

Status Report of HSC SSP

Satoshi Miyazaki

Subaru UM 2021/03/03

E-mail to the Collaboration from Yasuda-san

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件名: [HSC 2836] HSC-SSP Update

日付: 2020年10月27日 3:00

宛先: Discussions about the Hyper-SuprimeCam collaboration. hsc@astro.princeton.edu

Dear HSC-SSP collaboration members,

We are pleased to inform you that we have successfully completed the originally allocated 300 nights observation this month.

We still have additional ~30 nights to compensate for terrible weather in S18A and various troubles happened over the last few years.

At the same time the full color full depth area (5 dithers in i, z, and y-band are regarded as full depth) has reached 900 square degrees. We expect we will cover ~1100 square degrees at the completion of SSP(*).

The SSP observations have been carried out by many people including theorists coordinated by Masahiro at early stage of the survey and with the major contributions by students and postdocs at NAOJ and University of Tokyo coordinated by Masayuki in recent years. We thank them for their significant contributions to the survey. We also thank the observatory staff for their continued support.

Regards,

Satoshi Miyazaki

Naoki Yasuda

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Naoki Yasuda

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Message 2836 of HSC - Discussions about the Hyper-SuprimeCam collaboration
HSC@astro.princeton.edu
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On 2020/10, the initially allocated 300 nights observation has been completed. The survey started on 2014/03 (~ 1.5 year behind).

Full color-Full depth field already reaches up to 900 deg².

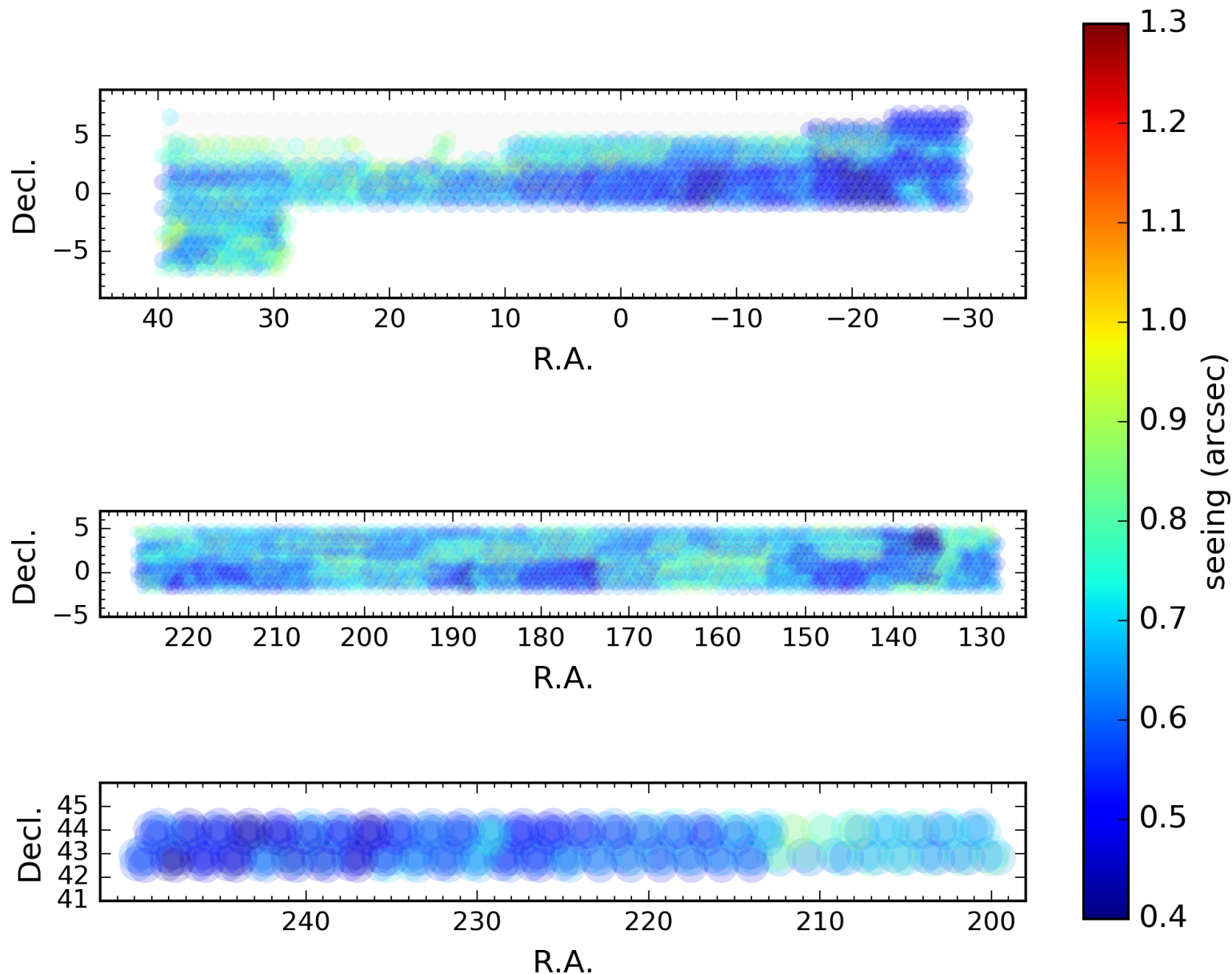
Additional 30 nights has already been allocated to compensate the extremely bad weather. 1100 deg² will be covered (goal:1200).

