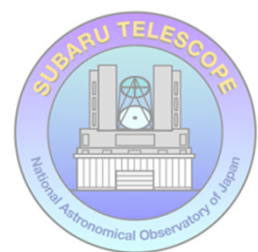


Instrument Report

Takashi Hattori (Instrument Division, Subaru Telescope)

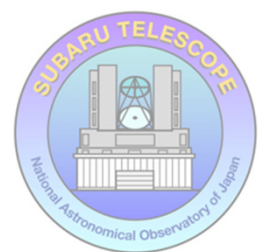
Subaru UM2023



HSC

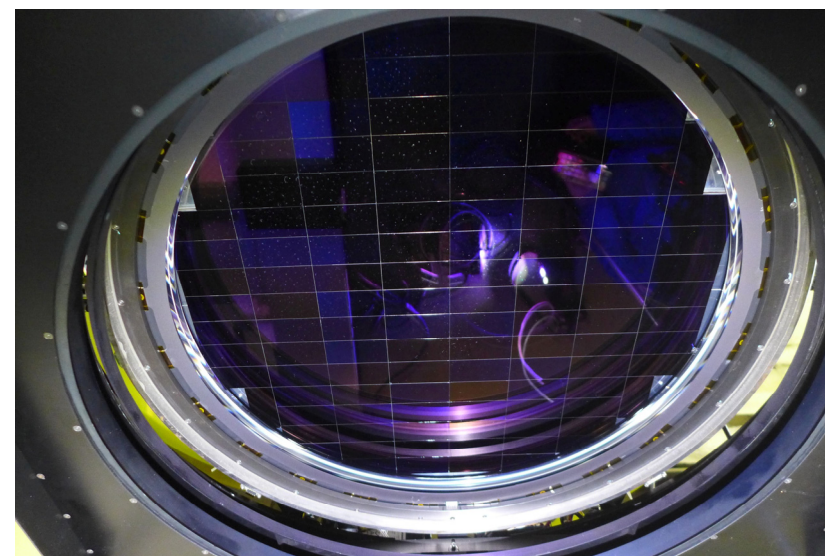
- ▶ Vacuum leak incident on 6/8/2023
 - POpt2+HSC installation to the telescope
 - Procedure before moving POpt2+HSC
 1. close vacuum valve at HSC entrance
 2. stop vacuum pump
 3. disconnect the vacuum hose
 - Unusual situation on 6/8
 - vacuum hose was connected to HSC, but the valve was not open or the pump was not running (the hose was not under vacuum)
 - the valve was accidentally opened for short time
 - CCD temperature was $\sim -105^{\circ}\text{C}$, and the vacuum level went up to ~ 70 Torr.

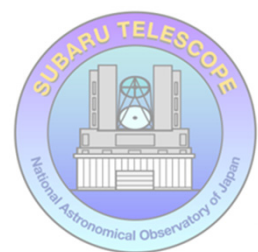




HSC

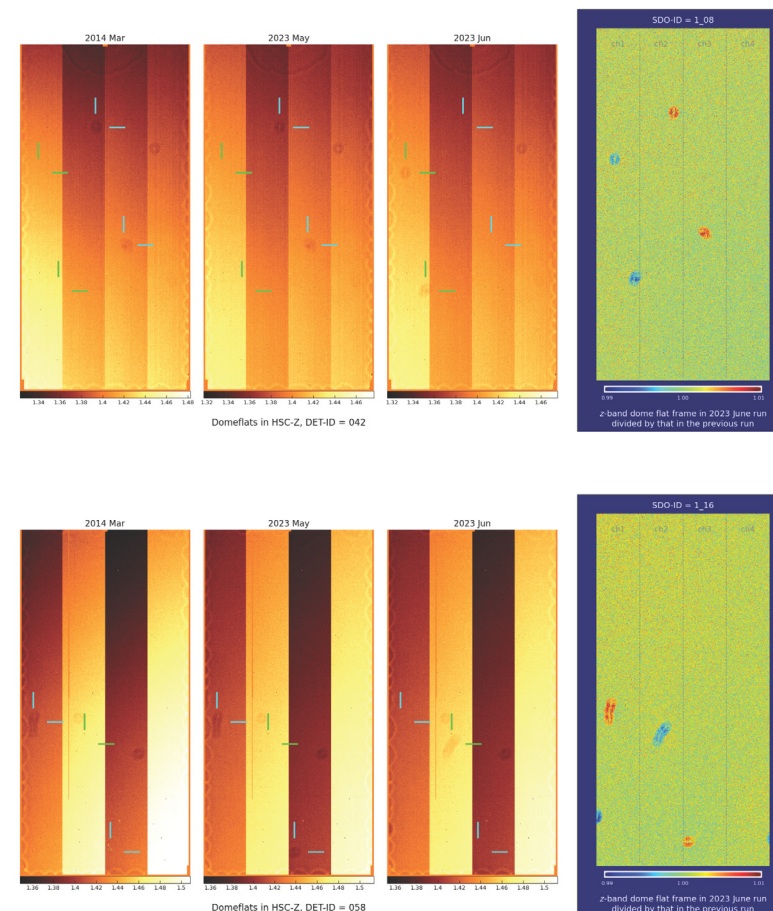
- ▶ Vacuum leak incident on 6/8/2023
 - Right after the incident,
 - stopped ion-pump and coolers
 - started vacuum pumping with the external pump immediately
 - HSC was removed from POpt2 next day, 6/9, for visual inspection
 - no apparent damage was found
 - HSC was reinstalled to POpt2
 - restarted the cooling down process
 - operation test of the cooler, ion-pump, and CCDs
 - HSC run was delayed by ~1 week

