NASA's InVEST HyTI CubeSat: thermal infrared calibration and validation

Presented by Robert Wright,
on behalf of the HyTI Team

Hawai'i Institute of Geophysics and Planetology,
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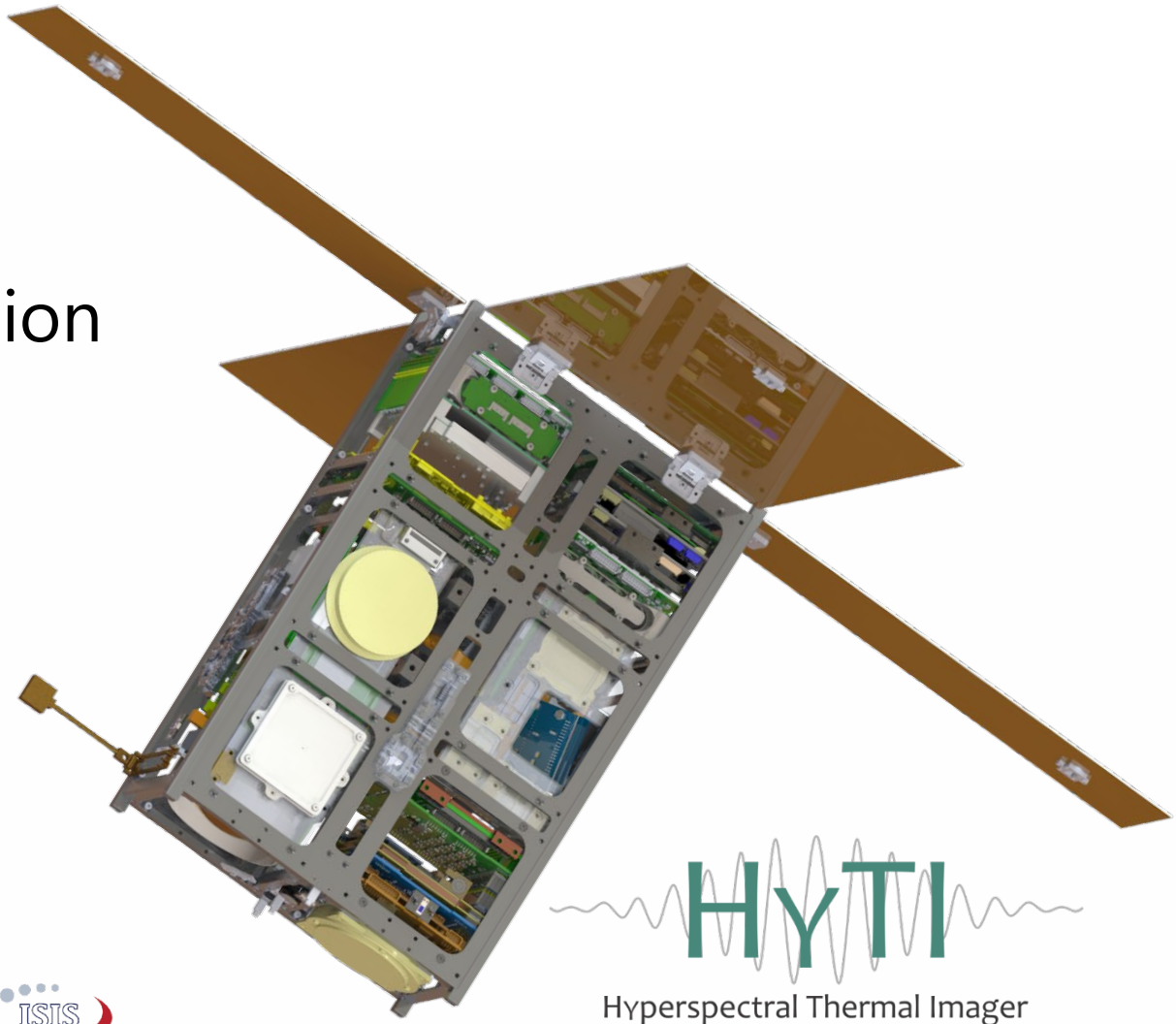

HyTI
Hyperspectral Thermal Imager

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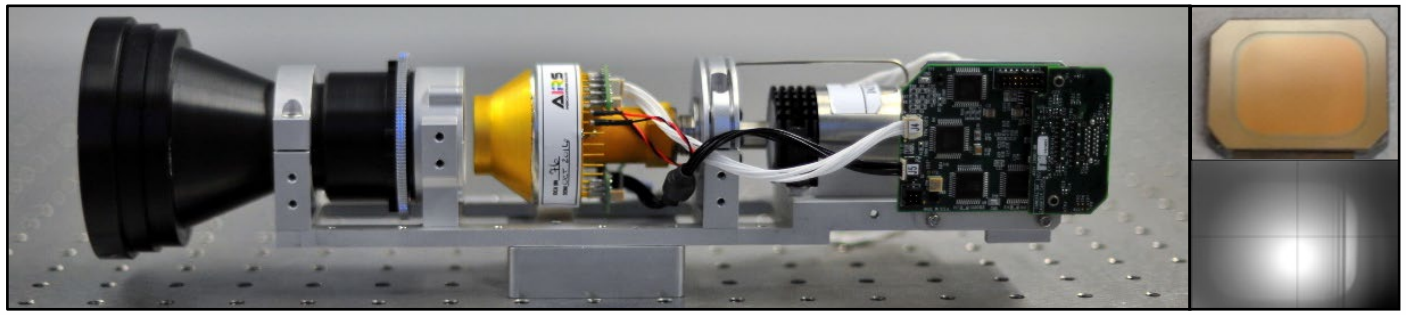
HyTI mission goals

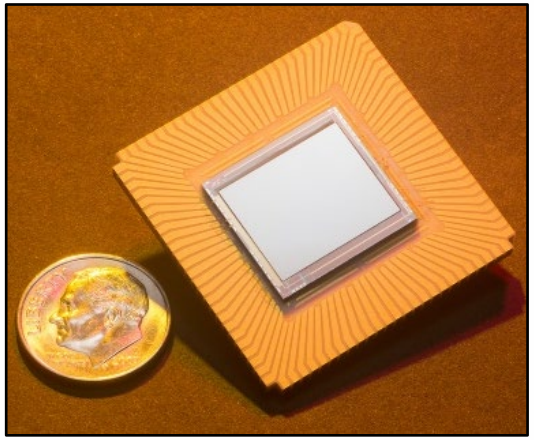
HyTI
Hyperspectral Thermal Imager

To demonstrate **high spectral, high spatial, and high SNR long-wave infrared imaging**, and **high performance on-board computing** to process the resulting data, on a **6U CubeSat** platform

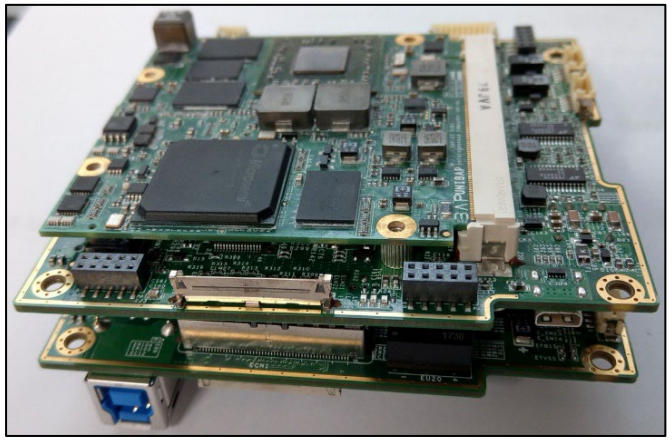
1. HIGP Fabry-Perot LWIR imaging interferometer (TRL_{in} = 4)