The left over concentrates on the fall field and therefore, the completion would be S22B. (TUE maintenance this spring also cause the delay.)

Unique feature of HSC-SSP Survey: The Image Quality

HSC-i

Created at 2021-01-20 14:09:36

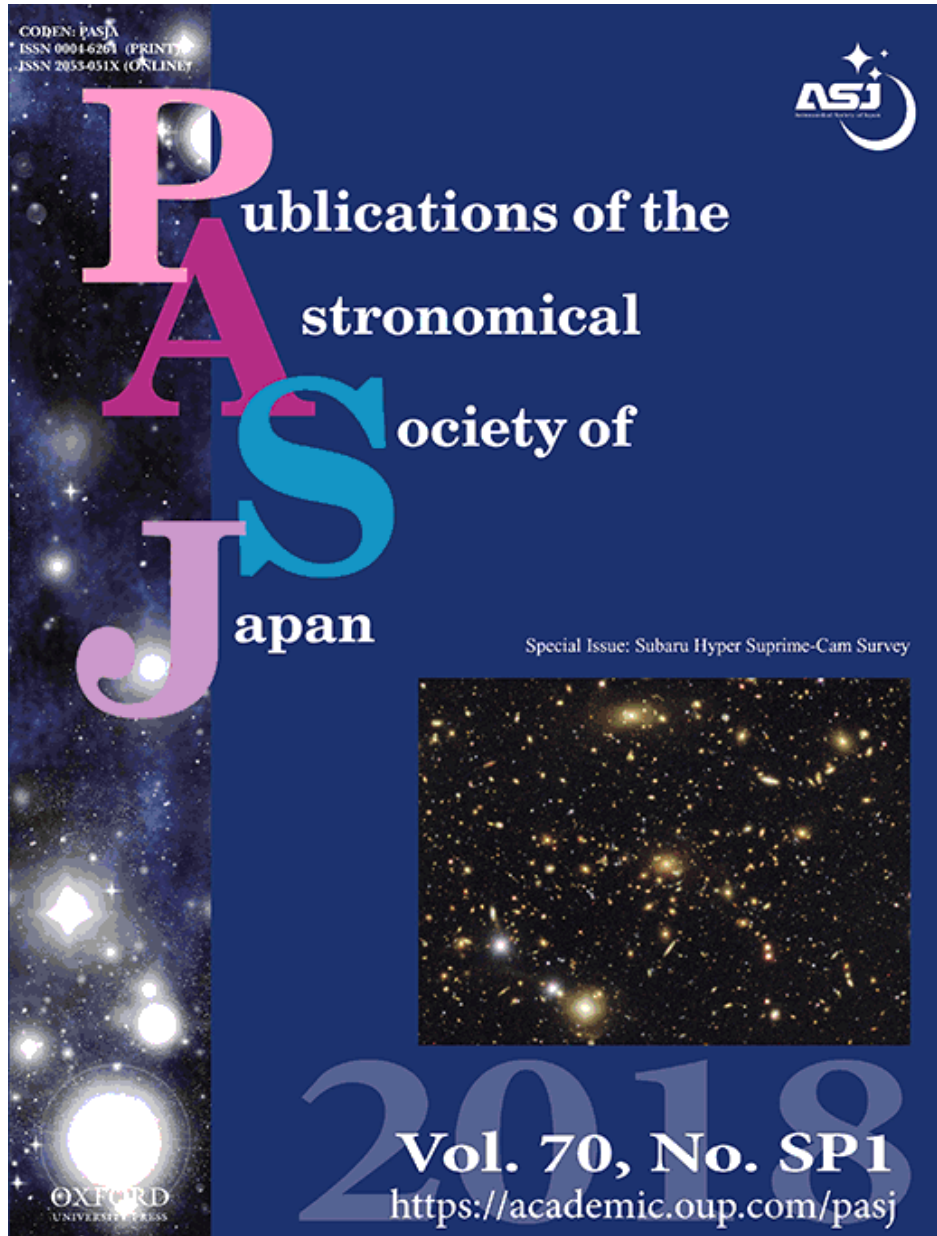


No other survey realized 0.5-0.7 arc-sec seeing imaging over ~ 1000 square degrees.

This may be true even afterwards.

(LSST expected median seeing ~ 0.7)

Science Reports at PASJ HSC Special Issue



- 2018/02
- 40 papers based on the S16A (170 deg^2)
- $t = 3 \text{ cm}$, $w = 2 \text{ kg}$

Citations Ranking on PASJ 2017 - 2020

HSC Related
papers
dominates
(7/8)

- 1 ☐ 2018PASJ...70S...4A 2018/01 cited: 292   
[The Hyper Suprime-Cam SSP Survey: Overview and survey design](#)
Aihara, Hiroaki; Arimoto, Nobuo; Armstrong, Robert *and 141 more*
- 2 ☐ 2018PASJ...70S...8A 2018/01 cited: 247   
[First data release of the Hyper Suprime-Cam Subaru Strategic Program](#)
Aihara, Hiroaki; Armstrong, Robert; Bickerton, Steven *and 107 more*
- 3 ☐ 2018PASJ...70S...5B 2018/01 cited: 160   
[The Hyper Suprime-Cam software pipeline](#)
