NRC Herzberg

Astronomy Technology Program Overview

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National Research Council Canada | Conseil national de recherches Canada

Canada

Program Resources

Critical mass of human, infrastructure, and financial resources:

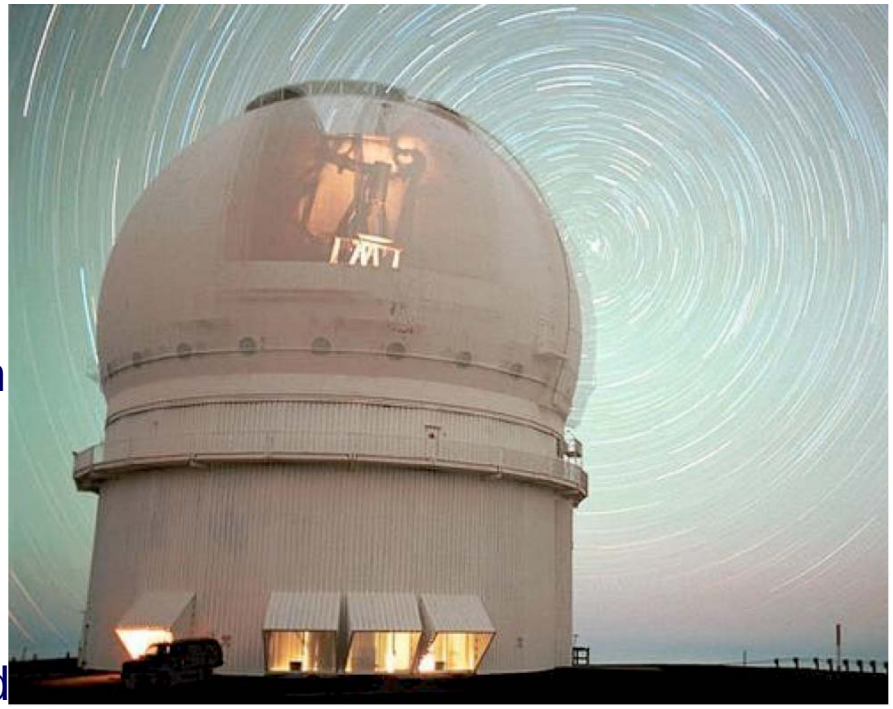
- 2 sites - Victoria and Penticton, with well established special purpose laboratories
- 60 staff - engineers, scientists, technicians, and support staff – **matrix organization**
- Operations cost of ~$3.5M per year
- Revenues variable, ~$1 to 5M per yea

Canada France Hawaii Telescope (CFHT)

3.6 meter optical/IR telescope

1979, Mauna Kea, Hawaii

Canada, France, Hawaii



- ATP contributions
  - HRCam High Resolution Camera
    first camera with fast tip-tilt correction
  - MOS/SIS multi-object spectrograph
    and imaging spectrograph
  - PUEO adaptive optics system with curvature wavefront sensor
  - MEGAPRIME wide field corrector and focus stage
  - **IMAKA GLAO**, SITELLE, and SPIRou instrument studies
  - Next generation ngCFHT study

