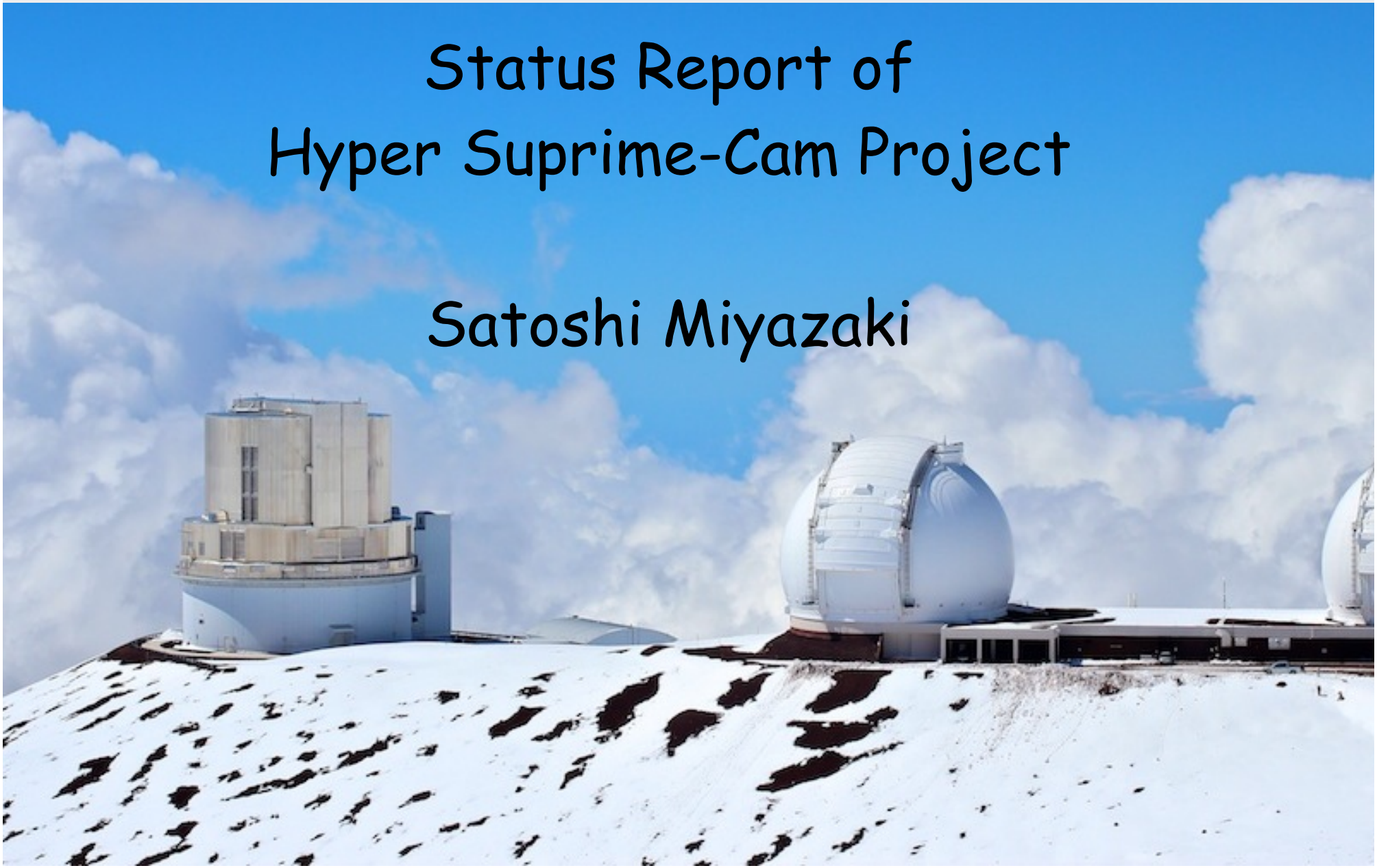
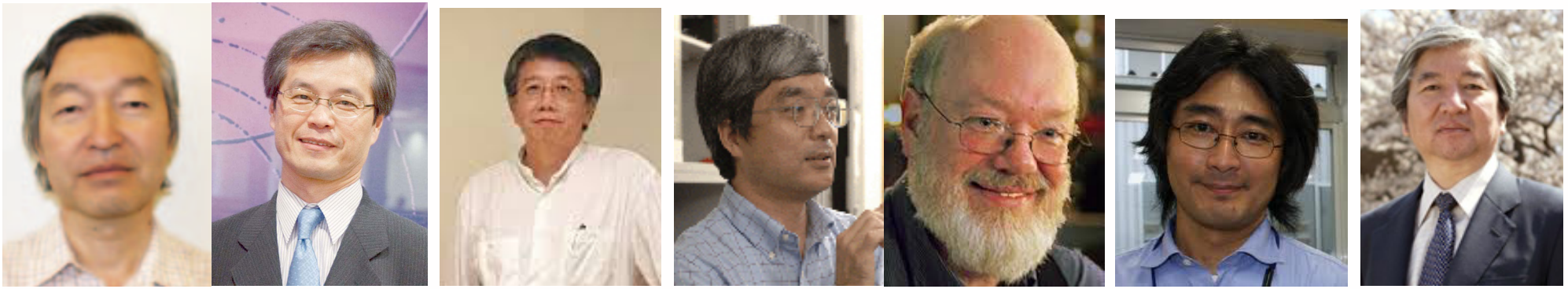
Status Report of Hyper Suprime-Cam Project

