HyTI
Hyperspectral Thermal Imager

Presented by
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On behalf of the HyTI Team
HyTI Mission Goals

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$_{in}$ = 5)

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 mission

Earth scientists have never had access to high spatial and high spectral longwave infrared image data from Earth orbit
HyTI Measurement Approach
HyTI (cooled) makes TIRCIS (uncooled) smaller
HyTI FPA: LWIR T2SL HOT-BIRD FPA

\( \lambda_c = 12.6 \, \mu m \)

T = 65 K

99.98% operability (18SLL03)

JPL developing T2SL-based LWIR detectors for NASA Sustainable Land Imaging Technology (SLI-T) Program

No AR coating
HyTI predicted instrument performance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Baseline</th>
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<tbody>
<tr>
<td>GSD</td>
<td>60 m</td>
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<tr>
<td>Swath</td>
<td>20 km</td>
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<tr>
<td>Revisit</td>
<td>Constellation</td>
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<tr>
<td>Spectral range</td>
<td>8-10.7 μm</td>
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<tr>
<td>Band count</td>
<td>25</td>
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<tr>
<td>Absolute radiometric uncertainty</td>
<td>&lt;10% @ 300 K</td>
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<tr>
<td>NEΔT</td>
<td>&lt;0.4 K at 300 K</td>
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TIRCIS (44 cm⁻¹)
HyTI design
HyTI interferometric LWIR imager
HyTI subsystems
HyTI will process from L0 to L2 onboard using a dedicated OBC.
Science data products will be generated on-board HyTI

Land Surface Temperature (LST, K)

Volcanic SO$_2$ concentrations (ppm.m)
HyTI, Day-in-the-life
Summary

Space-validating innovative new technology to provide Earth scientists with high spatial and spectral resolution thermal infrared image data from a 6U cubeSat

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