

Quality Assessment (IQA & FQA)

HSC Queue-Mode Workshop

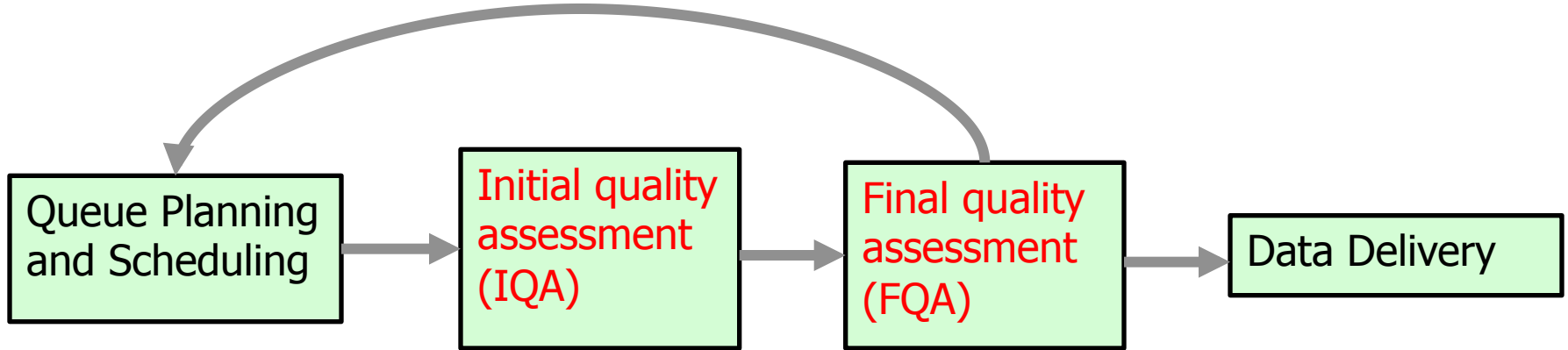
June 16th, 2015

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Subaru Telescope

National Astronomical Observatory of Japan

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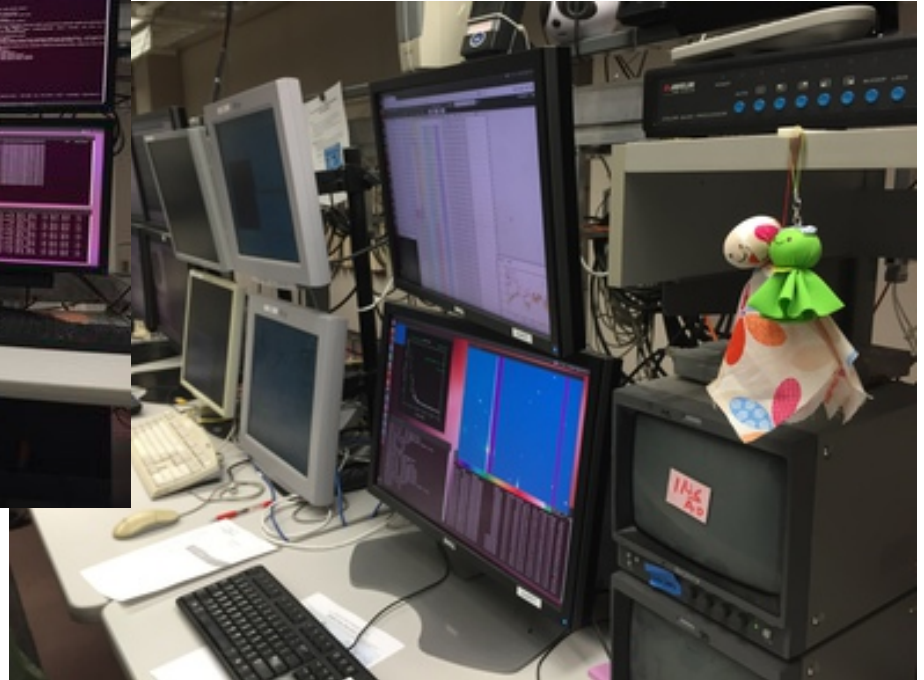
cf. Pyo-san's slide

- ◆ Initial quality assessment (IQA)
 - ◆ Check quality of HSC data during observation
 - ◆ Done by Queue Observer
- ◆ Final quality assessment (FQA)
 - ◆ Double check in the next day time
 - ◆ Done by HSC SS (who is not observing)

Observation



Gen2 windows



Ana (checking data quality)

- ◆ We watch many windows for proceeding the observation for checking
 - ◆ Telescope status
 - ◆ Instrument (HSC) status ...

