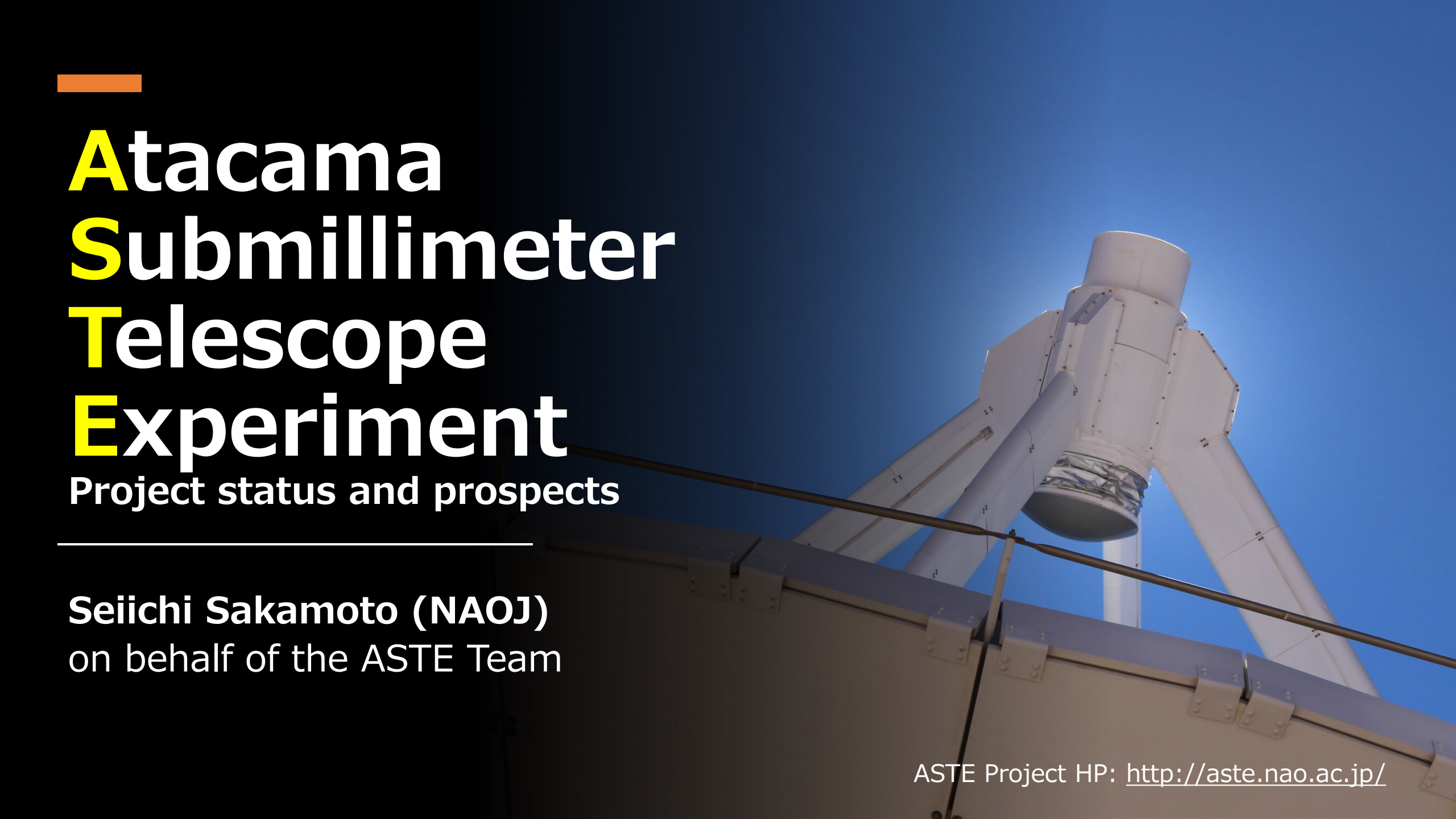
Atacama Submillimeter Telescope Experiment

