RAIDS Preview: Lower Thermosphere/Ionosphere Observations and Potential Collaborations

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Naval Research Laboratory

Space Science Application Laboratory
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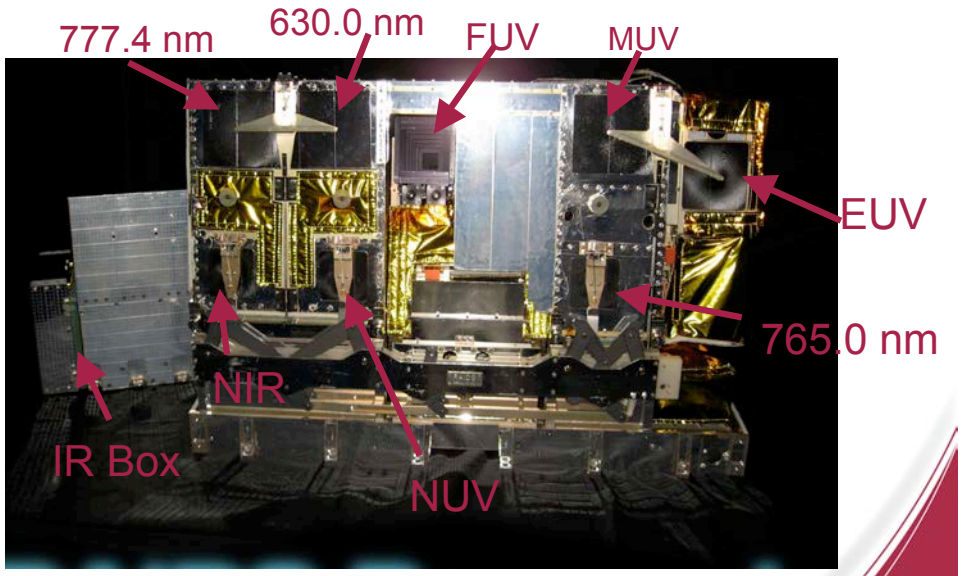
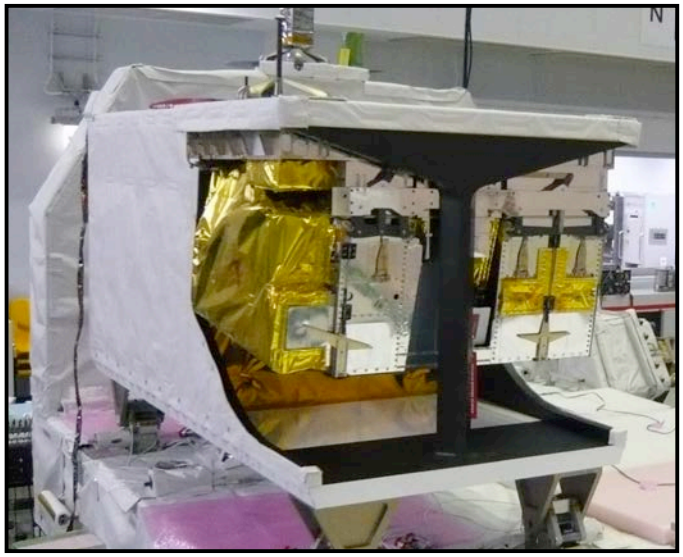
The Remote Atmospheric and Ionospheric Detection System (RAIDS) Program

- Joint Collaboration between NRL and Aerospace.
  - *Principal Investigator: Scott Budzien*
  - *Aerospace PI: Rebecca Bishop*
  - *Project Scientist: Andrew Stephan*
- Additional key RAIDS Team members
  - *Robert McCoy, Ken Wolfram, Don McMullin, Steve Myers, Mike Picone, Kelvin Cheung, Mazaher Sivjee, Glenn Holland, Paul Carranza, Jim Pranke, Gil Fritz, Dave Kayser and many others past and present!*



RAIDS Suite

- NRL design/built instruments:
  - *MUV, FUV, NUV*
- Aerospace design/built instruments:
  - *NIR, 3 photometers, EUV*



RAIDS integrated into the HREP platform awaiting placement on H2-B in Japan.