Satoshi Miyazaki

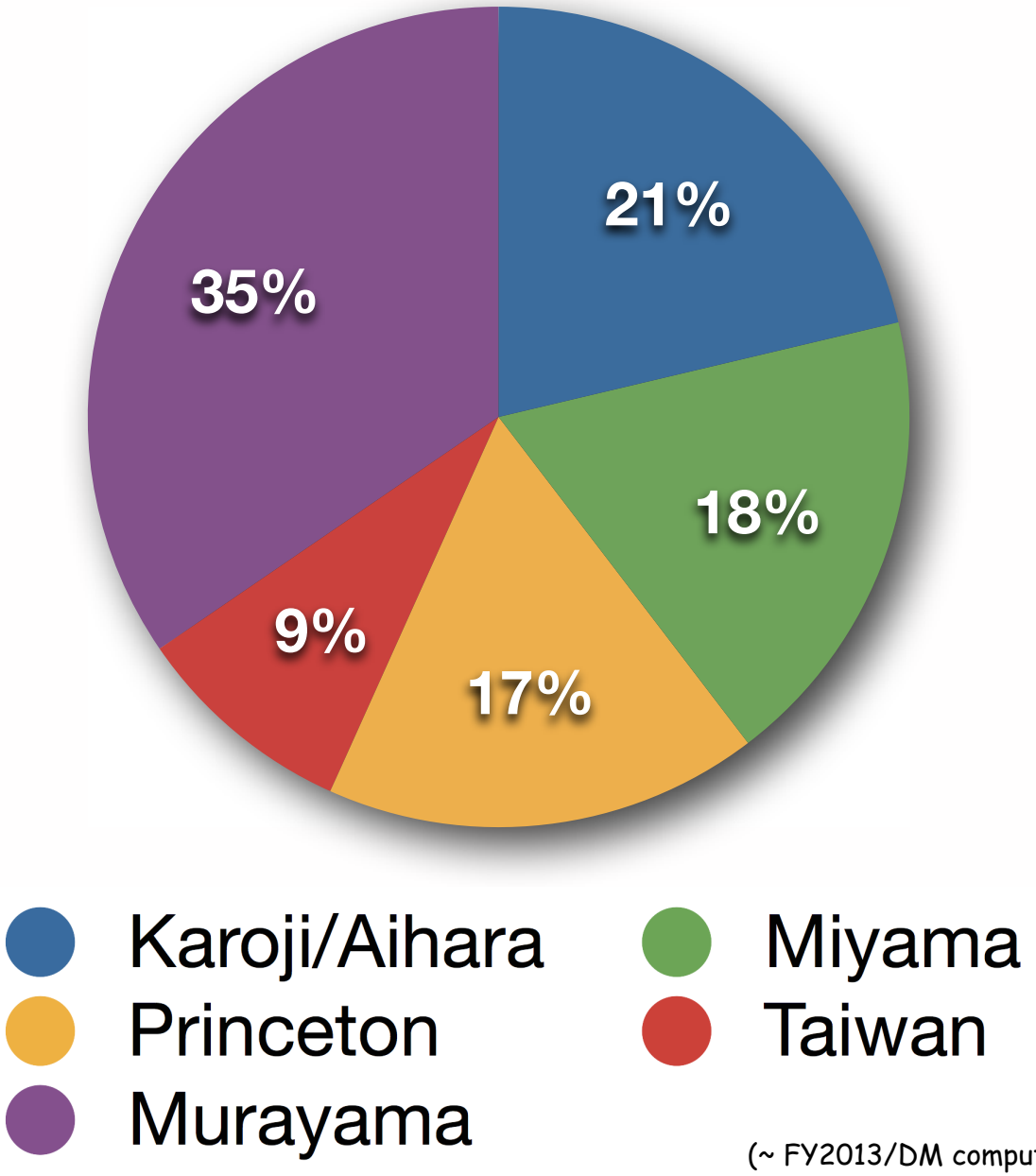


Brief History of HSC Project

2002	Pilot conceptual study started
2006	Grant-in-Aid Approved (Karoji, Aihara)
2007	Taiwan Joined, IPMU established
2008	Princeton Joined
2010	FIRST Grant Approved (Murayama)
2012/08	Engineering First Light
2013/01	Scientific First Light
2014/03	Survey Started



HSC Construction Budget




CAPACITY
80
TONNES
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501

Instrument Updates

- Camera
  - Replacement of control computer (obcp)
  - Shutter/Filter
  - CCD
- New Dome Flat

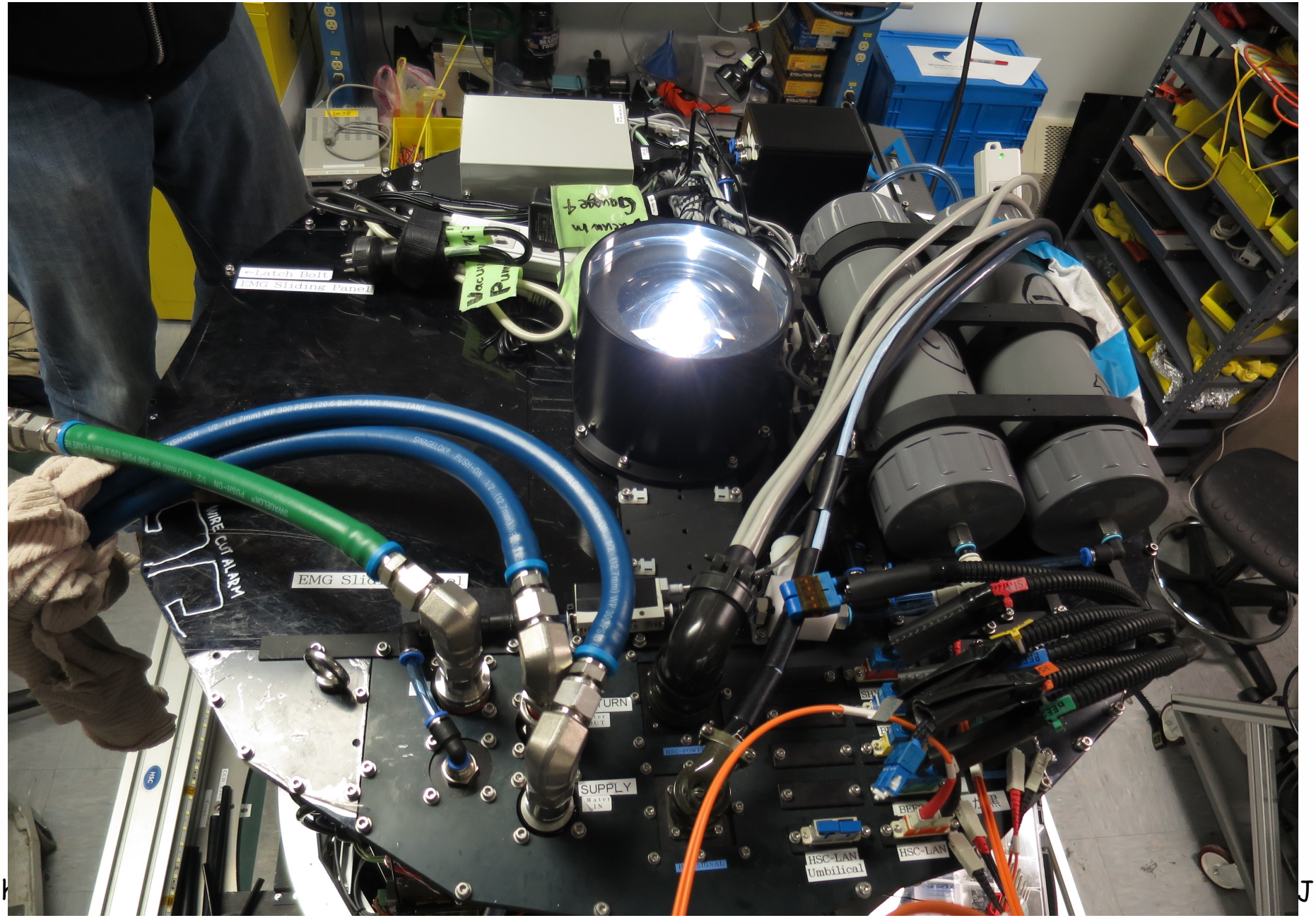
Camera

- Replacement of the control computer (OBCP) unexpectedly caused several hardware malfunctions and made the support scientists exhausted. Some (but not much, though) observing time was lost in November.
- Lesson: Such major work should have drawn the most of the builders attention to make the troubleshooting more efficient. Careful coordination and more formal authorization process should be introduced next time.

