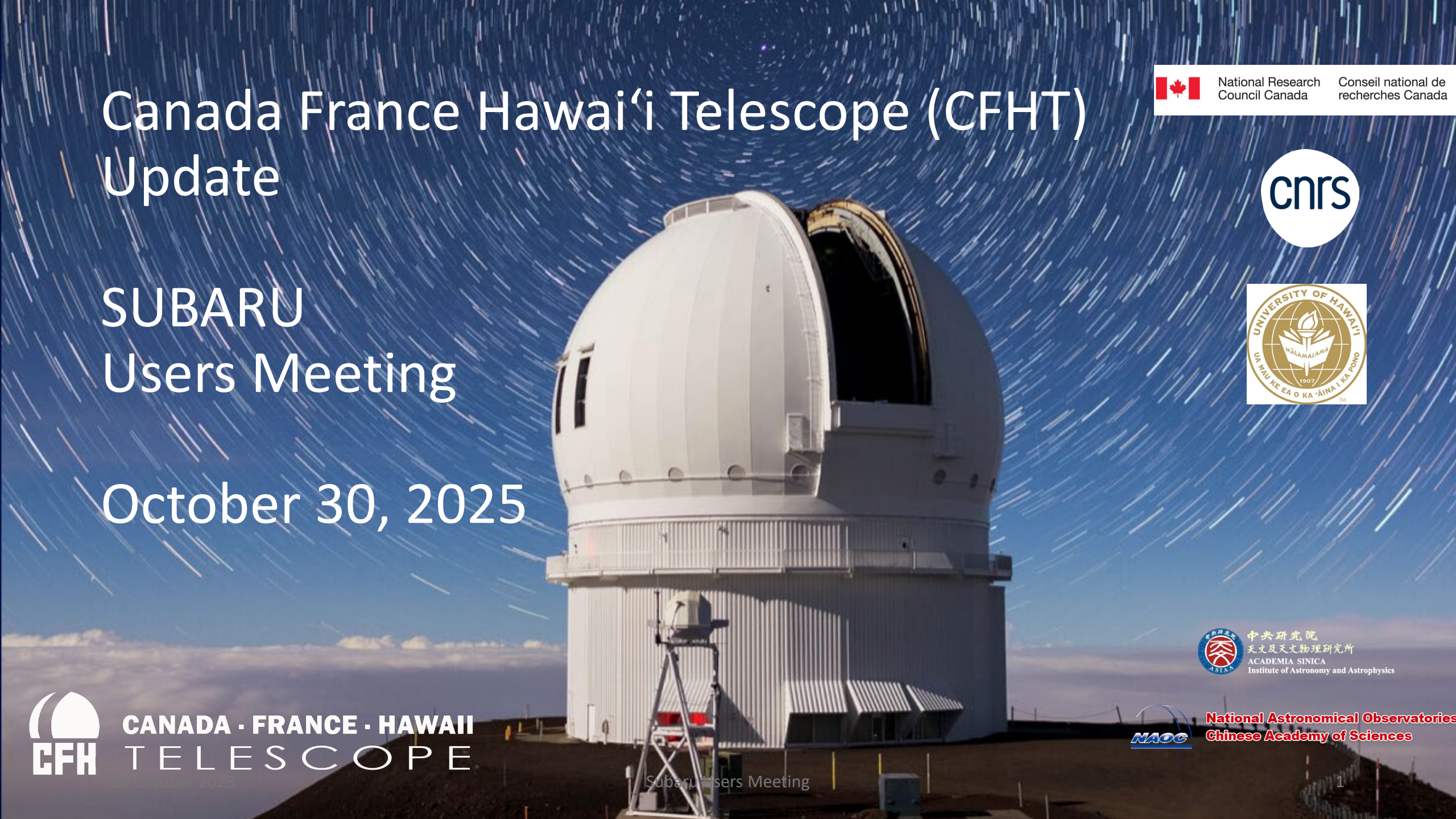
Canada France Hawai‘i Telescope (CFHT) Update