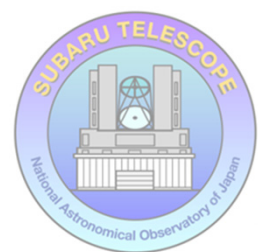




HSC

- ▶ Vacuum leak incident on 6/8
 - comparison of CCD images before and after the incident
 - some dust features were moved
 - no damage or degradation
 - report
- https://www.subarutelescope.org/Observing/Instruments/HSC/hsc_announcement_2023jun.pdf
- to avoid similar incidents in future
 - procedure improvement
 - better understanding of instrument status and operation

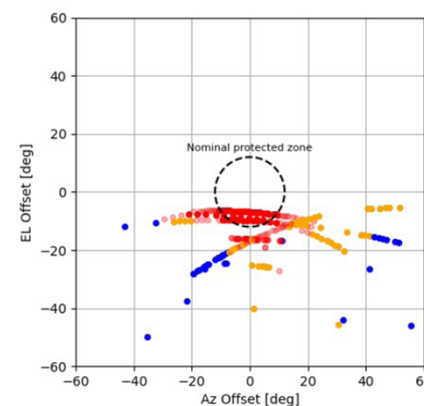




LGS/AO188

► new Laser Guide Star Facility system

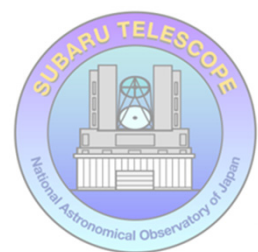
- no open-use or engineering observation since the last UM
- TBAD status
 - Transponder-Based Aircraft Detection system
 - Necessary for the operation of LGS without spotters
 - The system is ready, but needs the final flyover test with a dedicated aircraft
 - Difficulty in finding an aircraft in Hawaii which can go as high as 30,000 feet.
 - Retirement of the aircraft which was used for flyover tests in the past
 - Possibility of private-jet company or using an unmanned aircraft (drone) owned by the Marine Corps
 - Pacific Air Charters found an aircraft in late December
 - Flyover test in Feb.–March?



Az/El offsets of aircrafts from the telescope pointing

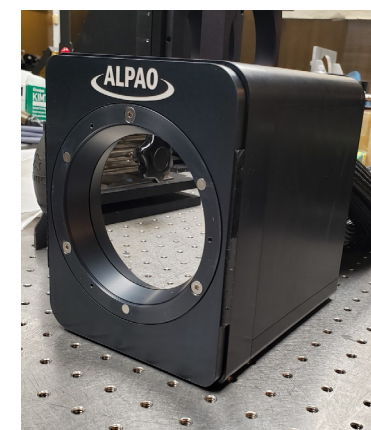
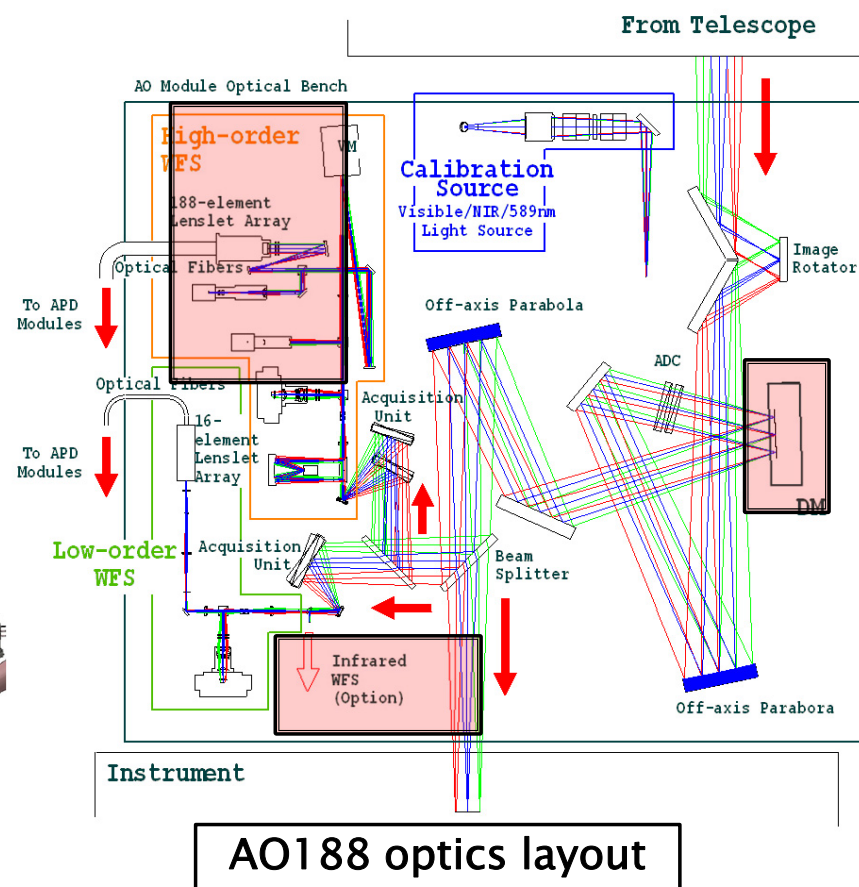
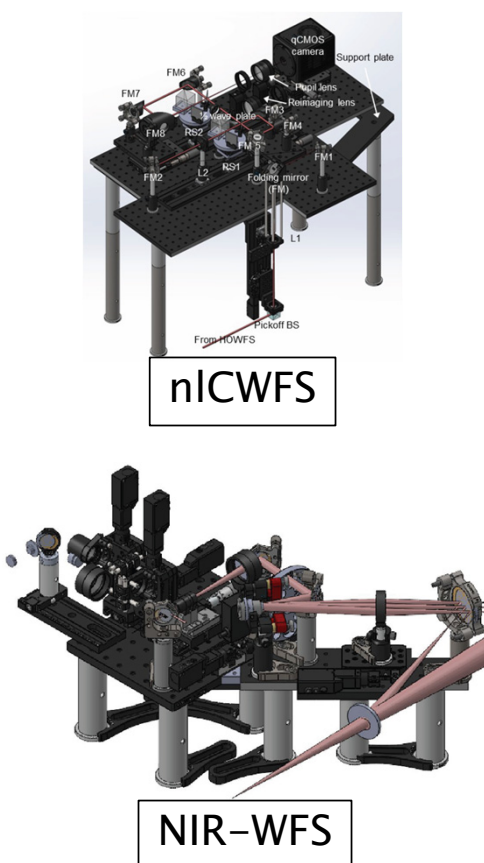


