  OT=0.77
2015-11-17T01:21:42  1233994  g_SDSS       0.92", 6  0.81", 2  0.83", 3  1.08",10    0    0.90" 0.90"   17.5 17.5    4.8  4.8         A  B  A  A  A  A     B GTO  (1233966)  1.1   0.75  9.3  3.5  OT=0.79
2015-11-17T01:23:00  1233997  g_SDSS       0.91", 7  0.77", 3  0.77", 3  1.01", 8    0    0.85" 0.85"   18.5 18.5    4.9  4.9         A  B  A  A  A  A     B GTO  (1233966)  1.1   0.76 10.1  3.6  OT=0.75
2015-11-17T01:24:19  1234000  g_SDSS       0.76", 6  0.65", 2  0.67", 3  0.84", 5    0    0.73" 0.73"   19.8 19.8    4.2  4.2         A  B  A  A  A  A     B GTO  (1233966)  1.1   0.75 10.9  3.6  OT=0.65
2015-11-17T01:25:37  1234003  g_SDSS       0.72", 5  0.64", 2  0.64", 3  0.77", 5    0    0.68" 0.68"   14.3 14.3    3.4  3.4         A  B  A  A  A  A     B GTO  (1233966)  1.1   0.75 11.2  3.6  OT=0.61
2015-11-17T01:26:56  1234006  g_SDSS       0.70", 2  0.68", 2  0.69", 2  0.72", 3    0    0.69" 0.69"    4.5  4.5    2.6  2.6         A  A  A  A  A  A     A GTO  (1233966)  1.1   0.74 10.7  3.5  OT=0.62

OMEGACAM_Landolt_SA92_Master_Key
2015-11-17T01:35:37  200244020  u_SDSS       0.95",10  0.88", 5  0.90", 6  0.93", 6    0    0.92" 0.92"    5.8  5.8    6.9  6.9         - - - - - -     - STD
2015-11-17T01:41:47  200244020  g_SDSS       0.61", 4  0.63", 4  0.63", 4  0.59", 4    0    0.61" 0.61"    1.5  1.5    3.5  3.5         - - - - - -     - STD
2015-11-17T01:44:05  200244020  r_SDSS       0.57", 4  0.62", 5  0.61", 4  0.57", 3    0    0.58" 0.58"    5.7  5.7    3.6  3.6         - - - - - -     - STD
2015-11-17T01:46:33  200244020  i_SDSS       0.53", 2  0.62", 3  0.64", 4  0.56", 2    0    0.57" 0.57"   10.9 10.9    3.3  3.3         - - - - - -     - STD
2015-11-17T01:49:47  200244020  z_SDSS       0.57", 6  0.53", 2  0.52", 4  0.60", 4    0    0.53" 0.53"   14.3 14.3    3.3  3.3         - - - - - -     - STD
```

Image quality measurement is performed **automatically by pipeline**

Real-time QC0 on Paranal

Description CLASSIFICATION:
Se : Seeing
ID : Image Quality Degradation
ME : Mean Ellipticity
Ai : Airmass
MD : Moon Distance
FL : Moon FLI
PM : Prost Mahlzeit

Example: Image quality measurement for OmegaCAM images

Date	OBid	Filter	ImaQuality Chip65 (", %)	ImaQuality Chip76 (", %)	ImaQuality Chip85 (", %)	ImaQuality Chip96 (", %)	N_El	MeanIQ Ima (arcsec)	MeanIQ OB/F	IQ_degr Ima (%)	IQ_degr OB/F (%)	MeanELL(%) Ima (%)	MeanELL(%) OB/F (%)	msg	CLASSIFICATION Se	ID	ME	Ai	MD	FL	FINAL	CONCATEN. contain.ID	IQ Req	IQ Concat	Degr Concat	Ell Concat	ORANG
OMEGACAM_Polar_Master_segmented																										
2015-11-17T01:00:24	200244032	u_g_r_i_SDSS	0.98", 8	1.07",10	1.49",24	1.65",27	15	1.22"	1.22"	1.2	1.2	16.3	16.3		-	-	-	-	-	-	-	STD					
*** Following OB is GTO. Give QC grade D if MeanIQ constraints are not met, BUT ONLY IF OB was started fulfilling the constraint. Classify C as usual for IQ variation or ellipticity ***																										
GTO_INAF-Sculptor_g_1																										
2015-11-17T01:09:56	1233967	g_SDSS	0.63", 2	0.62", 3	0.63", 2	0.61", 2	0	0.62"	0.62"	1.1	1.1	2.7	2.7		A	A	A	A	A	A	A	GTO	(1233966)	1.1	0.62	1.1	2.7	OT=0.57
2015-11-17T01:11:15	1233970	g_SDSS	0.70", 4	0.68", 5	0.66", 4	0.61", 3	0	0.66"	0.66"	2.1	2.1	3.7	3.7		A	A	A	A	A	A	A	GTO	(1233966)	1.1	0.64	1.6	3.2	OT=0.60
2015-11-17T01:12:34	1233973	g_SDSS	0.64", 1	0.63", 3	0.62", 3	0.59", 3	0	0.61"	0.61"	0.2	0.2	2.8	2.8		A	A	A	A	A	A	A	GTO	(1233966)	1.1	0.63	1.1	3.1	OT=0.56
2015-11-17T01:13:52	1233976	g_SDSS	0.70", 4	0.62", 2	0.64", 2	0.70", 2	0	0.66"	0.66"	11.0	11.0	2.4	2.4		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.64	3.6	2.9	OT=0.60
2015-11-17T01:15:11	1233979	g_SDSS	0.71", 5	0.65", 3	0.68", 3	0.78", 2	0	0.70"	0.70"	11.7	11.7	2.8	2.8		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.65	5.2	2.9	OT=0.63
2015-11-17T01:16:29	1233982	g_SDSS	0.77", 4	0.69", 2	0.71", 2	0.89", 5	0	0.76"	0.76"	15.7	15.7	3.3	3.3		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.67	7.0	2.9	OT=0.68
2015-11-17T01:17:47	1233985	g_SDSS	0.81", 5	0.69", 4	0.72", 3	0.92", 4	0	0.77"	0.77"	17.5	17.5	3.5	3.5		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.68	8.5	3.0	OT=0.69