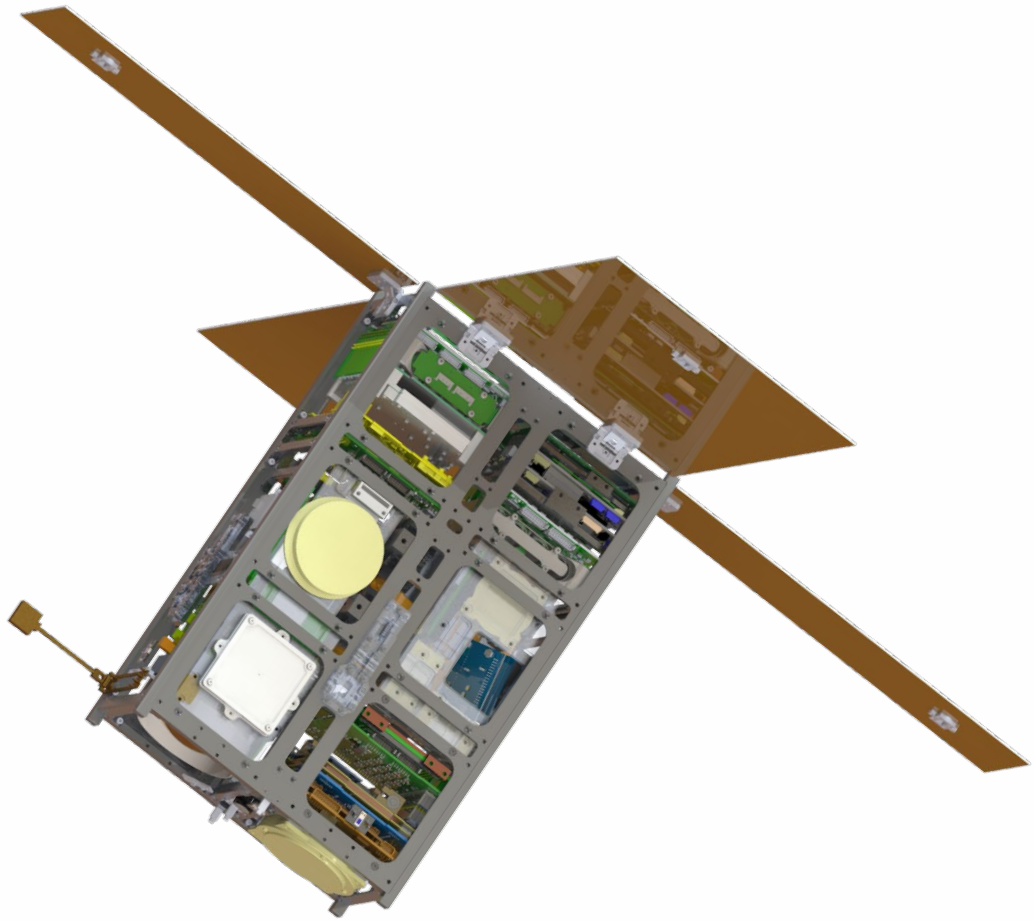


2. JPL T2SLS Barrier InfraRed Detector (BIRD) focal plane array (TRL_{in} = 5)



3. Unibap Deep Delphi iX5 heterogeneous onboard computer (TRL_{in} = 5)





Relevance of HyTI to NASA's Earth Science Division

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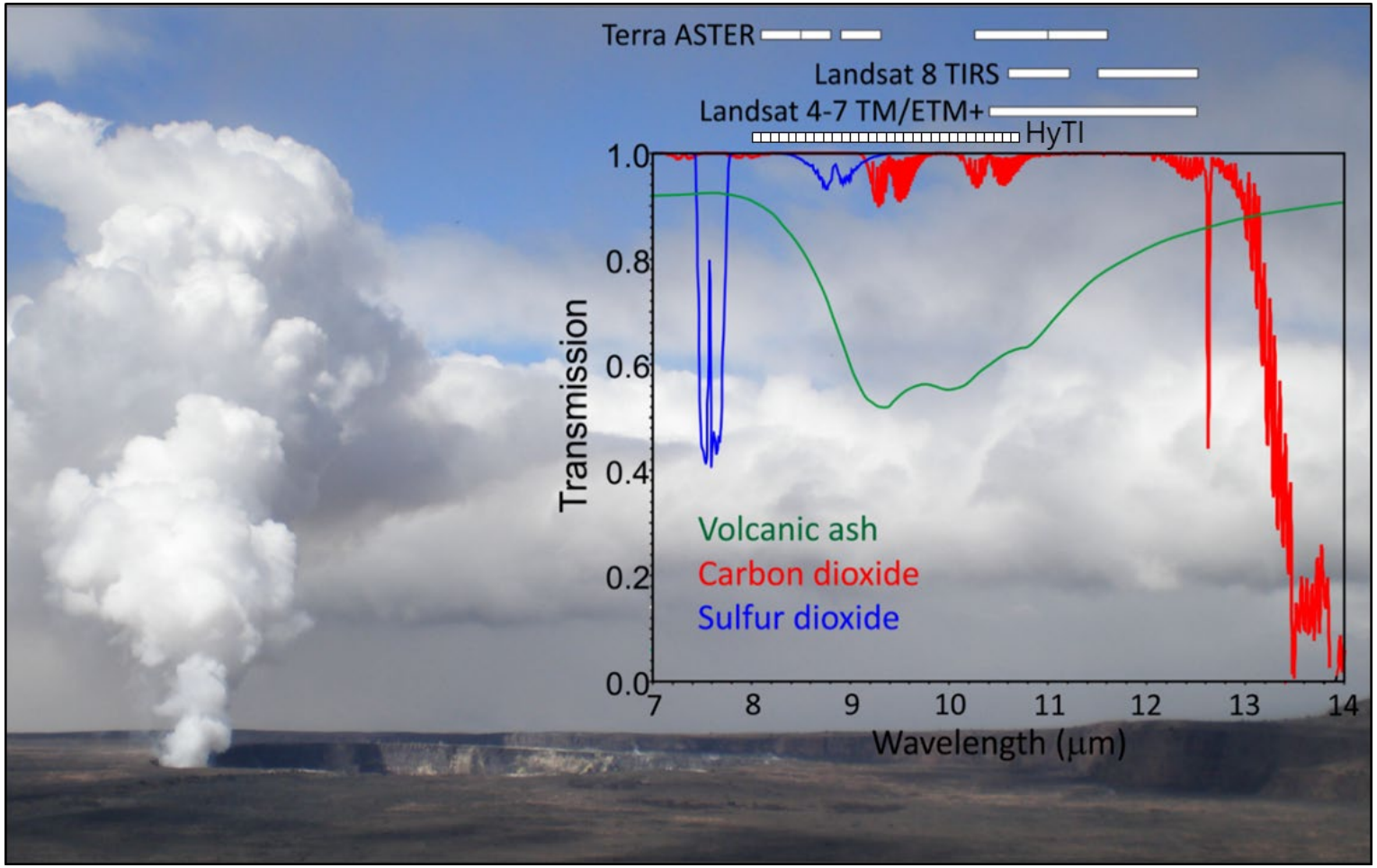
Earth scientists have never had access to high spatial and high spectral longwave infrared image data from Earth orbit