Quality Assessment (QA)

- ◆ For obtaining good data continuously.
 - ◆ To maintain the telescope and instruments is also important.
- ◆ Checking the indicators of data quality.
 - ◆ Seeing, elongation, transparency...
- ◆ Merits of QA
 - ◆ Reducing the inefficiency, and improving the observation.
 - ◆ For queue and remote observations, where PIs are not at the site, QA is important to determine whether the PIs' demands are satisfied.
 - ◆ Useful for searching adequate archive data for users

Initial Quality Assessment (IQA)

- ◆ Check quality of HSC data during observation

- ◆ Zview

- ◆ seeing, elongation
 - ◆ We can check quickly, but roughly.

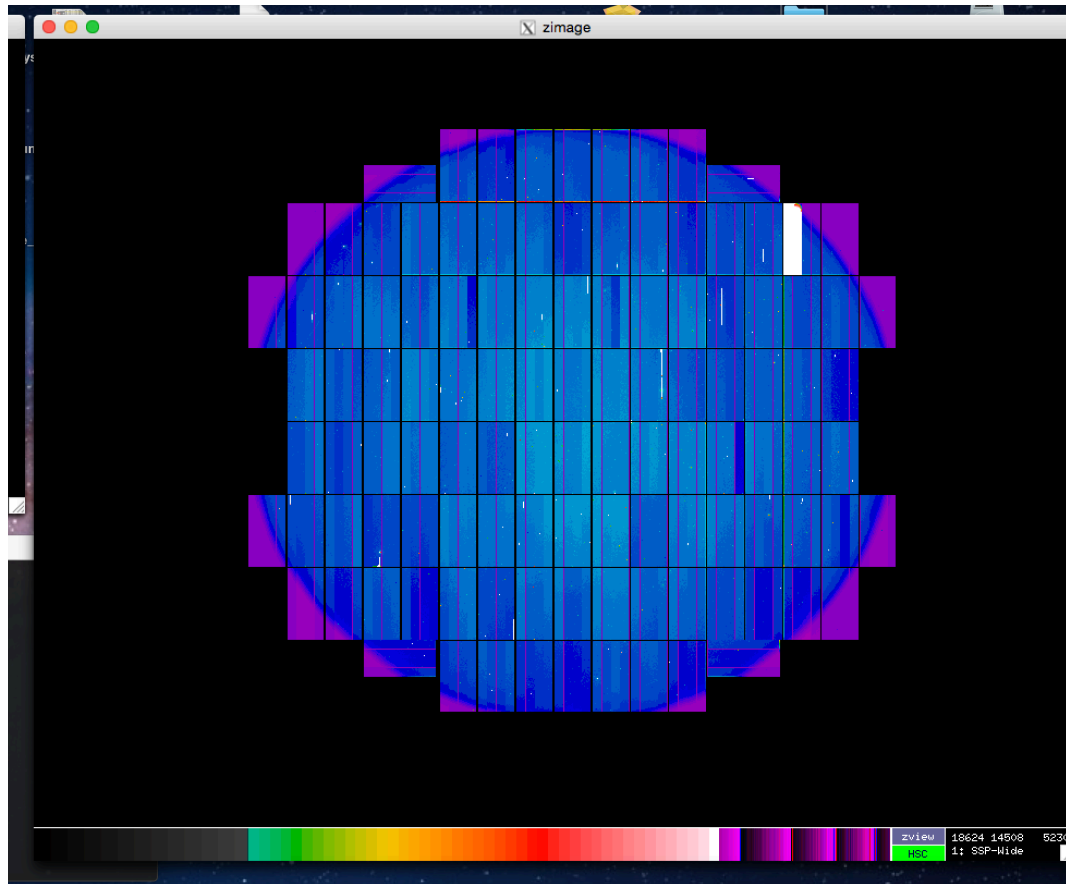
- ◆ On-site analysis system

- ◆ seeing, transparency, reduced image
 - ◆ It takes a few minutes to reduce data.
 - ◆ We can check more exactly.

- ◆ Etc.