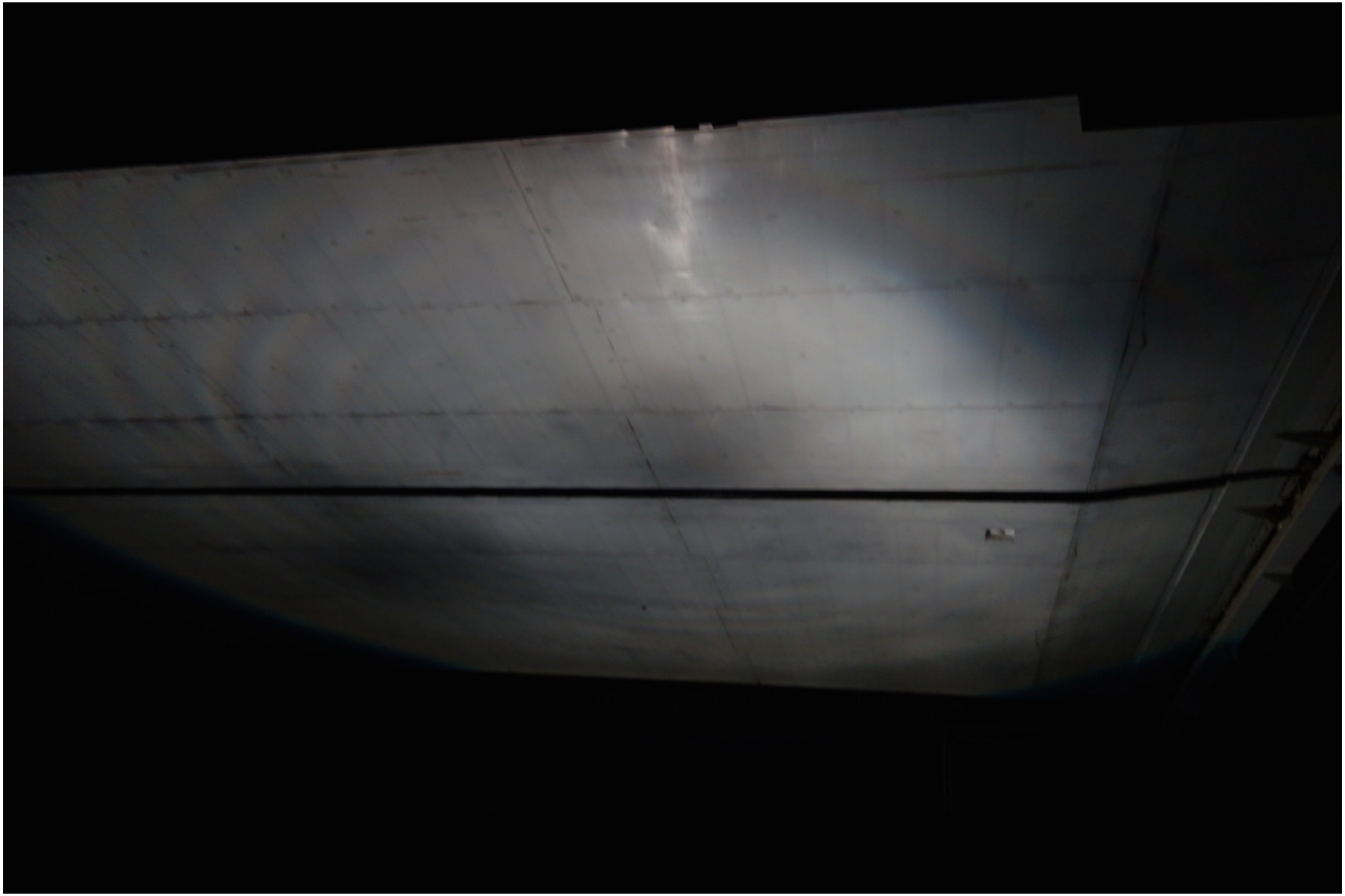
Camera

- Shutter does not open very rarely (~ once/two weeks ?)
  - Reset (zero position search) necessary (~30 sec)
  - Sources already identified. Need the maintenance work: Arranged
- Filter Exchanger
  - Sequence stopped while lifting the filter on to the camera (also rare but the rate increasing ?)
  - retry always works
  - Under investigation