SUBARU Users Meeting

October 30, 2025



National Research Council Canada | Conseil national de recherches Canada

cnrs

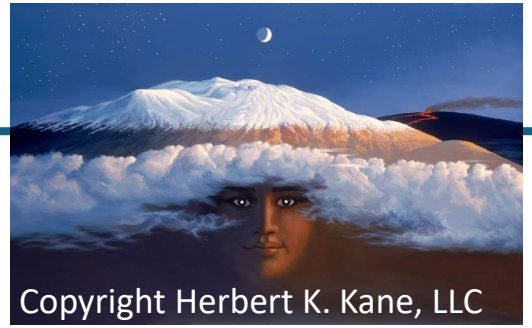
University of Hawai‘i

中央研究院 天文及天文物理研究所 ACADEMIA SINICA Institute of Astronomy and Astrophysics

National Astronomical Observatories Chinese Academy of Sciences

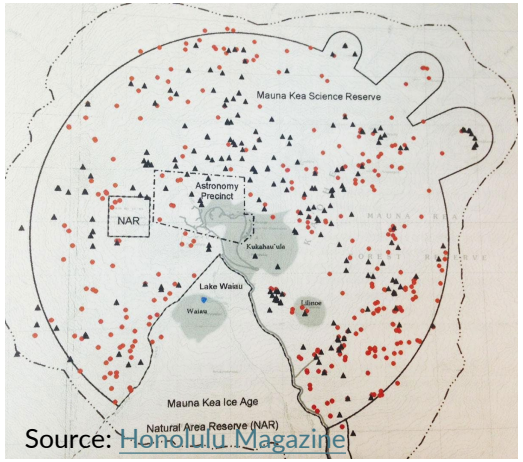
CANADA · FRANCE · HAWAII TELESCOPE

Acknowledgement



MKO Guiding Principles

Respect for Maunakea
Knowledge Exchange
Nurturing Connection
Hawai‘i-rooted within a global context



Source: Honolulu Magazine

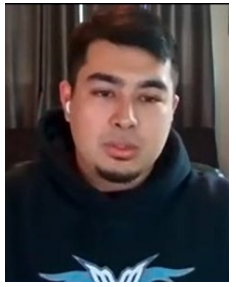
CFHT – Staff Changes

- Arrivals:
  - Kara Dumaguin. Director of Community Relations
  - Skyler Padamada. Mechanical Engineer

- Departures: Sam Barden, Benoît Epinat, Mary Beth Laychak, Andrew Sheinis, Raycen Wong

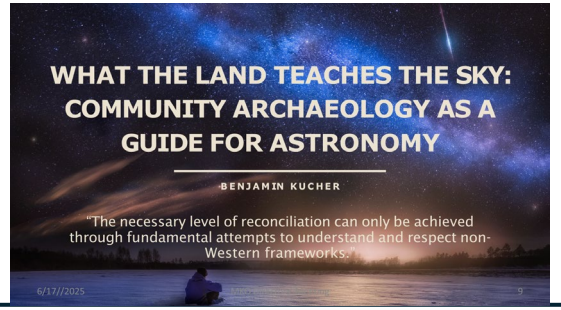






Users Meeting

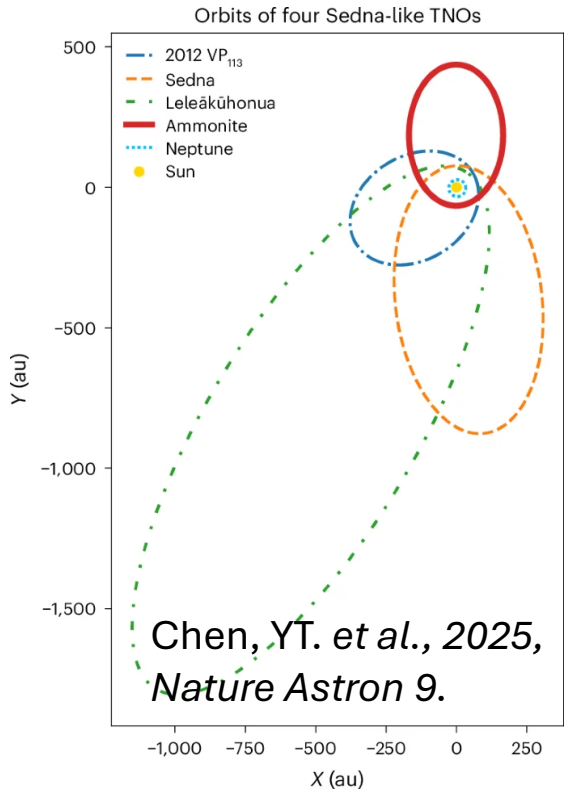
- May 26 – 28, 2025
- Lac-à-l'Eau-Claire, Québec, Canada, and remotely
- 80+ in-person participants
- 60+ remote participants
- The program included focus sessions on:
  - Community / Legacy Surveys
  - Maunakea session
  - Community Astronomy

