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A Quantum Leap Forward in Meteorological Sensor Capabilities NPOESS CrIS



ITT's Cross-track Infrared Sounder (CrIS) will be onboard the National Polar-orbiting Operational Environmental Satellite System (NPOESS). CrIS is the first in a series of advanced operational sounders that will provide more accurate, detailed atmospheric temperature and moisture observations for weather and climate applications.

This high-spectral resolution infrared instrument will take 3-D pictures of atmospheric temperatures, water vapor and trace gases. It will provide over 1,000 infrared spectral channels at an improved horizontal spatial resolution and measure temperature profiles with improved vertical resolution to an accuracy approaching 1 Kelvin (the absolute temperature scale). This information will help significantly improve climate prediction and both short-term weather "nowcasting" and longer-term forecasting. It will also provide a vital tool for National Oceanic and Atmospheric Administration (NOAA) to take the pulse of the planet continuously and assist in understanding major climate shifts.

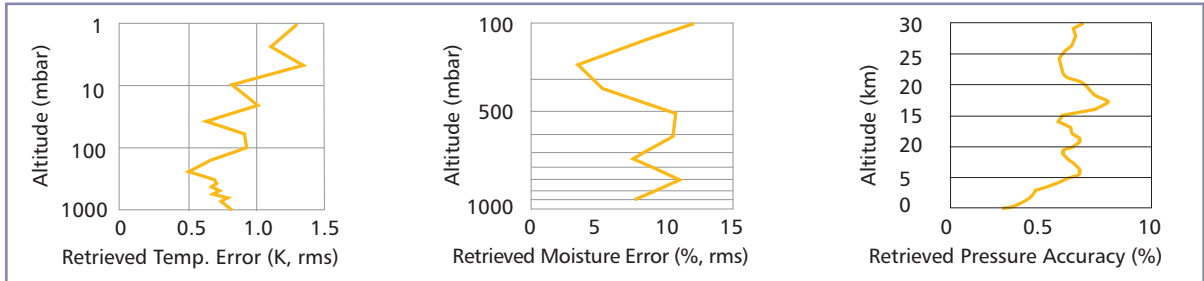
The CrIS continues ITT's legacy of providing NOAA with sounder technology for over 30 years since the first design of the High-resolution Infrared Radiation Sounder (HIRS) instrument on Polar Operational Environmental Satellite (POES).

Key Features

Application	Operational atmospheric sounding from low earth orbit
Technology	Advanced Michelson interferometer with dynamic alignment and automatic internal spectral calibration
Aperture	8cm
Spatial Resolution	16.8 mrad (14.0km) IFOVs arranged in a 3x3 array
Detector Cooling	4-stage "split-patch" passively cooled radiator (81K LWIR, 98K MWIR and SWIR)
Detectors	Photovoltaic HgCdTe

Specifications

Atmospheric Profile Estimated Accuracy

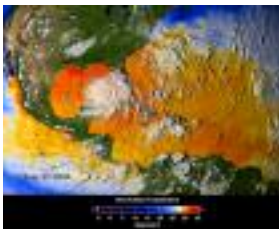


First METSAT Application of an Advanced FTS Interferometer

- 1305 spectral channels
- 3 spectral bands (SWIR to LWIR)
- Spectral resolution to 0.625cm^{-1}
- 3x3 FOVs (14km diameter)
- 8cm aperture
- Small size: 88x94x73cm
- Low weight: <165kg
- Low power: <117W
- Modest data rate: <1.5Mbps
- > 7-year on-orbit life
- 1394 firewire command/data interface

Hardware and Algorithms Provide Accurate Atmospheric Profiles

- Temperature to <1.0K accuracy
- Relative humidity to <10%
- Pressure to <1.0%
- 1km vertical resolution
- Cloud clearing algorithms operate in all types of weather



CrIS hardware and algorithms will provide even more accurate atmospheric temperature profiles than seen in this image from our current Geostationary Environmental Satellite (GOES) sensor.

More Accurate Profiles Mean Improved Forecast Accuracy

- 3-day weather forecast approaching current 1-day and 2-day accuracies

CrIS Sensor Parameter and Guaranteed Values

Sensor Parameter	Guaranteed Value
LWIR Band	655-1095 cm^{-1}
MWIR Band	1210-1750 cm^{-1}
SWIR Band	2155-2550 cm^{-1}
LWIR Spectral Res.	<0.625 cm^{-1}
MWIR Spectral Res.	<1.25 cm^{-1}
SWIR Spectral Res.	<2.5 cm^{-1}
Avg. LWIR NEdN $\text{mW}/(\text{m}^2\cdot\text{sr}\cdot\text{cm}^{-1})$	0.13
Avg. MWIR NEdN $\text{mW}/(\text{m}^2\cdot\text{sr}\cdot\text{cm}^{-1})$	0.04
Avg. SWIR NEdN $\text{mW}/(\text{m}^2\cdot\text{sr}\cdot\text{cm}^{-1})$	0.006
FOV Motion (Jitter)	<71 μrad (radial)
Mapping Accuracy	<1.5km
Absolute Radiometric Uncertainty	<0.45% (LWIR) <0.6% (MWIR) <0.8% (SWIR)
Spectral Accuracy	<10ppm

ITT provides a full range of remote sensing and GPS navigation solutions. For further information, contact us at:

ITT Corporation
 Space Systems Division
 1919 West Cook Road, P. O. Box 3700
 Fort Wayne, Indiana 46801, USA
 Telephone: 260-451-6000
www.ssd.itt.com



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