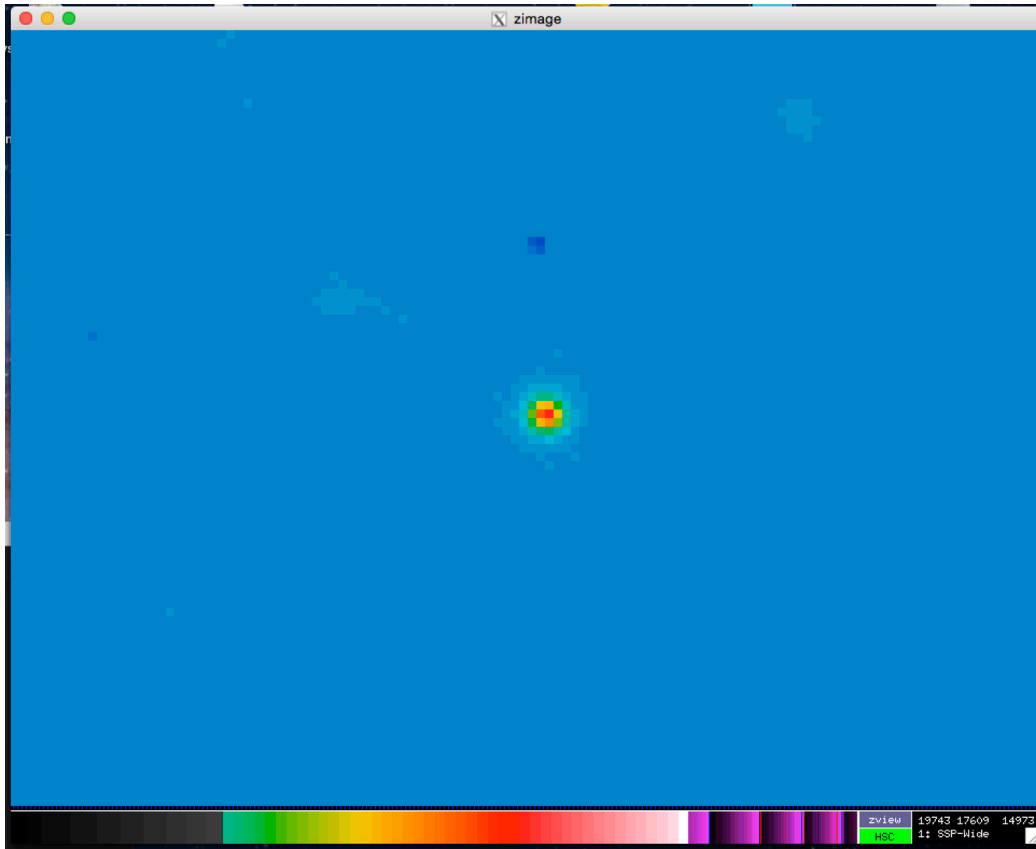
- ◆ Cloud, Cirrus
 - ◆ Moon phase and distance
 - ◆ Airmass

Initial QA: zview

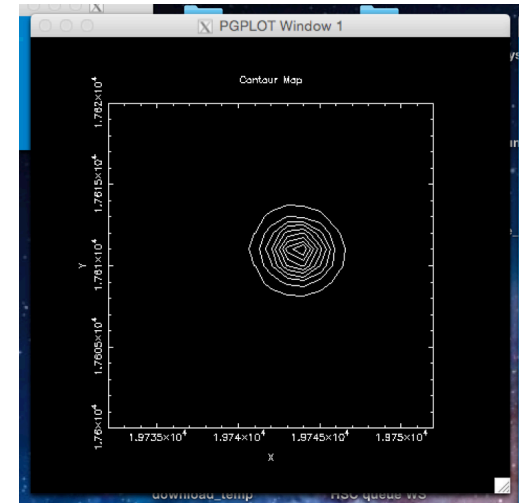


- ◆ Although the images shown by zview are not reduced, we can check immediately after exposures.

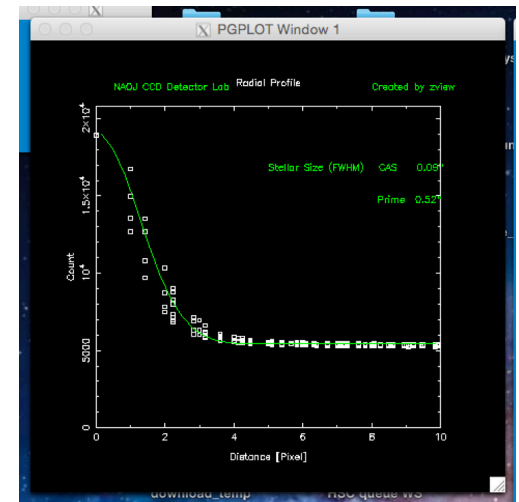
Initial QA: zview



If elongations of stellar images are seen, we may need to adjust the telescope focus.