Project status and prospects

Seiichi Sakamoto (NAOJ)
on behalf of the ASTE Team



ASTE Project HP: http://aste.nao.ac.jp/

Atacama Submillimeter Telescope Experiment

Subaru 1999-
VERA 2001-

- 10-m submm telescope located at Pampa La Bola within the ALMA concession (2002-)
  - Surface accuracy: 19 μm →~45 μm COMING SOON **Deformation correction may be made**
  - Pointing accuracy: ~2″ (rms) **Sugimoto's talk**
  - Receivers: DASH345 (321-376 GHz);
    Band8 → NEW **Wide-IF-bandwidth Band 8** (387-498 GHz, IFBW=16 GHz);
    Band10 (790-940 GHz)
  - Backend: WHSF → NEW **XFFTS**
  - Control and data reduction software:
    - COSMOS3, NEWSTAR/NOSTAR → NEW **CASA**
- Site infrastructure
  - Diesel generator (150 kW-220 V ×2)
  - Fuel tank (15 kL ×2, consumption 300 L/d)
  - Satellite network (1 Mbps)→ COMING SOON **FO (100 Mbps)**
  - Monitor (weather station, web cameras, etc.)

Change of project organization

Name		Position	Effort	Note
Seiichi Sakamoto	阪本成一	Director; Prof	**50%**	+50% for other managerial roles
Rei Enokiya	榎谷玲衣	Specially App Assoc Prof	**45%**	**+45% for TIFUUN**
Tetsuhiro Minamidani	南谷哲宏	Assoc Prof	20%	Main: ALMA Engineering
Takeshi Kamazaki	鎌﨑　剛	Assoc Prof	10%	Main: ALMA WSU
Hiroyuki Nishitani	西谷洋之	Engineer	70%	
Toshihiko Kobiki	木挽俊彦	Engineer	80%	
Javier Aguilera		Site Coordinator	50%	+50% for ALMA Engineering
Javier Zenteno		Site Coordinator	50%	+50% for ALMA Engineering
Shared support by admin, computing, safety, product assurance, EPO, etc.				

Collaboration is welcome in both science and engineering fields.

- Remote operation from Japan (and EA countries) is easy.
- Bilingual operation/maintenance manuals are available.

3-cartridge heterodyne RXs and XFFTS

RX	F_{RF} (GHz)	HPBW (")	N_{pix}	N_{pol}	SB	F_{IF} (GHz)	T_{rx} (K)	T_{sys} (SSB) (K)	Status	
DASH345	321–376	22	1	2	2SB	4–8	100–120	~250	Available	2015–
CAT8W	**387–498**	**17**	1	2	2SB	4–18	150–250	600–1000	Available	2021–
CAT10	787–950	8	1	2	DSB	4–12	200–350	1500–4000	(Available)	2019–

DASH345

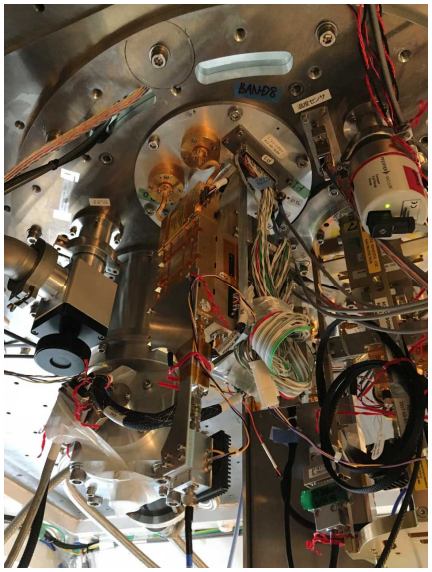
- ✓ CO J=3–2/HCO^+ J=4–3 simultaneous obs
- ✓ (CO J=3–2/^{13}CO J=3–2 simultaneous obs)

CAT8W

- ✓ [CI] $^3P_1$–$^3P_0$/CO J=4–3 simultaneous obs w/ the same resolution to NRO 45m CO J=1-0 and JCMT CO J=3-2