HyTI Science Measurement Approach

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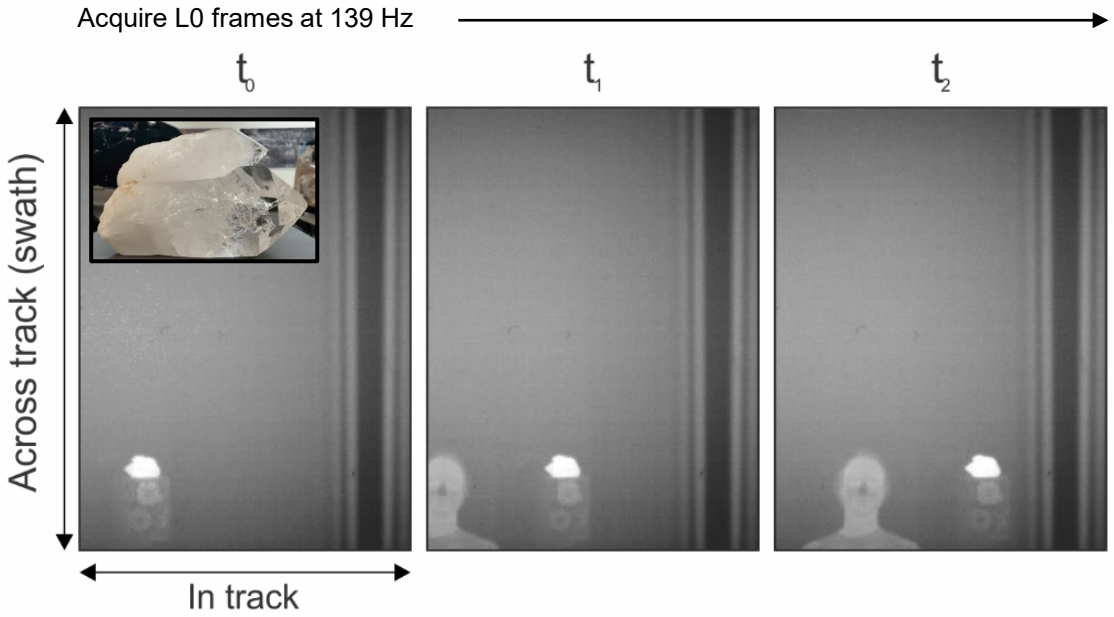
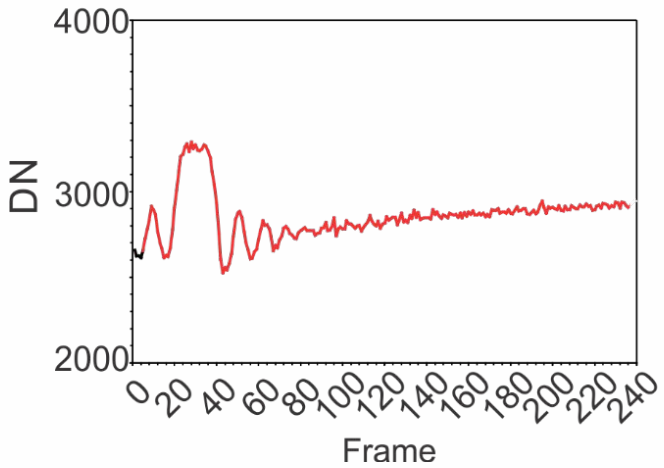
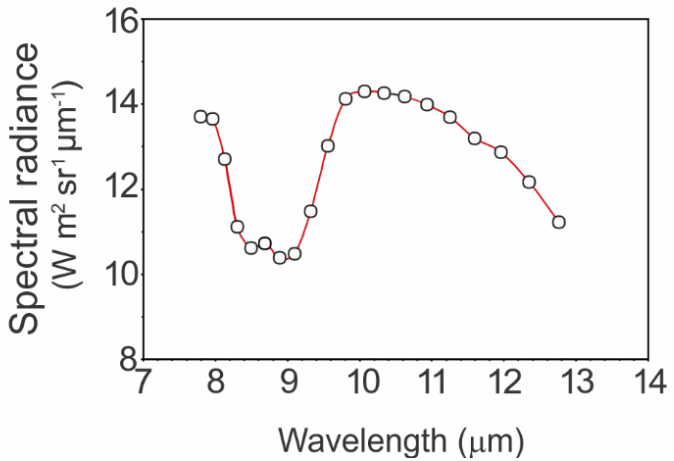
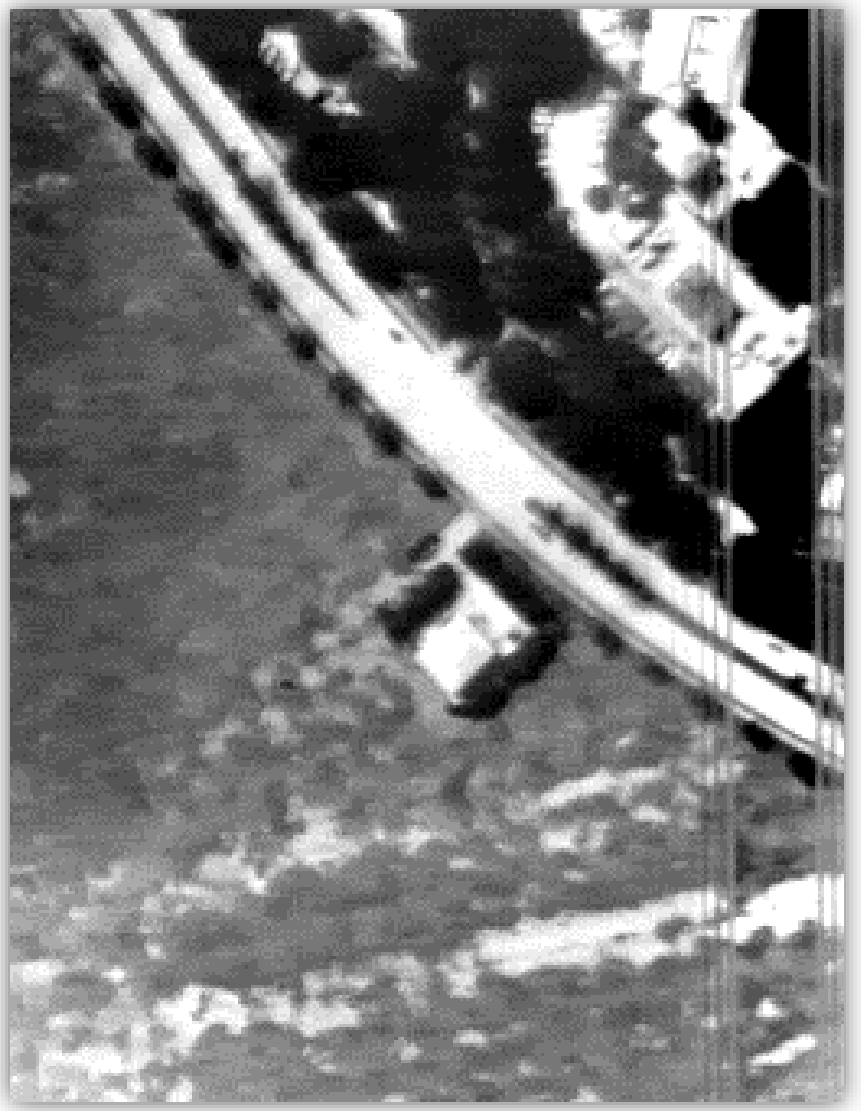
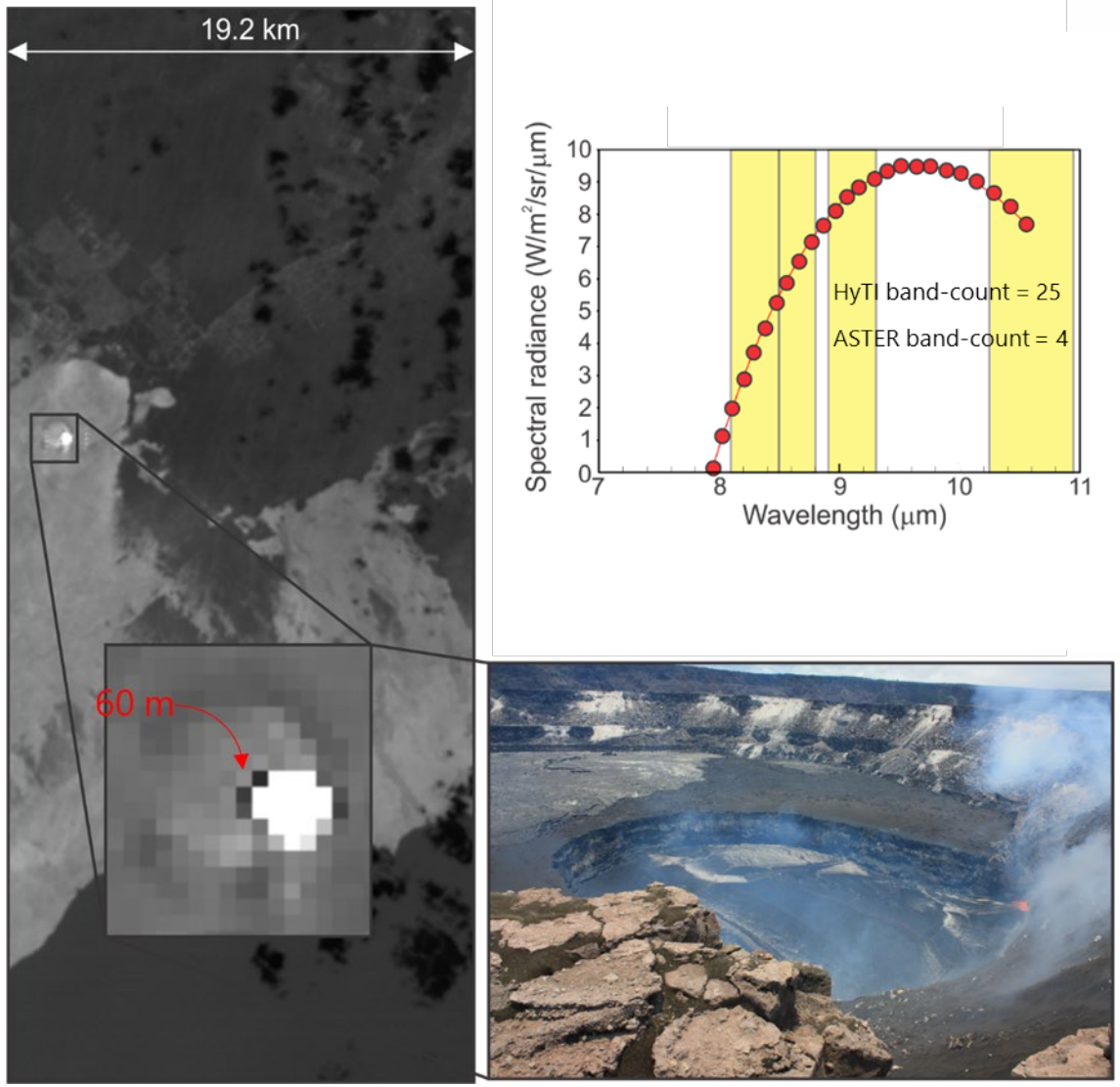