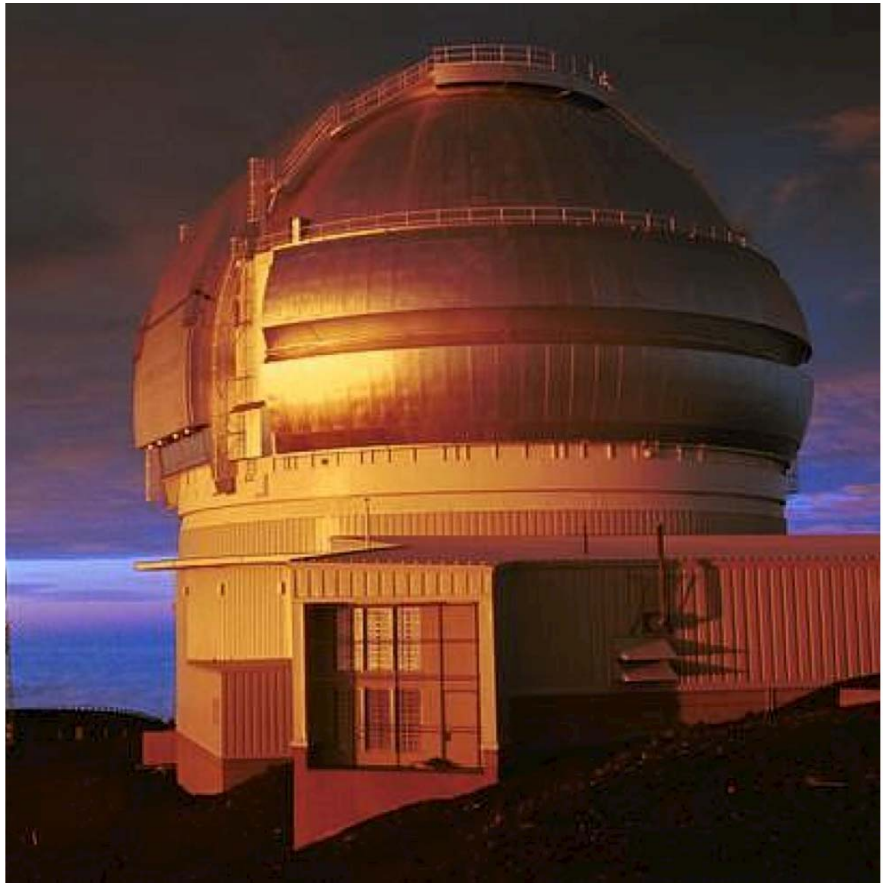
Gemini Observatories North & South

Twin 8 meter optical/IR telescopes

2000, Mauna Kea, Hawaii

2001, Cerro Pachon, Chile

US, Canada, Australia, Chile, Brazil, Argentina,



- ATP contributions
  - OCS Observatory Control System
  - GMOS Multi Object Spectrographs
  - ALTAIR NGS/LGS adaptive optics
  - **GLAO Ground Layer Adaptive Optics study**
  - Flamingos-2 OIWFS On-Instrument Wavefront Sensor
  - GPI Gemini Planet Imager

James Webb Space Telescope (JWST)

