

**Acronym:** HREP-RAIDS

**Title:** HICO and RAIDS Experiment Payload - Remote Atmospheric and Ionospheric Detection System (RAIDS)

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**Developer(s):**

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United States Department of Defense Space Test Program, Johnson Space Center, Houston, TX

**Sponsoring Agency:** National Aeronautics and Space Administration (NASA)

**Increment(s) Assigned:** 19, 20

**Mission Assigned:** HTV-1

**Brief Research Summary (PAO):** The HICO and RAIDS Experiment Payload - Remote Atmospheric and Ionospheric Detection System (HREP-RAIDS) experiment will provide atmospheric scientists with a complete description of the major constituents of the thermosphere (layer of the Earth's atmosphere) and ionosphere (uppermost layer of the Earth's atmosphere), global electron density profiles at altitudes between 100 - 350 kilometers.

**Research Summary:**

- The HICO and RAIDS Experiment Payload - Remote Atmospheric and Ionospheric Detection System (HREP-RAIDS) combines two experiment sensors into one payload.
- HREP-RAIDS is an ultraviolet (UV) and visible remote sensing instrument that measures limb profiles of electron density and neutral density to improve ionospheric (upper part of the atmosphere) and satellite drag models.

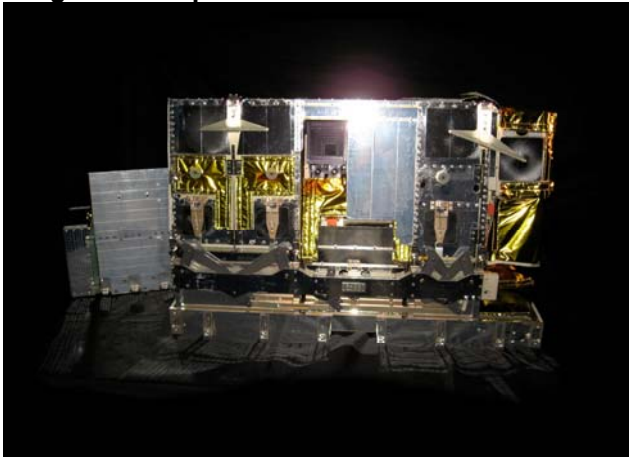
**Detailed Research Description:**

The Hyperspectral Imager for the Coastal Ocean (HICO) and Remote Atmospheric and Ionospheric Detection System (RAIDS) Experiment Payload (HREP) consists of two instruments. The HREP-RAIDS is a satellite experiment designed to perform a comprehensive study of upper atmospheric airglow

emissions. HREP-RAIDS observations will be used to develop and test techniques for remote sensing of the neutral atmosphere and ionosphere on a global scale. HREP-RAIDS is an array of 8 limb-scanning optical instruments covering the wavelength region 550 - 8700 Angstroms. The experiment scans or images the limb of the Earth to measure profiles of airglow from major ionospheric and neutral atmospheric species in the upper atmosphere. HREP-RAIDS measurements will be used to determine the composition and temperature of the thermosphere and ionosphere. HREP-RAIDS will test new techniques for ionospheric and neutral atmospheric remote sensing, and look for signs of global change. HREP-RAIDS will be the most comprehensive survey of the ionosphere and thermosphere in over 20 years.

**Project Type:** Payload

**Images and Captions:**



Unlatched HREP-RAIDS configuration fully rotated (On-orbit the instrument is rotated 180deg). Image courtesy of the Naval Research Laboratory.

**Operations Location:** ISS External

**Brief Research Operations:**

- HREP-RAIDS will be installed on the Japanese Experiment Module – Exposed Facility (JEM-EF) of the *Kibo* module.
- Following installation HREP-RAIDS 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-RAIDS 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-RAIDS will be launched to the ISS as a part of the HTV-1 mission. EVR will mount HREP to the JEM-EF and remove it for disposal on a later HTV flight.

**Category:** Technology Development for Exploration

**Subcategory:** Space Weather, Observing the Earth

**Space Applications:** HREP-RAIDS will test new techniques for ionospheric and neutral atmospheric remote sensing and study atmospheric temperature, composition, and chemistry.

**Earth Applications:** HREP-RAIDS will be the most comprehensive survey of the ionosphere and thermosphere in over 20 years. Data from this investigation will improve knowledge of Earth's atmosphere.

**Manifest Status:** Planned

**Supporting Organization:** Department of Defense

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

**Results Publications:**

N/A

**Related Publications:**

N/A

**Web Sites:**

Remote Atmospheric and Ionospheric Detection System  
<http://www.nrl.navy.mil/tira/Projects/raids/>

**Related Payload(s):** HREP-HICO