TBAD antennae on the Subaru Telescope



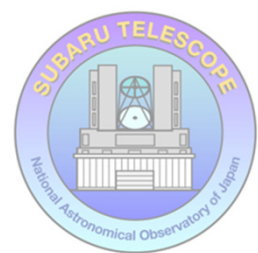
LGS/AO188

► upgrade of AO188 (“AO3K” project)



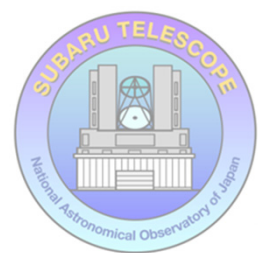
3k DM

new RTS



LGS/AO188

- ▶ upgrade of AO188 (“AO3K” project)
 - Poster presentations
 - P11 “AO3k: Major update of AO188” (Yoshito Ono)
 - P12 “A new visible wavefront sensor for AO3k” (Kyohoon Ahn)
 - Oral presentation
 - 1/24 15:45–16:00
“AO3k at Subaru: First on-sky results of the facility extreme-AO”
(Julien Lozi; REMOTE)
 - Status
 - NIR-WFS : open-use from S24A
 - nICWFS : installed to AO188, test in S24A
 - 3k DM : review is planned



IRCS

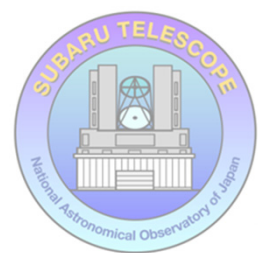
▶ observation with NIR-WFS

- newly available from S24A
 - 20 mas imaging mode in YJHK-band
 - Echelle spectroscopy with zJ, J, H, and K-band

https://www.naoj.org/Observing/Instruments/IRCS/nirwfs_24a.html

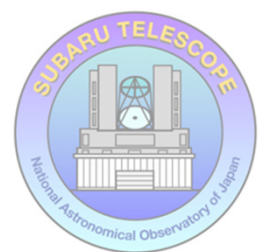
▶ user filters for IRCS

- Although IRCS filter slots are limited, we still accept proposals for user-filter installation
- Please see the IRCS web site
 - <https://www.naoj.org/Observing/Instruments/IRCS/> (to be updated for S24B)
 - IRCS user filter policy



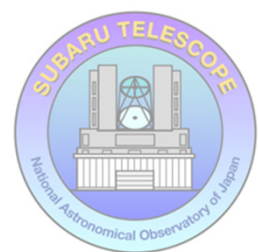
NBS

- ▶ Nasmyth Beam Switcher
 - Poster presentation
 - P03: Subaru Nasmyth Beam Switcher (Takashi Hattori)



HDS (summary)

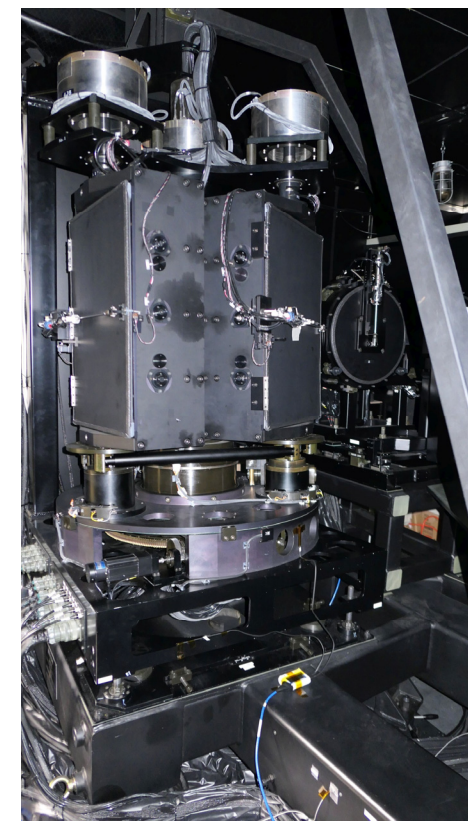
- ▶ various troubles
 - Cross Disperser issue
 - 2023 June to Aug.
 - CCD readout issue (bright horizontal stripes in the Blue CCD)
 - 2023 Aug. to Nov., characterization is still ongoing
 - Trouble with “slit-width” motor driver
 - 2023 Dec. to 2024 Jan.
 - Messia5 board replacement
 - 2024 Jan.
 - Collimator status issue
 - 2024 Jan. –
- ▶ Laser-comb for HDS (PI device)
 - P18 “Astrocomb for HDS precise wavelength calibration” (Masashi Omiya)