2015-11-17T01:19:06	1233988	g_SDSS	0.93", 5	0.90", 4	0.91", 4	1.01", 7	0	0.92"	0.92"	5.5	5.5	5.2	5.2		A	A	A	A	A	A	A	GTO	(1233966)	1.1	0.71	8.1	3.3	OT=0.81
2015-11-17T01:20:24	1233991	g_SDSS	0.89", 4	0.81", 2	0.84", 2	1.01", 5	0	0.87"	0.87"	10.4	10.4	3.4	3.4		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.73	8.4	3.3	OT=0.77
2015-11-17T01:21:42	1233994	g_SDSS	0.92", 6	0.81", 2	0.83", 3	1.08",10	0	0.90"	0.90"	17.5	17.5	4.8	4.8		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.75	9.3	3.5	OT=0.79
2015-11-17T01:23:00	1233997	g_SDSS	0.91", 7	0.77", 3	0.77", 3	1.01", 8	0	0.85"	0.85"	18.5	18.5	4.9	4.9		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.76	10.1	3.6	OT=0.75
2015-11-17T01:24:19	1234000	g_SDSS	0.76", 6	0.65", 2	0.67", 3	0.84", 5	0	0.73"	0.73"	19.8	19.8	4.2	4.2		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.75	10.9	3.6	OT=0.65
2015-11-17T01:25:37	1234003	g_SDSS	0.72", 5	0.64", 2	0.64", 3	0.77", 5	0	0.68"	0.68"	14.3	14.3	3.4	3.4		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.75	11.2	3.6	OT=0.61
2015-11-17T01:26:56	1234006	g_SDSS	0.70", 2	0.68", 2	0.69", 2	0.72", 3	0	0.69"	0.69"	4.5	4.5	2.6	2.6		A	A	A	A	A	A	A	GTO	(1233966)	1.1	0.74	10.7	3.5	OT=0.62
OMEGACAM_Landolt_SA92_Master_Key																										
2015-11-17T01:35:37	200244020	u_SDSS	0.95",10	0.88", 5	0.90", 6	0.93", 6	0	0.92"	0.92"	5.8	5.8	6.9	6.9		-	-	-	-	-	-	-	STD					
2015-11-17T01:41:47	200244020	g_SDSS	0.61", 4	0.63", 4	0.63", 4	0.59", 4	0	0.61"	0.61"	1.5	1.5	3.5	3.5		-	-	-	-	-	-	-	STD					
2015-11-17T01:44:05	200244020	r_SDSS	0.57", 4	0.62", 5	0.61", 4	0.57", 3	0	0.58"	0.58"	5.7	5.7	3.6	3.6		-	-	-	-	-	-	-	STD					
2015-11-17T01:46:33	200244020	i_SDSS	0.53", 2	0.62", 3	0.64", 4	0.56", 2	0	0.57"	0.57"	10.9	10.9	3.3	3.3		-	-	-	-	-	-	-	STD					
2015-11-17T01:49:47	200244020	z_SDSS	0.57", 6	0.53", 2	0.52", 4	0.60", 4	0	0.53"	0.53"	14.3	14.3	3.3	3.3		-	-	-	-	-	-	-	STD					

Image quality measurement is performed **automatically by pipeline**

Real-time QC0 on Paranal

Description CLASSIFICATION:
Se : Seeing
ID : Image Quality Degradation
ME : Mean Ellipticity
Ai : Airmass
MD : Moon Distance
FL : Moon FLI
PM : Prost Mahlzeit

Example: Image quality measurement for OmegaCAM images

Date	OBid	Filter	ImaQuality Chip65 (", %)	ImaQuality Chip76 (", %)	ImaQuality Chip85 (", %)	ImaQuality Chip96 (", %)	N_El	MeanIQ Ima (arcsec)	MeanIQ OB/F	IQ_degr Ima (%)	IQ_degr OB/F (%)	MeanELL(%) Ima (%)	MeanELL(%) OB/F (%)	msg	CLASSIFICATION Se	ID	ME	Ai	MD	FL	FINAL	CONCATEN. contain.ID	IQ Req	IQ Concat	Degr Concat	Ell Concat	ORANG
OMEGACAM_Polar_Master_segmented																										
2015-11-17T01:00:24	200244032	u_g_r_i_SDSS	0.98", 8	1.07",10	1.49",24	1.65",27	15	1.22"	1.22"	1.2	1.2	16.3	16.3		-	-	-	-								
*** Following OB is GTO. Give QC grade D if MeanIQ constraints are not met, BUT ONLY IF OB was started fulfilling the constraint. Classify C as usual for IQ variation or ellipticity ***																										
GTO_INAF-Sculptor_g_1																										
2015-11-17T01:09:56	1233967	g_SDSS	0.63", 2	0.62", 3	0.63", 2	0.61", 2	0	0.62"	0.62"	1.1	1.1	2.7	2.7		A	A	A	A	A	A	A	GTO	(1233966)	1.1	0.62	1.1	2.7	OT=0.57
2015-11-17T01:11:15	1233970	g_SDSS	0.70", 4	0.68", 5	0.66", 4	0.61", 3	0	0.66"	0.66"	2.1	2.1	3.7	3.7		A	A	A	A	A	A	A	GTO	(1233966)	1.1	0.64	1.6	3.2	OT=0.60
2015-11-17T01:12:34	1233973	g_SDSS	0.64", 1	0.63", 3	0.62", 3	0.59", 3	0	0.61"	0.61"	0.2	0.2	2.8	2.8		A	A	A	A	A	A	A	GTO	(1233966)	1.1	0.63	1.1	3.1	OT=0.56
2015-11-17T01:13:52	1233976	g_SDSS	0.70", 4	0.62", 2	0.64", 2	0.70", 2	0	0.66"	0.66"	11.0	11.0	2.4	2.4		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.64	3.6	2.9	OT=0.60
2015-11-17T01:15:11	1233979	g_SDSS	0.71", 5	0.65", 3	0.68", 3	0.78", 2	0	0.70"	0.70"	11.7	11.7	2.8	2.8		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.65	5.2	2.9	OT=0.63
2015-11-17T01:16:29	1233982	g_SDSS	0.77", 4	0.69", 2	0.71", 2	0.89", 5	0	0.76"	0.76"	15.7	15.7	3.3	3.3		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.67	7.0	2.9	OT=0.68
