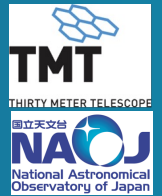
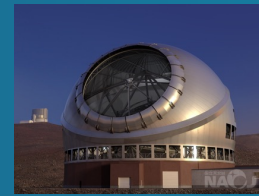


Progress of TMT's scientific activities and science operation

Chikako Yasui, NAOJ TMT Project members
National Astronomical Observatory of Japan



Abstract

- The 30-meter telescope (TMT) is under development, aiming for initial operations in the 2030s.
- In FY2024, Japan and international partners conducted scientific reviews, including:
 - **Revised TMT Science Case:** Updated from 2015 and made public.
 - **Workshops:**
 - "ELT Science in Light of JWST" focused on ELT research based on JWST results.
 - TMT ACCESS discussed 2040s science goals and instruments.
 - TMT Instrumentation Community Workshop facilitated TMT-related discussions at the SPIE conference.

Science Operation

In the United States:

- NSF is reviewing TMT plans under the US-ELT program.
- NOIRLab is preparing user support and data systems.

In Japan:

- Plans are underway to integrate Subaru and TMT operations.
- Input into US discussions and feedback from this users meeting are being sought.

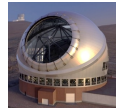
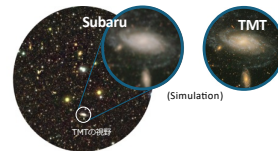
Synergy with the Subaru Telescope

Identify transient optical and infrared targets with the Subaru Telescope, which has 100 times the field of view of TMT

→ Enable efficient spectroscopic follow-up observations with TMT

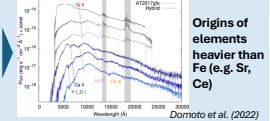


100 times wider field of view than TMT



3 times higher resolution
100 times higher sensitivity

Example:
Follow-up observation for gravitational wave event



By the 2030s, neutron star mergers up to 200 Mpc are expected to be detected, requiring follow-up spectroscopic observations down to ~25th magnitude.

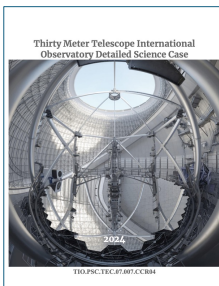
TMT Operation Plan

- In addition to queue observations, the classical observation mode that allocates observing time to programs is also planned.
- Observations of transient objects (ToO observations) are also considered. Coordination with the classical observation mode is a matter that needs to be considered.

TMT Science Activities in FY 2024

◆ Updates on Discussion

- Detailed Science Case 2024 released
 - First edition published in 2015
 - Revised based on subsequent scientific achievements



- The revision of the Subaru-TMT Science Book 2020 is also under consideration.

◆ Workshops for Science and Instrumentation

Discussions on TMT (and ELTs)

► ELT Science in Light of JWST

June 2024, Tohoku University

Following the achievements of the JWST, research collaborations with the next-generation Extremely Large Telescopes (ELTs) were discussed.



ELT Science in Light of JWST (Tohoku University)

► TMT-ACCESS ACCESS (eArly Career Centered, Engineers-Scientists Synergy)

June 2024, Tohoku University

A workshop led by early-career researchers and engineers focused on science in the 2040s and the instruments needed to achieve it.



TMT Access in Tohoku University

► TMT instrumentation community workshop

June 2024, Yokohama

Held during the SPIE conference for information exchange and discussions among TMT instrumentation experts.



TMT instrumentation community workshop

NSF Process

◆ Prospects to obtain consensus in Hawaii

- Environment Impact Statement (EIS)
- National Historic Preservation Act (NHPA) section 106
- Community Engagement Plan (CEP)

◆ Project review process

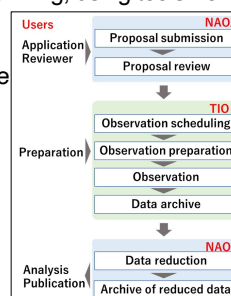
- TMT is proposed as US-ELT program with GMT and NOIRLab's contribution to operations
- Successfully completed Preliminary Design Review (PDR) in 2023. Ready to proceed to Final Design Phase (FDP)



TMT Science Operation

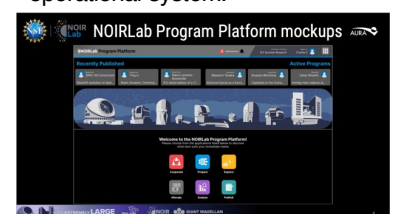
◆ TMT operation

- TMT observing time will be open to all Japanese science community members.
- TIO will manage operations, scheduling, observations, and raw data archiving, with data becoming public after a proprietary period.
- TMT partners will handle proposals, data reduction, and archiving, using tools from the US-ELTP.
- NAOJ will manage Japanese time and unify TMT and Subaru systems for proposals, data analysis, and archiving to enhance science and efficiency.



◆ NOIRLab Program Platform (NPP)

- The NOIRLab Program Platform (NPP) is currently under development with financial support from the NSF, as a shared-use support tool for telescopes operated by NOIRLab, including the TMT.
- An online portal providing end-to-end services for the U.S. astronomy community.
- Timeline
 - 2025: A review will be held.
 - 2026: Implemented in Gemini's operational system.



Credit: NOIRLab