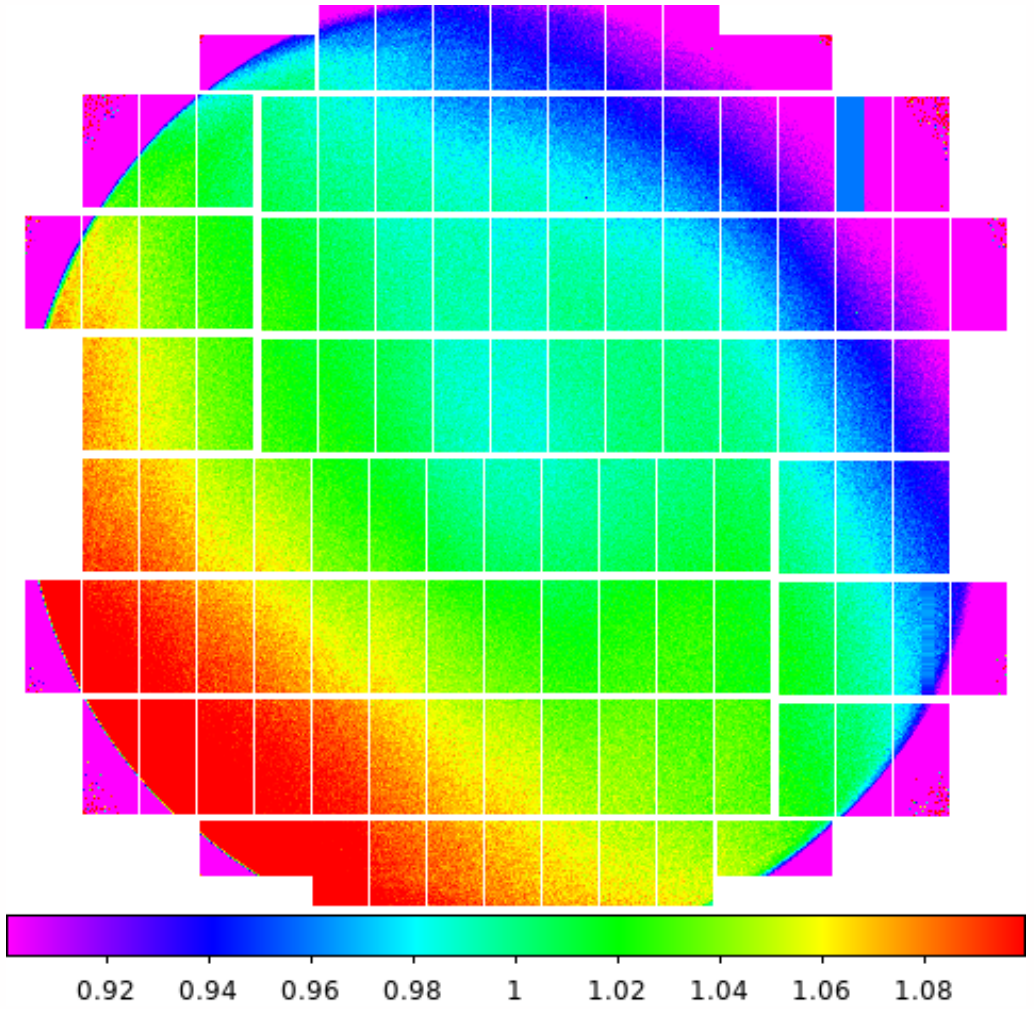
Flat lamp module on top of HSC



New Single Lamp Dome Flat



New Flat Lamp



New Flat Lamp

good sample

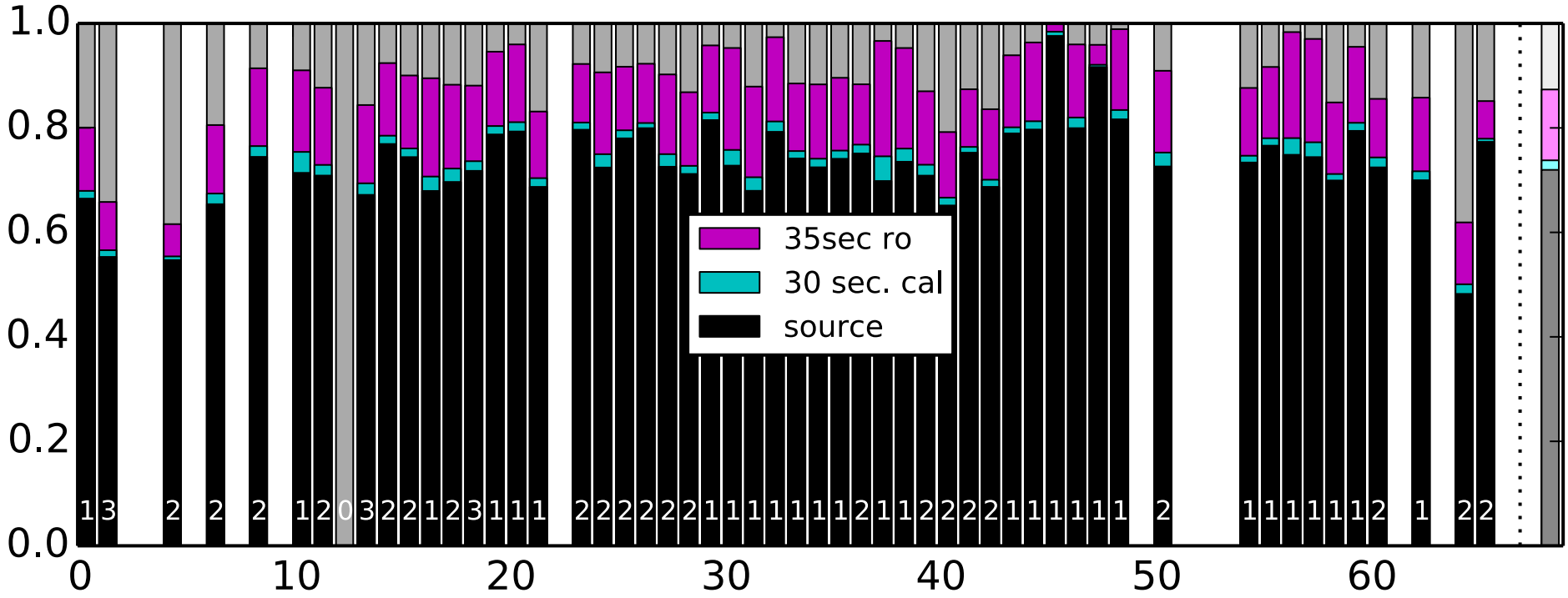
bad sample

Decenter of filaments in the light bulb will explain the non-uniformity: Replacement next Feb.

Operation Status

SSP Observing Status

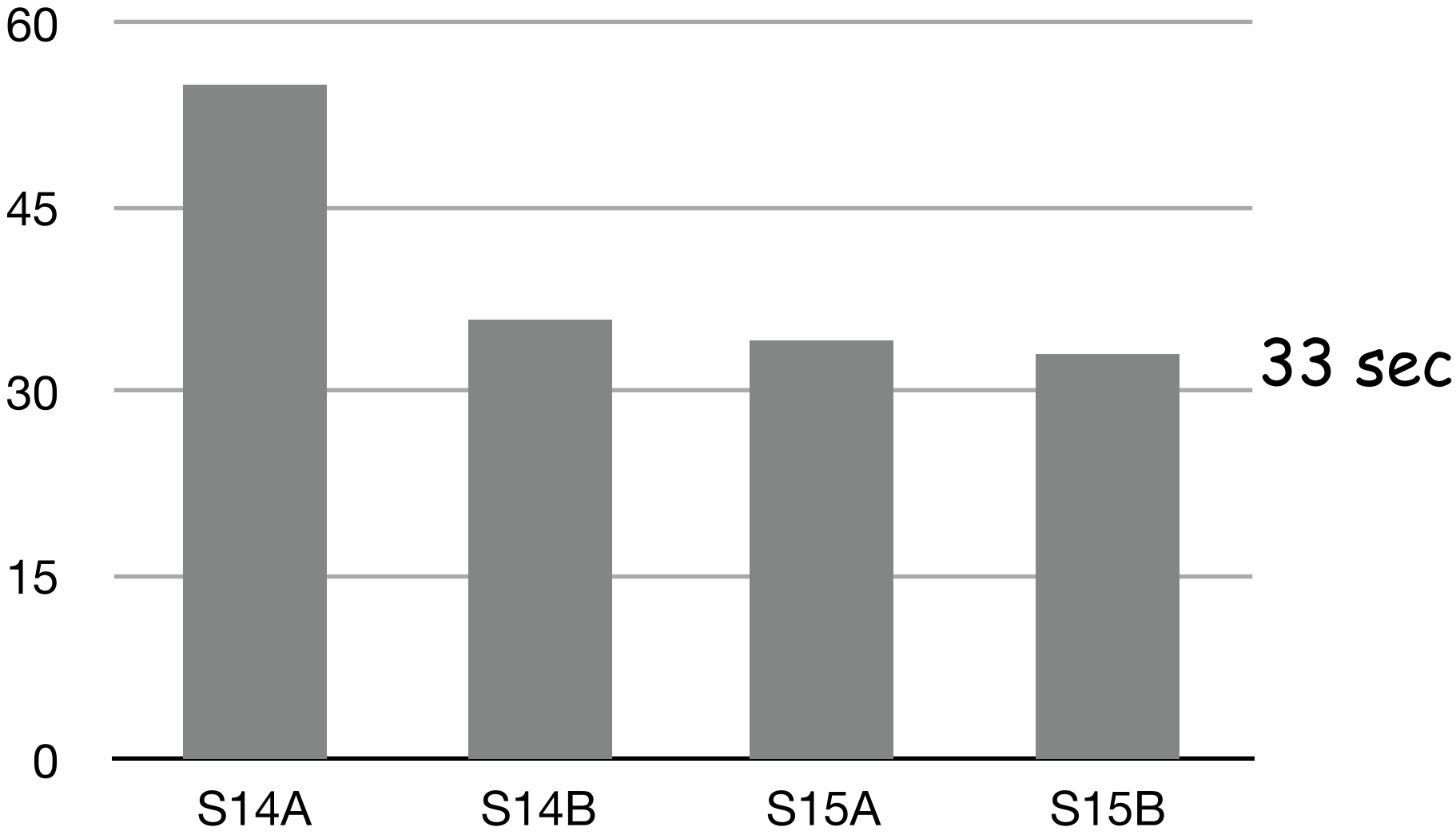
Normalized Usage (of allocated 64 nights over 2 yr)