2015-11-17T01:17:47	1233985	g_SDSS	0.81", 5	0.69", 4	0.72", 3	0.92", 4	0	0.77"	0.77"	17.5	17.5	3.5	3.5		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.68	8.5	3.0	OT=0.69
2015-11-17T01:19:06	1233988	g_SDSS	0.93", 5	0.90", 4	0.91", 4	1.01", 7	0	0.92"	0.92"	5.5	5.5	5.2	5.2		A	A	A	A	A	A	A	GTO	(1233966)	1.1	0.71	8.1	3.3	OT=0.81
2015-11-17T01:20:24	1233991	g_SDSS	0.89", 4	0.81", 2	0.84", 2	1.01", 5	0	0.87"	0.87"	10.4	10.4	3.4	3.4		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.73	8.4	3.3	OT=0.77
2015-11-17T01:21:42	1233994	g_SDSS	0.92", 6	0.81", 2	0.83", 3	1.08",10	0	0.90"	0.90"	17.5	17.5	4.8	4.8		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.75	9.3	3.5	OT=0.79
2015-11-17T01:23:00	1233997	g_SDSS	0.91", 7	0.77", 3	0.77", 3	1.01", 8	0	0.85"	0.85"	18.5	18.5	4.9	4.9		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.76	10.1	3.6	OT=0.75
2015-11-17T01:24:19	1234000	g_SDSS	0.76", 6	0.65", 2	0.67", 3	0.84", 5	0	0.73"	0.73"	19.8	19.8	4.2	4.2		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.75	10.9	3.6	OT=0.65
2015-11-17T01:25:37	1234003	g_SDSS	0.72", 5	0.64", 2	0.64", 3	0.77", 5	0	0.68"	0.68"	14.3	14.3	3.4	3.4		A	B	A	A	A	A	B	GTO	(1233966)	1.1	0.75	11.2	3.6	OT=0.61
2015-11-17T01:26:56	1234006	g_SDSS	0.70", 2	0.68", 2	0.69", 2	0.72", 3	0	0.69"	0.69"	4.5	4.5	2.6	2.6		A	A	A	A	A	A	A	GTO	(1233966)	1.1	0.74	10.7	3.5	OT=0.62
OMEGACAM_Landolt_SA92_Master_Key																										
2015-11-17T01:35:37	200244020	u_SDSS	0.95",10	0.88", 5	0.90", 6	0.93", 6	0	0.92"	0.92"	5.8	5.8	6.9	6.9		-	-	-	-	-	-	-	STD						
2015-11-17T01:41:47	200244020	g_SDSS	0.61", 4	0.63", 4	0.63", 4	0.59", 4	0	0.61"	0.61"	1.5	1.5	3.5	3.5		-	-	-	-	-	-	-	STD						
2015-11-17T01:44:05	200244020	r_SDSS	0.57", 4	0.62", 5	0.61", 4	0.57", 3	0	0.58"	0.58"	5.7	5.7	3.6	3.6		-	-	-	-	-	-	-	STD						
2015-11-17T01:46:33	200244020	i_SDSS	0.53", 2	0.62", 3	0.64", 4	0.56", 2	0	0.57"	0.57"	10.9	10.9	3.3	3.3		-	-	-	-	-	-	-	STD						
2015-11-17T01:49:47	200244020	z_SDSS	0.57", 6	0.53", 2	0.52", 4	0.60", 4	0	0.53"	0.53"	14.3	14.3	3.3	3.3		-	-	-	-	-	-	-	STD						

Renormalised IQ as input for short-term scheduling

Image quality measurement is performed **automatically by pipeline**

Homogenizing QC0 on Paranal

- To train & homogenise QC0 practises, in early 2015 a QC0 workshop was held within SciOps
- List of action items was derived and mostly completed
  - Common rules & documentation, improved user features
- One outcome: e-learning quizzes with series of multiple choice questions for 11 instruments
  - used for re-training of existing staff and for training of newcomers
- Potential for further homogenisation
  - Ongoing projects, brainstorming for long-term evolution

Homogenizing QC0 on Paranal

European Southern Observatory

MUSE, TIO/ASTRO QC0

NAVIGATION

Home
- My home
- Site pages
- My profile
- Current course
  - MUSE, TIO/ASTRO QC0
    - Participants
    - Badges
    - General
      - Course summary
      - MUSE - Multi Unit Spectroscopic Explorer
      - Overall Paranal QC0 policies
      - **MUSE operations, and QC0 summary**
      - MUSE troubleshootiing
    - MUSE quizzes
- My courses

ADMINISTRATION

- Page module administration
  - Edit settings
  - Locally assigned roles
  - Permissions
  - Check permissions
  - Filters
  - Logs
  - Backup
  - Restore
- Course administration
- Switch role to...
- My profile settings

MUSE operations and specific QC0 guide

Standard classification rules also apply for MUSE, which can be found here: Ser
These apply to Image Quality (IQ); transparency; airmass; FLI; moon distance; a

Always provide comments in the night-log for QC0, but especially for B or C grades.

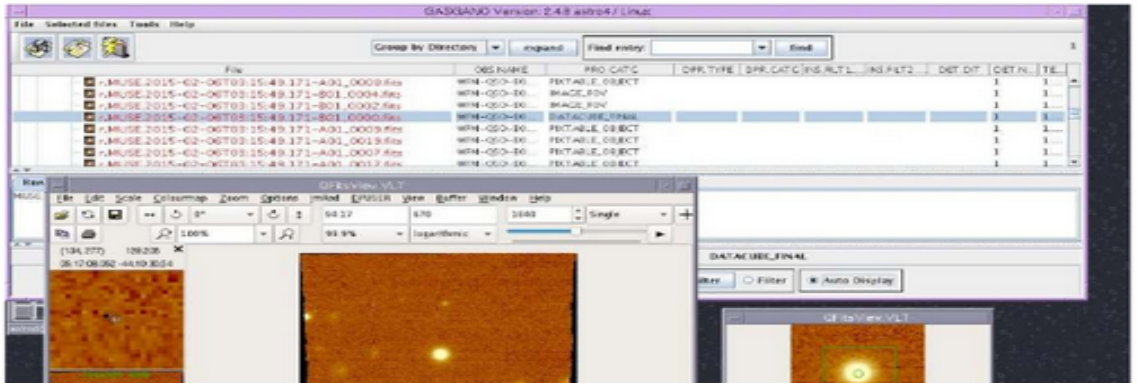
Where did the IQ value come from: data cube?, Slow Guiding System (SGS)?, telescope guide cam

Also note, if during MUSE operations one has to put the DCS into standby: when the DCS is recov
observations.

What to check on the science frames?
Are we in the correct field?
- check using finder chart (if you think that the pointing is in error then send a mail to usd-hel

IQ monitoring:
- was this measured using reduced data cube/SGS/telescope guide probe?