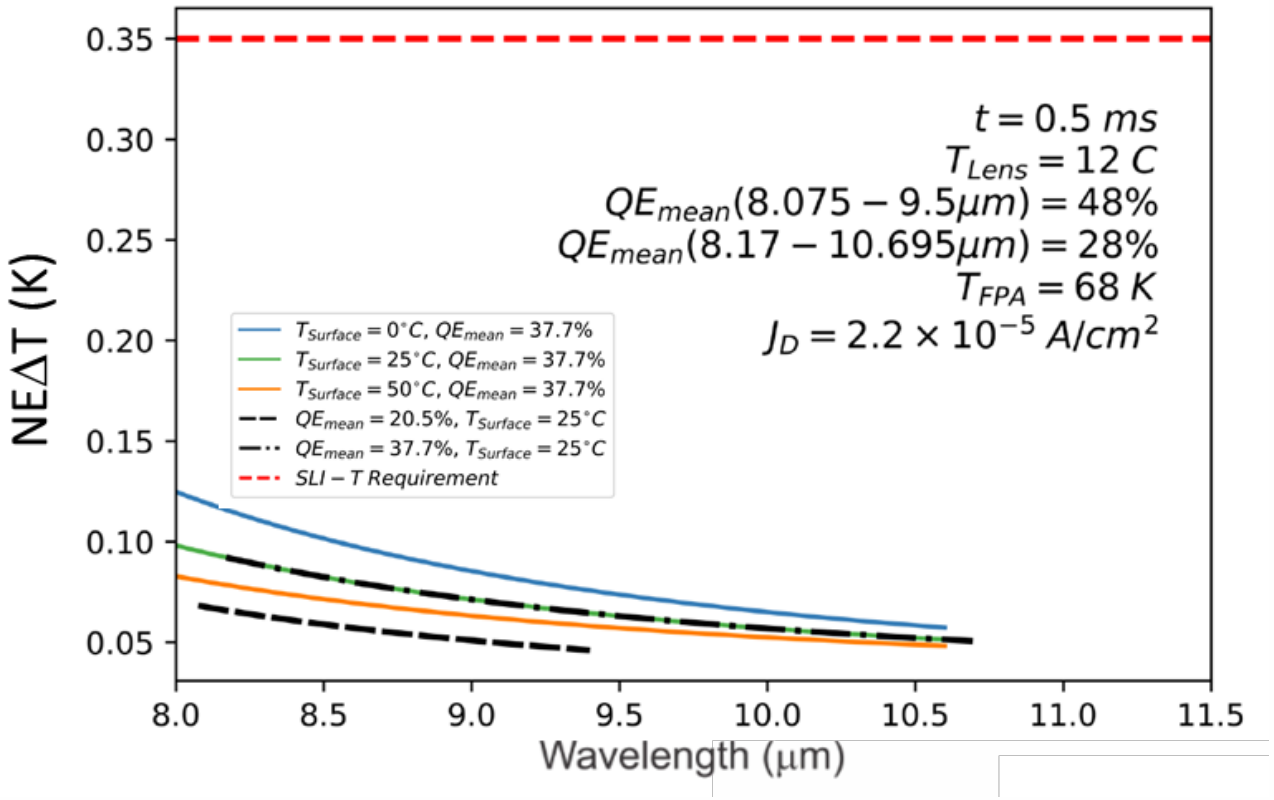






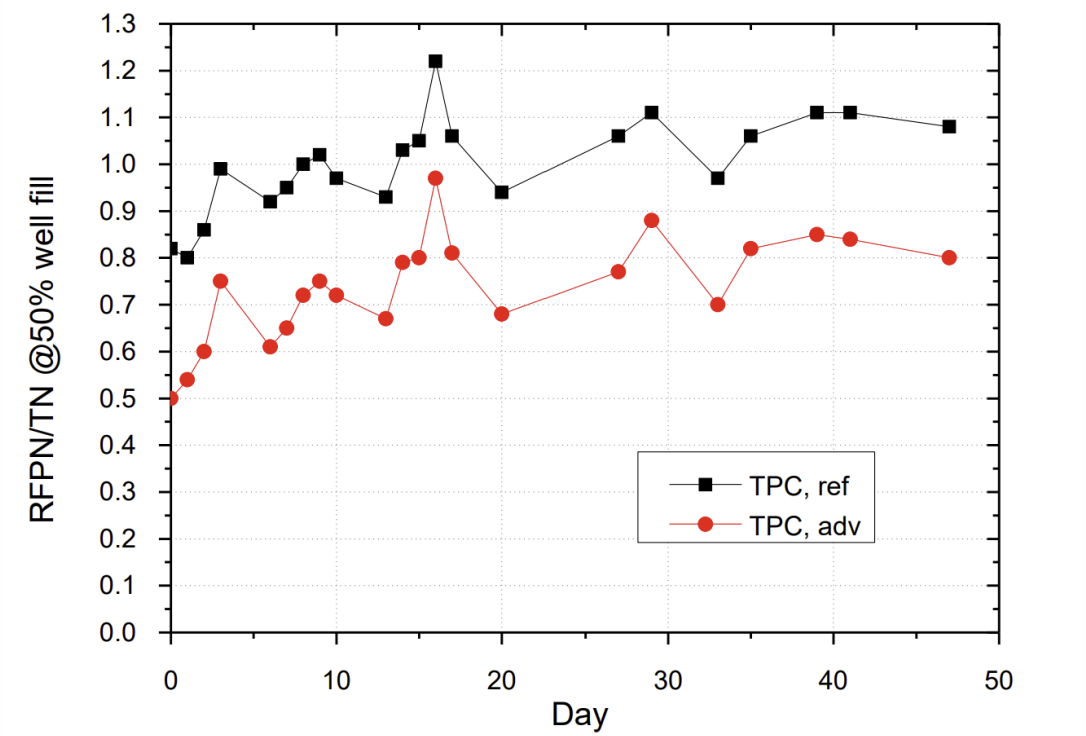
What HyTI data will look like

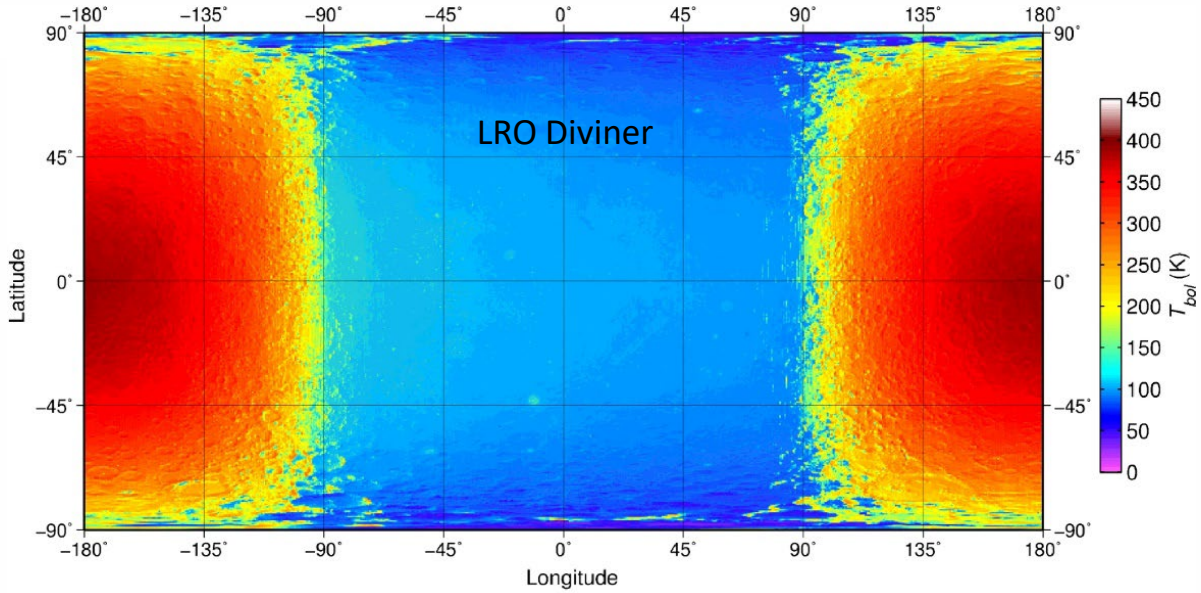


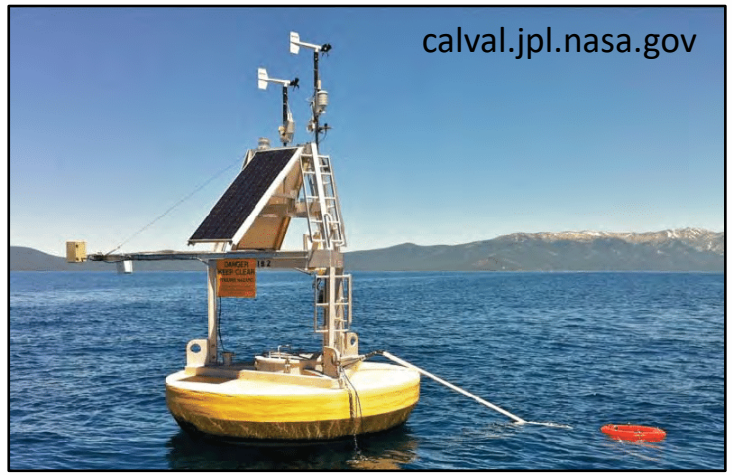


Calibration and validation

HyTI calibration will rely on the temporal stability of T2SLS, supplemented by deep-space and Lunar