- RAIDS and the Hyperspectral Imager for the Coastal Oceans (HICO) Integrated into HICO-RAIDS Experiment Platform (HREP).
- In Japan for launch on HTV rocket.
- On-schedule Launch in September 2009

An artist's conception of a future launch of the Japanese H2-B. Courtesy of JAXA.

RAIDS Suite

- NRL design/built instruments:
  - *MU*
- Aerosp
  - *NIP*

- RAIDS and the Hyperspectral Imager for the Coastal Oceans (HICO) integrated into HP-1 EXPRESS

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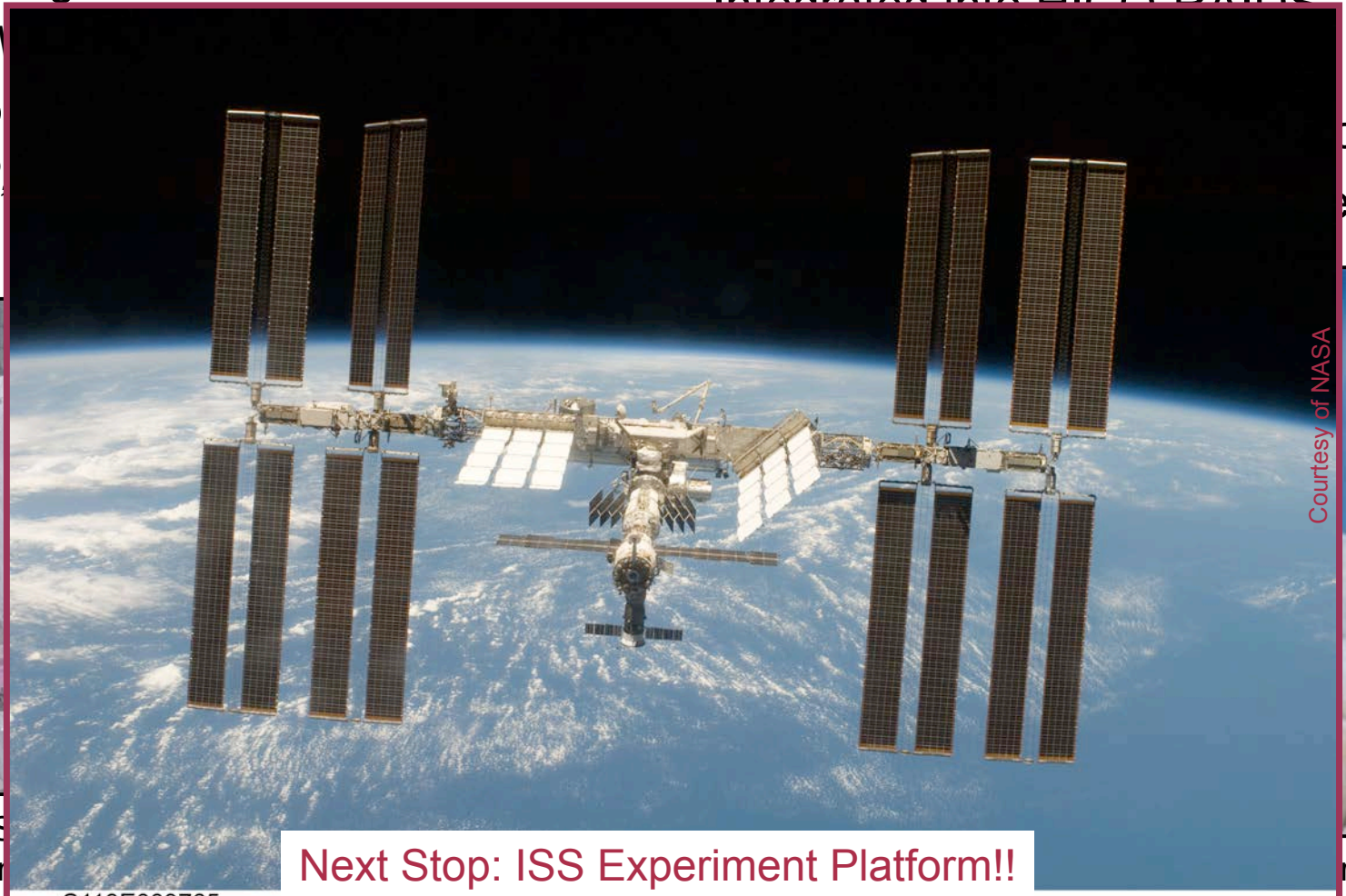