>~70 % on-sky if it is clear except initial glitches

Bad weather: ~ 25 %

Time between exposures

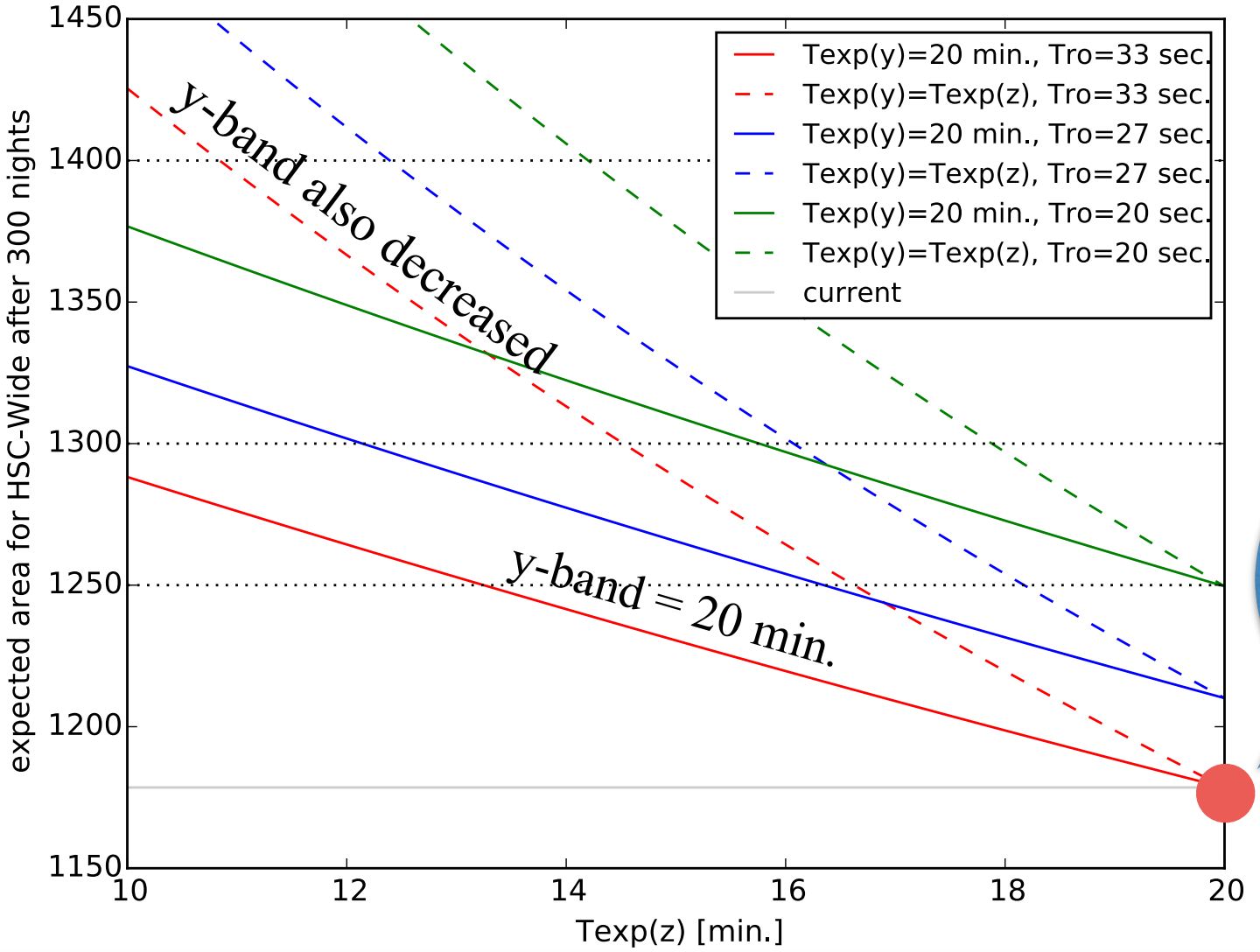


Thanks to Philip & Eric's efforts

Operation Status

Camera runs quite nicely but …

SSP Survey Status



We are Here

Expected Coverage
1170 deg^2
with 33 sec RO

More reduction is necessary.

Trimming of Readout Time

- 5 sec from CCD clocking (perhaps no risk)
- 3 sec from saving data onto disk
  - risk assessment preliminary

After the lab testing, engineering nights will be requested.

Poster by Data Analysis Support Team

Support for HSC Data Analysis

Sogo Mineo, Rieko Momose, Tadafumi Takata, Hisanori Furusawa, Yoshihiko Yamada,
Michitaro Koike, Masayuki Tanaka, Satoshi Miyazaki & the HSC software development team

For General Observers and SSP collaborators,
if you have questions, write to
'helpdesk@anela.mtk.nao.ac.jp'
either in Japanese or English.

hanaco is equipped with 32 cores of CPU, 256GB of memory and 36TB of storage. It is prepared for users who do not have sufficient computing resources to process images they take with HSC. It processes the tutorial data in a day; a user's data in two weeks or a month. We expect just two users are active at a time. Use hanaco to get stacked images and object catalogs only. Users should use their own computer once they get them on hanaco.

To get a user account in hanaco, first read our page:
`http://hsc.mtk.nao.ac.jp/pipedoc/j_env/index.html`
and send the form at:
`http://hsc.mtk.nao.ac.jp/hanaco-application/`

Help desk `helpdesk@anela.mtk.nao.ac.jp`
Feel free to send us questions about data analysis.

HSC Data Flow for GO

Mitaka

Hilo

Client's Home Institute Computer

data selection

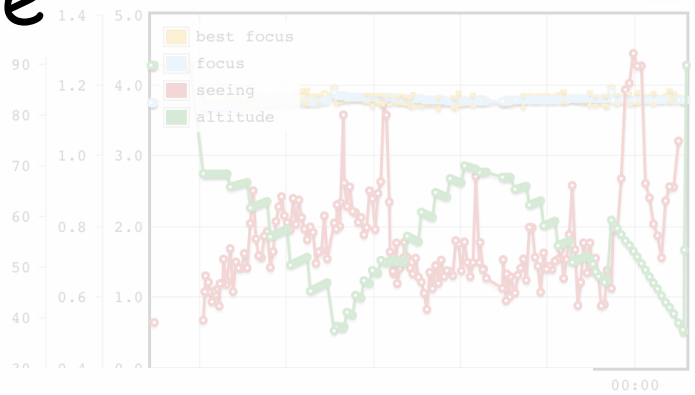
Obslog Server

QL clusters

MASTARS

raw data

then run hscPipe



Selectors/Downloader prototyping under way

Engineering works remained

- CCD operation optimization
  - Few channels has been lost perhaps due to the breakdown of gate structure near the corner where the internal electric field is strong.
  - In order to reduce the risk of losing more CCDs, we need to lower some of the operation voltage without causing performance degradation. We are working on this at lab.