Bosch, James; Armstrong, Robert; Bickerton, Steven *and 32 more*
- 4 ☐ 2018PASJ...70S...1M 2018/01 cited: 151   
[Hyper Suprime-Cam: System design and verification of image quality](#)
Miyazaki, Satoshi; Komiyama, Yutaka; Kawanomoto, Satoshi *and 83 more*
- 5 ☐ 2017PASJ...69..102T 2017/12 cited: 131   
[Kilonova from post-merger ejecta as an optical and near-Infrared counterpart of GW170817](#)
Tanaka, Masaomi; Utsumi, Yousuke; Mazzali, Paolo A. *and 42 more*
- 6 ☐ 2019PASJ...71...43H 2019/04 cited: 128   
[Cosmology from cosmic shear power spectra with Subaru Hyper Suprime-Cam first-year data](#)
Hikage, Chiaki; Oguri, Masamune; Hamana, Takashi *and 34 more*
- 7 ☐ 2018PASJ...70S..25M 2018/01 cited: 105   
[The first-year shear catalog of the Subaru Hyper Suprime-Cam Subaru Strategic Program Survey](#)
Mandelbaum, Rachel; Miyatake, Hironao; Hamana, Takashi *and 28 more*
- 8 ☐ 2018PASJ...70S...9T 2018/01 cited: 105   
[Photometric redshifts for Hyper Suprime-Cam Subaru Strategic Program Data Release 1](#)
Tanaka, Masayuki; Coupon, Jean; Hsieh, Bau-Ching *and 6 more*

Citations Ranking on PASJ 2017 - 2020

Domination also continues after 8.