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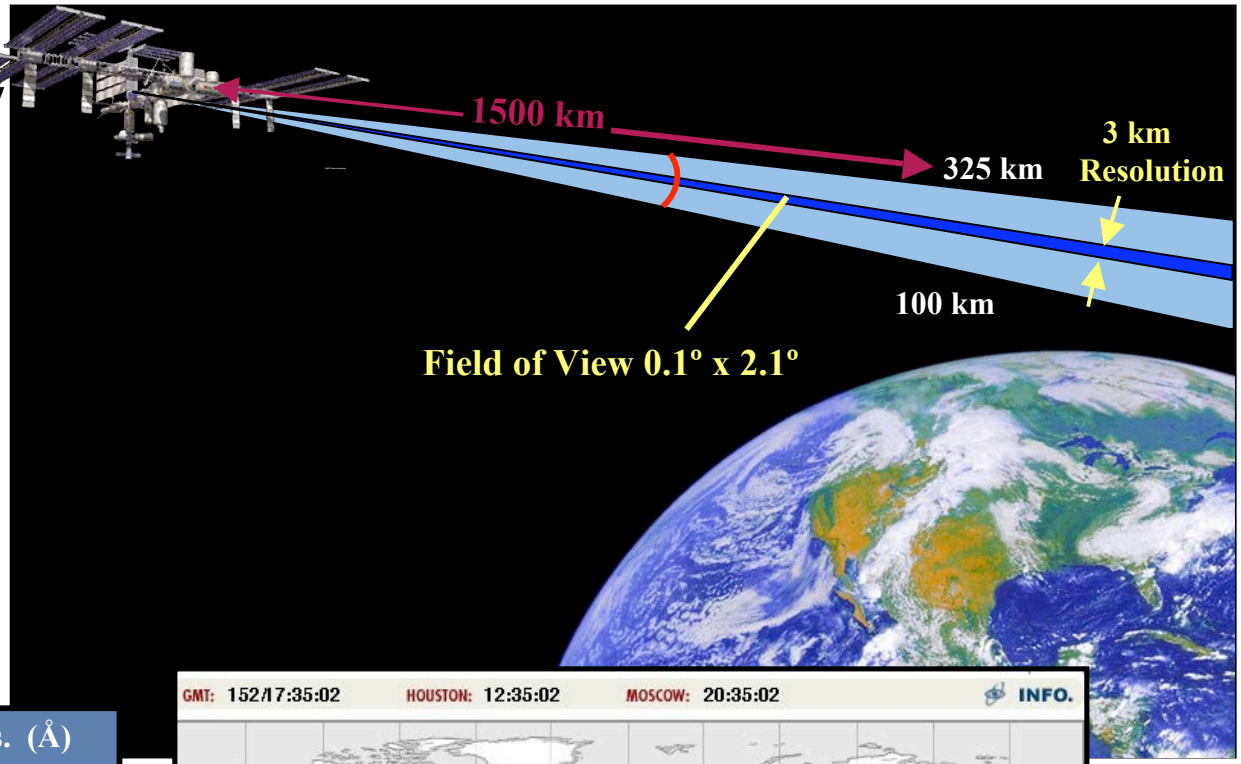
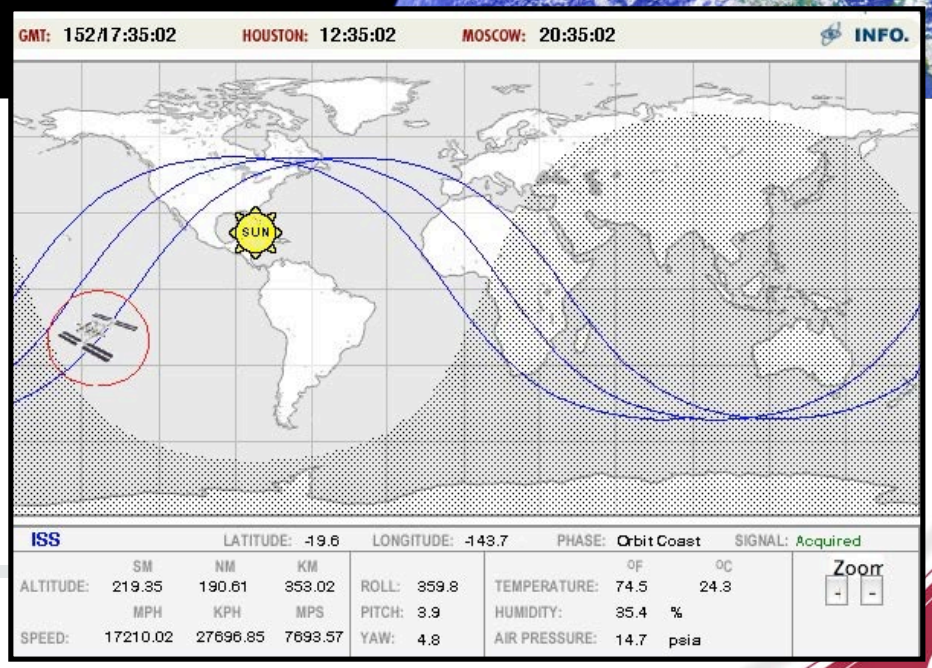
Courtesy of JAXA.

