Acronym: HREP-HICO

Title: HICO and RAIDS Experiment Payload - Hyperspectral Imager for the Coastal Ocean

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Sponsoring Agency: National Aeronautics and Space Administration (NASA)

Increment(s) Assigned: 19, 20

Mission Assigned: HTV-1

Brief Research Summary (PAO): HICO and RAIDS Experiment Payload - Hyperspectral Imager For The Coastal Ocean (HREP-HICO) will operate a visible and near-infrared (VNIR) Maritime Hyperspectral Imaging (MHSI) system, to detect, identify and quantify coastal geophysical features from the International Space Station.

Research Summary:

- HICO and RAIDS Experiment Payload - Hyperspectral Imager For The Coastal Ocean (HREP-HICO) combines two experiment sensors into one payload.

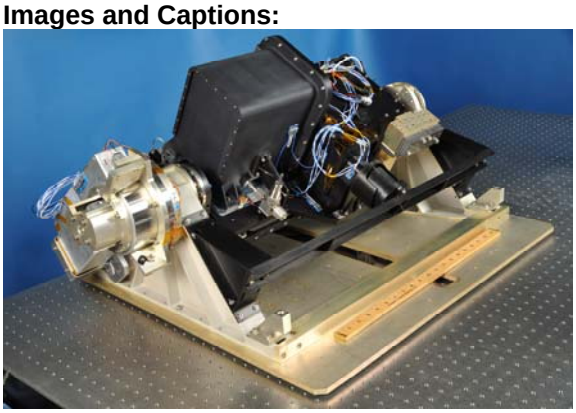
- HREP-HICO demonstrates space-based Maritime Hyper-Spectral Imagery (MHSI) for characterization of littoral regions (coast of an ocean or sea) on Earth.

Detailed Research Description:
The HICO and RAIDS Experiment Payload - Hyperspectral Imager For The Coastal Ocean (HREP-HICO) consists of two instruments. The objective of the HREP-HICO is to launch and operate a rapid-development, cost-constrained visible and near-infrared (VNIR) Maritime Hyperspectral Imaging (MHSI) system, to demonstrate the detection, identification and quantification of littoral (coast of an ocean or sea) and terrestrial geophysical features. HREP-HICO will validate the performance of MHSI technology in

space and demonstrate its utility to meet Department of Defense (DoD) requirements. HREP-HICO will provide an initial data stream to introduce new DoD users to MHSI data products, and to develop data dissemination channels. Hyperspectral imagery data from HREP-HICO also has significant application in the civil remote sensing community. Extensive experience with airborne visible/infrared imaging spectrometer (AVIRIS) airborne hyperspectral data at 20-meters Ground Sample Distance (GSD) has demonstrated its utility for land use and land cover, vegetation type, stress, and health, and crop yield. In the ocean, bathymetry (depth measurement of large bodies of water), bottom type, and water optical properties are of great interest to National Oceanic and Atmospheric Administration (NOAA) and other agencies with marine responsibilities. These applications are of immediate interest to the United States Departments of Agriculture, Commerce, Homeland Security, and Interior, as well as National Aeronautics and Space Administration (NASA).

Project Type: Payload

Images and Captions:



The HREP-HICO imager on its rotating spindle. Image courtesy of the Naval Research Laboratory.

Operations Location: ISS External

Brief Research Operations:

- HREP-HICO will be installed on the Japanese Experiment Module – Exposed Facility (JEM-EF) of the *Kibo* module utilizing extravehicular robotics (EVR).

- Following installation the HREP-HICO instrument will be powered on and operated via ground commanding from the Payload Operations and Integration Center at Marshall Space Flight Center (MSFC) in Huntsville, AL, utilizing the Telescience Resource Kit (TReK) capabilities at the local site of the investigator team.

Operational Requirements: HREP-HICO is mounted to the ISS exterior on JEM-EF at position number six. It requires power provided by the International Space Station, and uses the ISS for commanding and data downlink. All interaction will be via the POIC and no crew interaction is planned other than installation and removal via extravehicular robotics (EVR).

Operational Protocols: HREP-HICO will be launched to the ISS as a part of the HTV-1 mission. EVR will mount HREP-HICO to the JEM-EF and remove it for disposal on a later HTV flight.

Category: Observing the Earth and Educational Activties

Subcategory: Observing the Earth

Space Applications: imagery captured by HREP-HICO during long-duration missions provide insight for anomalies that occur in low Earth orbit (LEO)..Observations that are made from LEO create the model for planetary exploration observations on future long-duration missions.

Earth Applications: HREP-HICO will validate the performance of MHSI technology in space and demonstrate its utility to meet DoD requirements.

Manifest Status: Planned

Supporting Organization: Department of Defense

Previous Missions: HREP-HICO is a unique investigation which has not been performed on spacecraft before.

Related Publications:
Corson MR, Bowles JH, Chen W, Davis CO, Gallelli KH , Korwan DR, Lucey PG, Mosher R, Holasek TJ. The HICO Program - Hyperspectral Imaging of the Coastal Ocean from the International Space Station. Geoscience and Remote Sensing Symposium, 2004. IGARSS '04. Proceedings. 2004 IEEE International. 2004; 6: 4184 – 4186.

Web Sites:
Hyperspectral Imager for the Coastal Ocean
http://www.nova-sol.com/capabilities/remote-sensing/hyperspectral-imager-for-the-coastal-ocean

Related Payload(s): HREP-RAIDS