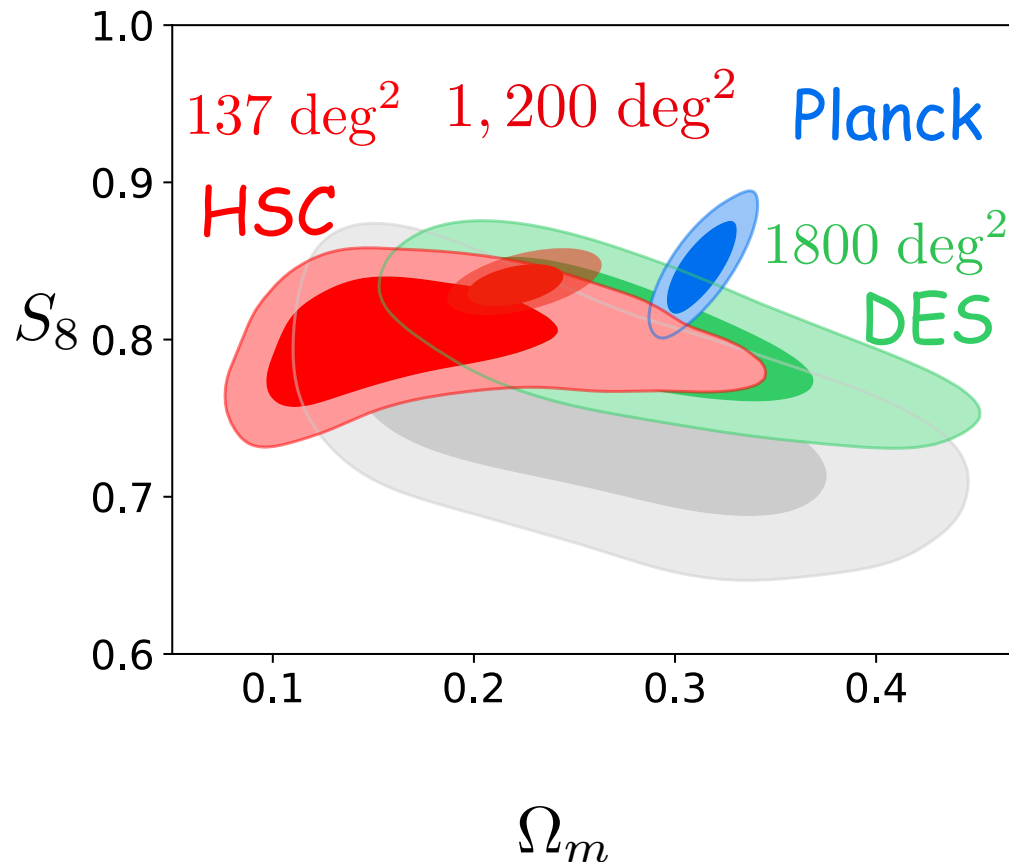
→ 9	2018PASJ...70S..100	2018/01	cited: 89	16	2018PASJ...70S..200	2018/01	cited: 66
	Great Optically Luminous Dropout Research Using Subaru HSC (GOLDRUSH). I. UV luminosity functions at $z \sim 4-7$ derived with the half-million dropouts on the 100 deg² sky				An optically-selected cluster catalog at redshift $0.1 < z < 1.1$ from the Hyper Suprime-Cam Subaru Strategic Program S16A data		
	Ono, Yoshiaki; Ouchi, Masami; Harikane, Yuichi <i>and 23 more</i>				Oguri, Masamune; Lin, Yen-Ting; Lin, Sheng-Chieh <i>and 22 more</i>		
→ 10	2018PASJ...70S..130	2018/01	cited: 88	→ 17	2018PASJ...70S..11H	2018/01	cited: 66
	Systematic Identification of LAEs for Visible Exploration and Reionization Research Using Subaru HSC (SILVERRUSH). I. Program strategy and clustering properties of ~ 2000 Lyα emitters at $z = 6-7$ over the 0.3-0.5 Gpc² survey area				GOLDRUSH. II. Clustering of galaxies at $z \sim 4-6$ revealed with the half-million dropouts over the 100 deg² area corresponding to 1 Gpc³		
	Ouchi, Masami; Harikane, Yuichi; Shibuya, Takatoshi <i>and 17 more</i>				Harikane, Yuichi; Ouchi, Masami; Ono, Yoshiaki <i>and 15 more</i>		
→ 11	2018PASJ...70S...2K	2018/01	cited: 84	18	2019PASJ...71...71H	2019/08	cited: 65
	Hyper Suprime-Cam: Camera dewar design				Big Three Dragons: A $z = 7.15$ Lyman-break galaxy detected in [O III] 88 μm, [C II] 158 μm, and dust continuum with ALMA		
	Komiyama, Yutaka; Obuchi, Yoshiyuki; Nakaya, Hidehiko <i>and 15 more</i>			→ 19	2018PASJ...70S..37G		
→ 12	2018PASJ...70S...3F	2018/01	cited: 81		2018/01 cited: 62		