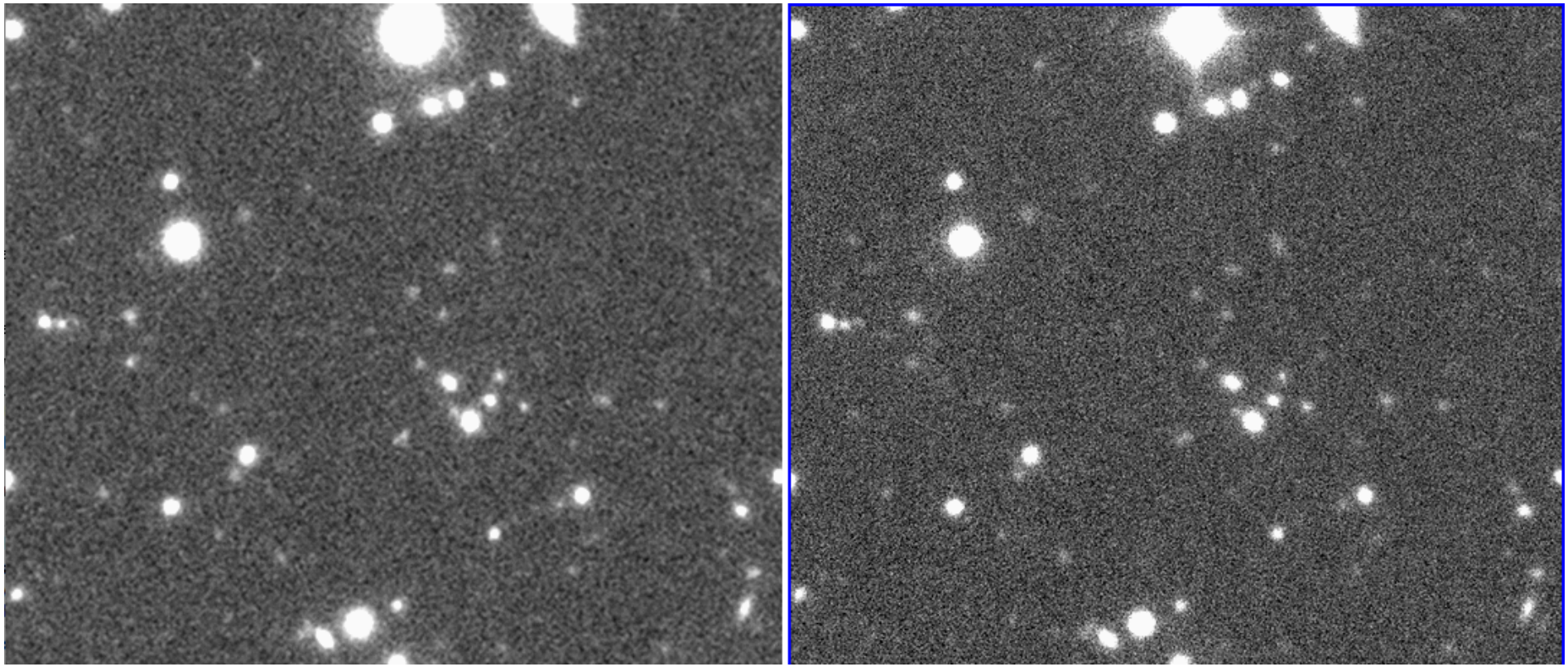
Some fancy pictures

Thickness of CCDs

36h Ultra-Vista Y band D=4m

2h HSC y band D=8m

(c) Hasinger

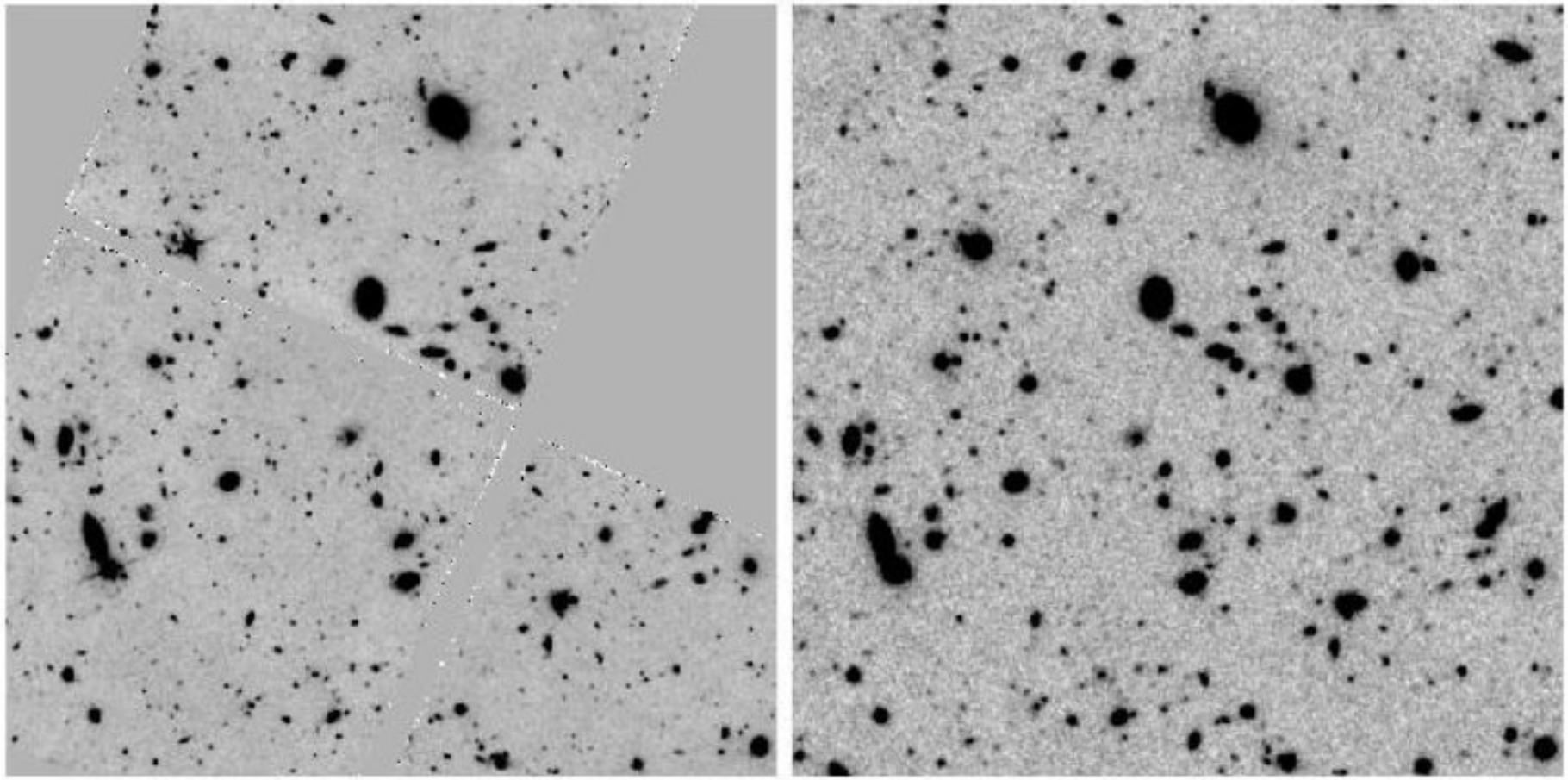


HSC features very High QE in red
thanks to the thickness of CCDs

Suprime-Cam (old slide)