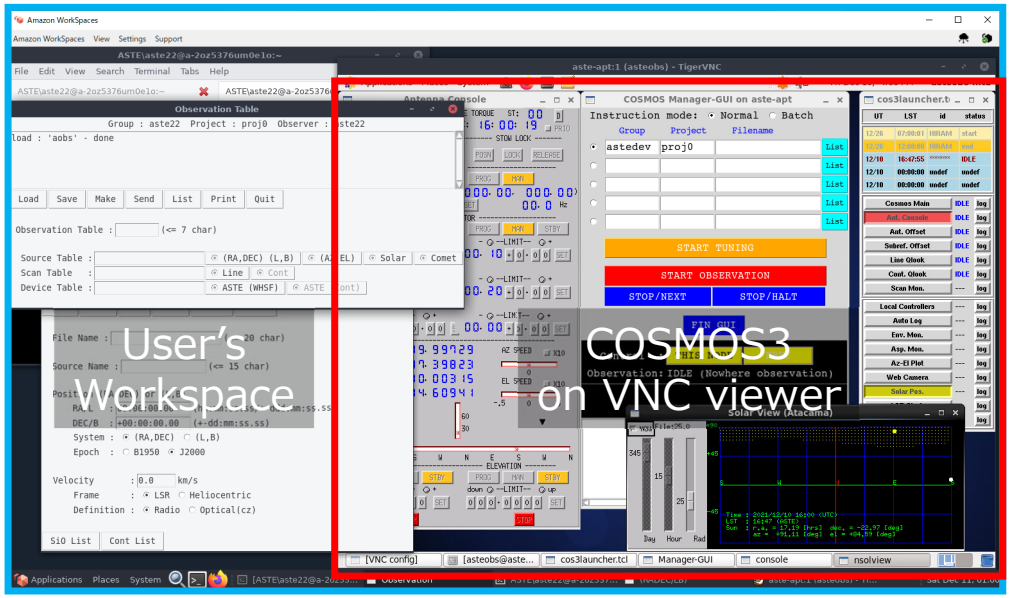
A backup observation plan in the 345 GHz band is highly recommended

Spectrometer	XFFTS
IF bandwidth	2.5 GHz
channels/IF	32,768
IFs	4



Remote telescope control via AWS

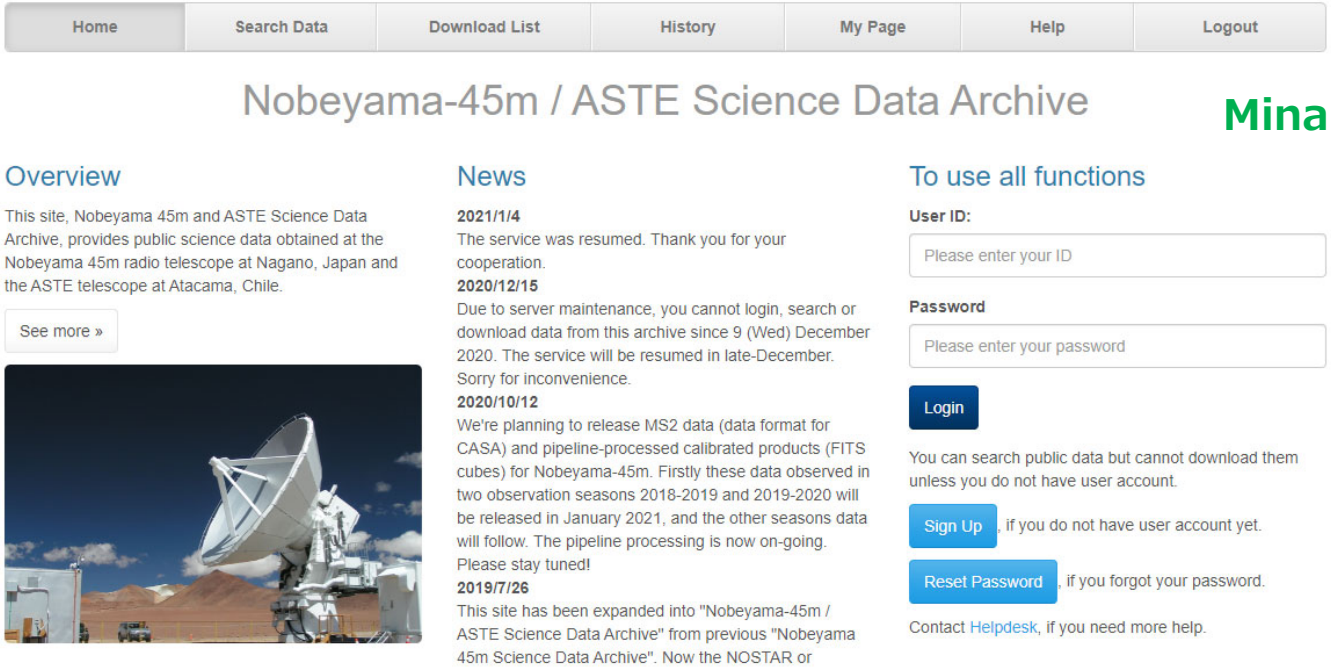
- A workspace is provided for a user
  - Observation preparation
  - VNC viewer to access the remote-control virtual PC (on Amazon WebServices)
- A user can connect its own workspace using AWS client (Win, Mac, Linux, ...) from user's institute (even from home)