	The on-site quality-assurance system for Hyper Suprime-Cam: OSQAH				Galaxy interactions trigger rapid black hole growth: An unprecedented view from the Hyper Suprime-Cam survey		
	Furusawa, Hisanori; Koike, Michitaro; Takata, Tadafumi <i>and 24 more</i>				Goulding, Andy D.; Greene, Jenny E.; Bezanson, Rachel <i>and 6 more</i>		
13	2017PASJ...69..101U	2017/12	cited: 75	→ 20	2018PASJ...70...66K	2018/08	cited: 61
	J-GEM observations of an electromagnetic counterpart to the neutron star merger GW170817				Hyper Suprime-Cam: Filters		
	Utsumi, Yousuke; Tanaka, Masaomi; Tominaga, Nozomu <i>and 56 more</i>				Kawanomoto, Satoshi; Uraguchi, Fumihiro; Komiyama, Yutaka <i>and 7 more</i>		
→ 14	2018PASJ...70S..16K	2018/01	cited: 71	21	2018PASJ...70....9H	2018/03	cited: 61
	SILVERRUSH. IV. Lyα luminosity functions at $z = 5.7$ and 6.6 studied with ~ 1300 Lyα emitters on the 14-21 deg² sky				Atmospheric gas dynamics in the Perseus cluster observed with Hitomi		
	Konno, Akira; Ouchi, Masami; Shibuya, Takatoshi <i>and 18 more</i>			→ 22	2018PASJ...70S..35M		
→ 15	2018PASJ...70S..15S	2018/01	cited: 67		2018/01 cited: 57		
	SILVERRUSH. III. Deep optical and near-infrared spectroscopy for Lyα and UV-nebular lines of bright Lyα emitters at $z = 6-7$				Subaru High-z Exploration of Low-Luminosity Quasars (SHELLQs). II. Discovery of 32 quasars and luminous galaxies at $5.7 < z \leq 6.8$		
	Shibuya, Takatoshi; Ouchi, Masami; Harikane, Yuichi <i>and 23 more</i>				Matsuoka, Yoshiki; Onoue, Masafusa; Kashikawa, Nobunari <i>and 43 more</i>		