Orientation/Capability

- Pointed in the anti-ram direction.
- Capable of limb scan or stare mode.
- Campaign modes available.



Instrument	Passband / Res. (Å)
EUV Spectrograph	550 - 1110 @ 12.5
FUV Spectrograph	1300 - 1700 @ 7.0
MUV Spectrometer	1903 - 3170 @ 9.5
NUV Spectrometer	2950 - 3993 @ 7.0
NIR Spectrometer	7223 - 8744 @ 8.4
7650 Å Photometer	14.5
6300 Å Photometer	15.5
7774 Å Photometer	15



Science Objectives

- Primary Objectives
  - *Investigate the global temperature, density and composition structure and variability of the lower thermosphere and upper mesosphere*
    - Neutral Temperatures [Lead: J. Hecht]
    - Composition [Lead: A. Christensen]
  - *Investigate importance of internal and external forcing in the region 100-300 km*
    - [Lead: S. Budzien]

Dayide / Nightside	Temp (Discrete)	Temp Profile	N2 density	O2 density	O density	Minor Species	O+
NIR Spectrometer 7400-8700 A	☾☀	☾☀		☾☀			☾
O2 7650 Photometer							
MUV Spectrometer 1900-3200 A	☾☀	☾☀	☀	☀	☾☀	☾☀	
NUV Spectrometer 2950-4000 A	☾☀	☾☀	☀		☾☀		
FUV Spectrograph 1300-1700 A	☀	☀	☀	☀	☀		
7774 A Photometer							☾
6300 A Photometer				☾			☾
EUV Spectrometer 550-1100 A	☀		☀		☀	☀	☾☀
Objective	*Solar flux, Solar wind response*	*Waves and tides response*	*Composition*			*Chemistry*	*Ionosphere*

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Science Objectives (cont.)

- Secondary Objectives:
  - *Self-consistent understanding of O+ production and radiative transfer on dayside (including initial source and cross section)*
    - Utilize 834/617 Å data [Lead: A. Stephan]
  - *Determine the quiet-time state of the thermosphere and ionosphere and compare to models.*
    - Utilize 834/617 Å, photometer data [Lead: A. Stephan & R. Bishop]

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FUV Spectrograph 1300-1700 A	☀	☀	☀	☀	☀		
7774 A Photometer							☾
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EUV Spectrometer 550-1100 A	☀		☀		☀	☀	☾☀
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Other Studies

- Metallic Ions
  - *MUV/NUV [R. Bishop]*
- He
  - *584 Å EUV*
- Hydrocarbons
- NO
  - *MUV*
- Ground-based over-flight campaigns.
- Model comparisons and/or assimilations.