scans, imaging of cal-val sites on Earth, and other Landsat/Terra ASTER measurements







Ribet-Mohamed, I., et al. (2019). Proc. SPIE 11002, Infrared Technology and Applications XLV. doi: 10.1117/12.2520211

A Day-in-the-Life of HyTI

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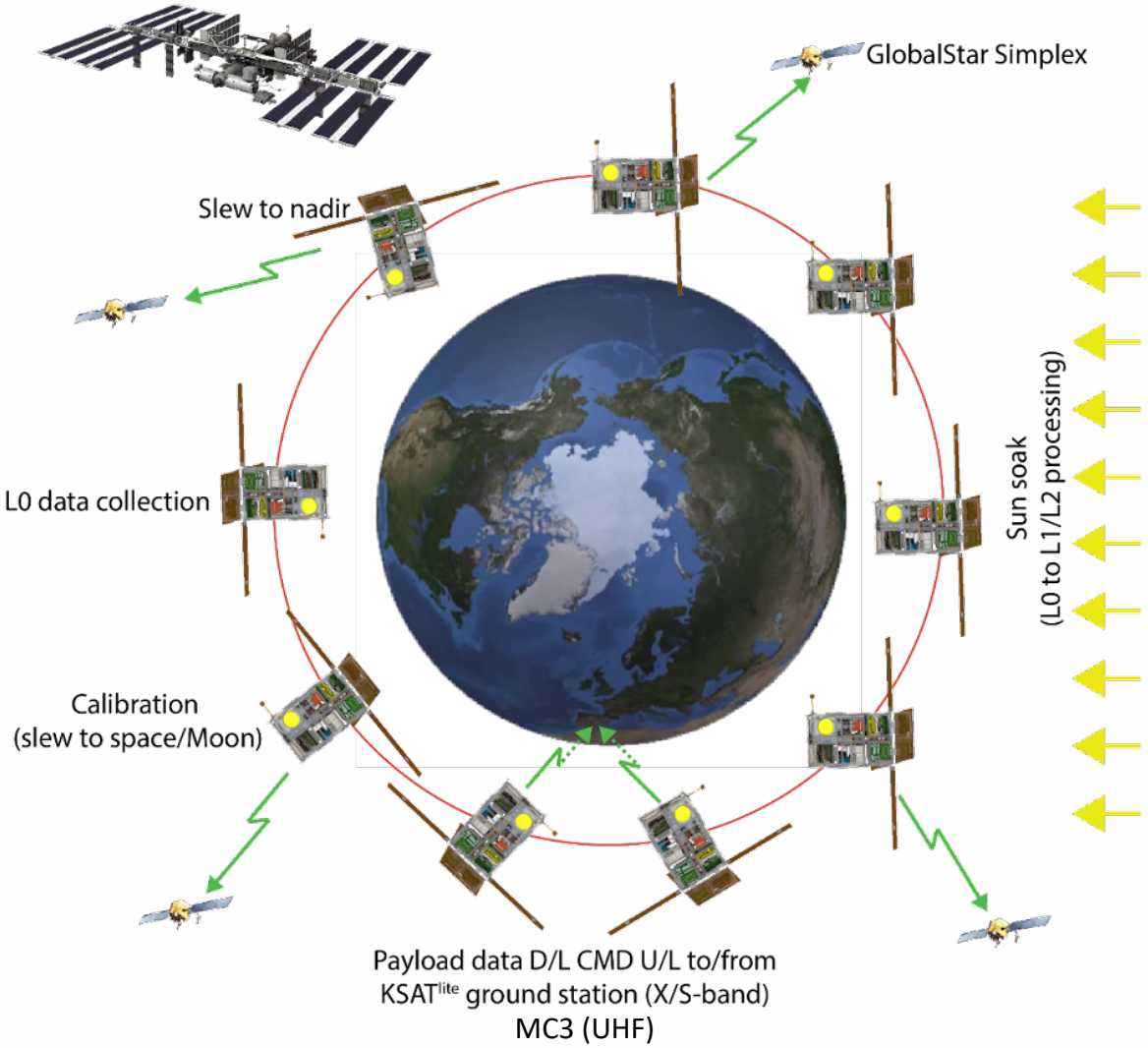