Data reduction with CASA

- XFFTS data are reduced with CASA.
  - Debugging is ongoing w/ support from user groups.

- These CASA MSv2 format data will be delivered and distributed through NRO/ASTE archive. (Collaboration with ALMA-J computing team)

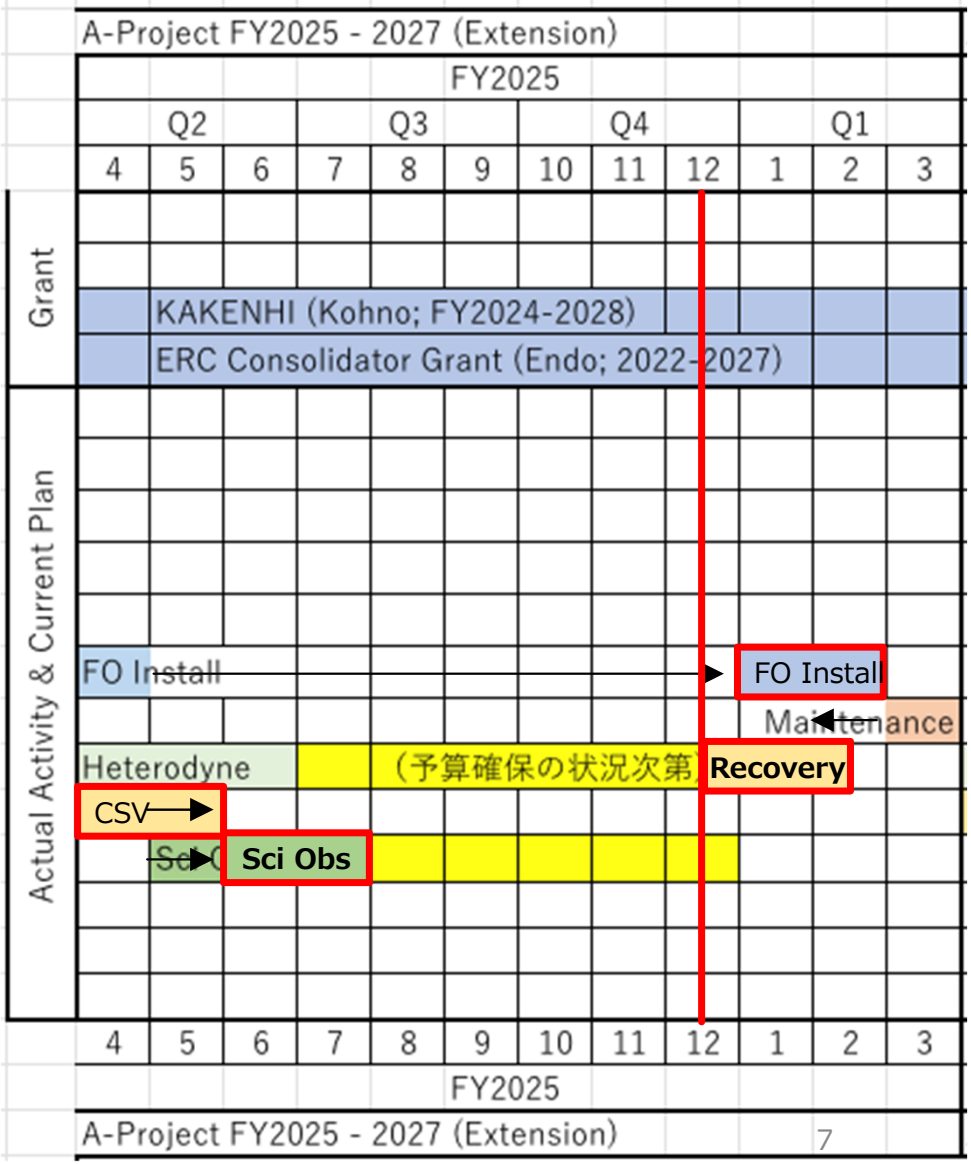


Minamidani's talk

Status and prospects for FY2025

- CSV: Done
- Science obs (Jun 06-~~Oct 01~~ Jul 31)
  - Backlogs from 2020
  - External fund projects
  - Chilean time (Fast Track)

  Enokiya+ Makita's talk
- Re-certification of tanks (Nov)
- Fiber optics installation (Jan-Feb)
- Regular maintenance done by NAOJ staff (Feb-Mar)



Thefts at the high site

- On **2025-07-13**, around 05:00 Chilean time, the ASTE/NANTEN2 site was vandalized by external intruders.
- On **2025-07-22**, around 03:00 Chilean time, the ASTE/NANTEN2 site was vandalized again.
- 14 out of 16 ASTE containers were intruded.
- Hand tools, small electric tools, cameras, etc., were lost.
- The surveillance cameras have been functioning, but could not capture images of the intruders.
- There was no noticeable damage to the telescope.

Power outage and resulting telescope failure

- On **2025-07-31**, a power outage occurred (possibly due to lightning strikes). After completing snow removal, we attempted to restart the site, but we found the telescope system is inoperable due to:
  - Errors of the servo motor drives for all AZ-A/B and EL-A/B axes.
  - Possible failure of an R/D converter (no spare available)

  Under investigation with MELCO's support

  - The telescope control PC won't start → Reconfiguring a spare
  - The subref control PC won't start → Reconfiguring a spare
  - The RX control PC won't start → Reconfiguring a spare
  - The compressor for the cryocooler won't start → Checking the power supply module
  - One of the two generators won't start due to low AC voltage → Investigation will resume soon; waiting for technical support by Komatsu
  - One of the PDBs has a short circuit → SOLVED by replacing the failed terminal blocks
  - Bad network in the Meeting Room Container → SOLVED by replacing the failed network switch

Plans in FY2025-2026

- Restoration of the telescope (Dec-Feb)
- Fuel tank inspection after site restart (Jan)
- Optical fiber connection work (Jan-Feb)
- Routine antenna maintenance by NAOJ staff (Feb)

- Further cost reduction...
- We aim to provide observation time for the completion of pending scientific observations and tests, as well as for Chilean time and contributions to operations (May-)
- No regular domestic call for proposals is planned for FY2026
- We welcome external funding and in-kind contributions for CSV etc.
  - ~3 MJPY/month for regular operation (~×3 of NRO 45m)
- TIFUUN (3rd generation DESHIMA) will be coming in 2027.