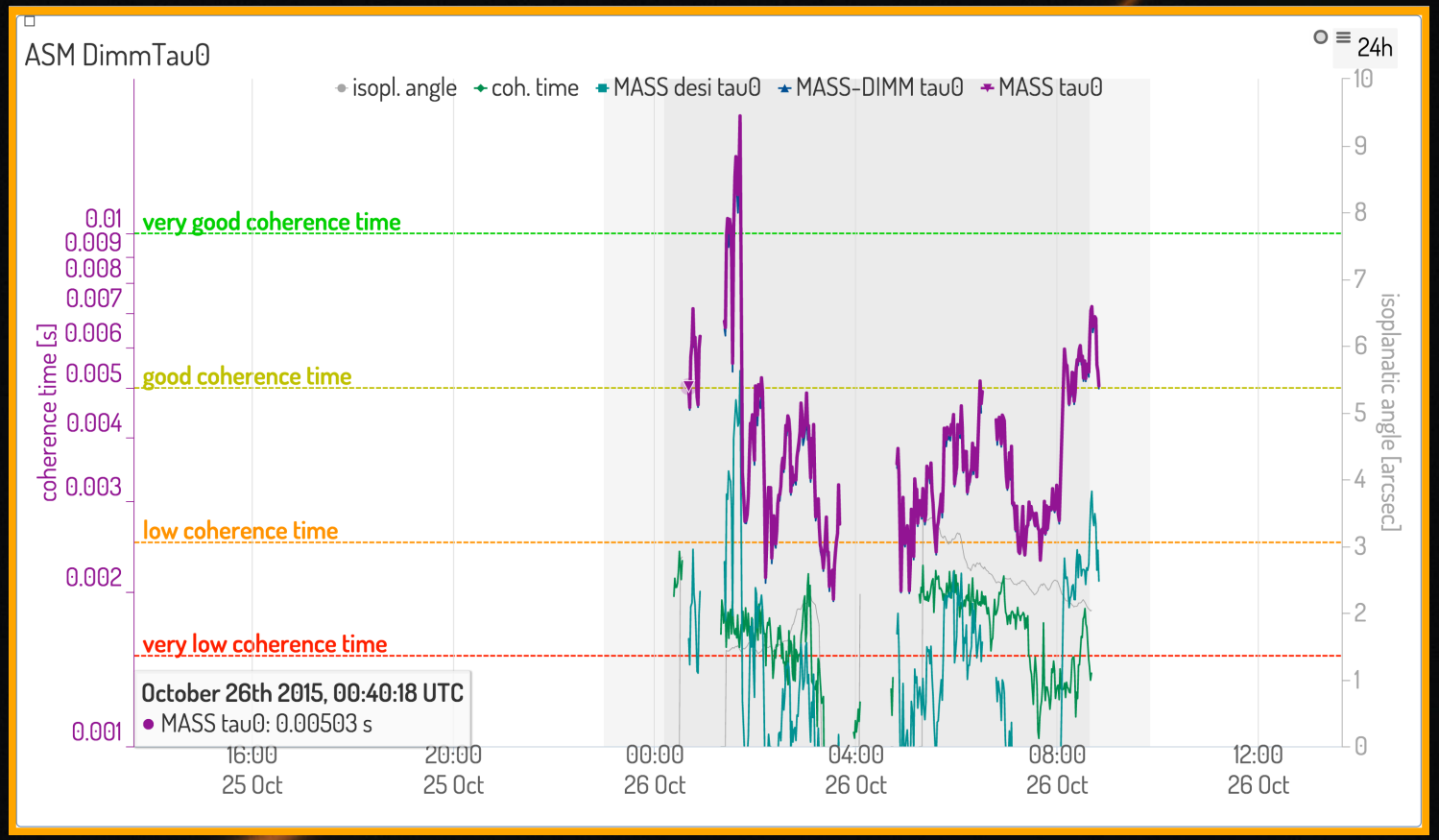
In the best case scenario one should try to measure the IQ from the reduced data cube, after loading this in gasgano, as in the exampl
as one has to wait for the reductions to finish.... Example of measuring IQ on reduced cube:



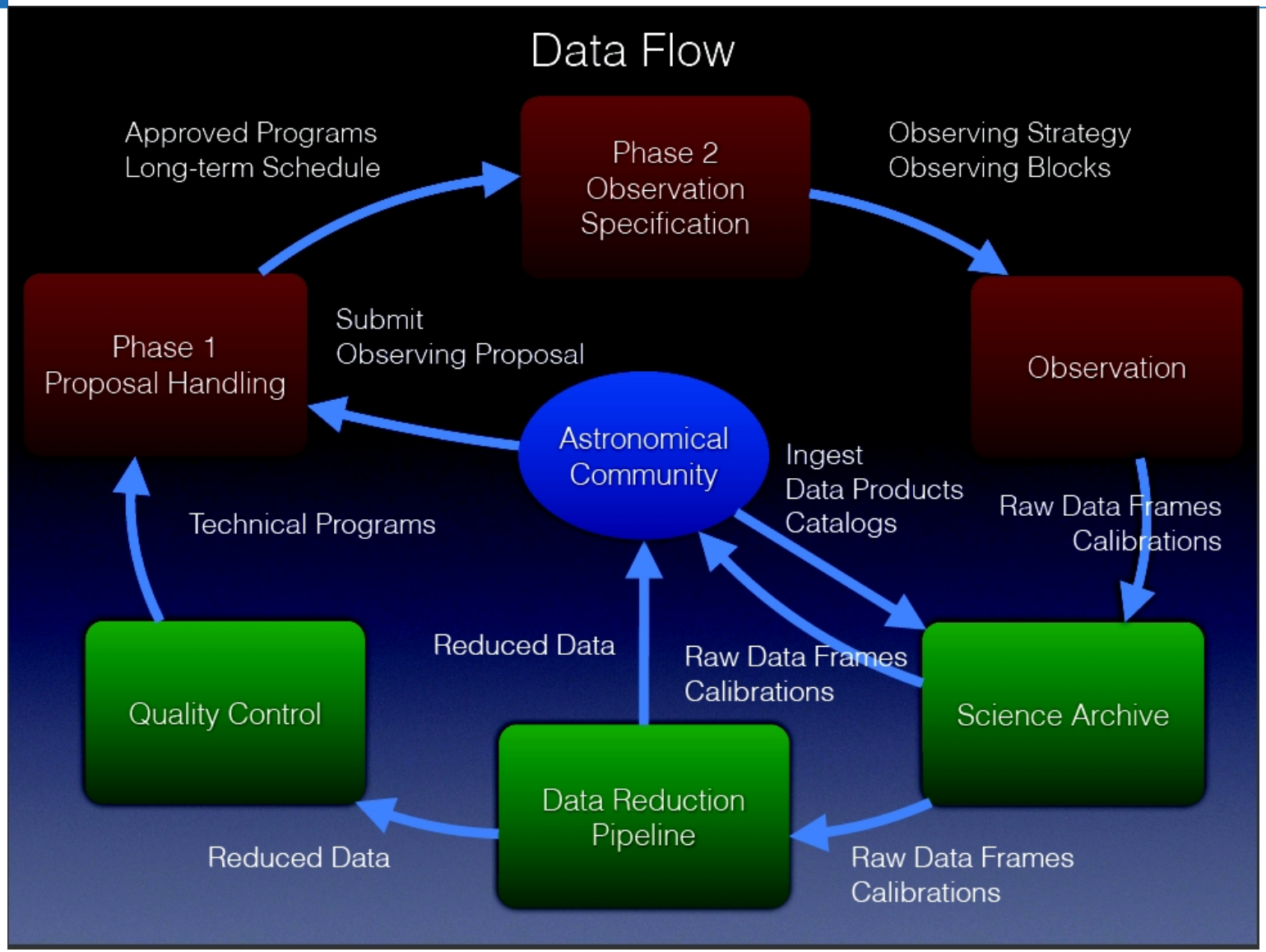
QC0 for adaptive optics systems

- QC0 procedures for our AO systems vary
  - (Combinations of) Strehl Ratio, Coherence time, guide probe seeing, contrast
- With the advent of the Adaptive Optics Facility on UT4, increased need for homogenised QC0 procedures
  - Important department goal for next ~2 years
  - Take advantage of updated Atmospheric Site Monitoring

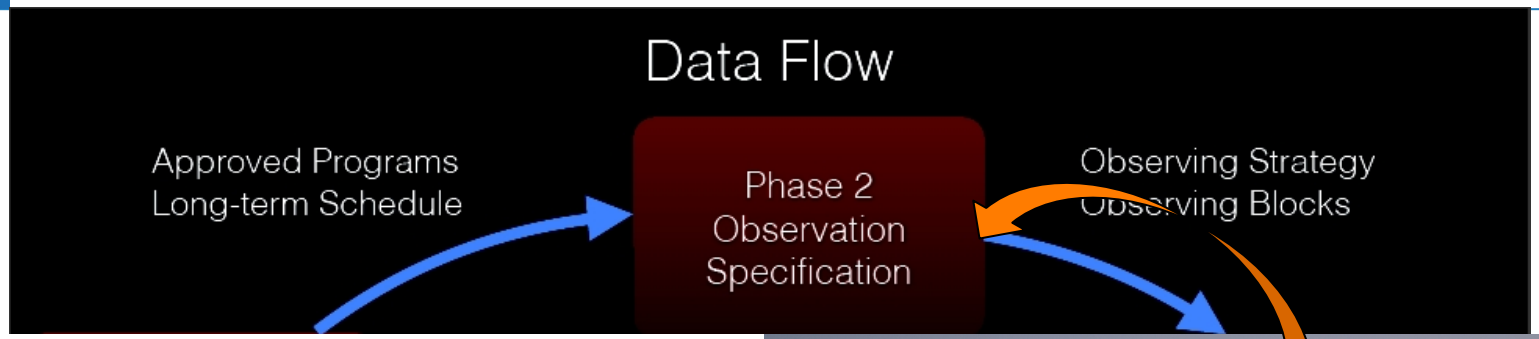
QC0 for adaptive optics systems

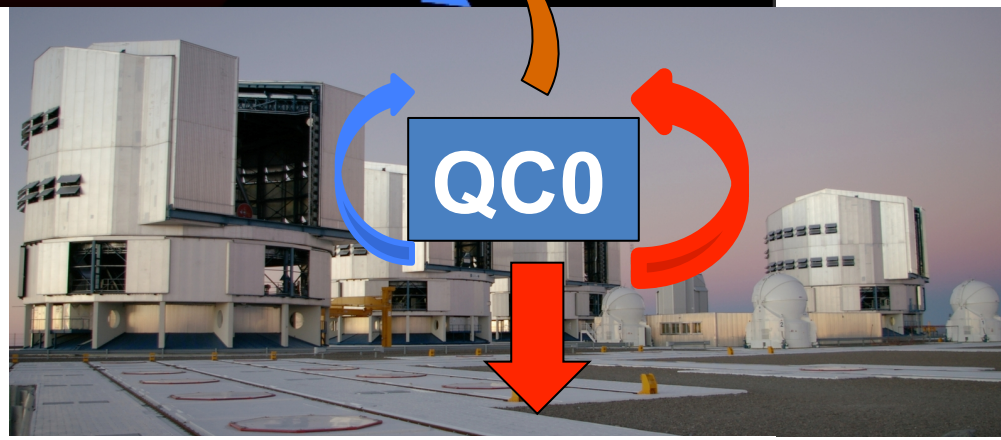


QC0 Paranal: summary



QC0 Paranal: summary





Data quality

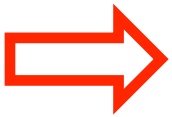
Input for short-term scheduling

Feedback on Observation Preparation