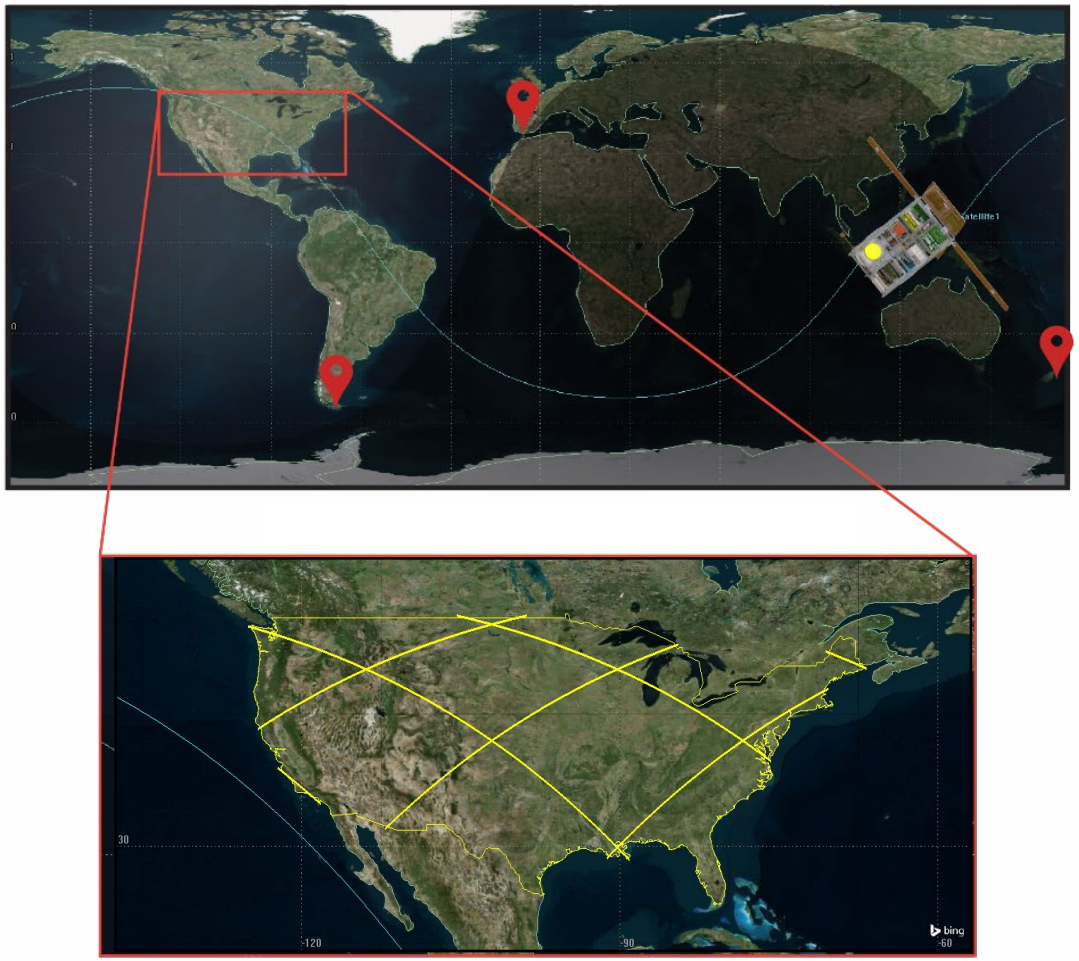

The HyTI payload

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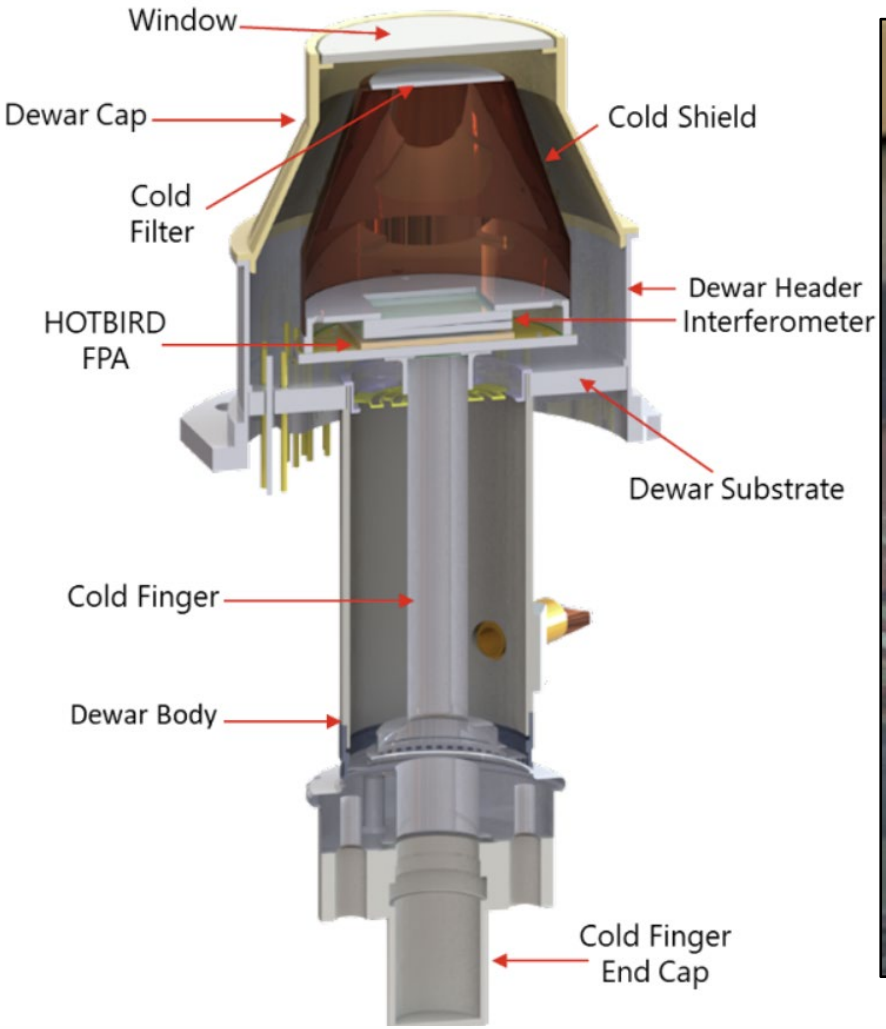