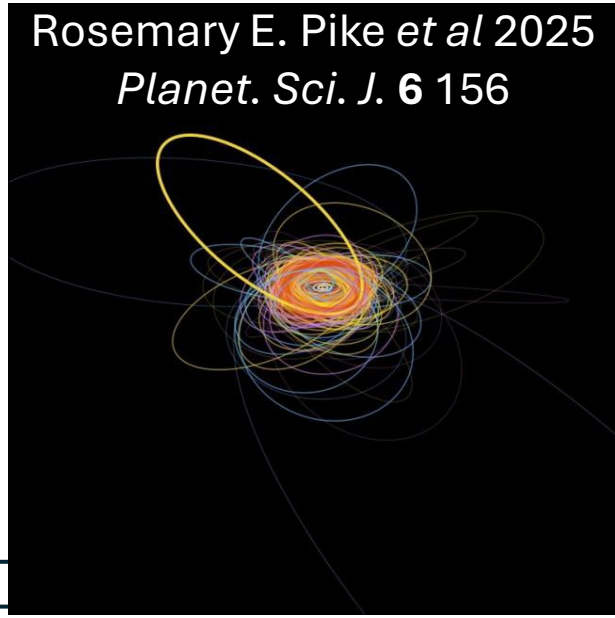


Recent Science Highlights (MegaCam): TNOs

- Ammonite: Discovery and dynamics of a Sedna-like object with a perihelion of 66 au
  - Discovered by Subaru (FOSSIL II survey), confirmed by CFHT
  - Constraints on the orbital parameters of hypothesized planet Nine.

- 2020 VN40 : Discovery of a 10:1 Resonator with a Novel Libration State
  - Discovered by CFHT (L*i*DO survey), follow-up with Gemini
  - Constraints on the orbital distribution of distant resonators





Technology • Staff Jun 24

Canada-France-Hawai‘i Telescope’s MegaCam Helps Discover 128 New Saturnian Moons

The Canada-France-Hawai'i Telescope (CFHT) played an integral role in discovering 128 new moons of Saturn, which were recognized by the International Astronomical Union on March 11, 2025. From 2019 to 2021, CFHT has monitored the sky around Saturn, with its first run yielding 64 moons and even more uncategorized objects. Fueled by the knowledge that there was more to discover, scientists pressed on, leading them to find a total of 128 new “irregular” moons.