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NUV Spectrometer 2950-4000 A	☀☾	☀☾	☀		☀☾		
FUV Spectrograph 1300-1700 A	☀	☀	☀	☀	☀		
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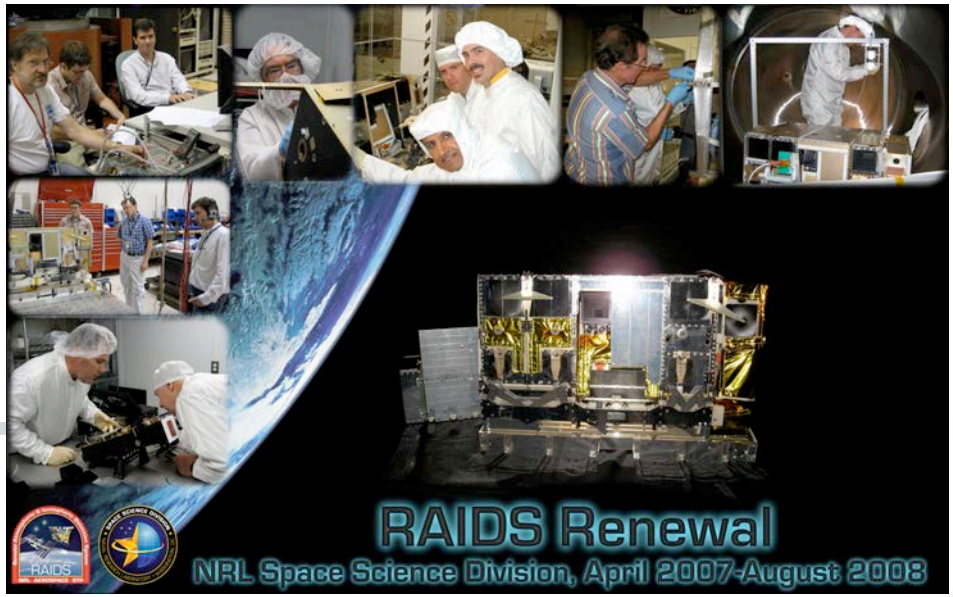
Collaboration Opportunities

Join the RAIDS Science Team!

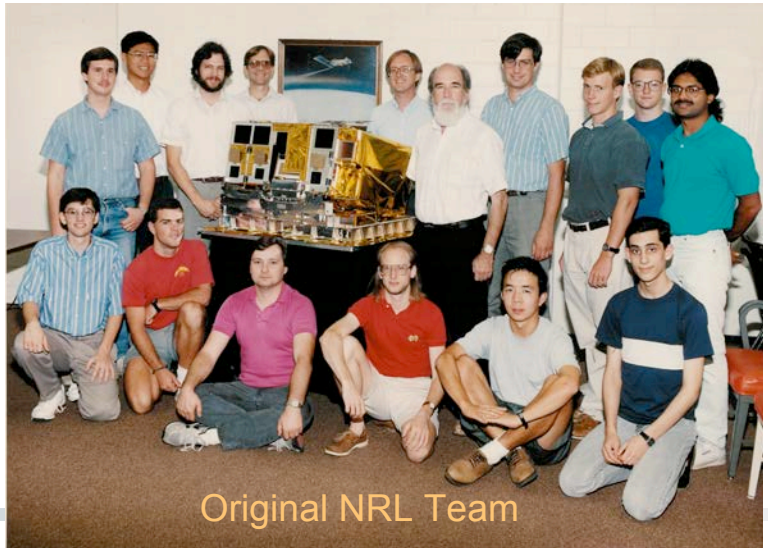
- Identify a problem or dataset of interest.
- Contact a RAIDS Team Member:
  - *Scott Budzien: budzien@nrl.navy.mil*
  - *Rebecca Bishop: Rebecca.L.Bishop@aero.org*
  - *Andrew Stephan: andrew.stephan@nrl.navy.mil*
- Obtain access to data from NRL database through sponsorship.
- Work with sensor leads to ensure data availability and quality.
  - *Team with RAIDS scientists as needed on project.*



Acknowledgments

- RAIDS/HICO is integrated and flown under the direction of DoD's Space Test Program.
- RAIDS is a joint project of the Naval Research Laboratory and The Aerospace Corporation, with support from the Office of Naval Research and The Aerospace Corporation's Independent Research and Development program.

Current Aerospace Team



Original NRL Team

Original Aerospace Team