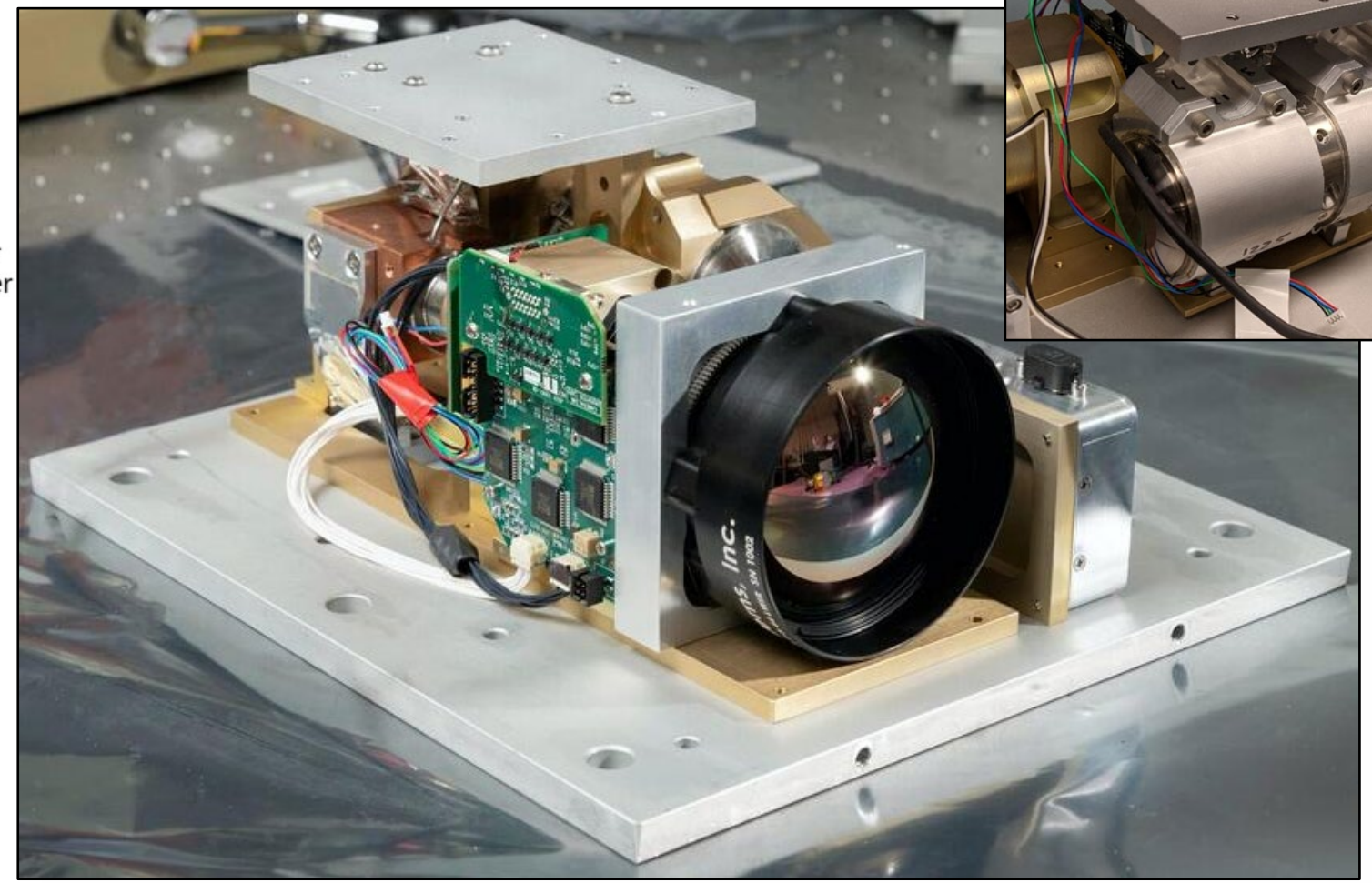

HyTI spacecraft currently deep into I&T

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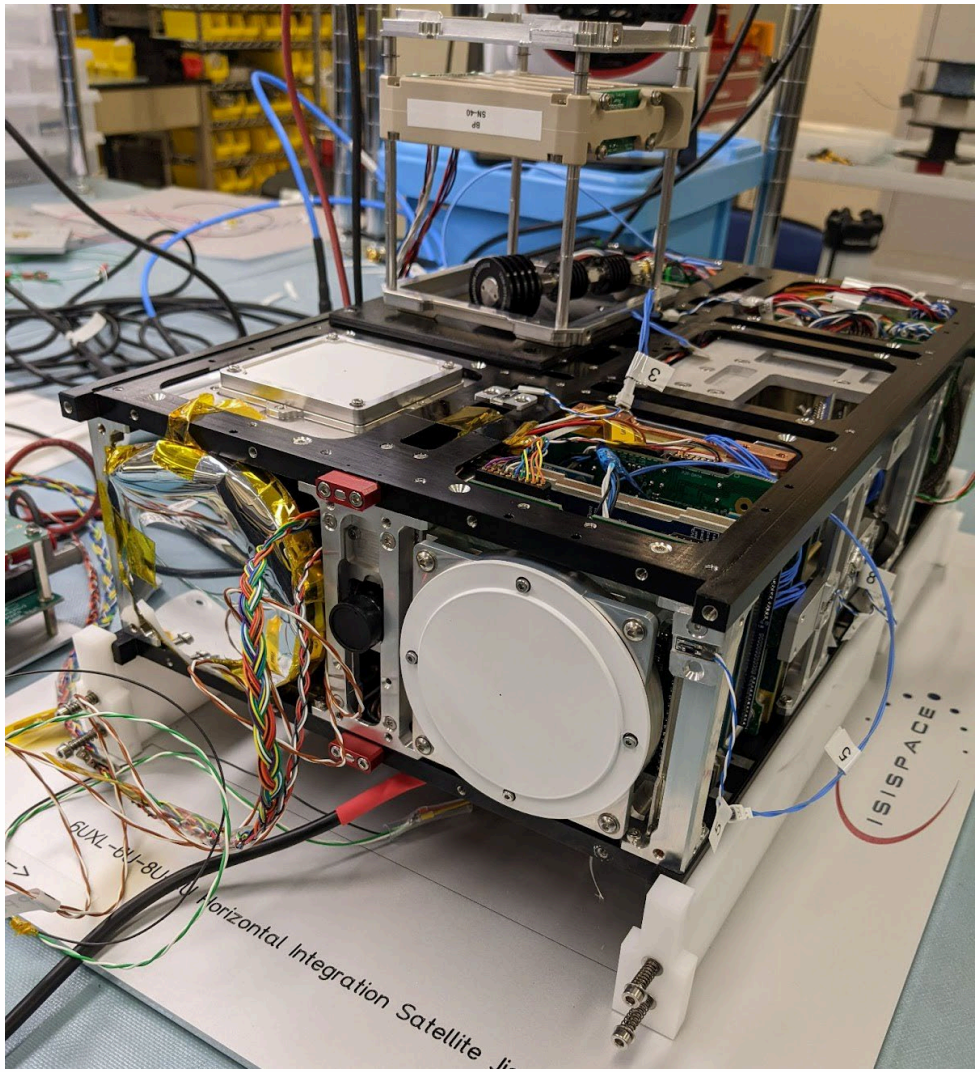
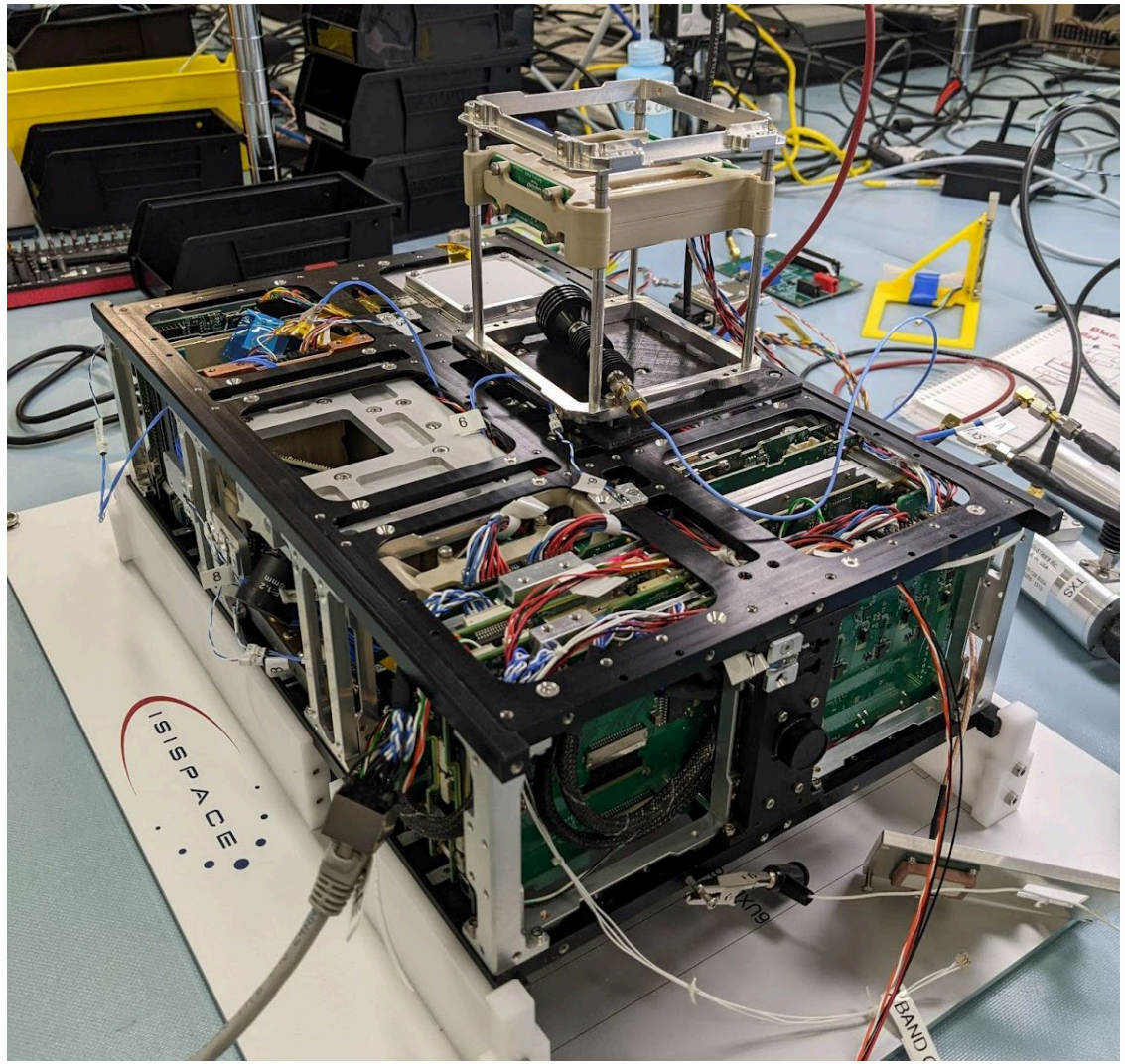
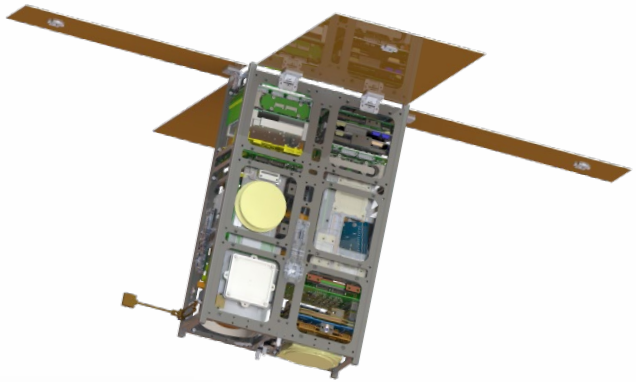