Each irregular moon is a fragment of a small number of

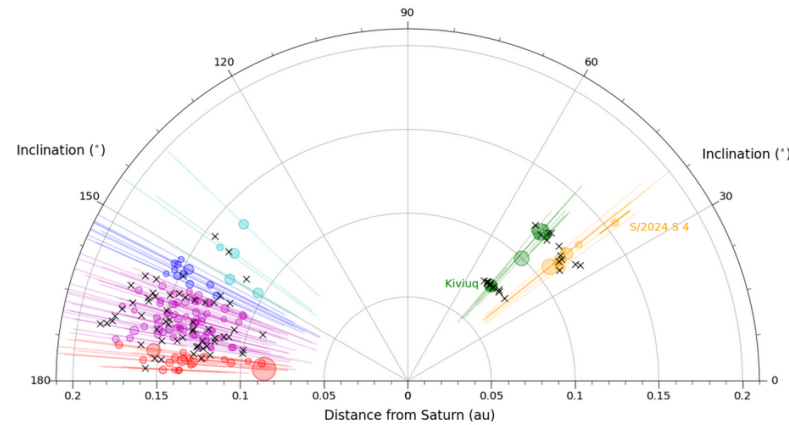
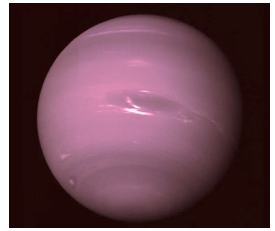
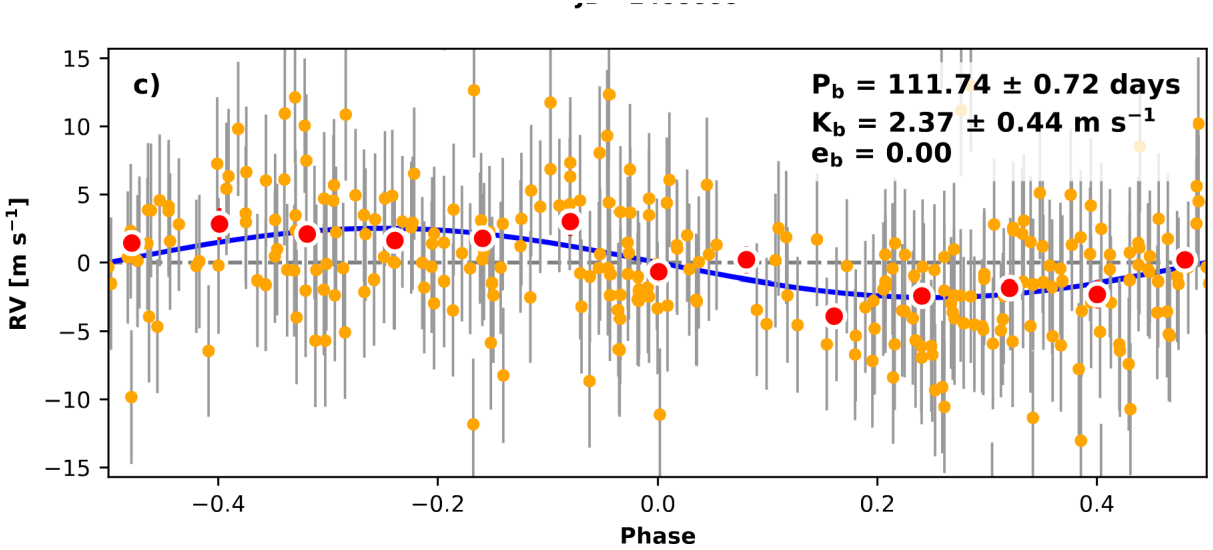


Figure 1. Rose diagram of the irregular moons of Saturn. For the 122 previously known irregular moons each circle represents the time-averaged inclination and semi-major axis of a moon, with the size of the circle indicating the relative size of the moon. Additionally, each moon has a line that goes from the time-averaged pericentre to the time-averaged apocentre. Color has been used to split six specific regions; the Gallic group (yellow), the Inuit group (green), the low-i (<151°) Norse members (cyan), Kari subgroup (blue), the Mundilfari subgroup (magenta), and the Phoebe subgroup (red). (E. Ashton et al. in review). The

Recent Science Highlights (SPIRou)

- Characterising planetary systems with SPIRou: Temperate sub-Neptune exoplanet orbiting the nearby fully convective star GJ 1289 (M4.5V, 0.21 $M_{\odot}$)
  - First SPIRou exoplanet around an M-dwarf
  - Mass: 6.27 ± 1.25 $M_{\oplus}$
  - Period 111 day





Moutou et al., 2024, A&A, 688, A196

Ten Year Strategic Plan

- Two overarching goals from our Board (Dec. 2023): The focus for the next “15 years” should be on :
  1. obtaining a new lease
  2. operating CFHT as a “viable operational entity” until 2033.