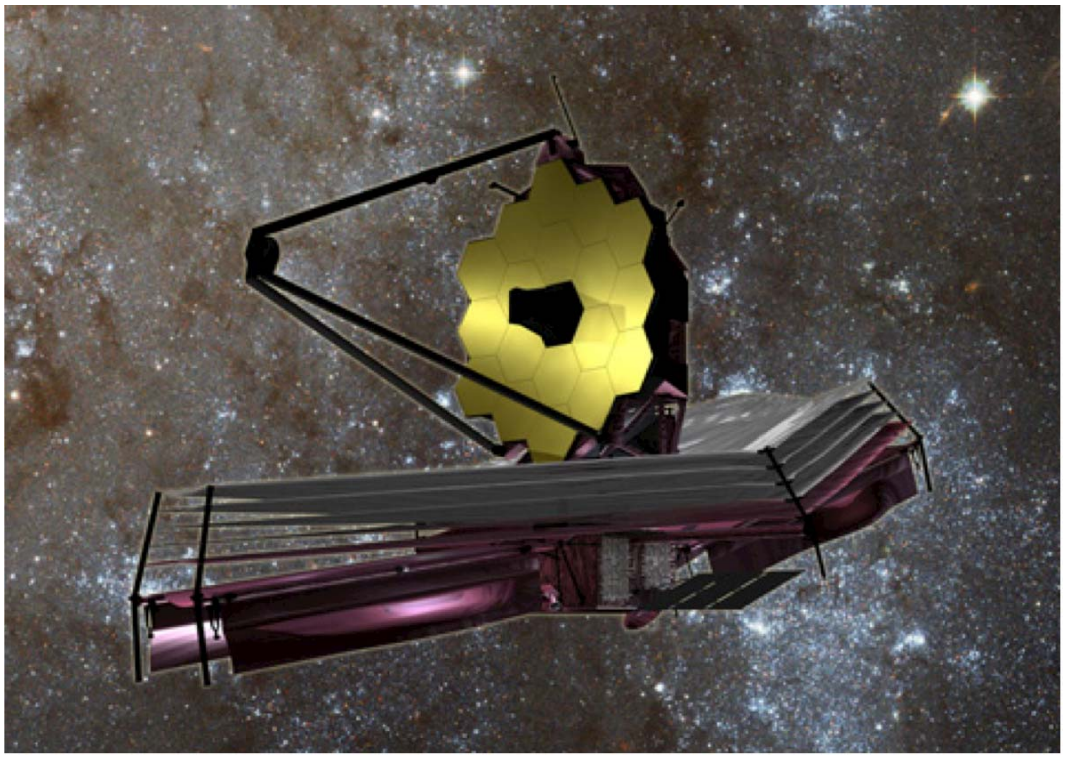
6.5 meter infrared telescope

~2014, L2 orbit

NASA, ESA, CSA

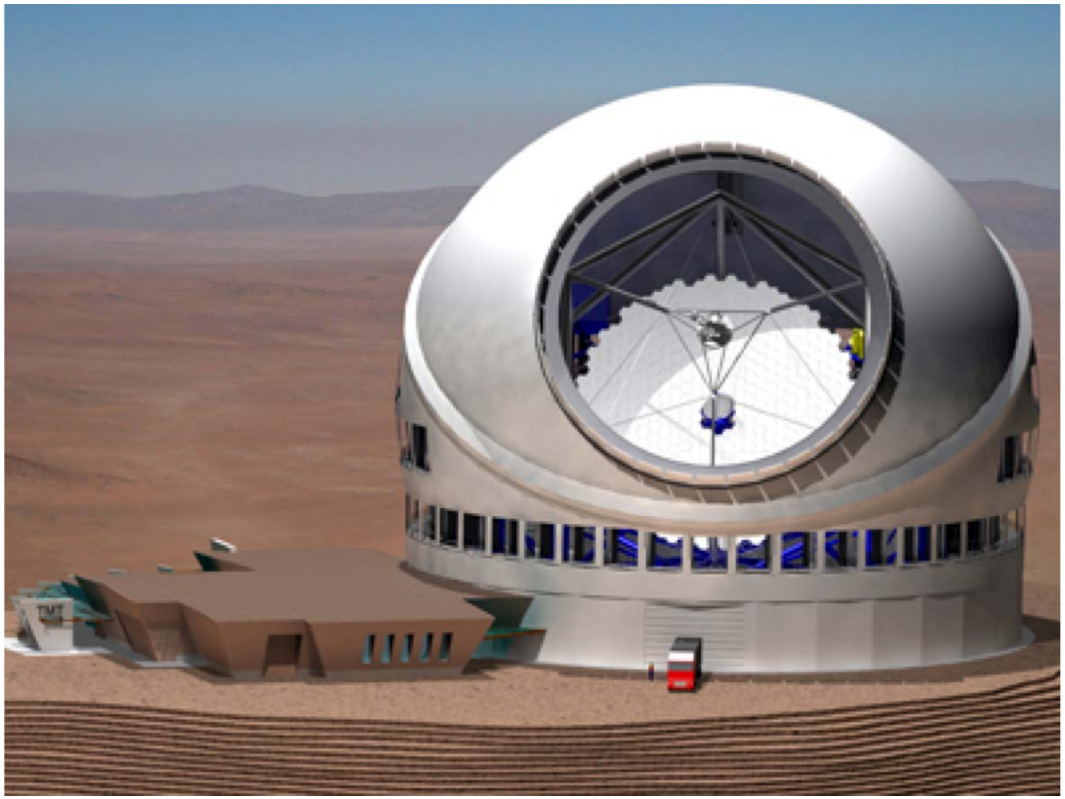
0.6 to 27 µm wavelengths

NIRCam, NIRSpec, MIRI, TFI science instruments



- ATP participation
  - John Hutchings, CSA Project Scientist
  - Fine Guiding Sensor detector, optics, mechanics consulting, with U de Montreal

Thirty Meter Telescope (TMT)



30 meter optical/IR telescope

~2022, Mauna Kea site

U Cal, Caltech, ACURA,
Japan, China, India

492 primary mirror segments

Active optics

Adaptive optics

- ATP participation
  - VLOT precursor design
  - System Engineering, Instrumentation Management, Telescope & Enclosure
  - WFOS, IRMOS, IRIS, OIWFS instrument studies
  - NFIRAOS Multi Conjugate AO system

International Collaborations

ATP is well respected in the international astronomy community for its ability to collaborate on projects:

- ALMA Band3 - NRAO, U Virginia
- ALMA Band1 - Chile, ASIAA/NTU Taiwan
- TMT - U California, Caltech, ACURA, Japan
- Gemini GPI - LLNL, UCLA, UCSC, JPL, U Montreal, AMNH, UC Berkley
- Gemini GMOS - U Durham, UK ATC
- Gemini GLAO - U Durham, U Arizona
- Gemini Flamingos-2 - U Florida
- CFHT MegaPrime - CEA-DAPNIA, Obs Paris, IAP, CNRS-INSU, E2V, Sagem
- JCMT HARP - MRAO, UK ATC, DIMES
- TMT IRIS – UCLA, Caltech, NAOJ Japan

Summary

- Canada has a long history in adaptive optics
- Canada has had a keen interest in GLAO on a 8-m class telescope for many, many years
- Thank you very much for the very kind invitation to attend this workshop, and we look forward to hear more about the exciting science cases that will drive the design of the Subaru GLAO system!

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Michael Balogh (University of Waterloo)
Kim Venn (University of Victoria)
Alan McConnachie (NRC Herzberg)
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