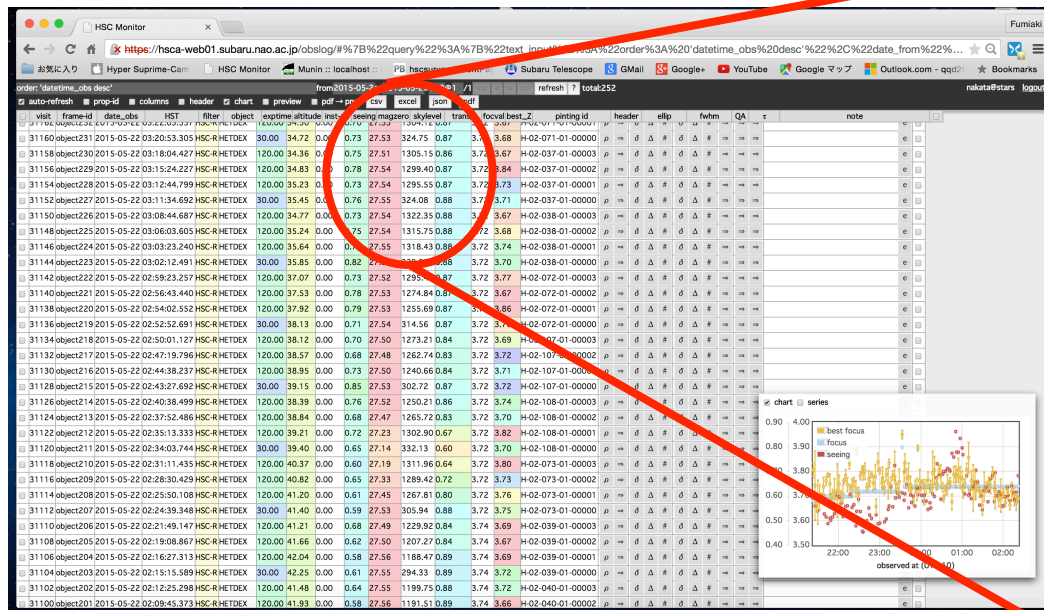


contour



profile (seeing)

Initial QA: On-site analysis system seeing and transparency



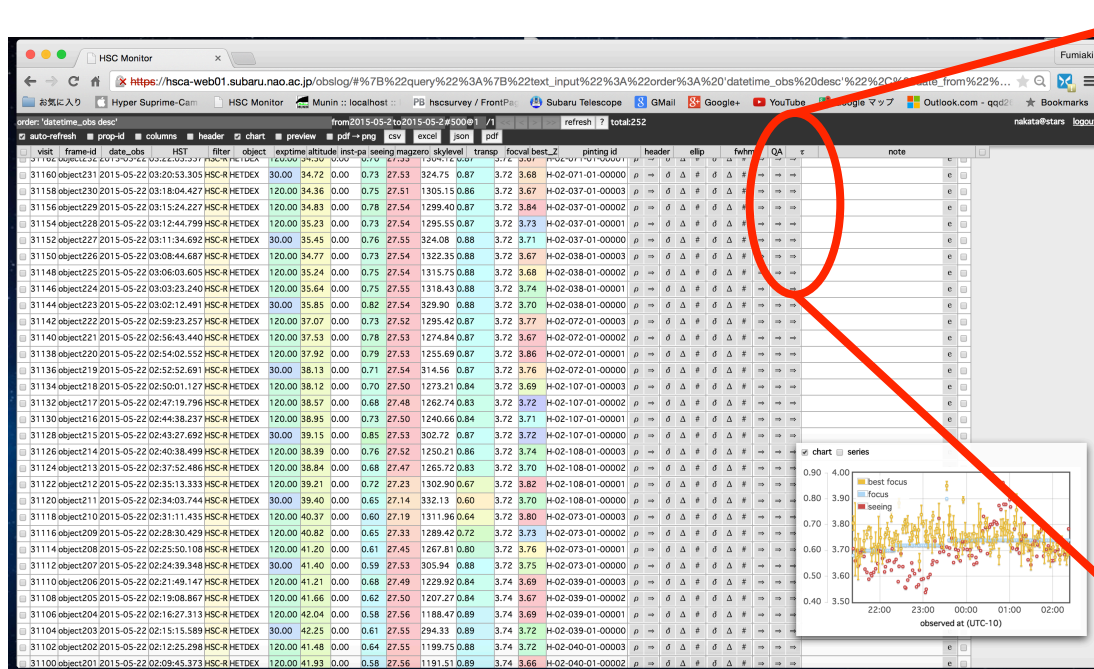
2015-05-2 to 2015-05-2 #500@1 /1

→ png csv excel json pdf

st-pa	seeing	magzero	skylevel	transp
0.70	27.33	1304.12	0.87	3.7
0.73	27.53	324.75	0.87	3.7
0.75	27.51	1305.15	0.86	3.7
0.78	27.54	1299.40	0.87	3.7
0.73	27.54	1295.55	0.87	3.7
0.76	27.55	324.08	0.88	3.7
0.73	27.54	1322.35	0.88	3.7
0.75	27.54	1315.75	0.88	3.7
0.75	27.55	1318.43	0.88	3.7
0.82	27.54	329.90	0.88	3.7

- ◆ For deriving Seeing and transparency, data of all CCD chips are considered.
- ◆ The transparency is estimated using SDSS catalog.