  (In Dec. 2024, the Board further recommended to pause MSE activities. MSE remains a possible future for CFHT, in line with Act255 recommendations to prioritize new developments on existing sites)

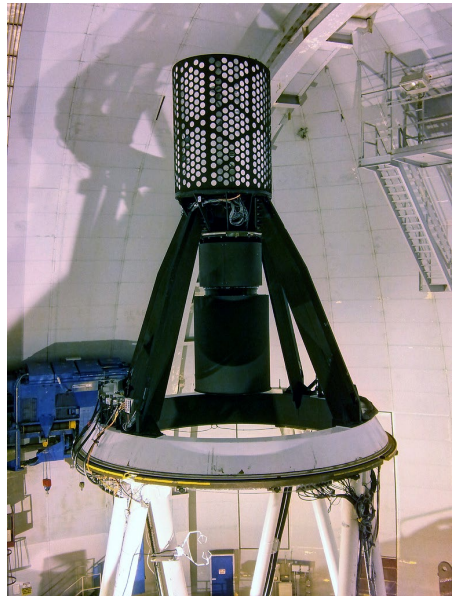
- CFHT strategic plan:
  I. Deferred maintenance
  II. Community (legacy) surveys spanning the period 2027-2033
  III. Contribute to the development of a community astronomy model

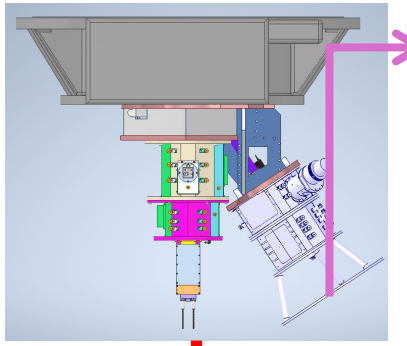
I – Deferred Maintenance

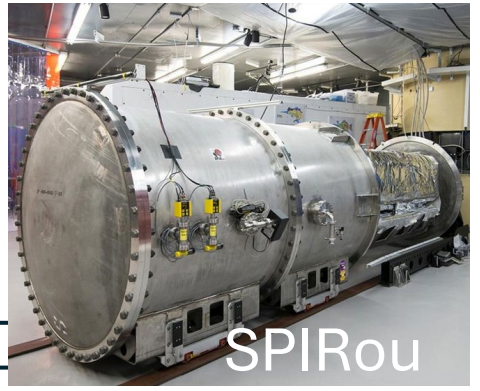
II – Community Surveys

- Call for proposals released mid-October
- 800–1400 nights, over a 6-year period (2027B–2033A)
- Baseline: two instruments only
  - MegaCam – wide field imager, 1 sq. degree
  - Wenaokeao, co-mount of SPIRou and ESPaDOnS, to be installed in 2026 and offered in 2027. [380 – 2,500 nm] spectral coverage at R ~ 70,000

	Publications per night
All PI papers (from 1980)	0.30
Large Program papers	0.75
CFHT Legacy Survey (CFHTLS)	1.5