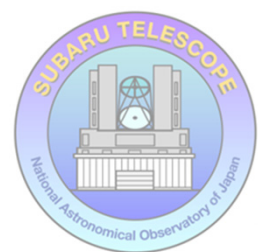
HDS

► Cross Disperser issue

- Occasionally generates vibrating noise (2018–)
 - replacement of damaged gears and bearings
 - adjustment of gear separation, control speed, etc.
 - some improvement, but not solved yet
- In 2023,
 - stopped the motion several times due to overload while switching the Cross Disperser
 - replacing the motor and driver didn't improve the situation
 - then, tried to adjust the driver control parameters
 - “time-constant for low-pass filter” can suppress the vibration

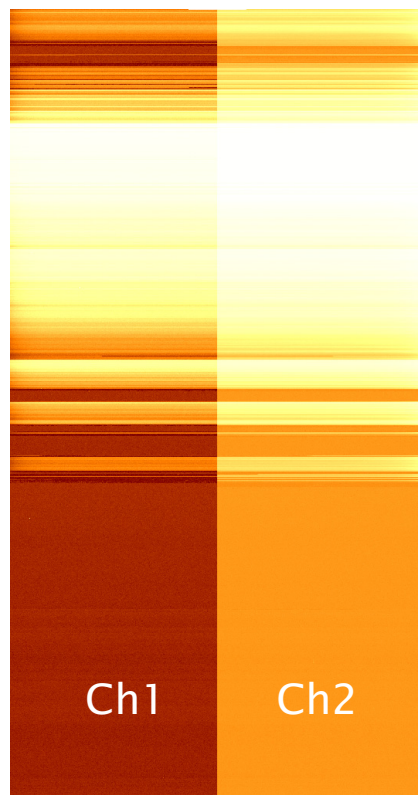


HDS Cross Disperser Unit

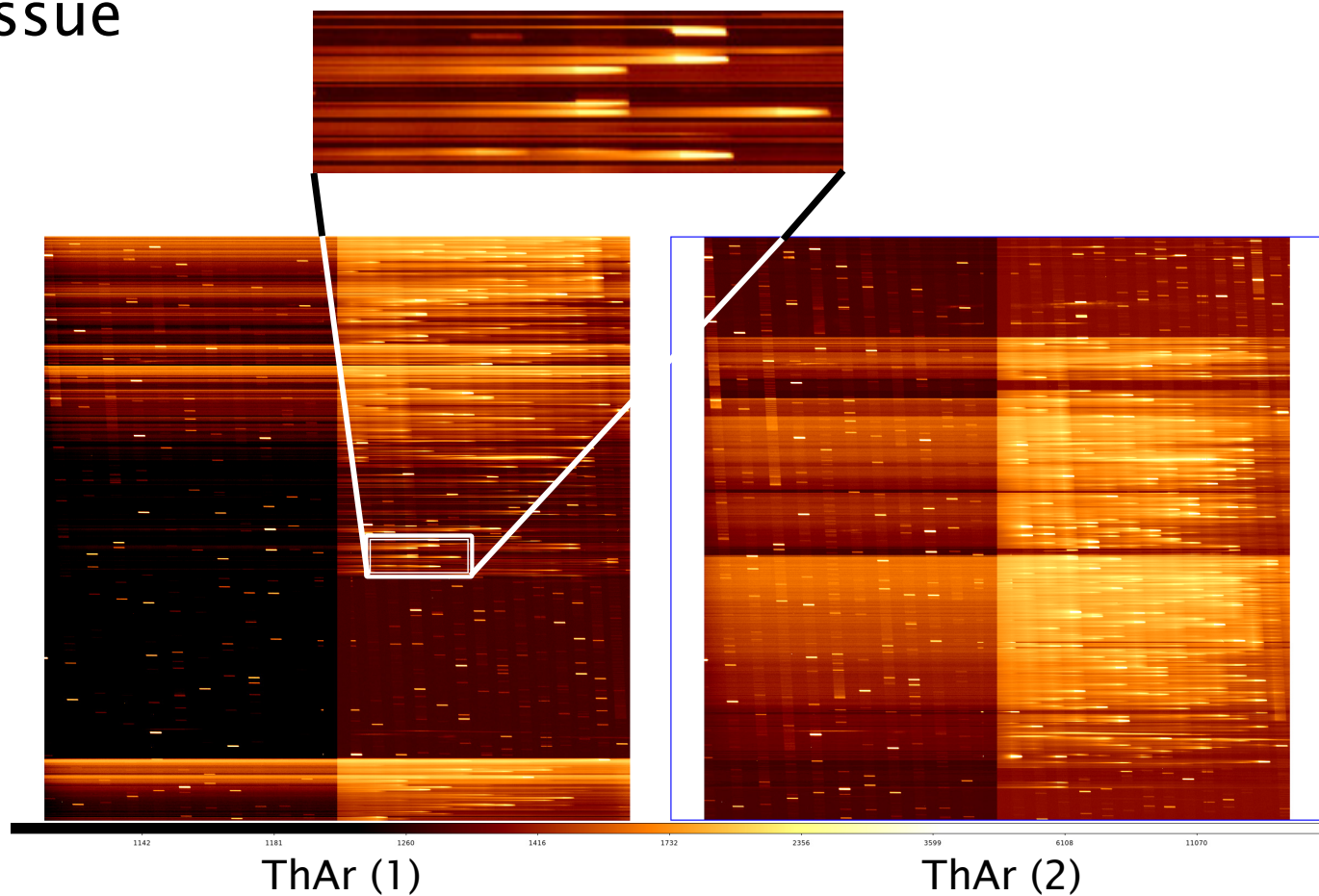


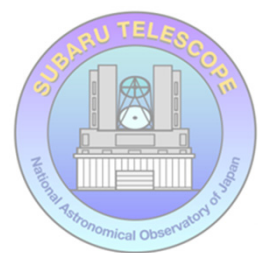
HDS

► Blue CCD readout issue



1x1 bias full-frame

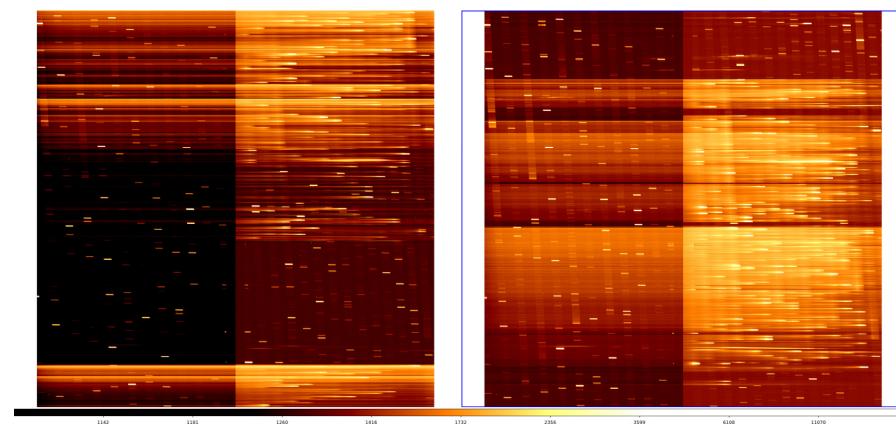


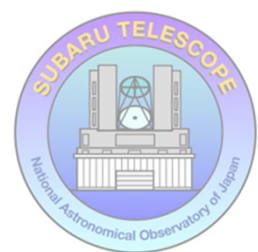


HDS

► Blue CCD readout issue

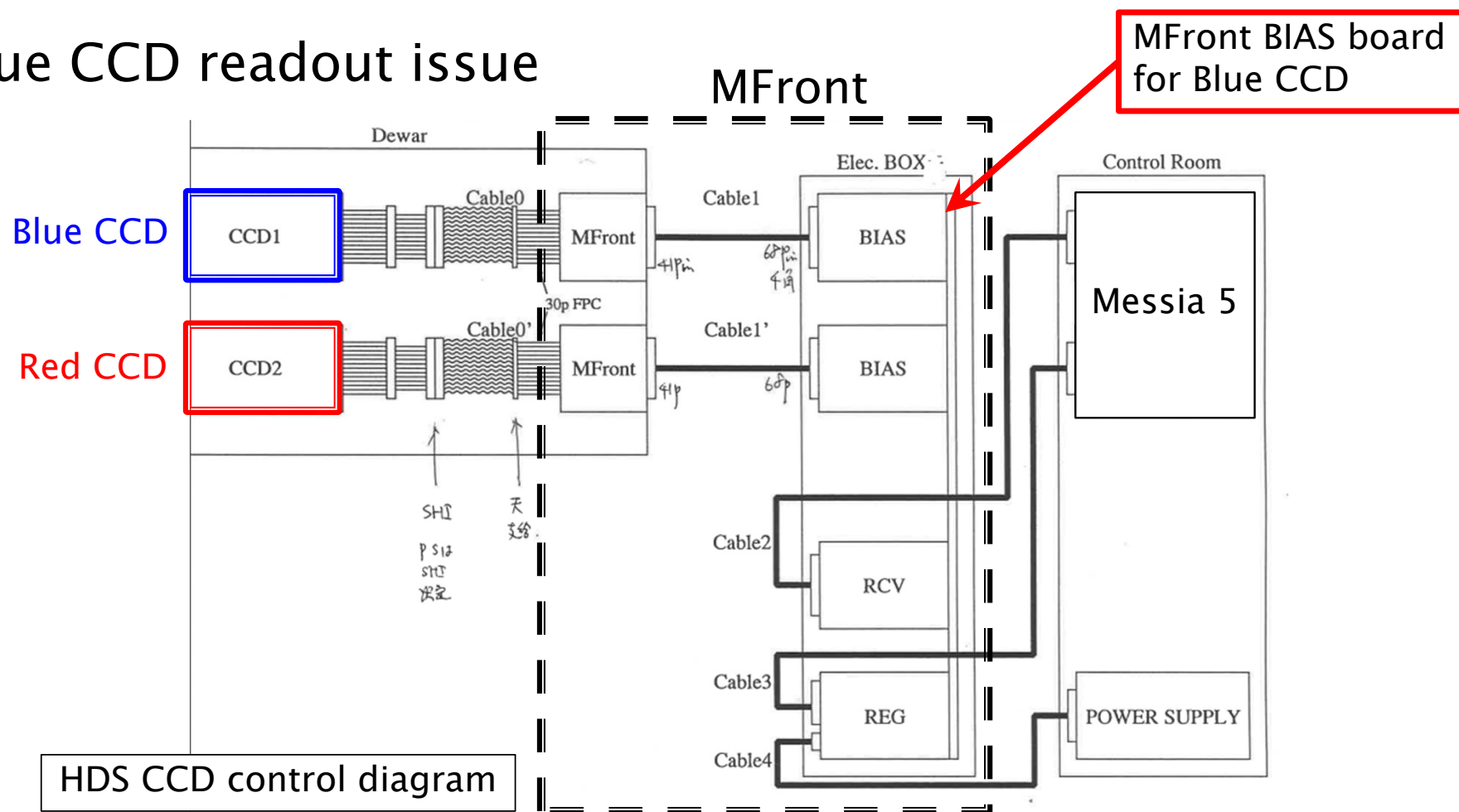
- Found on 2023/8/30
- random and bright horizontal stripes
- light streak toward serial readout direction in the right half of the CCD image
- Red CCD was totally fine
 - asked the observer on 9/1 to use only Red CCD

