



# **HyspIRI**

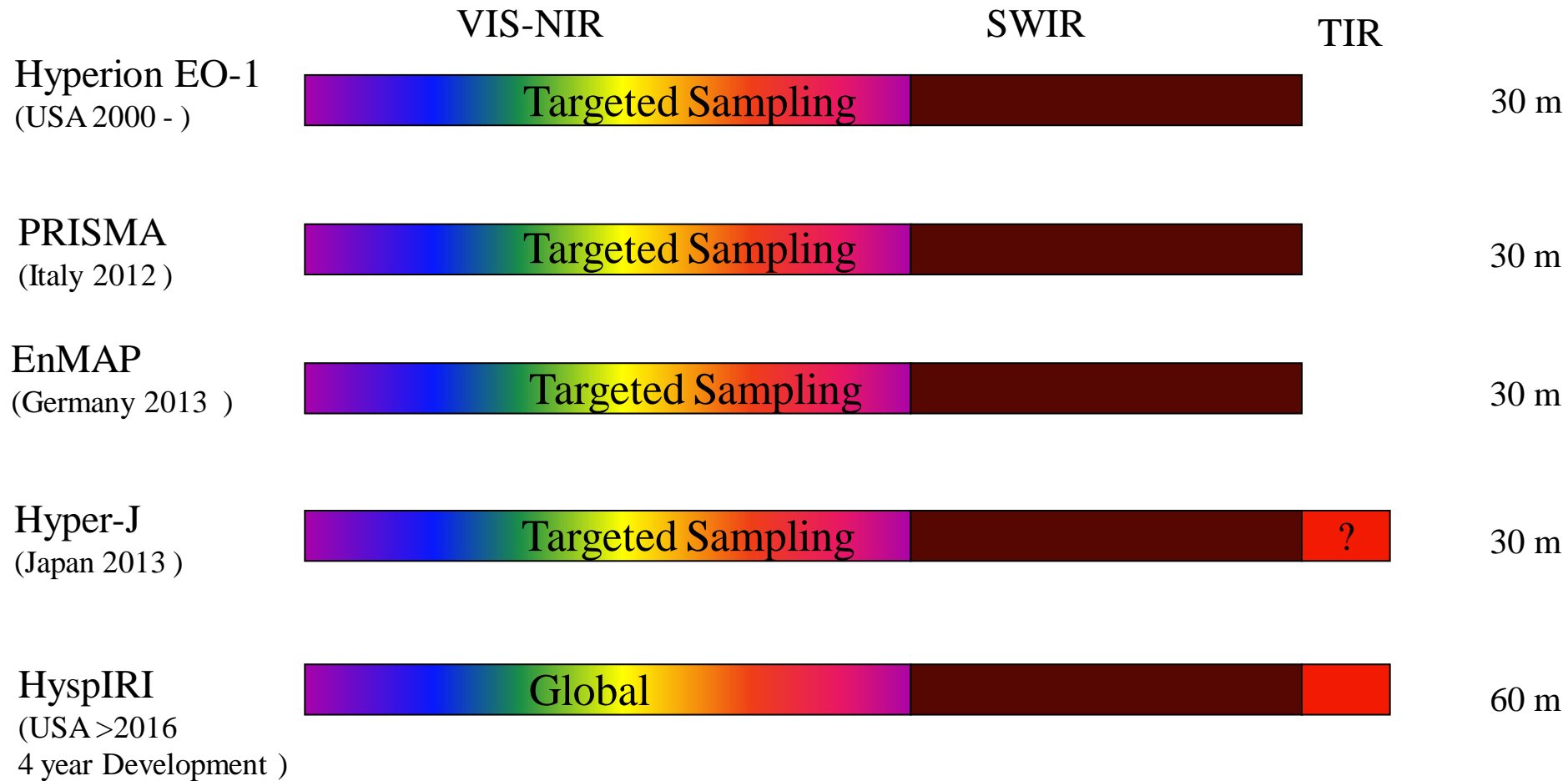
## **International Activities and Connections**

