TMT Progress Report

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Outline

0) Overview
1) International Status
2) FY2014 TMT-J activities
Overview: Telescope

- **Ritchey-Chrétien optical design**
- **M1**: 30-m f/1 (492 x 1.44m) hyperboloidal
- **M2**: 3.1-m convex hyperboloidal
- **M3**: 2.5m x 3.5m flat
- **f/15 final focal ratio**
- **FOV=20’**
- **Wavelength**: 0.31~28μm
- **Diffraction limit**: 8 mas (@1μm)
- **Elevation axis 3.5 m above M1 vertex**
- **Science instruments mounted on Nasmyth platforms (fixed gravity vector)**
TMT on Mauna Kea (CG: 136 sec)
0) Overview: Global Participants

- M1 blank
- M1 polish
- AO
- Facility
- Telescope
- Enclosure
- Instruments
- M2
- M3
- Control Systems & Software

Flag percentages:
- Japan: 40%
- USA: 30%
- China: 15%
- Canada: 15%
- India: 15%
1）International Status

- 2009 July: Mauna Kea, Hawaii selected as site
- 2009: Preconstruction phase was initiated
- 2012 July: US NSF selected TMT as
  - the candidate ELT for the US community and
  - for study of possible participation in the TMT project
- 2013 April: Conservation District Use Permit (CDUP) completed all court review successfully
- 2013 July: Scientific Authorities Sign the TMT Master Agreement
- 2014 May 6: TMT International Observatory (TIO) was formed as the legal entity
1) International Status

- Members of TIO
  - National Institutes of Natural Sciences, Japan / NAOJ
  - California Institute of Technology
  - Chinese Academy of Sciences
  - University of California
  - Indian Institute of Astrophysics (since Dec 2014)

- Associate Members of TIO
  - Association of Canadian Universities for Research in Astronomy (ACURA) pending federal decisions in Canada in 2015
    - Canada decision in 2015 will be a major input to second vote by TIO on continuation of Construction Phase

- Observers
  - NOAO/AURA consistent with the US NSF Cooperative Agreement
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- 2014 May 6: TMT International Observatory (TIO) was formed as
  the legal entity by which the members
- 2014 May 22: the Governing Board of TIO voted to start the Construction Phase
- 2014 July: Final Approval for sublease of the construction site at Mauna Kea
Construction started (Sep. 18th)
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- 2014 May 22: the Governing Board of TIO voted to start the Construction Phase
- 2014 July: Final Approval for sublease of the construction site at Mauna Kea
- 2014 October 7: Ground Breaking Ceremony
- 2015: Major construction will be started
The disruptions do not disrupt the TMT construction plan.
2) FY2014 TMT-J activities: M1 Blank & Polishing

• Mass production in FY2014
  – Fabrication of 35 blanks is ongoing (cf. 60 blanks in FY2013)
  • For actual M1 segments and for process verification
• 35 segment blanks are to be produced in JFY2014
  – Aspheric grinding of 18 blanks is ongoing.

NAOJ has received 5 blanks
2) FY2014 TMT-J activities: M1 Blank & Polishing

- SMP test polishing using a new SMP tool with fluid supports is ongoing
- 14 blanks will be polished in FY2015
2) FY2014 TMT-J activities: M1 Blank & Polishing

• Test processing of hexing and sensor pockets is planned at Shiba-giken (Shiba R&D Co.) under a control of Canon
• Six blanks will be processed in FY2015
2）FY2014 TMT-J activities: Telescope Structure

• From 2014 April, Final Design Phase has started for two years.
  – Successfully passed PDR of M1 Segment Handling System (SHS) on Nov.18~20
2) FY2014 TMT-J activities: M1 Segment Handling System
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Prototype of Segment Lifting Fixture (SLF)
2) FY2014 TMT-J activities: Telescope Structure Full-Scale Prototype
2) FY2014 TMT-J activities:
Telescope Structure

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  – Successfully passed PDR of M1 Segment Handling System (SHS) on Nov.18~20

• Other Key Milestones:
  – FDR1 (for Mechanical: partially) in 2015 Feb. 17~20
  – Fabrication of mechanical parts will be started in 2015
  – FDR2 (for Mechanical & Control System) in 2015 June
  – FDR3 (for SHS & CO2 cleaning arm) in 2015 Oct
2) FY2014 TMT-J activities: Current Instrumentation Status

- **NFIRAOS:** Final Design Phase started in April 2014
- **IRIS:** Preliminary Design Phase started in April 2013 and scheduled for completion in November 2015
- **WFOS:**
  - Conceptual Design Handover Workshop held in Oct 13, 2013
  - A short “mini-study” phase with participants from across the TMT partnership now getting underway and scheduled for completion in February 2015
  - “mini-study” design review is scheduled in March 2015
- **IRMS:**
  - An initial study showed IRMS to be a viable option
  - A “mini-study” phase will start in 2015 followed by a “delta” conceptual design phase from 2015
2) FY2014 TMT-J activities: IRIS imager Design & Prototype

- Conduct a technical trade study for the IRIS imager
- 11 optical designs are investigated and compared
- The winner design increases the FoV from 17”x17” to 34”x34” with one additional lens.
2) FY2014 TMT-J activities: IRIS imager Design & Prototype

- Mechanical design and prototyping of subsystems are ongoing at NAOJ ATC.
- Compatible with the new optical design (wide field imager)
2) FY2014 TMT-J activities: Design: WFOS Camera System

Collaborations have started with ASIAA for Slit Mask Exchanger system.
ISDT (International Science Development Teams)

**Membership admission complete:**
- 94 new members + 70 previous members = 164 total
- Caltech (3), Canada (11), China (27), India (22), U.C. (29), US/NSF (40), other (5 = 2 from TMT-PO; 2 from UK; 1 from Spain)
- Japan (27)

**ISDT Subgroups (conveners):**

**DSC (Detailed Science Case) update 2007 → 2015**
- M.Fukagawa is one of the editors of DSC
- Release in 2015 April
TMT Science Forum

Thirty Meter Telescope Science Forum

Save the Date: The Thirty-Meter Telescope observatory will host the inaugural “TMT Science Forum” on

July 22 and 23, 2013

at the

Waikoloa Resort on the island of Hawaii.

The TMT is an international project to build and operate a 30-m telescope located on Mauna Kea, H. The program will consist of talks and workshop discussions exploring science, first-light and future instruments, observatory operations, archiving and data products, key projects and cross-partnership collaborations, astronomy education and science, technology, engineering, and math (STEM) opportunities.

More information and the Forum program can be found at [http://conference.ipac.caltech.edu/tmtsf](http://conference.ipac.caltech.edu/tmtsf)

If you are interested in attending the Forum, register at the conference website. As part of the NSF-TMT agreement, some travel funding will be available for U.S. community members (who are not at TMT institutions) to attend the forum.

To request consideration for travel funding, send an email to TMT@noao.edu with your name, institutional affiliation, and areas of interest relevant to TMT.

- 2015 June/July in US (location & date will be fixed soon)
- 2016 NAOJ hopes to host the 4th Forum in Japan
Display to realize the TMT mirror size

Visitors enjoyed writing messages on the hexagonal segments
Subaru’s Synergy with TMT

SDSS (2m) → Survey by small telescopes → Detail studies by large telescopes

Now

Subaru (8.2m)

TMT (30m)

2020’s

Survey by large telescopes → Detail studies by TMT