Hubble

Subaru



HST 'wide-I' continuum

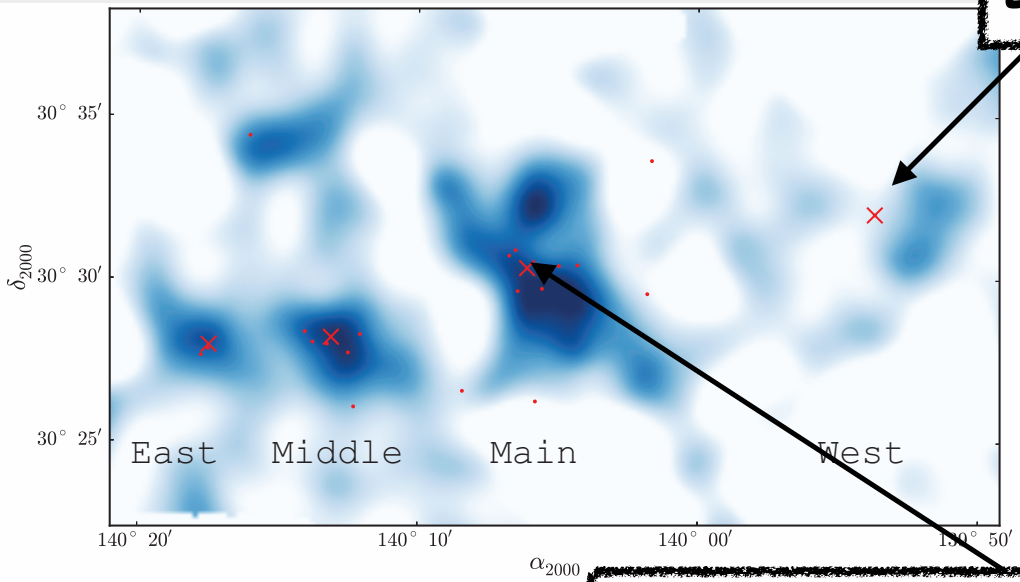
NB816 narrowband

on Nature by Esther Hu

Resolution of Mass M

Less DM

HSC

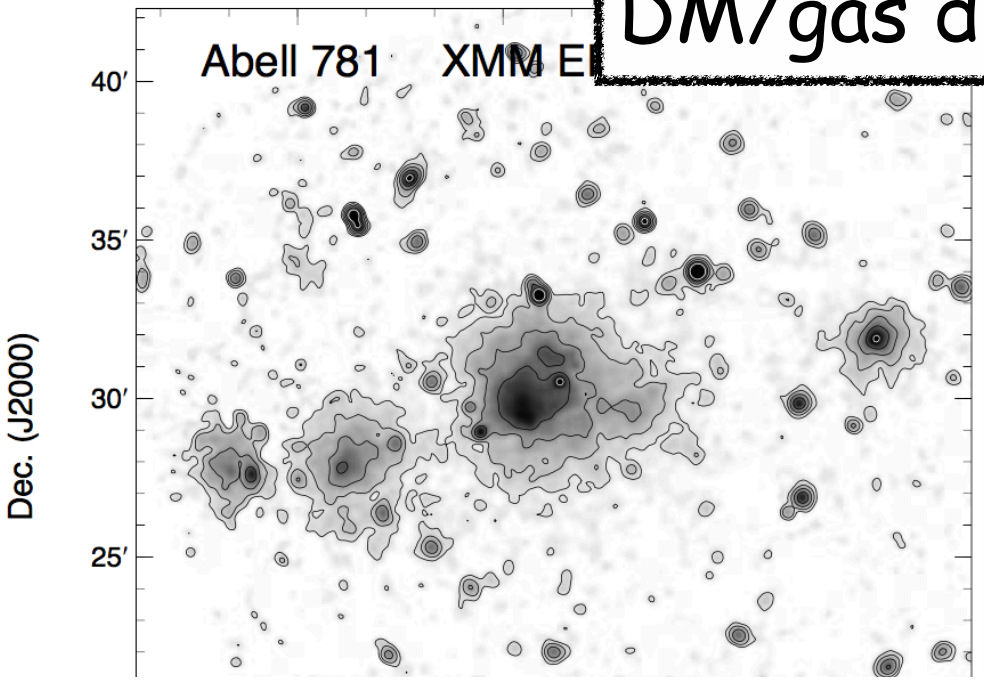


Angular resolution ~ X-ray cluster size

A781 (z=0.3)