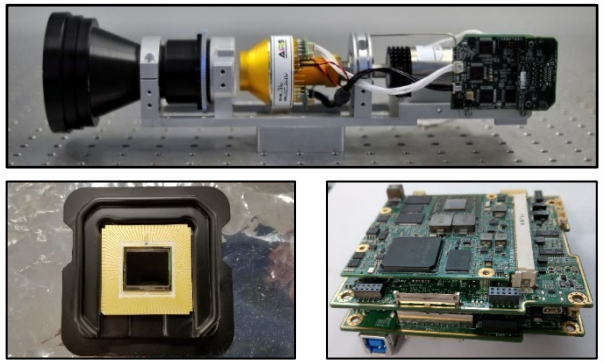


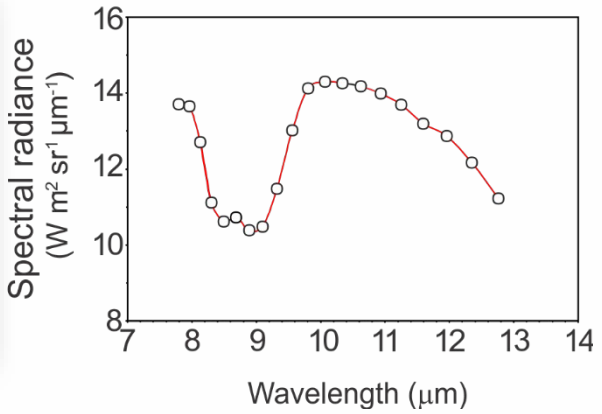
Summary

HyTI
Hyperspectral Thermal Imager

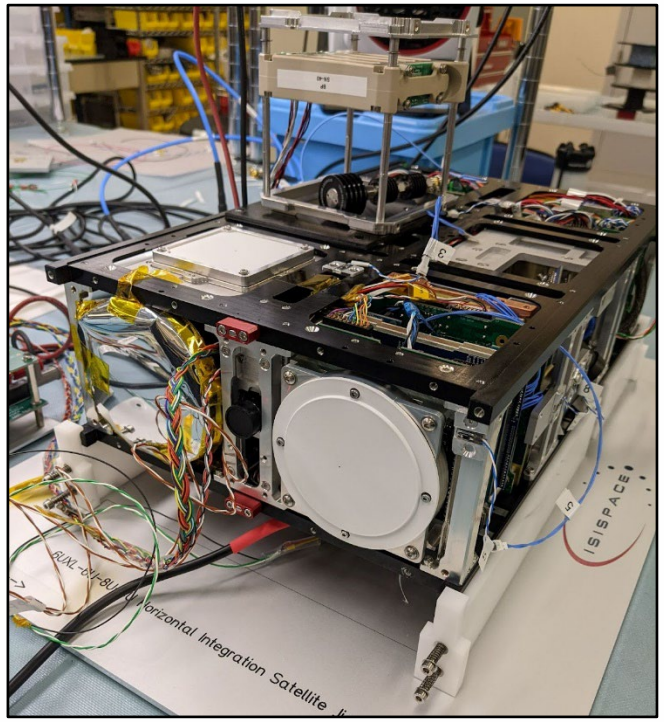
HyTI will space validate innovative new technology to provide Earth scientists with high spatial and spectral resolution thermal infrared image data from a 6U CubeSat







Status: delivery in Fall 2022, for launch to ISS in early 2023



Acknowledgements:

1. Support from *NASA Earth Science Technology Office's InVEST program* (80NSSC18K1601), and HyTI Program Manager, Sachi Babu
2. Co-Is and collaborators: Paul Lucey, Miguel Nunes, Luke Flynn (UH Mānoa); Sarath Gunapala, Sir Rafol, David Ting, Alex Soibel (JPL); Lloyd French (Qwest Inc.); Carl Kirkconnell (West Coast Solutions); Dan Manitakos and Bob Papinsick (AIRS), Tom George (SaraniaSat); Peter Kornick, Greg Fitzgerald and team (New England Optical Systems, now FLIR OSG); ISIS