



Earth Science Airborne Program

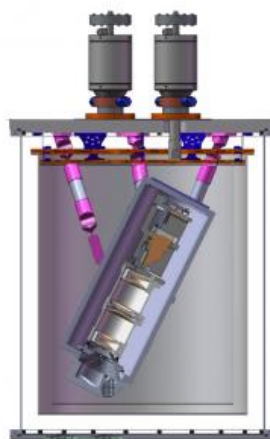
JPL's Suborbital Earth Science Instruments & Measurements

HyTES

HyTES: A Hyperspectral Thermal Emission Spectrometer for HypIRI-TIR Science

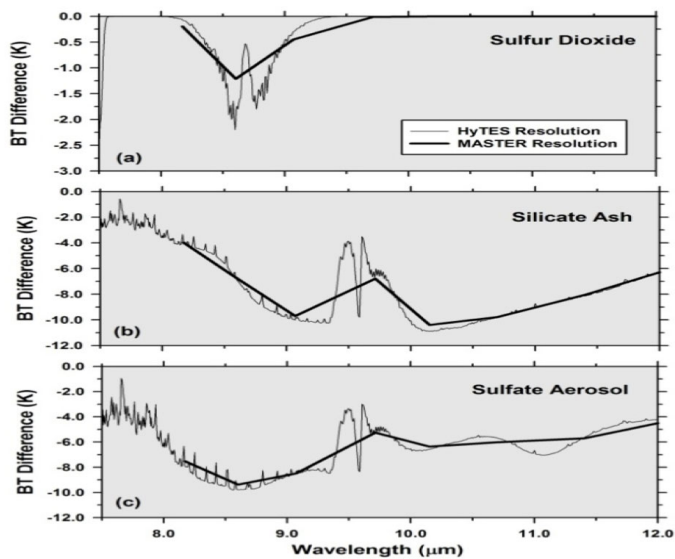
The objective of this work carried out at JPL is to build and deploy an airborne Hyperspectral Thermal Emission Spectrometer (HyTES) with 512 pixels across track with pixel sizes in the range of 5 to 50 m depending on aircraft flying height and 256 spectral channels between 7.5 and 12 μm . The HyTES design is built upon a Quantum Well Infrared Photodetector (QWIP) focal plane array (FPA), a cryo-cooled Dyson Spectrometer and a high-efficiency, concave blazed grating, produced using E-beam lithography.

HyTES will be useful for a number of applications, including high-resolution surface temperature and emissivity measurements and volcano observations. HyTES measurements will also be used to help determine scientifically optimal band locations for the thermal infrared (TIR) instrument for the Decadal HypIRI mission.



Comparison of the spectra of SO_2 , silicate ash, and SO_4 aerosols at the spectral resolution of HyTES and MASTER. These simulated spectra are distinct at the resolution of MASTER or HyTES. Due to similarities in these spectra, unique estimates of the proportions of these materials in heterogeneous plumes would require HyTES-class resolution.

HyTES for Volcanic Plume Observations



Comparison of the spectra of SO_2 , silicate ash, and SO_4 aerosols at the spectral resolution of HyTES and MASTER. These simulated spectra are distinct at the resolution of MASTER or HyTES. Due to similarities in these spectra, unique estimates of the proportions of these materials in heterogeneous plumes would require HyTES-class resolution.

[\(/sites/default/files/public/hytes-chart.jpg\)](http://sites/default/files/public/hytes-chart.jpg)

Parameter	Value
Spectral range	7.5 - 12 mm
Spectral channels (sampling)	256 (17.6 nm)
Field of view	48.3°
IFOV (pixel subtense)	1.44 mrad
Spatial elements	512
Pixel size at 2000 m flight altitude	3.64 m
Slit width	39 mm
F-number	1.6

Instrument Type:

[Passive \(http://airborescience.nasa.gov/instrument/type/Passive\)](http://airborescience.nasa.gov/instrument/type/Passive), [Spectrometer \(http://airborescience.nasa.gov/instrument/type/Spectrometer\)](http://airborescience.nasa.gov/instrument/type/Spectrometer)

Measurements:

[Temperature \(http://airborescience.nasa.gov/instrument/meas/Temperature\)](http://airborescience.nasa.gov/instrument/meas/Temperature)

Aircraft:

[Twin Otter \(http://airborescience.nasa.gov/instrument/aircraft/Twin_Otter\)](http://airborescience.nasa.gov/instrument/aircraft/Twin_Otter)

Instrument Team:

[Bjorn Eng \(http://airborescience.nasa.gov/person/Bjorn_Eng\)](http://airborescience.nasa.gov/person/Bjorn_Eng) (PI)