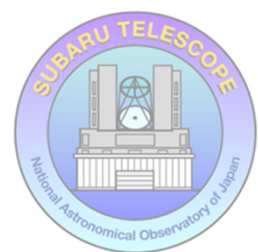




HDS

Blue CCD readout issue

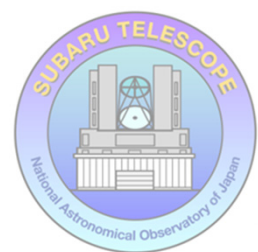




HDS

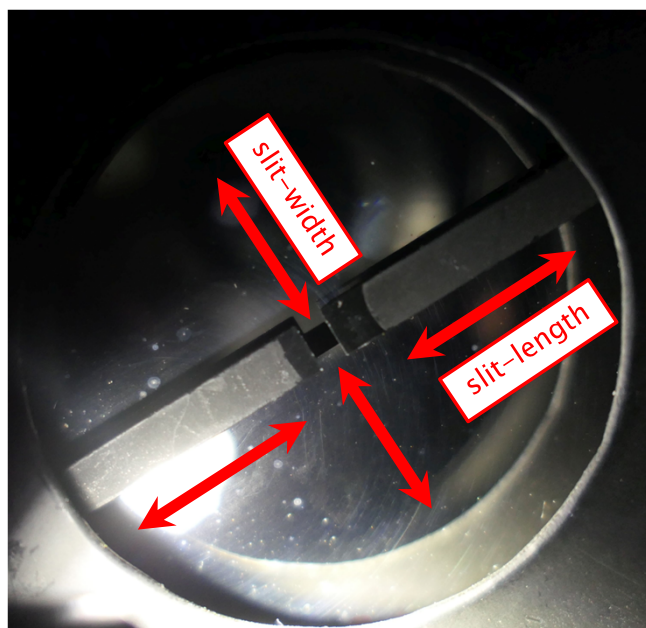
► Blue CCD readout issue

- MFront BIAS board replacement
 - It took long time to recover the readout system because ...
 - information how to disassemble the electronics box was lost
 - the BIAS board had to be customized for HDS
 - one of the SIGADC boards, which are on the BIAS board, was accidentally damaged during the recovery work
 - had to replace the SIGADC board
 - Blue CCD readout was recovered in Nov. 2023, but detailed gain and linearity measurements are still to be done (in Jan. 2024)

