

Space Station Instruments

Unique challenges and advantages associated with International Space Station (ISS) payload design, calibration, and operation

Data, Calibration and Processing of Thermal Infrared Data from the LisR ISS Mission

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ABSTRACT: The Longwave Infrared Sensing demonstratoR (LisR) mission is a longwave infrared camera which is flying on board the International Space Station (ISS), launched in February 2022 with first light in early March 2022. This demonstrator, developed by the founders of ConstellIR at Fraunhofer Institute of High Speed Dynamics in Freiburg/Germany, is a platform to demonstrate the capabilities of cryo-cooled long wave infrared detectors from space. The goal of this mission is to derive high-accuracy Land Surface Temperature (LST) information used for better planning and efficiency in the agricultural sector. This information is critical in order to ensure the sustainability of global food supplies. LisR is the precursor of a full satellite constellation called HiVE which is planned to deliver high temporal, spatial and spectral resolution thermal and VisNir information from space from the end of 2023 onwards.

The demonstrator mainly consists of a cryo-cooled thermal infrared frame camera, a free form optical assembly and an on board data processing unit. It images the earth's surface in two longwave infrared bands which allows the derivation of highly accurate Land Surface Temperature information with high spatial resolution.

The main industries benefitting of such data are, but not only, the global agricultural sector, food supply chains, sustainable finance and insurance industries which can monitor and optimize the water cycle of global food production with this information.

Besides a brief description of the instrument itself the envisaged presentation will detail:

- the pre-launch laboratory characterization of the instrument for spectral resolution, spatial resolution and the MTF characterization,
- the laboratory absolute radiometric measurements,
- the available data products,
- the operational radiometric and geometric correction and processing algorithms and pipeline,
- the algorithm used to derive Land Surface temperature from absolute calibrated and orthorectified radiance data,
- the initial image quality and accuracy assessments,
- the initial in-flight absolute radiometric characterization and calibration and finally,
- an insight into the planned constellation of multispectral vis/nir/tir satellites.

AWE from Science to Mission

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ABSTRACT: Atmospheric Waves Experiment (AWE) is a mission to study gravity waves (upward propagating pressure waves) in the Earth's atmosphere. The AWE science objectives are to quantify seasonal and regional variabilities and influences of gravity waves near the mesopause, identify the dominant dynamical processes controlling the gravity waves, and estimate the wider role of gravity waves in the ionosphere-thermosphere-mesosphere. This presentation will discuss the development of AWE from the science objectives to a practical mission design and from the mission concept to calibration requirements.