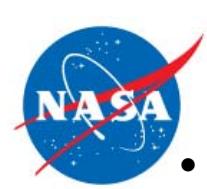
**NASA Earth Science and Applications  
Decadal Survey**

Robert O. Green and HyspIRI Team



# Planned Civilian Satellite Missions

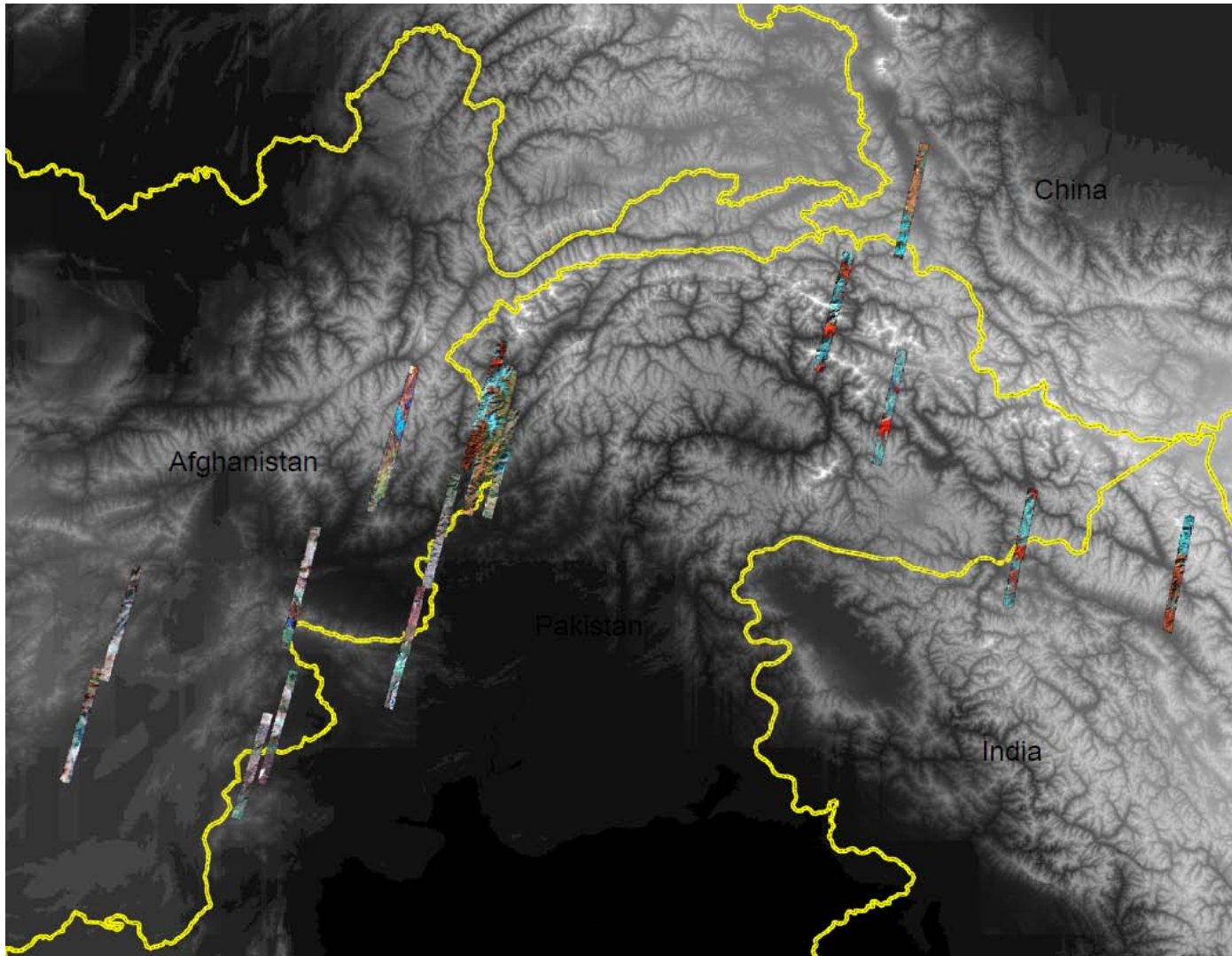




# EO1-Hyperion Coverage for Himalaya Study



- Example of study for snow and ice science in the Himalaya with EO1-Hyperion
  - Coverage is a severe limitation of regional and global **climate** investigations.



