CATAC report to CASCA Board

Dec 7, 2020

Membership

Michael Balogh (University of Waterloo), Chair
Bob Abraham (University of Toronto; TIO SAC)
Stefi Baum (University of Manitoba)
Laura Ferrarese (NRC)
David Lafrenière (Université de Montréal)
Harvey Richer (UBC)
Kristine Spekkens (RMC)
Luc Simard (Director General of NRC-HAA, non-voting, ex-officio)
Don Brooks (Executive Director of ACURA, non-voting, ex-officio)
Sara Ellison (CASCA President, non-voting, ex-officio)
Kim Venn (TIO Board, non-voting, ex-officio)
Stan Metchev (TIO SAC, non-voting, ex-officio)
Tim Davidge (TIO SAC Canadian co-chair; NRC, observer)
Greg Fahlman (NRC, observer)

CATAC Activities

CATAC continues to meet almost weekly, via telecon. A record of selected meetings is on our web page and, where possible, reports are shared publicly. Updates are provided in every issue of eCassiopeia. Here we provide a brief summary of notable activities over the last six months.

- In July, CATAC met (online) with the analogous organization in Japan (TMT-J SAC), chaired by Masayuki Akiyama. We discussed the Japanese assessment of the alternative TMT site, in the Canary Islands. While this assessment included some new information, the findings and conclusions align closely with our own report in May 2017. They note that mid-infrared observations are not impossible on ORM, and in fact conditions can be suitably dry in Winter, though seeing may be poorer. Queue scheduling will be essential, but studies that need observations at a particular time (e.g. some exoplanet work) will still be impacted by the low fraction of dry nights. We mutually agreed the meeting was constructive, and we plan to meet again soon with a likely focus on future TMT instrumentation.
- In October the CATAC Chair had an informal discussion with the ESO Extremely Large Telescope (ELT) Programme Scientist, Michele Cirasuolo, to better understand the scientific landscape in the context of the relative timelines for the deployment of instrumentation capabilities on TMT and ELT.
- CATAC received a letter from the Office of Hawaiian Affairs (OHA) in October. This letter expressed concern that two CATAC reports from Sept-Oct 2019 did not mention the fact that OHA changed from a supportive to a neutral stance regarding TMT construction on Maunakea, following the protests that blocked construction in 2015. We confirm that we were aware of this public information, but do not believe that its omission compromises the integrity of our report, which was limited in scope. The final version of the LRP documents both the original OHA position, as well as their later decision to rescind support for TMT on Maunakea.

- CATAC is aware that there is an urgent need for more timely and relevant communications with the Canadian community regarding the TMT site selection. In November we wrote a letter to the Canadian TMT Board members, formally recommending that the Board publicly release more detailed information about the project on a timely basis. This is to be considered at an early December Board meeting.

Project update

Despite the travel restrictions and other challenges associated with the Covid-19 pandemic, since our last report there has been some progress made in the discussions around establishing a viable site for the TMT. We report here on some of these developments.

Canadian Long Range Plan

The draft release of the infrastructure recommendations chapters of the Canadian LRP2020 was issued in September. These chapters identify access to a Very Large Optical Telescope as the top-ranked priority, and they note that TMT currently appears to be the best opportunity to achieve that access. LRP2020 also recommends developing and adopting "a comprehensive set of guiding principles for the locations of astronomy facilities and associated infrastructure in which Canada participates. These principles should "be centred on consent from the Indigenous Peoples and traditional title holders who would be affected by any astronomy project". This recommendation is important particularly in the context of TMT, and we look forward to seeing the developed guidelines. **We reaffirm our position that the decision about whether or not TMT is built in Hawaii should be entirely in the hands of the Hawaiian community, and that they are the only ones who should be responsible for defining what consent means within their own constituency. We hope that any Canadian guidelines will respect that.**

The US community and NSF engagement

In response to the initial planning proposal for the US Extremely Large Telescope Program (ELTP, submitted in May), the National Science Foundation (NSF) announced the initiation of an informal outreach process to engage people and groups interested in the Thirty Meter Telescope (TMT) project. Hawai'i House Speaker Saiki issued a press release about this on Aug 18. This outreach is a precursor to an NSF decision about whether or not to accept the ELTP proposal and formally join the project. This engagement on the part of the NSF is welcomed by the TMT International Observatory (TIO) Partners and brings a new opportunity for a Hawaiian consultation process and formal review, led by a widely respected body.