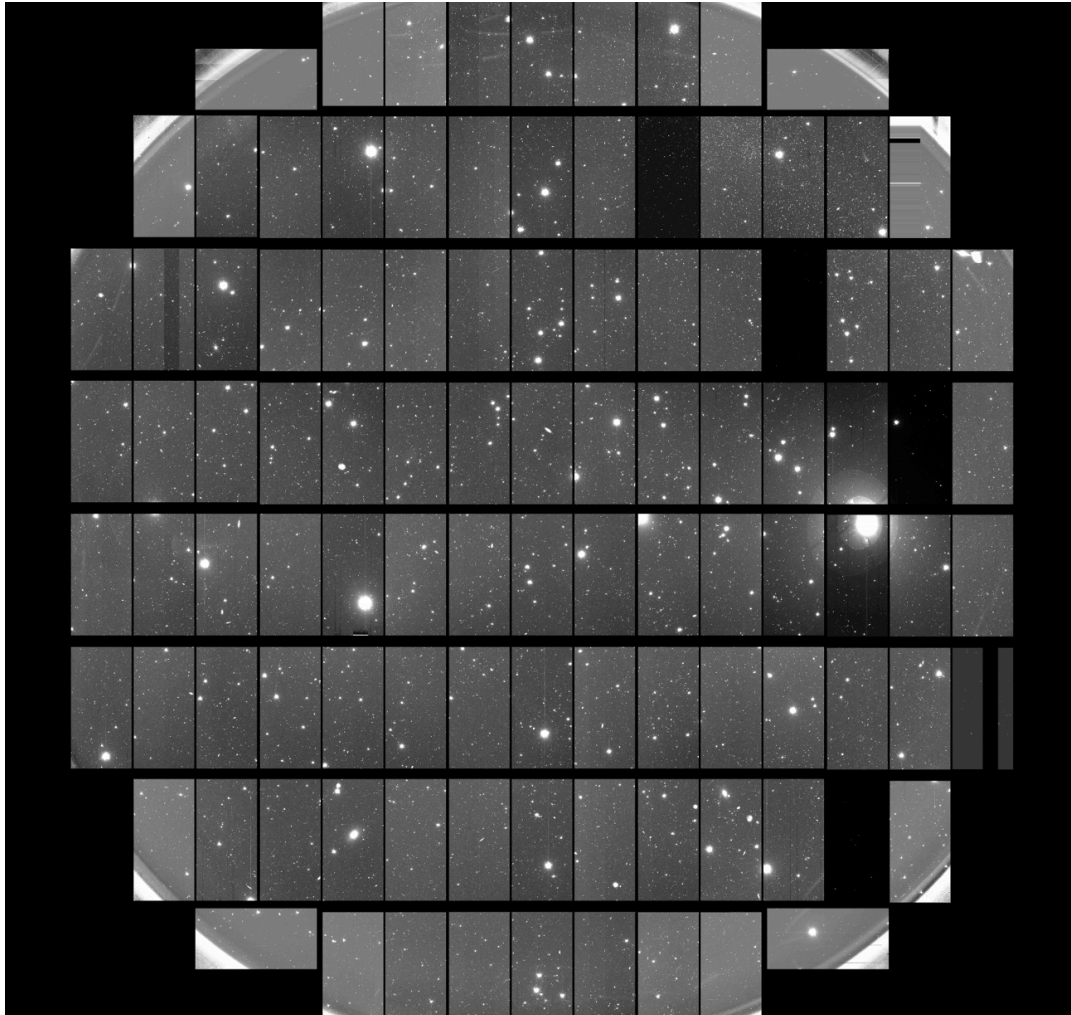
Initial QA: On-site analysis system reduced image



fwhm	QA	τ	
Δ #	\Rightarrow	\Rightarrow	\Rightarrow
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Δ #	\Rightarrow	\Rightarrow	\Rightarrow
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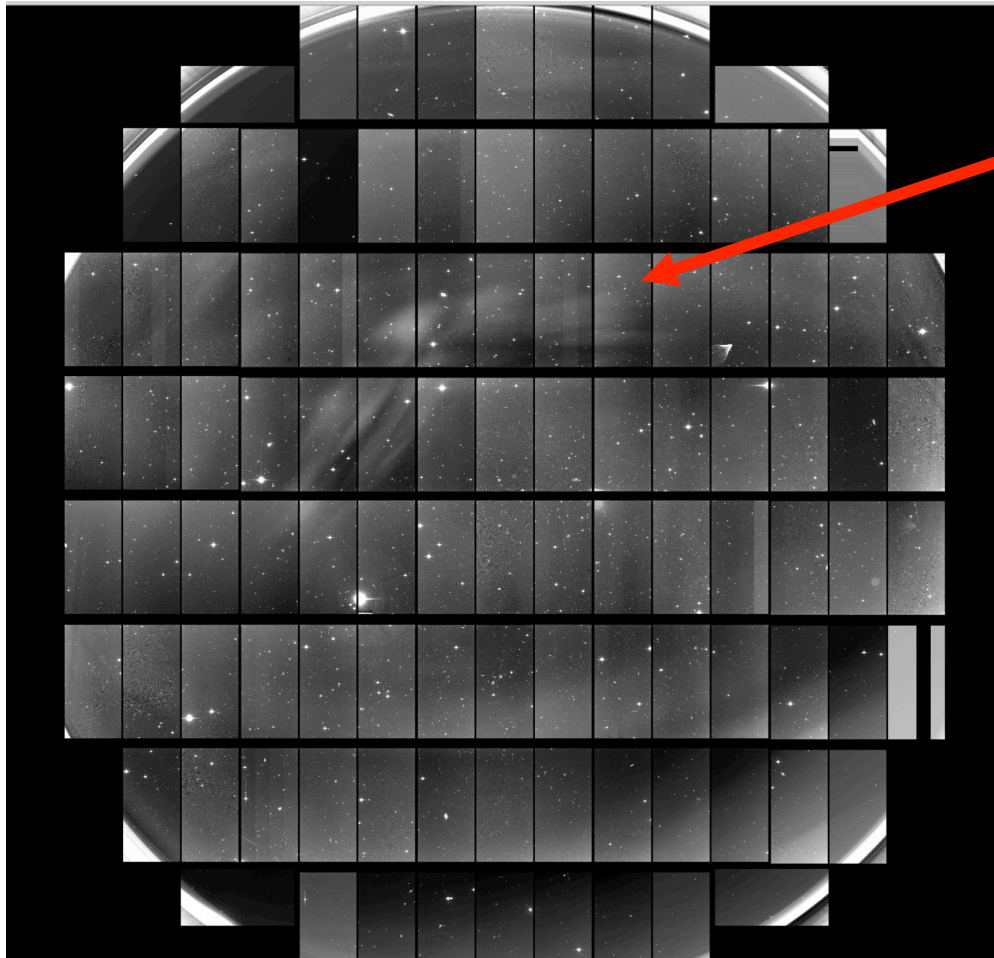
push the buttons at this row
to check the reduced images.