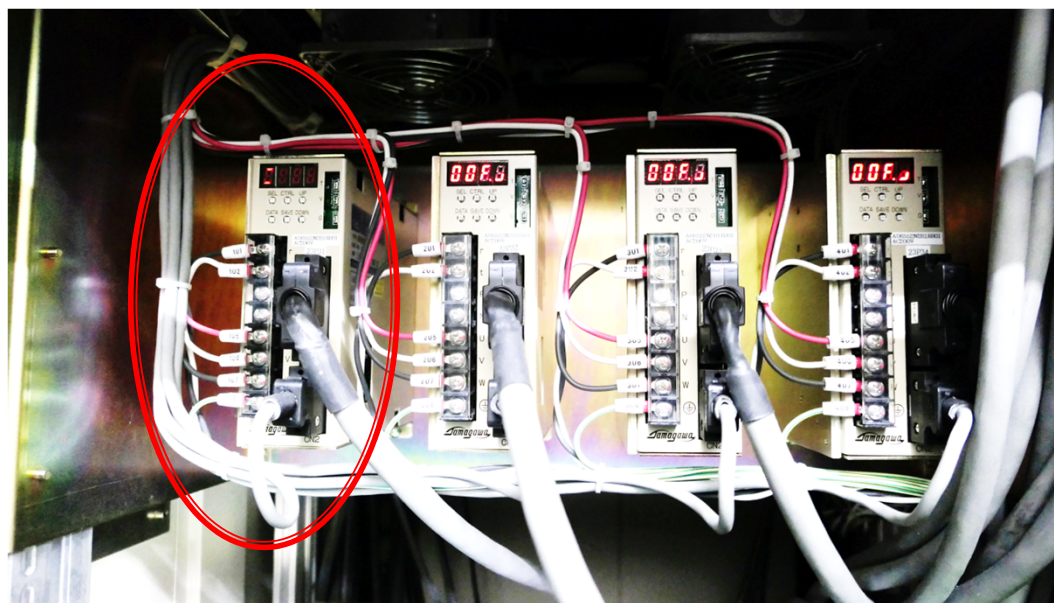


HDS

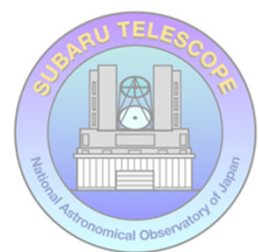
- ▶ Trouble with the “slit-width” motor driver for slit-width
 - Happened on 2023/12/1(TBD) when trying to measure the gain and linearity of the Blue CCD...



HDS entrance slit unit

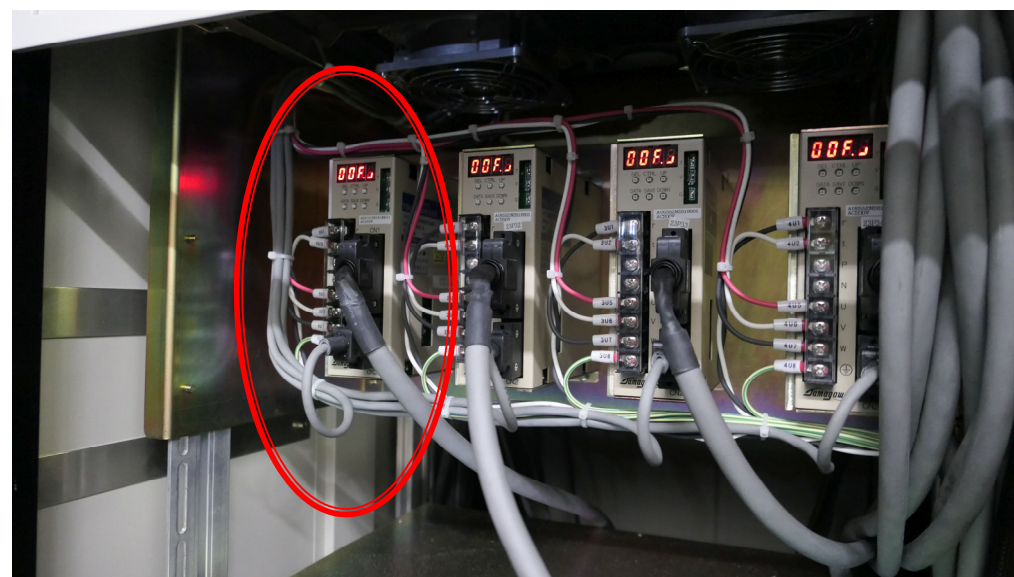


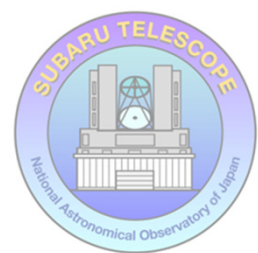
The driver for “slit-width” suddenly stopped working



HDS

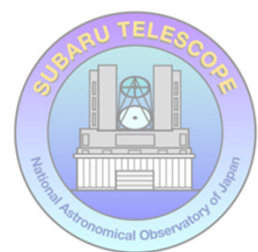
- ▶ Trouble with the “slit-width” motor driver for slit-width
 - It was recovered by replacing the driver to a spare
 - It is a spare driver for the telescope (tertiary mirror)
 - The driver is no longer available for purchase
 - Working on the repair of the broken driver.





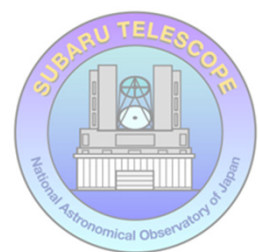
HDS

- ▶ Messia5 board replacement
 - issue with the initialization process
 - replaced the Messia5 board (DSP + M5 combo card)
- ▶ Collimator status issue
 - occasionally loose the initialization status
 - The motor controller, VxWorks, cannot remember it was initialized before...
 - Probably need to replace the VxWorks CPU board



MOIRCS

- ▶ MOIRCS in 2023
 - ... the Year of Restarting Operation after Hibernation.
 - Engineering tests and the open-use operation were significantly affected by bad weathers
 - Imaging Programs went well, including service programs.
 - Some engineering items for spectroscopy mode carried over to 2024.
- ▶ We started a new (but conditional) MOS Service program.
 - Discussion ongoing