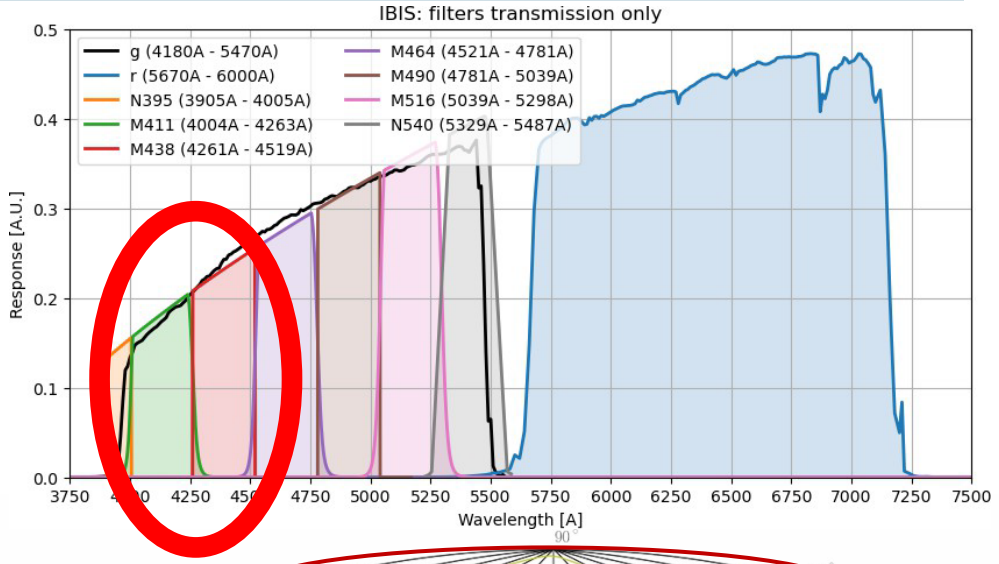




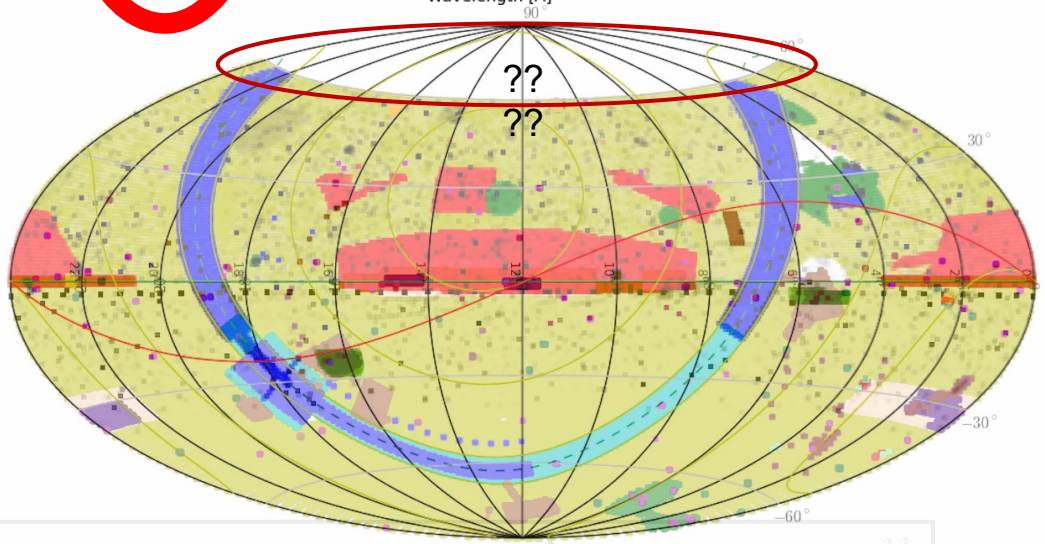


II – Community Surveys

- Interest from Berkeley Lab and DESI2 collaboration to conduct a survey (u-band and two Medium-Band filters) for Target Selection of galaxies at redshifts [2.2 – 3.5]
  - Funding and partnership opportunities



- Possibility of a USNO-led North Cap Survey, to complement the UKIRT Hemisphere Survey (UHS) (with WIRCam).



III – Community Astronomy

- Local (Hawai‘i) outreach and community engagement activities
  - Community Service Day with CMS
  - AstroDay Hilo
  - Summer Fun Program
  - Kaukau4keiki
  - ‘Ohana Stargazing at Mo‘okini Heiau
  - And many more

- Raise awareness within the astronomy community of the need for a community-based model for astronomy, as recommended in the Astro2020 report.

Keck & CFHT Join Community Effort To Feed Keiki

This summer, W. M. Keck Observatory served as a hub of community care each Monday. Over 40 staff from both W. M. Keck Observatory and Canada-France-Hawai'i Telescope (CFHT) came together once again to pack and distribute meal kits for children as part of the *Kaukau 4 Keiki* program, an initiative that has become a lifeline for many families across Hawai'i Island.

Running from June 16 to July 25, Kaukau 4 Keiki was created to fill a crucial gap: when school is out for summer, many keiki lose access to the free or reduced-price breakfasts and lunches their families rely on during the school year.

Hawai'i Island non-profit organization Vibrant Hawai'i coordinates the program, which is funded by the federal U.S. Department of

Maunakea Observatories Participate in Hawai‘i Island Summer Fun Programs

In support of ‘ohana and keiki during summer vacation, the County of Hawai'i Department of Parks and Recreation hosts the Summer Fun Programs each year, providing recreational opportunities for keiki at public parks and gyms across Hawai'i Island. For over a decade, the International Gemini Observatory, along with other Maunakea Observatories, has had the great pleasure of working with the Summer Fun Programs and coordinating a variety of educational activities and visits.