Initial QA: On-site analysis system reduced image



- ◆ Reduced image (flatfielded)
- ◆ Check satellite trails, and ghost/stray lights by bright stars.
- ◆ Check whether faint objects is not fallen to CCD gaps.

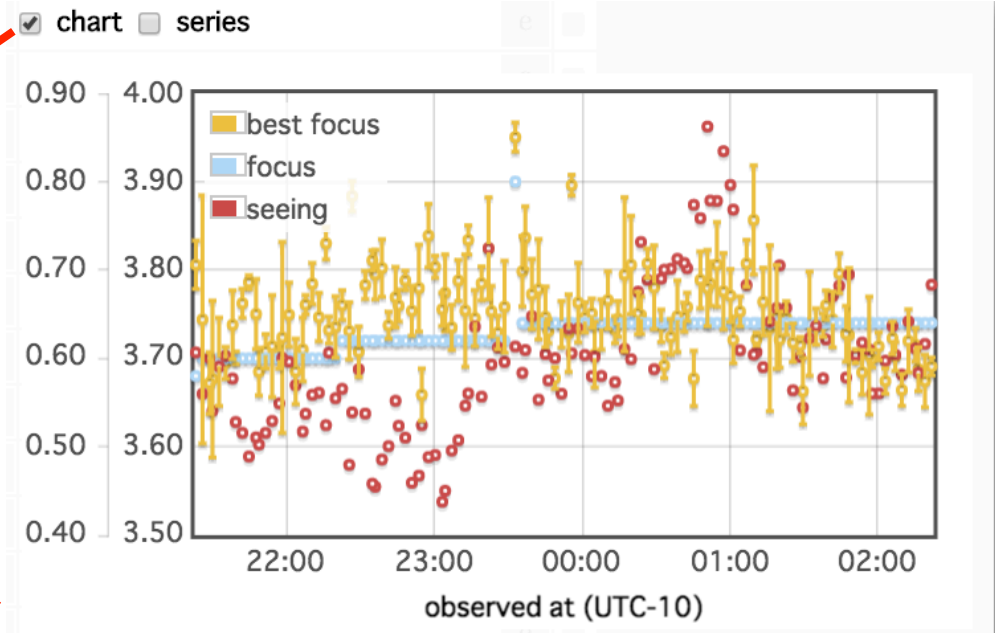
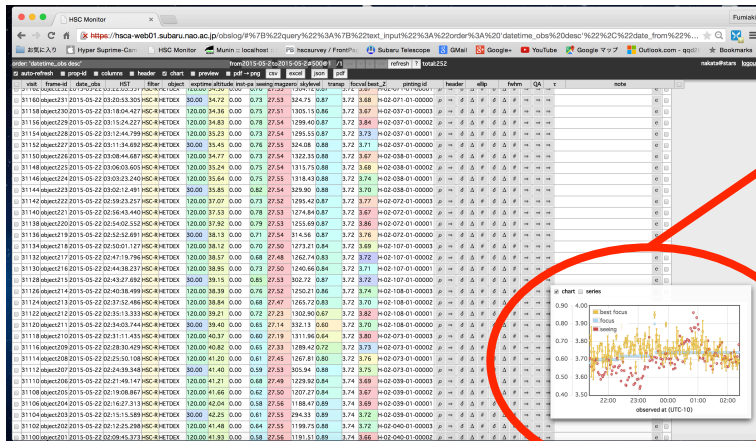
Initial QA: On-site analysis system reduced image (stray light)



When we take images under bright moon condition, especially brighter than half moon, stray lights may be affected.