S/N is no formal QC criterion

Closed QC loop

QC0: on (raw) science data



QC1: on (processed) calibration data

Why calibrations?

- Satellite-based:

science ✖ instrument

stable, inaccessible

- Ground-based:

science ✖ instrument ✖ atmosphere

unstable, accessible

really unstable, uncontrollable

⇨ Frequent (typically daily or even during night) and accurate calibrations required

- Calibration plan:
  - Defines nature and frequency of calibrations per instrument

Table 10: Summary of KMOS calibration plan

Calibration	Frequency	Purpose	Notes
Darks	Daily	Master dark; bad pixel map	DIT=60s
Flats*	Daily as needed	Pixel-to-pixel variation; location of the slits on the array	Taken at optimised rotator angles, based on night observations
Arcs* (Argon/Neon)	Daily as needed	Wavelength calibration	Taken at optimised rotator angles, based on night observations
Flats	Daily as needed	Pixel-to-pixel variation; location of the slits on the array.	Taken at 6 different rotator angles (every 60°) to correct for flexure
Arcs (Argon/Neon)	Daily as needed	Wavelength calibration	Taken at 6 different rotator angles (every 60°) to correct for flexure

QC aspects (1)

- Ensure calibration plan is fulfilled (*calChecker*)
  - Daily calibrations as triggered by science set ups
  - Plus additional long-term calibrations

→ Save the last night

- Ensure instrument is within specs:
  - Process calibrations by automated data reduction pipelines
  - Extract relevant information (e.g. detector bias, spectral resolution) as *QC parameters*
  - Trending of selected parameters (*Health Check*)
  - *Score* parameters for automated quality assessment

→ Calibrate instrument rather than calibrate science

QC aspects (2)

- Two sites, shared process:
  - Paranal:
    - Science observations and calibration measurements
    - Operated 24/7 with shift system (night-time and daytime shifts)
  - Garching:
