

IAF EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Sensors and Technology (3)

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INTERNATIONAL SPACE STATION HYPERSPECTRAL EARTH IMAGING SYSTEM TRIAL

Abstract

Orbital Sidekick (OSK), in conjunction with the International Space Station National Laboratory, has recently deployed a commercial space-based hyperspectral sensor system on the International Space Station. The International Space Station Hyperspectral Earth Imaging System Trial (ISS-HEIST) is comprised of a visible to near infrared (VNIR, 400-1000 nm) hyperspectral sensor and powerful commercial on-board processing and data storage. ISS-HEIST utilizes the NanoRacks External Platform (NREP) located on the Japanese Experiment Module-Exposed Facility (JEM-EF). The system samples 150 discrete spectral bands at 28-meter ground sample distance (GSD) and its automated tasking scheme collects and stores approximately 100 gigabytes (GB) of hyperspectral imagery each day, with primary coverage over the continental United States. On-board processing and georectification of hyperspectral data cubes, real-time anomaly alerts, and in-depth analytics are performed and delivered via OSK's proprietary Spectral Intelligence™ analytics platform. The platform is designed around a multi-tenant, scalable, service-oriented architecture facilitating spiral development and ease of evolution, expansion and refinement, with scalability to support an expanding user community. The unique chemical speciation and change detection capability of the ISS-HEIST system enables unparalleled space-based detection of pipeline corrosion and leaks for asset integrity monitoring. Additional applications include mineral surveying, crop protein content and evapotranspiration monitoring, and road infrastructure assessments. By 2021, OSK plans to deploy a constellation of five nanosatellites with this hyperspectral earth imaging system which will monitor across a continuous spectral range spanning the visible to shortwave infrared region (VSWIR, 400-2500 nm). ISS-HEIST operations have yielded terabytes of VNIR hyperspectral data of the continental United States, and multiple spectral classification algorithms and band indices have been developed as a direct result.