- ◆ For avoiding the stray lights, we will not observe targets, which is close ($D < 30^\circ$) to Moon.

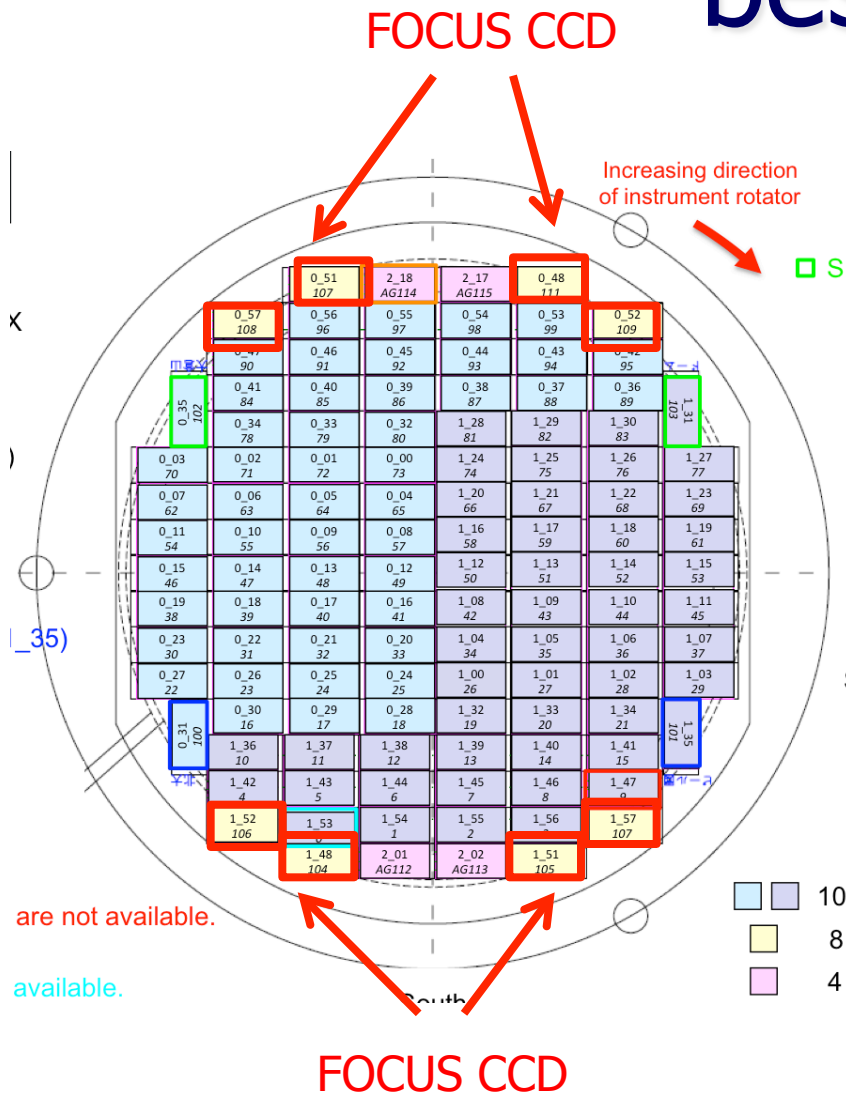
Initial QA: On-site analysis system best z



◆ When the difference of 'best focus' and 'focus' becomes large continuously, we may need to adjust the telescope focus.

Initial QA: On-site analysis system

best z



- ◆ Best z is derived from 8 'FOCUS CCDs' at inside the dewar.
- ◆ The heights of these CCDs are different from those of 104 science CCDs.

Initial QA: On-site analysis system

Non-SDSS field

er	object	exptime	altitude	inst-pa	seeing	magzero	skylevel	transp	foc
	DARK	30.00	54.76	-90.00	-1.00	-99.00	0.00	-9999.00	3.80
	BIAS	0.00	54.76	-90.00	-1.00	-99.00	0.00	-9999.00	3.80
	BIAS	0.00	54.76	-90.00	-1.00	-99.00	0.00	-9999.00	3.80
	BIAS	0.00	54.76	-90.00	-1.00	-99.00	0.00	-9999.00	3.80
	BIAS	0.00	54.76	-90.00	-1.00	-99.00	0.00	-9999.00	3.80
	BIAS	0.00	54.76	-90.00	-1.00	-99.00	0.00	-9999.00	3.80
15	BD_33D2642	10.00	27.10	-90.00	1.38	-99.00	18.40	-9999.00	4.20
15	BD_33D2642	7.00	27.88	-90.00	1.38	-99.00	7.85	-9999.00	4.20
15	UML_F4	0.33	22.86	90.00	0.59	-99.00	0.39	-9999.00	3.80
15	UML_F4	240.00	23.27	90.00	0.68	-99.00	186.88	-9999.00	3.80
15	UML_F4	240.00	23.75	90.00	0.62	-99.00	141.55	-9999.00	3.76
15	UML_F4	240.00	24.25	90.00	0.59	-99.00	121.85	-9999.00	3.76
15	UML_F3	240.00	23.56	90.00	0.59	-99.00	115.65	-9999.00	3.76
15	UML_F3	240.00	23.97	90.00	0.61	-99.00	110.77	-9999.00	3.76