    - Data archiving and data processing
    - Daytime (different time zone), Mon to Fri

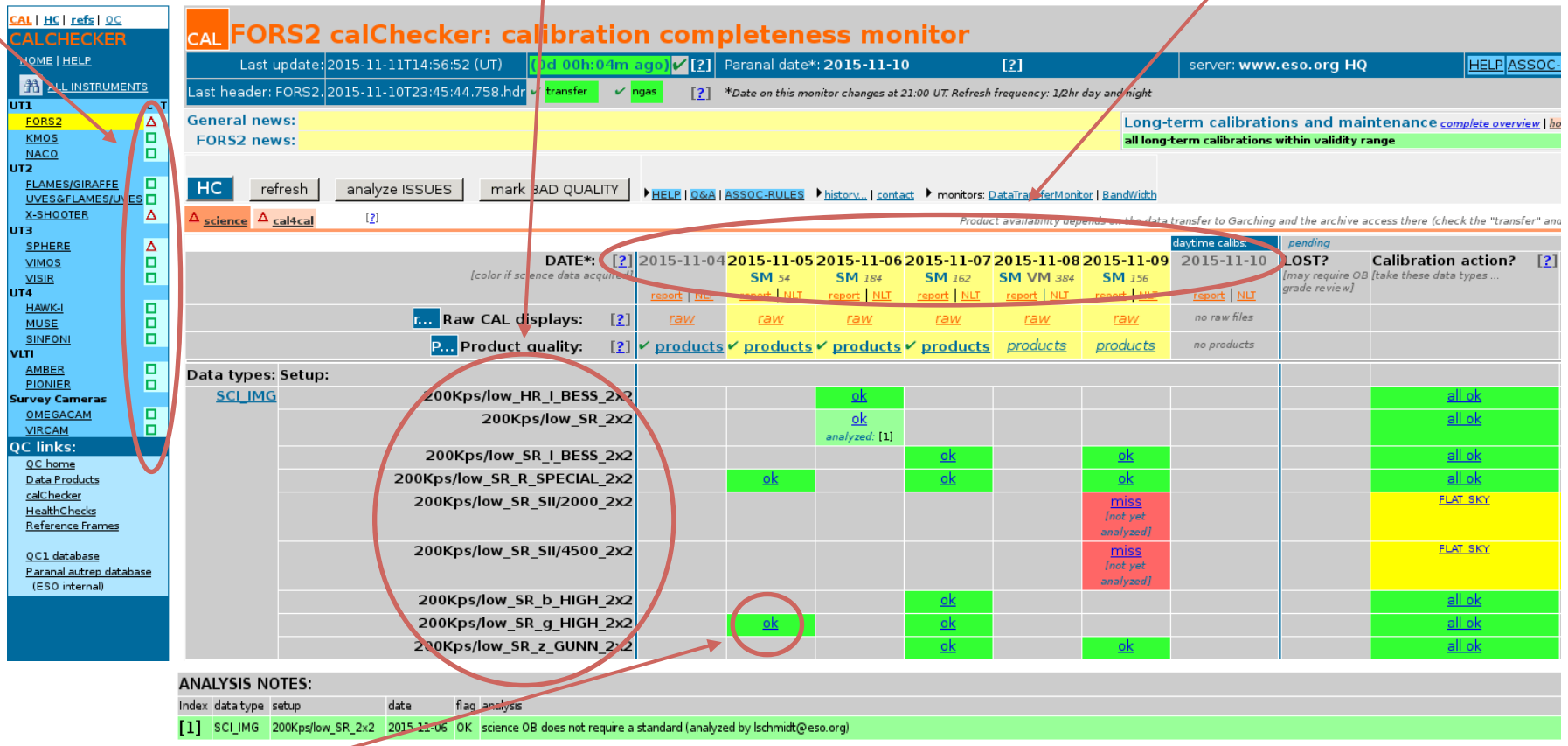
- Operational requirements:
  - Fast data transfer (~ minutes) and automated processing
  - Close the loop:
    - Feedback: automatically updated web pages
    - Focus on relevant information: scoring
  - Communication:
    - Comments on issues and on actions taken

calChecker (1)

instrument scores

set up info

last 7 days

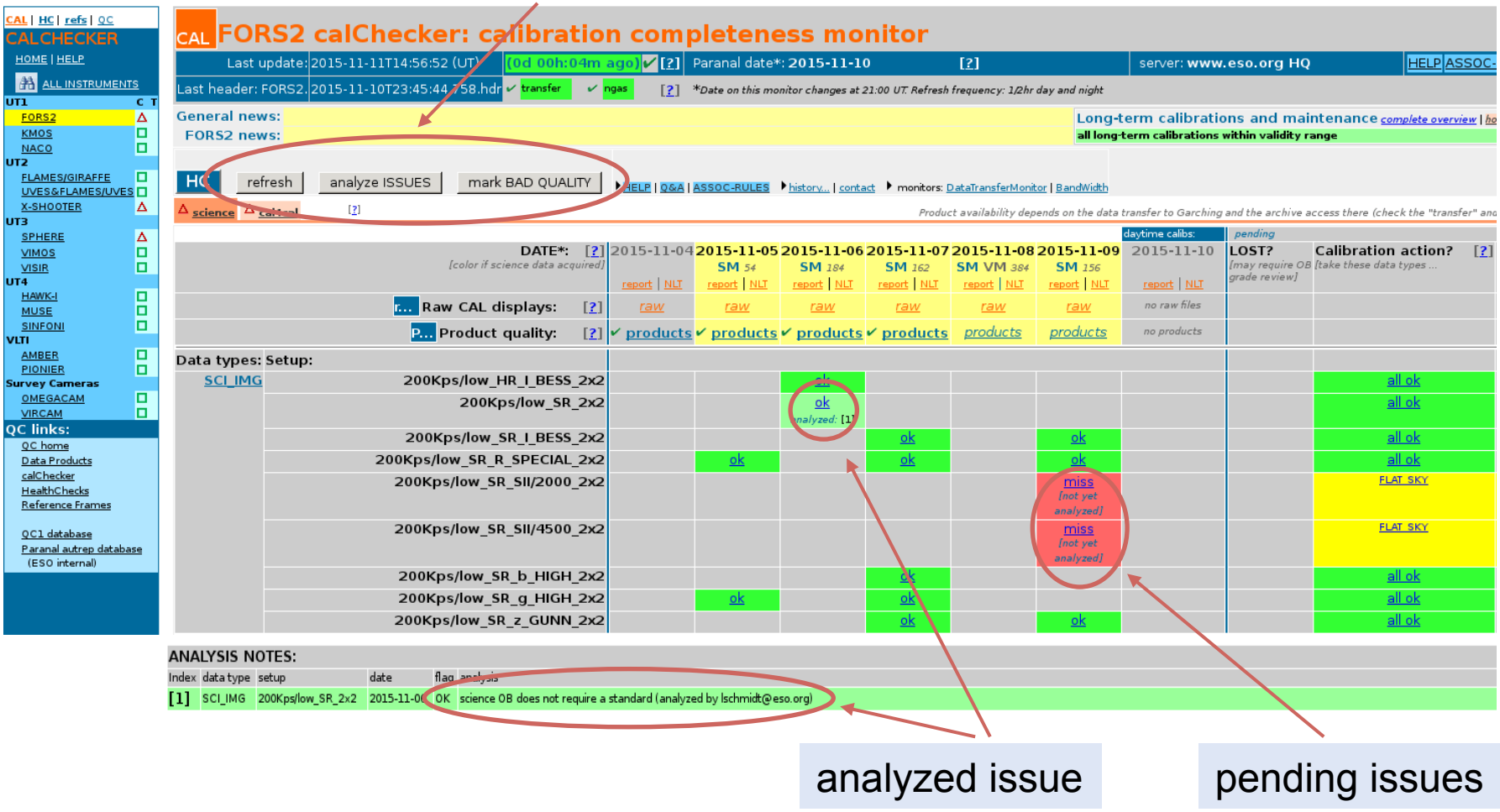


flags per set up and date:
OK, NOK, or MISS

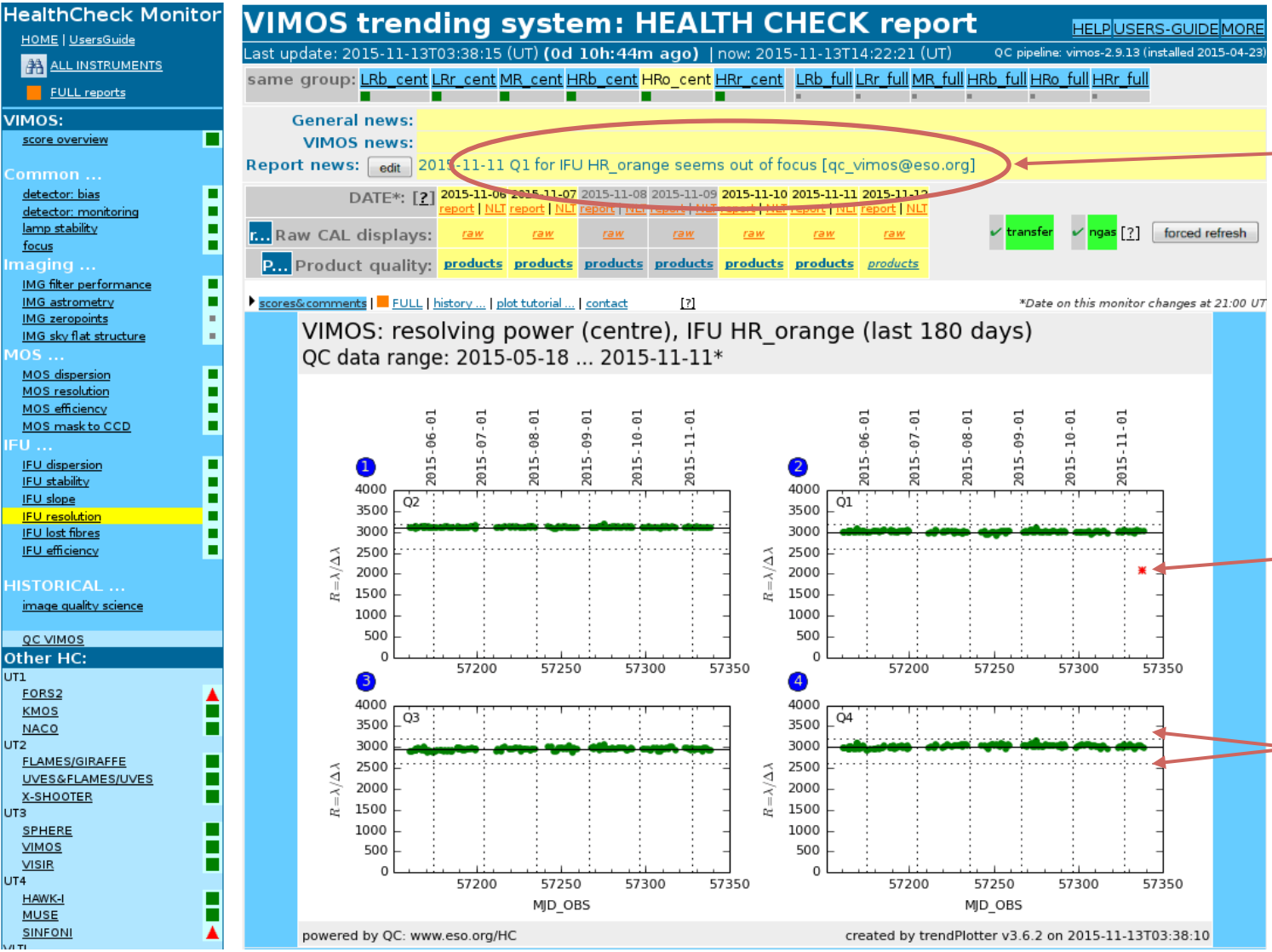
calChecker (2)

interactivity:

- can be used by both Paranal and Garching staff



Health Check plots

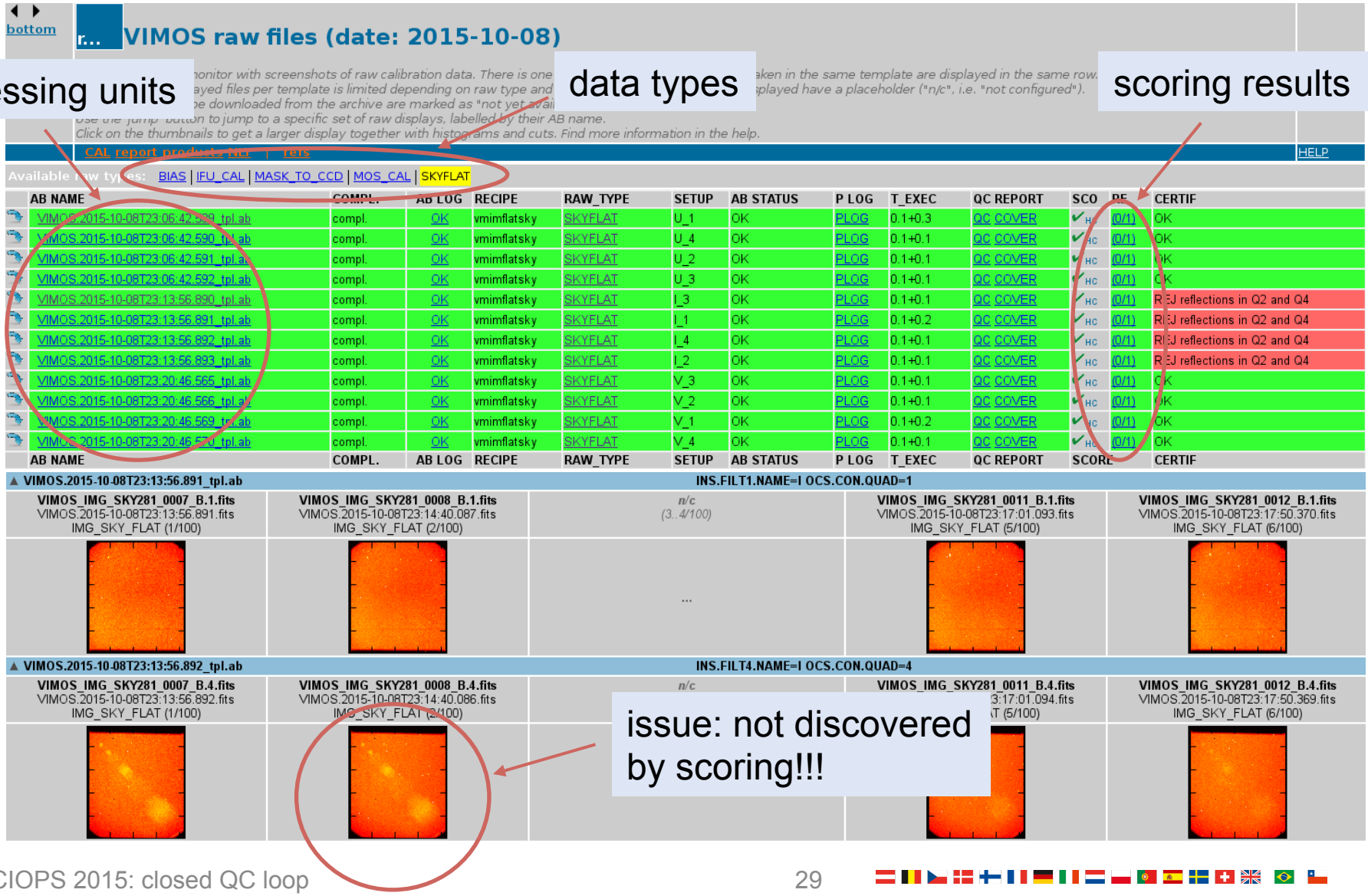


comment provided

outlier

thresholds

Raw file overview (1)



Raw file overview (2)

link to reference plot

current | reference

2015-10-08: VIMOS

		type info		set-up info	