This contributes to realize the boost of PASJ Impact Factor from 2.750 (2019) to 5.024 (2020).

Cosmology Papers

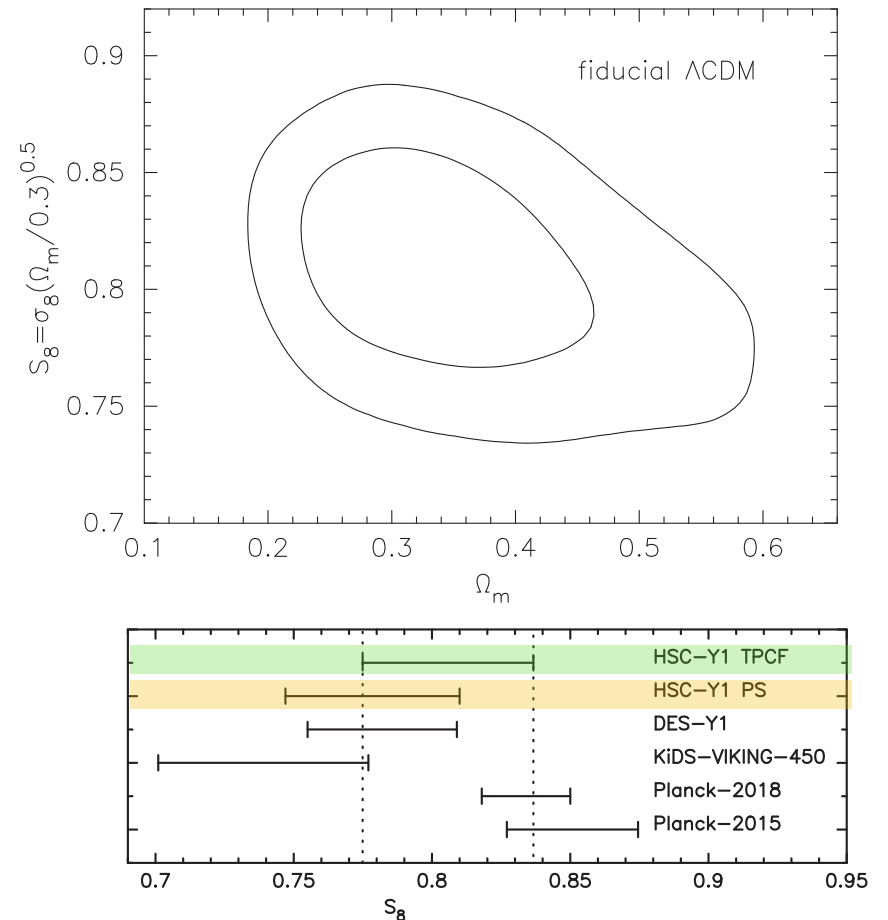
Cosmic Shear Tomography to challenge standard LCDM

PASJ Excellent Paper Award 2020 !



Hikage et al. (2019) in Fourier space

$$300 < \ell < 1900$$



Hamana et al. (2020) in Real space

$$\ell < 300$$

The error contour is different because the observed angular scale is different.

Internal Data Release and Public Data Release

IDR

S16A	2016/08/04	Data used for the special issue.
S17A	2017/09/28	
S18A	2018/06/25	PDR2 on 2019/05/30. 174 nights.
S19A	2019/09/25	
S20A	2020/08/03	~275 nights. This will eventually become PDR3
S21A	2021/05	Possibly an incremental release (~318 nights)
S22A	2022/05?	Final data release (330 nights). This will become PDR4