Over the next 12-18 months, we will see several important milestones come to pass, each of which will provide increasing clarity over the future viability of TMT. Canadian decision-making about how to achieve the top-ranked priority in our LRP (VLOT access) needs to evolve together with these milestones, which include:

- The US Astro2020 process is anticipated to release their public report in mid-2021. A top ranking in this report is essential for NSF engagement and the viability of the project. The report may make other recommendations relevant to TMT.
- Should the NSF accept the ELTP proposal, this will trigger a federal Environmental Impact Statement (EIS), which will take about three years to complete. Part of this review would include the important Section 106 process of the National Historical Protection Act, and would lead to a federally recognized record of the importance of Maunakea to Hawaiians. Information from the public consultation phase of this process will shed further light on the situation as the review progresses. We note that a federal EIS may also be required at La Palma if the NSF is a partner.
- Upon acceptance of the proposal, NSF will also conduct an in-depth Preliminary Design Review, likely in late 2021. This is a comprehensive review of all aspects of the project, including operations and a detailed costing.

Assuming construction cannot begin until the EIS has completed (which may not be the case), construction might not start before 2023. An estimate of seven years construction and three years commissioning would mean first science in 2033 or later. The ELT project remains on track, with current planning anticipating technical first light (TFL[1]) by the end of 2025, though the COVID-19 pandemic may add some delay. It is planned that all four first-light instruments would be commissioned within two to three years after TFL. Assuming no delays to that project, the gap to TMT science could be six years.

State of Hawaii

In May, 2020, the Department of Land and Natural Resources (DLNR) launched an independent review of the University of Hawaii (UH) management of Maunakea as part of the Master Lease renewal process. As announced by the DLNR, "the review will evaluate the efficiency of UH management and specifically its Office of Mauna Kea Management (OMKM). The DLNR review will also include an assessment of the governance structure in managing the cultural and natural resources within areas on the mountain for which UH/OMKM are responsible." The independent Hawaiian consultation group Ku`iwalu, has been engaged to evaluate the effectiveness of the UH and the OMKM in its implementation of the Comprehensive Management Plan (CMP). Ku`iwalu specializes specifically "with Native Hawaiian Organizations under Section 106 of the National Historic Preservation Act, the National Environmental Policy Act, and the State Burial Laws under Chapter 6E of the Hawaii Revised Statutes". Some information about the process underway is available at their website, https://www.evaluatethecmp.com/. At the time of launch, the review was expected to conclude by the end of 2020, though this may be delayed.

An important part of Governor Ige's proposed path forward for TMT on Maunakea is the decommissioning of "as many telescopes as possible". This process is underway, through the OMKM. Decommissioning is a lengthy process, as it involves its own Environmental Assessment and DLNR permit preceding the physical removal of the facility and complete restoration of the site. Decommissioning of the UH-Hilo teaching telescope, Hoku Kea is

[1] TFL refers to the commissioning of the telescope only, without instruments. Note that, unlike TMT, the adaptive optics capability of ELT is intrinsic to the telescope, and technical first light aims to achieve a good Strehl ratio, though it will not be fully optimized.

expected to be completed in 2023. The Caltech Submillimeter Observatory decommissioning is anticipated to be completed in 2022.