- ◆ For Non-SDSS field, The analysis system cannot derive transparency.
- ◆ Before (and after?) taking Non-SDSS fields, we will take SDSS fields for calibration.
- ◆ By the transparency derived by the calibration frames, we may be able to estimate that at the Non-SDSS fields.
 - ◆ Relative photometry?
 - ◆ CFHT SkyProbe?
- ◆ However, it is not perfect. Thus, we may not be able to guarantee the transparency completely for Non-SDSS fields.

Initial QA (IQA)

cf. Iwata-san's slide

- ◆ Especially using on-site analysis system, night observers report whether each data meets criteria PIs set.
- ◆ Considering that weather may change during observations
 - ◆ **Seeing:** 0.1 tolerance will be applied.
 - ◆ If the PI asks for seeing $<0.8''$, observations done with seeing $<0.9''$ will be considered as completed.
 - ◆ **Transparency:** 20% tolerance will be applied.
 - ◆ If the PI asks for $T > 80\%$, observations done with $T > 64\%$ will be considered as completed.
- ◆ The night observers will decide the rough estimate of quality
 - ◆ 'good': meet constraints
 - ◆ 'bad': not meeting constraints
 - ◆ 'marginal': need more investigation

Final QA (FQA)

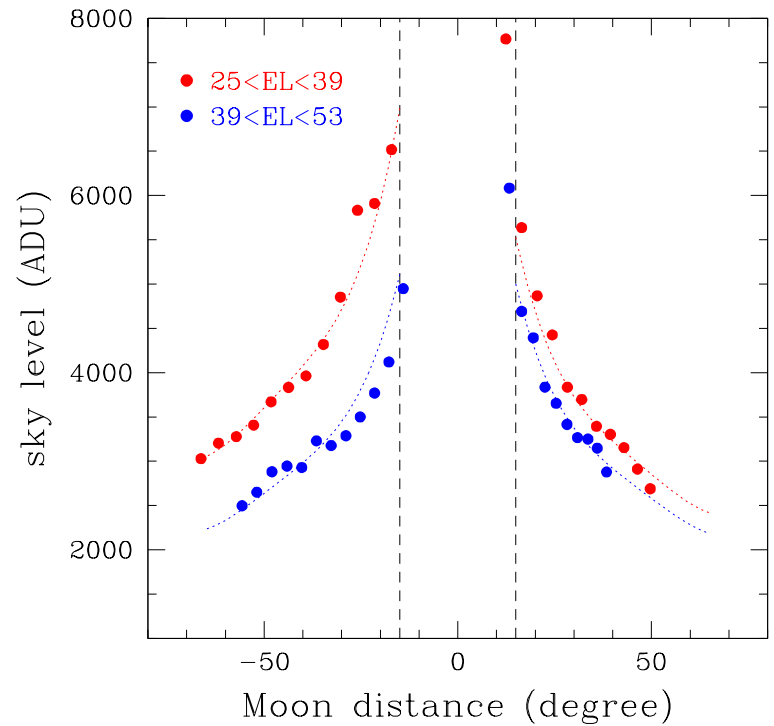
cf. Iwata-san's slide

- ◆ Final QA will be done next day of observation by another day time staff. (not night observers)
 - ◆ Checking a night log written by night observers.
 - ◆ Deciding whether each OB satisfies criteria PIs set.
 - ◆ Especially checking 'marginal' data is important.
 - ◆ If the OB does not meet the criteria (seeing, transparencies), it will bring back to queue.
 - ◆ Even if only 1 of exposures will not pass the FQA, the OB will bring back to queue.
 - ◆ Longer OB has less probability to be executed.
 - ◆ The total on-source time of OB must be $< 100\text{min}$.
 - ◆ If you plan to do the Nditth-mode observation with large N (e.g., $N > 5$), it is better to divide the observation into a few OBs.

Exposure Time Calculator (ETC)

◆ Parameter:

- ◆ Seeing
- ◆ Transparency
- ◆ Moon phase
- ◆ Moon distance
 - ◆ To avoid the affect of stray lights the moon distance should be larger than 30deg.



Moon distance vs. skybackground