PDR

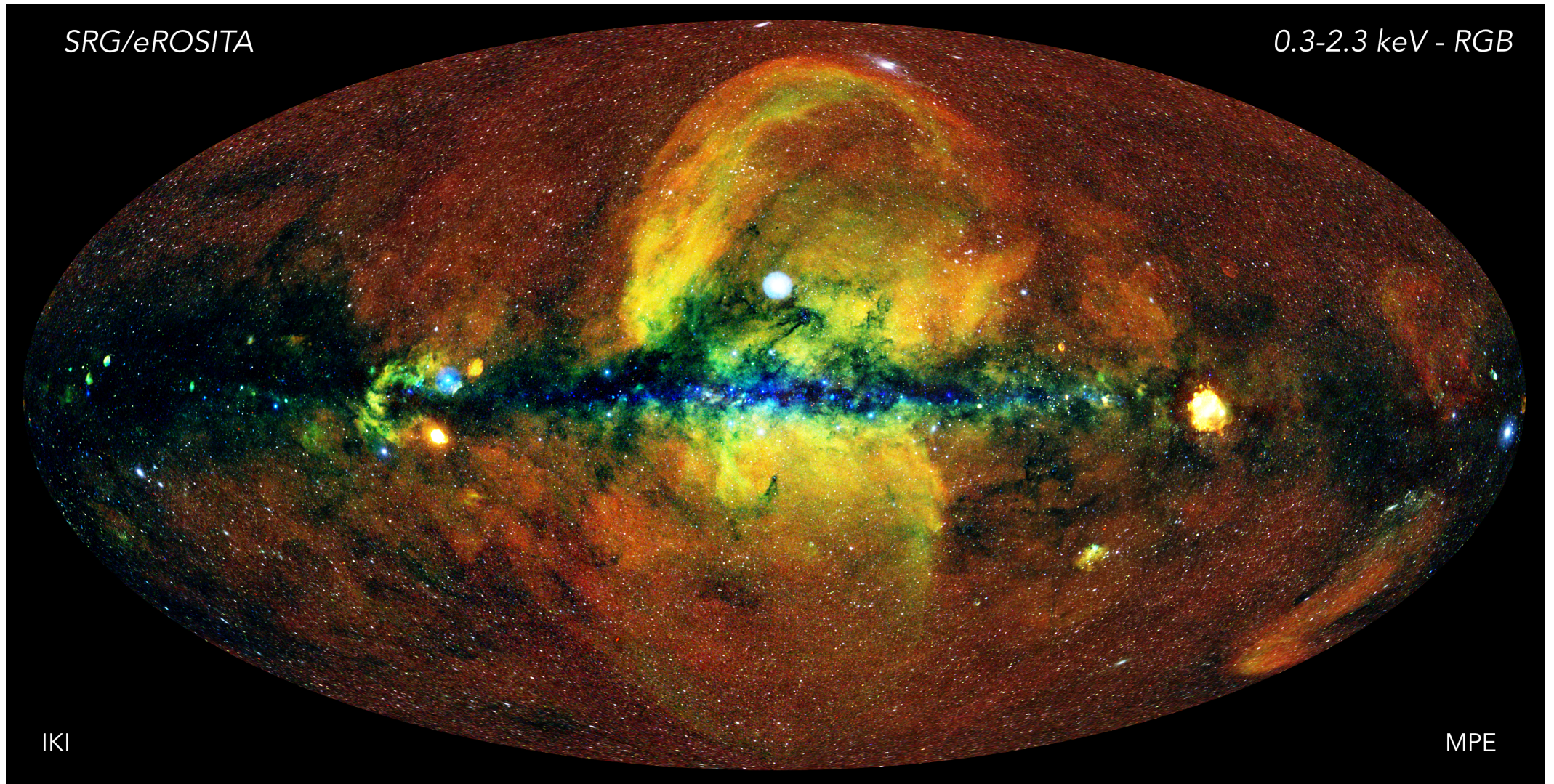
PDR1	2017/02/28	FCFD area only. 61.5 nights
PDR2	2019/05/30	174 nights
PDR3	2021/08?	We release the processed data as PDR3.
PDR4	TBD	All data. Final data release. 330 nights.

< 1
year

Some collaboration members concerned about the short period between IDR and PDR.