- HyspIRI would measure the full area every 19 days returning all the data



# HypSIRI compared with possible International Imaging Spectroscopy Missions



**Only HypSIRI provides the full spectrum of data required to address climate-carbon cycle feedbacks articulated in the NRC Decadal Survey**

**HypSIRI Provides Seasonal and Annual Global Coverage that Uniquely Addresses Critical Gaps in Climate Research and Ecosystem Understanding.**

>100 years for international mission to equal 1 year of HypSIRI

Country	Instrument	Swath km	Pixel Size, m	Terrestrial Coverage in 19 days	Repeat interval, days	TIR capability
USA	HypSIRI	150	60	100%	19	8 TIR bands
Germany	EnMAP	30	30	<1%	--	NO
Italy	PRISMA	30-60	20-30	<1%	--	NO
Japan?	ALOS3	30	30	<1%	--	NO
India?	IMS Resource Sat-3	25	25	<1%	--	1 TIR band

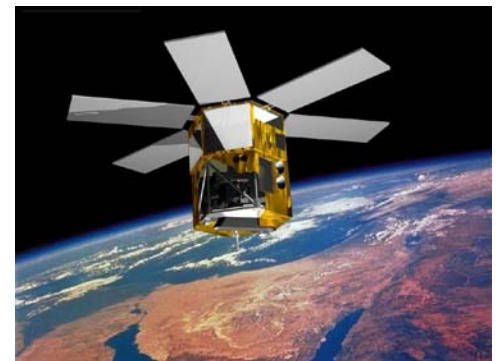
**US, HypSIRI:** a full spectral range (380 to 2500 at 10 nm), high SNR, uniform, 60m spatial with 150 km swath imaging spectrometer and multiband thermal imager (8 band thermal imager from 3-12 μm).

Other countries are occasionally mentioned (China, South Africa, South Korea, etc.). All are proposing first generation visible-only, small sample process/application missions with scattered terrestrial coverage and no TIR imager



# International Satellite Imaging Spectroscopy – ISIS Technical Committee

Co-Chairs: Alex Held, CSIRO - Australia  
Karl Staenz - University of Lethbridge - Canada





# Background

- The ISIS TC provides a forum for technical and programmatic discussion and consultation among national space agencies, research institutions and other.
- Main goals of the ISIS are to share information on current and future spaceborne imaging spectroscopy missions, and to seek opportunities for new international partnerships to the benefit of the global user community.
- An initial “ISIS Working Group” was established in November 2007, realising the large number of countries planning imaging spectroscopy satellite missions with little mutual understanding and coordination.
- Meetings of the WG have been held in Hawaii (2007), Boston (IGARSS 2008) and Tel Aviv (EARSeL 2009).
- Next meeting IGARSS 2010





# Inaugural Meeting of ISIS WG



Hilo, Hawaii, November 2007



Bryan Bailey (USGS), Greg Asner (Carnegie), Bruce Quick (USGS), Andreas Muller (DLR), Joe Boardman (AIG), Karl Staenz (ATIC), Hermann Kaufmann (GFZ), Benoit Rivard (Univ Alberta), Steve Ungar (NASA), Jan van Aardt (CSIR), Hiroji Tsu (ERSDAC), DeWayne Cecil (NASA/USGS), Rob Green (JPL), Alex Held (CSIRO), Duke Takahashi (WSI), Stephen Ward (Symbios Communications), Nagamitsu Ohgi (JAROS),