Astronomy's relationship with the lands and communities of Maunakea

Jean-Gabriel Cuby*[a], Christine Matsuda[b], Rich Matsuda[c], Andy Adamson[d], John O'Meara[e], Nadine Manset[a]

[a]Canada-France-Hawai'i Telescope, 65-1238 Mamalahoa Hwy, Waimea, HI 96743, [b]Maunakea Observatories, Maunakea, Island of Hawai'i, [c]W. M. Keck Observatory, 65-1120 Mamalahoa Hwy, Waimea, HI 96743, [d] The Gemini International Observatory, operated by NSF NOIRLab, 670 N Aohoku Pl, Hilo, HI 96720

ABSTRACT

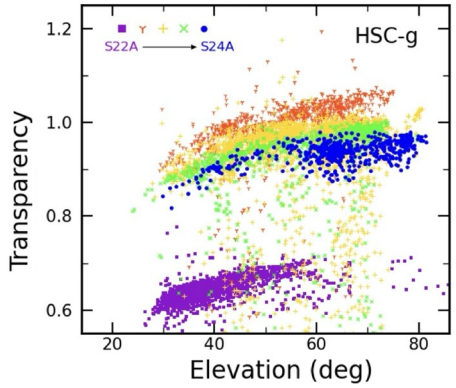
Astronomy is at a turning point in its history and in its relations with the Indigenous peoples who are the generational stewards of land where several of our main observatories are located. The controversy regarding the further development of astronomy facilities on Maunakea is probably the most significant and publicized conflict about the use of such land in the name of science. Thousands have stood in resistance, elders were arrested, and the community is divided. Astronomy's access to one of its most emblematic sites is at risk. This situation challenges our professional practice, the projects we build on Indigenous lands, and our relationships with the people who live within these lands and with society in general. This paper attempts to share the perspective of the authors on the historical events, including the very recent past, through the lens of our understanding and opinions; to provide transparency, with humility, into our process of introspection and transformation; and to share our hopes and ambitions as leaders from Maunakea Observatories for the future of astronomy in Hawai'i, as advocated by the Astro2020 report from the U.S. National Academies of Sciences, Engineering, and Medicine; and to suggest ways for the profession to commit to this long-term vision.

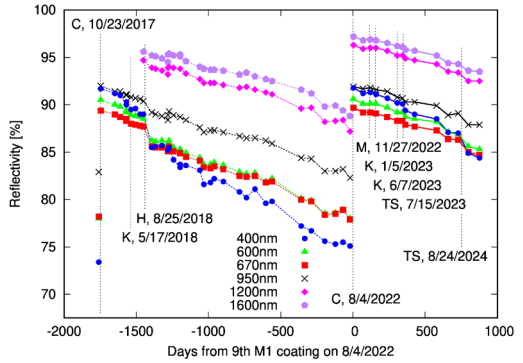
Keywords: Maunakea, Culture, Community, Protests, Activism, Mutuality, Stewardship, Governance, Community Astronomy Model

1. INTRODUCTION

Other updates

- Thanks to Subaru for your help with our investigation of the rapid degradation of CFHT's M1 reflectivity.
  - We had **ten** condensation events when Subaru had **two**
  - We will improve the confinement of the M1 cavity
  - Mirror just re-coated. Re-assembly in progress.
  - Discrepancy between reflectometer measurements and MegaCam zero points (ZPs). Probable cause: amount of scattered light within the acceptance angles at the degree scale (reflectometer) and arcsec scale (ZP).





Plots : Subaru, Miyazaki-san, Okita-san

- CFHT to join the Astronomical Event Observatory Network (AEON), alongside Gemini and Keck thanks to NSF funding.

AEON
Astronomical Event Observatory Network

Closing

Projecting CFHT into the new lease:

- Improving reliability (deferred maintenance) and streamlining operations
- Community / Legacy Surveys through 2033, 1000+ nights
- Actively working on Community Engagement and promoting a Community-based Astronomy model