Long lead time of Weak Lensing Catalog. The one based on S19A not available until very recently...

eROSITA



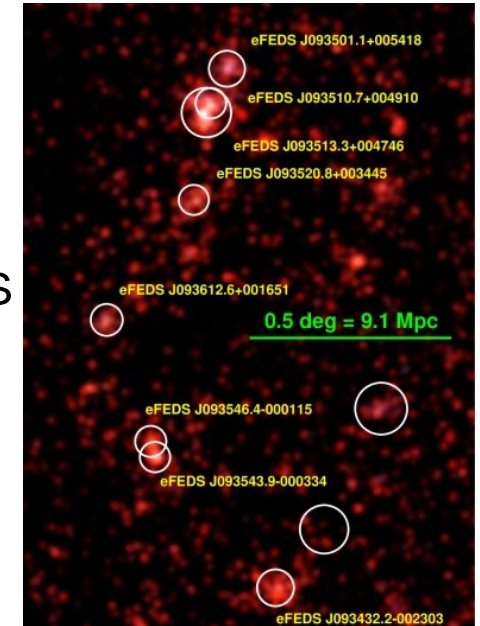
1st all sky sweep completed mid 2020: already 4 times deeper than RASS

HSC-eROSITA_DE collaboration

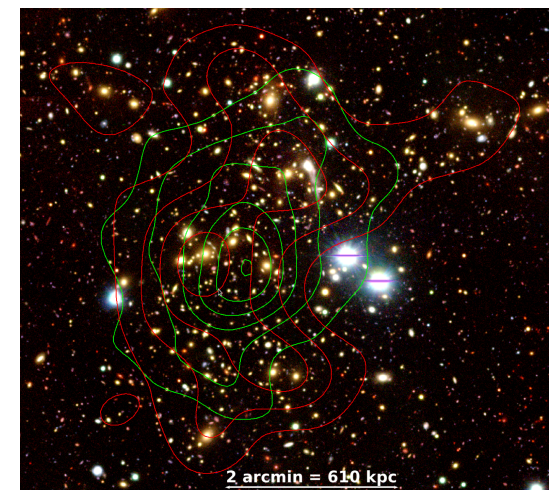
analysis in eROSITA Final Equatorial Depth Survey (eFEDS) [$\sim 140 \text{ deg}^2$]

- X-ray cluster catalog
(M. Klein, M. Oguri, A. Liu, N. Okabe, ...)
[1 paper published, a few papers coming soon]
- X-ray properties of optical/WL selected clusters
(N. Ota, I. Mitsuishi, M. Ramos-Ceja, S. Miyazaki, ...)
[a few papers coming soon]
- Weak lensing analysis of X-ray clusters
(I. Chiu, E. Bulbul, ...)
[a few papers coming soon]
- Galaxy properties, splashback radius, ...
(S. More, A. Leauthaud, L. Kawinwanichakij, S. Grandis, ...)
- see Y. Toba's talk [o27] for AGN results!

(Borrowed from Oguri-san)



new supercluster in eFEDS at $z=0.36$
(Ghirardini+2021)



Subjects toward the Final Data Release

- Accurate Photometry ($\sim 1\%$)
 - challenging to realize over 1100 deg² but ****MUST**** (Gunn-sensei)
- Generation of Weak Lensing Catalog
 - So far, pipeline has been updated by LSST Software Group. New release introduced new program taking more time than originally expected.
 - Introduction of a modern sophisticated calibration method (such as Meta Calibration) was preferred but given up because of the time pressure. (Need more man power)

Appropriate retain and re-location of human resources would be necessary to deal with these issues.

HSC is crying for "Maintenance"

Maintenance comes with ...

- 1 year scale shutdown
 - Camera Dewar must be brought back to Mitaka.
- Risk to damage other CCDs
- Two CCDs has been procured. Two more needed.

Time frame around Year 2023-24 might be a good time because the PFS operation will have started ?