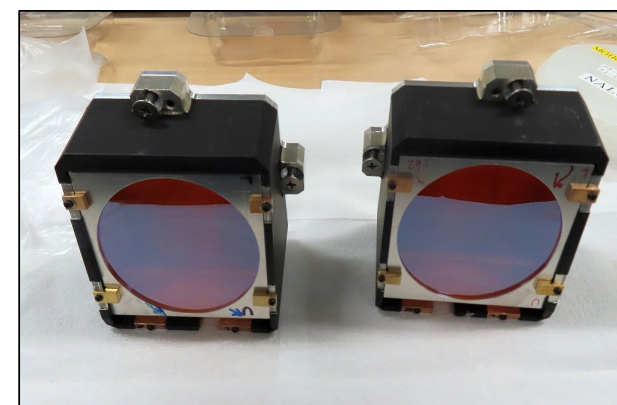
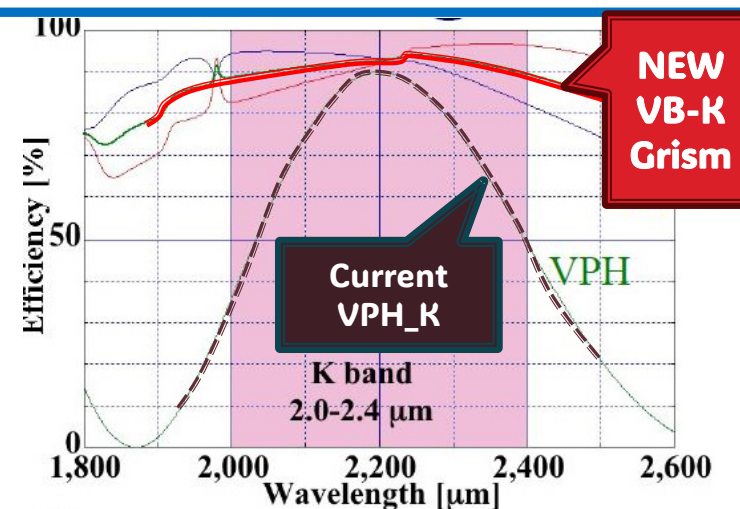
MOIRCS

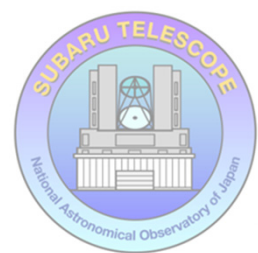
► New VB-K grism

- Similar spectral resolution to VPH-K but much wider spectral coverage
- Fabrication and installation to MOIRCS completed
- Ready for testing
 - on-sky test in February?
- See the poster for details

P10: Development of MOIRCS medium-dispersion grism with high efficiency and wide spectral coverage (Ichi Tanaka)

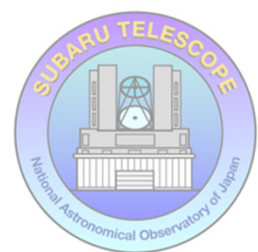
P22: Novel high-dispersion, high-efficiency, broadband transmission gratings (Noboru Ebizuka)





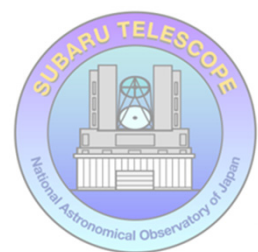
FOCAS

- ▶ New IFU project
 - P09: IFU for Technology Verification (Tech. IFU) (Shinobu Ozaki)



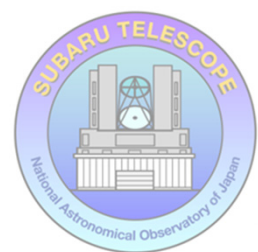
PI Instruments

- ▶ Poster presentations for PI instruments
 - P04: PI-type instrument activities at Subaru Telescope (Hirofumi Okita)
 - New procedure and summary of PI instruments
 - SCExAO
 - P36: SCExAO/MEC: High speed ultra-low noise spectro-imaging in near-IR (Ben Mazin)
 - P37: SCExAO/FIRST: Interferometric spectro-imaging in visible light (Sébastien Vievard)
 - P38 : SCExAO/fastPDI: Near-IR polarimetric imaging optimized for high contrast imaging (Tomoyuki Kudo)
 - P39:SCExAO/GLINT: Exoplanet detection at small angular separation with photonic nulling (Olivier Guyon)
 - IRD
 - P17: IRD, REACH, and K-REACH: Current Status and Upgrade Plans for Near-Infrared High-Dispersion Spectrometer (Takayuki Kotani)



PI Instruments

- ▶ **Poster presentations for planned PI instruments**
 - P09: IFU for Technology Verification (Tech. IFU) (Shinobu Ozaki)
 - P12: A new visible wavefront sensor for AO3k (Kyohoon Ahn)
 - P14: ULTIMATE-START: Subaru tomography adaptive optics research experiment project status (Masayuki Akiyama)
 - P16: NINJA: the wide-band spectrograph optimized for the Laser Tomography Adaptive Optics (Chihiro Tokoku)
 - P18: Astrocomb for HDS precise wavelength calibration (Masashi Omiya)
 - P23: Resurrection of Subaru+COMICS for the study of solar system objects with ground-based mid-infrared observations (Takafumi Ootsubo)



Summary 2022

Prime Focus

HSC	Vacuum leak incident
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Nasmyth

AO188	AO3k project, TBAD for LGS operation
IRCS	NIR-WFS, user-filter for IRCS
HDS	A lot of issues (due to aging devices?)

Cassegrain

MOIRCS	Restart from hibernation, VB-K grism
FOCAS	No major issue/activity, new IFU project

PI instruments

New procedure for PI instruments
Poster presentations by PIs

