B02

Subaru Imaging Survey Updates

Satoshi Miyazaki National Astronomical Observatory of Japan 2019/03/03 Shingakujutsu Symposium @ YITP Kyoto



HSC



Satoshi Miyazaki

HSC/NAOJ



Comparison

| Camera | Image["] | AOmega | Start |
|----------------------------------|----------|--------|--------------------|
| DECam (US) | ~ 1 | 30.0 | 2012 |
| HSC (JP) | ~ 0.6 | 91.3 | 2012 |
| USST (US) Satoshi Miyazaki | (~0.8) | 347.8 | (2022) hsc/naoj |

Survey Progress

~ 200 nights done by May 2018

Created at 2018-05-01 11:44:33



Date

Survey Progress Rate

- Progress rate is ~ 75 % of what we originally anticipated when we prepared the proposal (~ 1.5 years before the commissioning).
- What was wrong?
 - Weather: Ratio of Survey quality night (T > 0.3, seeing < 1".3): 60
 % not 70 %: 0.85 (unlucky)
 - Weather has long time scale noise (1/f noise) that might causes large deviation from the average
 - Time between exposures: 35 sec not 20 sec: 0.93 (hardware team was optimistic)
 - Addition of short (30 sec) exposure: 0.94 (team's decision)

0.85 * 0.93 * 0.94 ~ 0.75





classical mode observation only



Observation statistics



- The rest of 100 nights will be split into W and D/
 UD with 2:1
 - Using 33 nights, D/U will complete 80 %
 - Using 66 nights, W is going to be ...

Survey Prospect



Survey prospect

Using 66 nights



Wide: 72 %

Survey prospect

If we have 30 more nights



Wide: 84 % and more rectangular survey field



Data Release

| Internal release | Release date | Data included | | |
|------------------|--------------|---------------|--|----------------------|
| S15B | 2016/01 | -2015/11 | | PDR1 on 2017/02 |
| S16A | 2016/08 | -2016/04 | | |
| S17A | 2017/07 | -2017/05 | | |
| S17B | - | - | | $DDD_{2} = -2010/05$ |
| S18A | ~2018/05 | -2018/01 — | | PDR2 011 ~2019/03 |
| S18B | ~2018/11 | -2018/07 | | |
| S19A | ~2019/05 | -2019/01 | | |
| S19B | ~2019/11 | -2019/07 | | PDR3 on ~2021/05 |
| S20A | ~2020/05 | -2020/01 — | | |

30 Nights Request

- 2018/09: Request submitted to Subaru Science
 Advisory Committee (SAC)
- 2019/01: Presentation and discussions at Subaru
 User's Meeting
- 2019/03: Discussions at SAC
 - Almost favorable. No proposal necessary. But, we need to prepare a (few) viewgraph that demonstrate clear scientific merits by next SAC (22 Mar)

HSC Collaboration with eROSITA

Progress on eFEDS region



<u>Collaboration with eROSITA</u>

- Launch postponed to Summer 2019 (from March)
- 9 h Field is most likely to be observed

- Science cases
 - WL cluster mass calibration
 - · AGNs

Development of High Speed CMOS



NAOJ-HPK Collaboration



1998



2011

New CMOS development since 2016

- Large format (equivalent with 2k4k 15 μ m CCD)
- All digital for fast readout (~ 10 Hz)
- High QE (as much as possible) in red (thick BI)

HSC Front-side Illuminated CMOS

- 2,560 x 10,000
- 7.5 *µ*m pixel
- Full well ~ 30,000 e
- R.N. ~ 2 e
- Dark: 90 e/s/pix @ 300 K
- K4D-F42008

• 6.5 Hz (Goal 10 Hz)

■ 外形寸法図(単位:mm)





Back Illuminated CMOS





Back Illuminated CMOS



Back Illuminated CMOS



NAOJ

HSC



- 2 ~ 3 scientific grade CMOSs will be delivered under the contract covered by this grant.
 - Test observing at a small telescope in FY19
- 10 is necessary to cover Subaru Prime Focus focal plane.

d = 0.5 deg

• Further grant must be secured.





Summary