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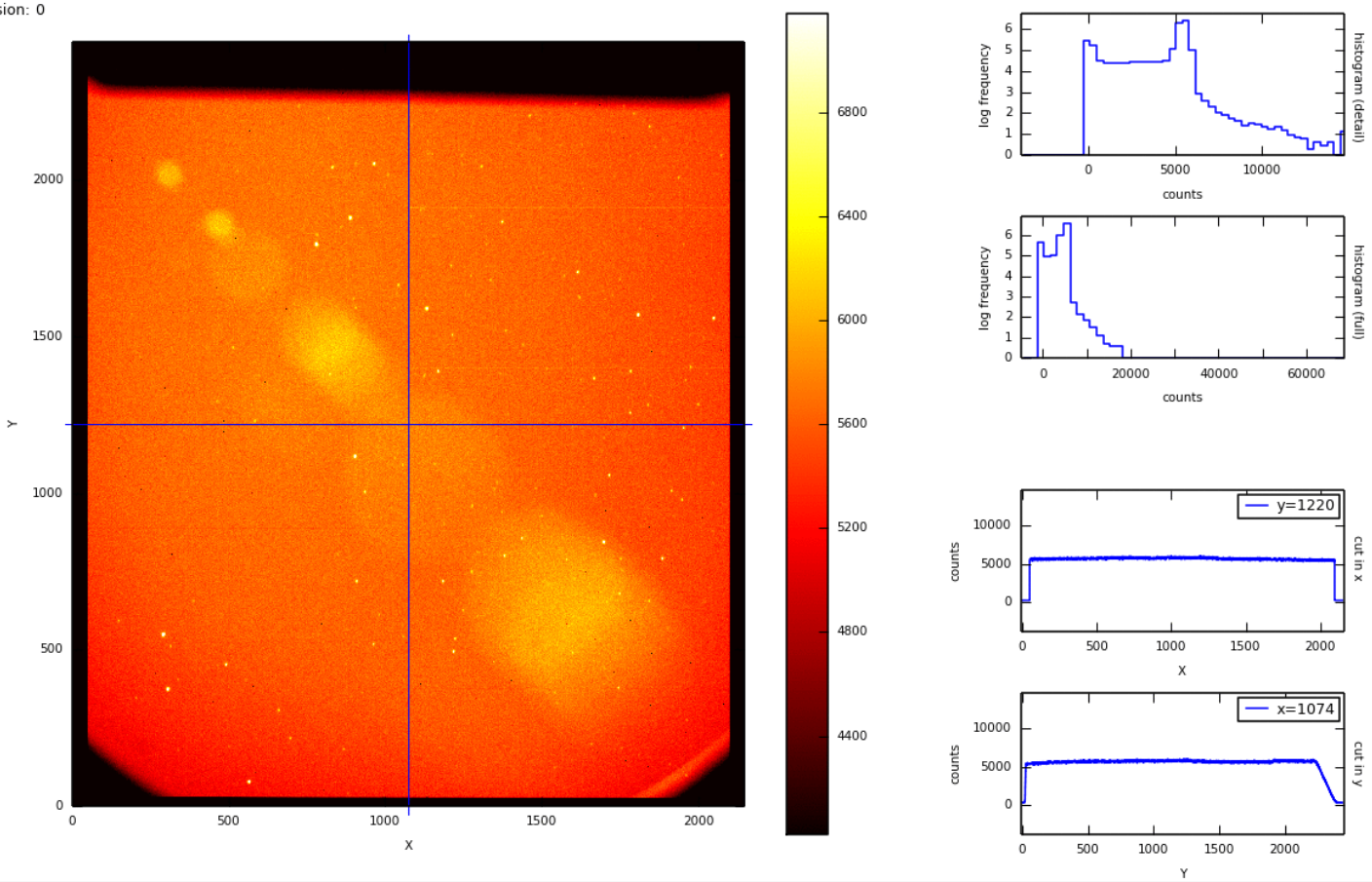
ARCFILE:	VIMOS.2015-10-08T23:13:56.892.fits	DPR.TYPE:	FLAT,SKY	OCS.CON.QUAD:	4
raw_type:	SKYFLAT	DPR.TECH:	IMAGE		
do_class:	IMG_SKY_FLAT	TPL.ID:	VIMOS_img_cal_FlatSky		
extension:	0				



powered by QC: www.eso.org/HC

created by qc_rawdisp.py v1.2 on 2015-10-09T00:37:44

Summary

- Real-time classification of science data (QC0)
  - Data quality (mostly IQ)
    - Range of quality control procedures depending on instrument / data type
    - Signal to noise is checked but is no formal user constraint
  - IQ measurements also used as input for short-term scheduling
  - Quality control includes feedback on observing preparation to USD
- Shared QC
  - Distributed between 2 sites
  - Automated processing and feedback: close the loop
  - Interactivity
- See also:
  - Talks on QC for PIONIER (Percheron) and on science products (Hanuschik)
  - Posters on QC for MUSE and SPHERE (Dobrzycka, Hummel)