In parallel with this CMP evaluation, multiple groups in Hawaii are meeting to discuss broad issues such as housing, education and land ownership, including the role of astronomy. Among these groups are the Hawai'i Executive Collaborative (https://www.hec.org/) and the 'Aina Aloha Economic Futures (https://ainaalohafutures.com). Participants in these meetings include TMT opponents. Canadians associated with TMT have also been invited to participate in some of these discussions, though the travel restrictions associated with the pandemic have significantly affected this effort.

TIO Board

The TIO Board has established a Site Evaluation Working Group, which was originally tasked with evaluating many of the details for the two potential TMT sites. There is Canadian representation on this and other key subcommittees. We anticipate that the mandate of this group will become broader in the near future, and we will provide an update as soon as possible.

The TMT Cost Book Review, originally scheduled for November, has been postponed until Spring 2021. This thorough review will be needed before a final cost of the project and its impact on shares can be reliably known. If the NSF decides to participate in the project at a significant level, this will likely require renegotiation of the governance structure and partner shares.

UC Board of Regents

At their July meeting, the UC Board of Regents heard requests from several people that they divest from the TMT project. Arguments for and against this proposed action were heard, and summarized in the public minutes from that meeting. No decision regarding TMT was taken by the Board at this time, but the Chair noted that "it was not unlikely that the Board would consider this again, and it might be an action item in the future".

Alternative access to a VLOT

The LRP recommends that Canada participate in a 30-m class optical telescope, "at a level that provides compelling opportunities for Canadian leadership in science, technology and instrumentation". The opportunities provided by TMT depend to some degree on the final share, governance model and construction timeline. We expect more certainty about those factors over the next year, but **with the information available today we continue to believe that participation in TMT (at either site) represents the best route to fulfill the goals of the LRP.** Nonetheless, we also believe that it is pragmatic to continue thinking about other routes to VLOT access (ELT or GMT). This is important, to be prepared for an outcome in which TMT is ultimately unsuccessful, or to ensure sufficient interim opportunities for the Canadian community in the case of a prolonged delay. We anticipate and expect that this consideration will fall to the LRPIC, and we stand ready to contribute to that discussion. A few of the relevant discussion points could include:

- Fleshing out what is meant by “compelling opportunities for Canadian leadership in science, technology and instrumentation”. In particular, it is timely to revisit the science case for a VLOT in the Canadian context.
- At what point does a delay between ELT and TMT first light become unacceptable? We stand by our earlier statements, that over the long projected lifetime of TMT a delay of a few years relative to our colleagues is unfortunate, but still leaves TMT with an opportunity for an enormously productive scientific legacy. Exoplanet science and the search for life are the science topics that may be most rewarding to those who are “first”, but even this will take some time to mature. We note that most TMT exoplanet instrumentation is already planned for well after first light, so even without the delays TMT was never positioned to be first to some of this science. Finally, it would need to be understood whether or not joining a project like ELT would even open substantial opportunities to participate in these first, high-profile projects.
- It is vitally important to give discussions about astronomy on Maunakea, including the NSF-led process, the time and space they need. These discussions are about more than just TMT.

Instrumentation

- IRIS and the redesigned WFOS are both progressing well. The Project recently decided to replace the UV-sensitive mirror coatings with more conventional coatings at first light. This compromises some important WFOS and HROS science and is being discussed within the SAC.
- Development of the MODHIS instrument is now prioritized, to provide TMT with some first light exoplanet capability. The HISPEC instrument on Keck will precede it, as a proto-type.
- The TMT Exoplanet Roadmap Committee is considering the prioritization of desired exoplanet capabilities for planned second-generation TMT instruments: PSI, MICHI and HROS. The prioritization would be a function of the various instrument modes (imaging, spectroscopy, polarimetry) and their implementation (resolution, IFU, choice of wavelengths/bands). **Input from the Canadian community is welcome, before mid-January.** A short summary of proposed capabilities together with an Excel template for feedback are available on the CATAC web page.

Meetings and Important dates

- Dec 14-18, 2020: SPIE forum on Astronomy Telescopes and Instrumentation 2020
- TMT Science forum June 26-29, 2022 in Vancouver.