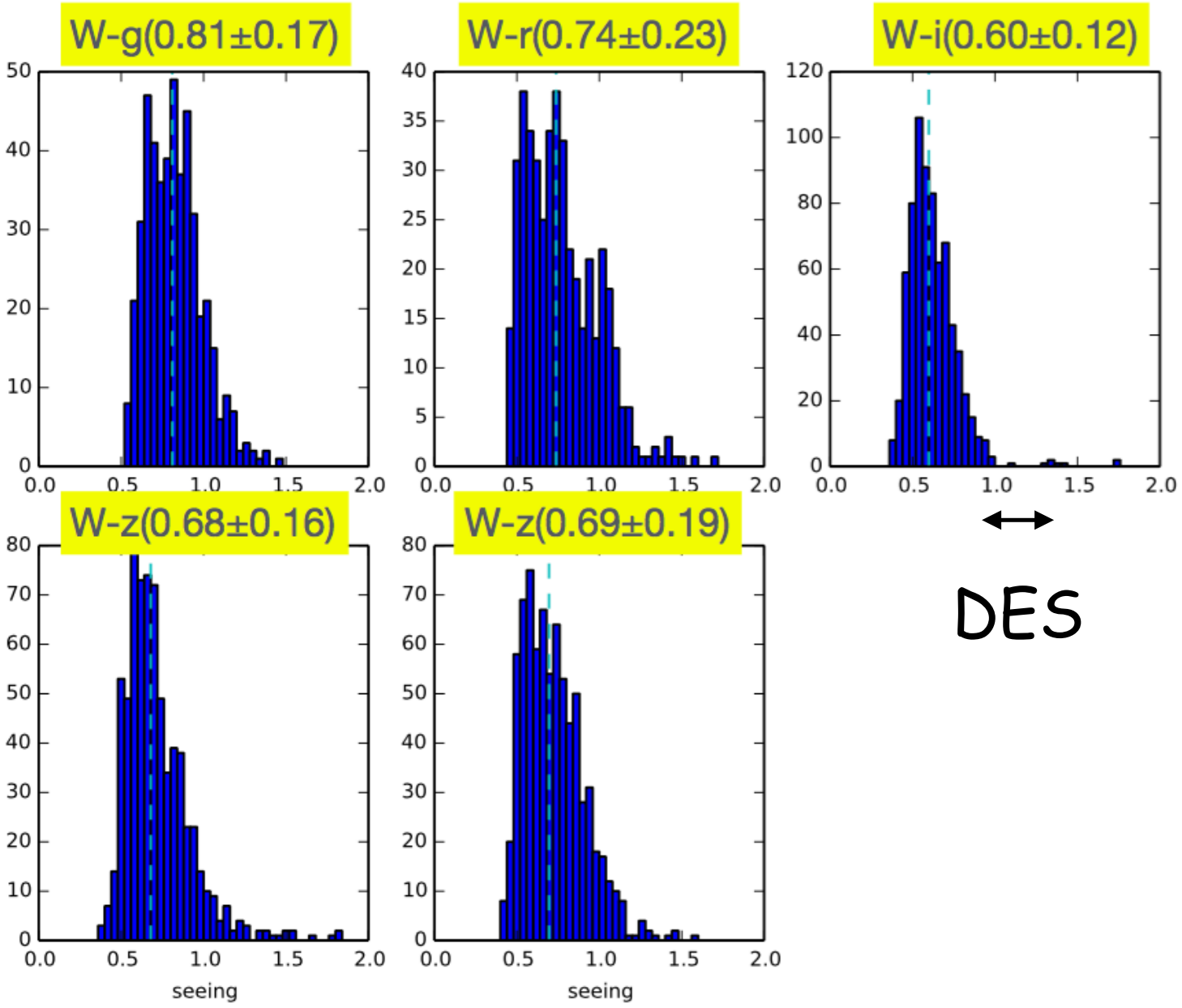
DM/gas dist. displaced

XMM



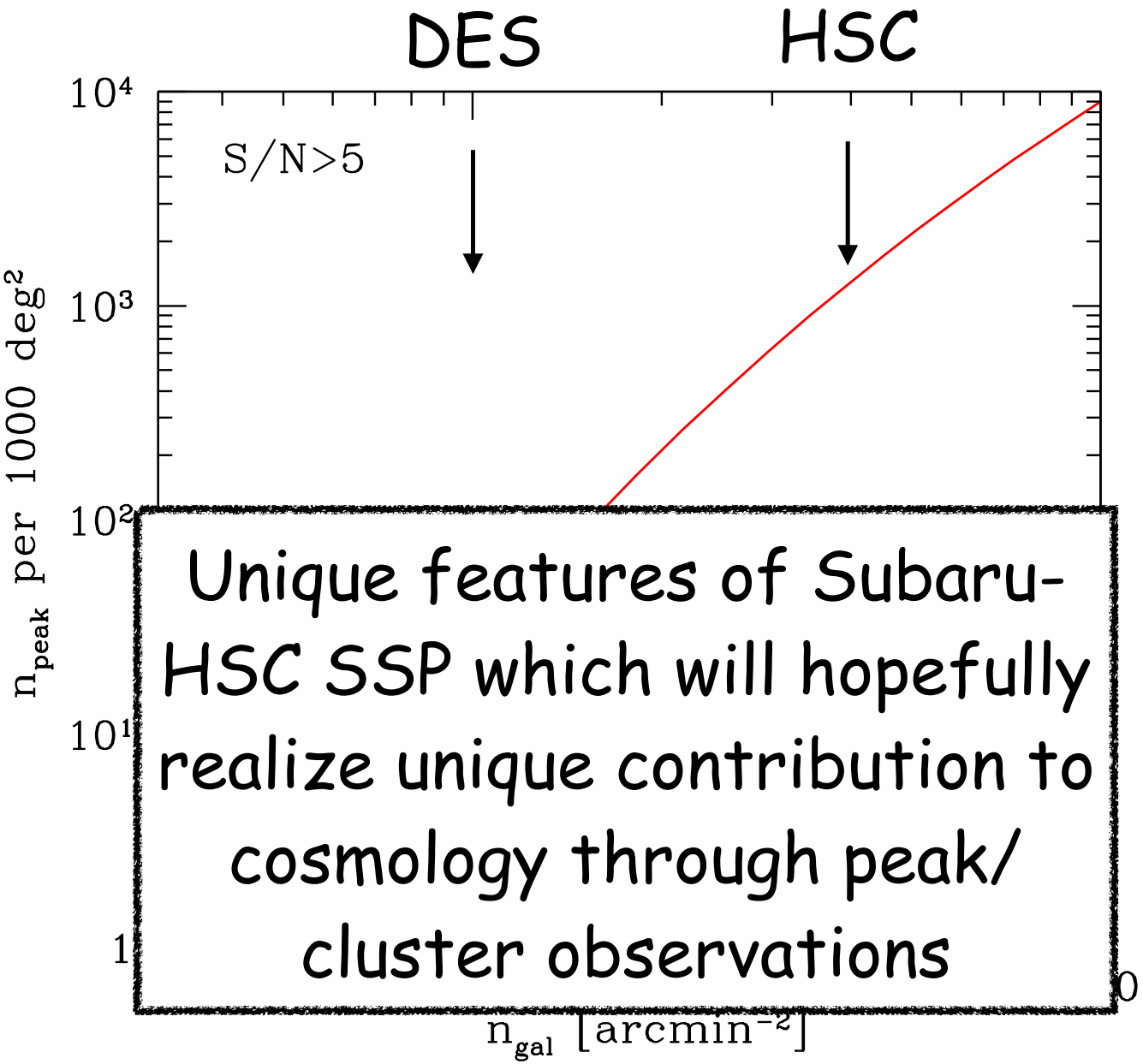
Displacement of DM/gas/galaxy -> Probe of Nature of DM

We have better seeing.



DES

Galaxy Number Density vs Peaks



Unique features of Subaru-HSC SSP which will hopefully realize unique contribution to cosmology through peak/ cluster observations

Subaru Strategic Observation Program

Primary Science Driver: Cosmology

What causes acceleration ?

In order to answer this question,,,

We have to identify flaws of Standard Theory which is based on LCDM and General Relativity.

Then, we will be able to argue about,,,

- Existence of new type of physical entity ?
- Gravity theory modified at large scale ?

More coming …

HSC collaboration meeting last week where excited new results presented.

Early Years Science

- Data release for early years science soon !
- ~ 2017/02 Submission deadline for a PASJ special issue
- ~ 2017/Summer ?
  - Mid term Review of SSP

Come join us !