# Key Drivers/Arguments for Imaging Spectroscopy Missions



**Science Questions**  
Eg. HypsIRI

- VQ1 - Pattern and Spatial Distribution of Ecosystems
- VQ2 - Ecosystem Function, Physiology and Seasonal Activity
- VQ3 - Biogeochemical Cycles
- VQ4 - Ecosystem Response to Disturbance
- VQ5 - Ecosystems and Human Well-being
- VQ6 - Surface and Shallow-Water Bottom Composition
- TQ1 - Volcanoes and Earthquakes
- TQ2 - Wildfires
- TQ3 - Water Use and Availability
- TQ4 - Human Health and Urbanization
- TQ5 - Earth Surface Composition and Change
- CQ1 - Coastal, Ocean, and Inland-Aquatic Environments
- CQ2 - Wildfires
- CQ3 - Volcanoes
- CQ4 - Ecosystem Function and Diversity
- CQ5 - Land Surface Composition and Change
- CQ6 - Human Health and Urbanization

**Standard  
Level 2, 3  
Global  
Products**

**GEO 'Societal Benefit Areas':**  
Energy  
Health  
Agriculture  
Water  
Disasters  
Etc.

**National Priorities**  
Food Security  
Water Security  
National Security  
Etc.

**Policy-relevant Issues**  
Climate Convention  
Desertification Convention  
Etc.

?

**Commercial  
????**

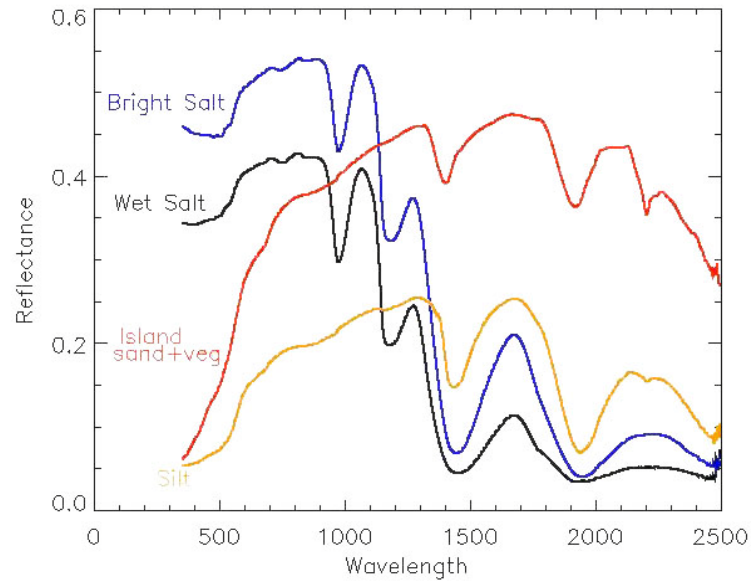




# Main Topics for GRSS ISIS TC

- Primarily about multiple satellite mission planning, and data interoperability aspects [Not about hyperspectral science and applications development -this is well covered elsewhere].
- Specific coordination of:
  - interoperability among missions,
  - ‘best practice’ mission implementation,
  - **data management challenges,**
  - **establishment of global reference cal/val sites and regular field campaigns and**
  - ‘Global’ imaging spectroscopy products.

# Establishment of Key Post-launch Spectroscopy Instrument Calibration & Validation Sites





# International Interaction for Calibration and Validation (Level 1 and Level 2)



- Australia
  - Calibration-validation, Carbon, Coastal Ocean GBR
  - Data Processing
- Canada
  - Product validation, Forestry,
  - Data Processing
- Israel
  - Calibration-validation
- Europe
  - EnMap, PRISMA, Product validation
  - Data Processing
- Brazil
  - Product validation
- Argentina
  - Calibration-validation, Product validation
- India
  - Agriculture, Himalaya, Product validation



# Next Meeting



ISIS Meeting planned for IGARSS 2010  
July 26-30, Honolulu, Hawaii, USA

[http://www.grss-  
ieee.org/Resources/TechCommittees](http://www.grss-ieee.org/Resources/TechCommittees)

Also plans for ISRSE 2011 in Sydney

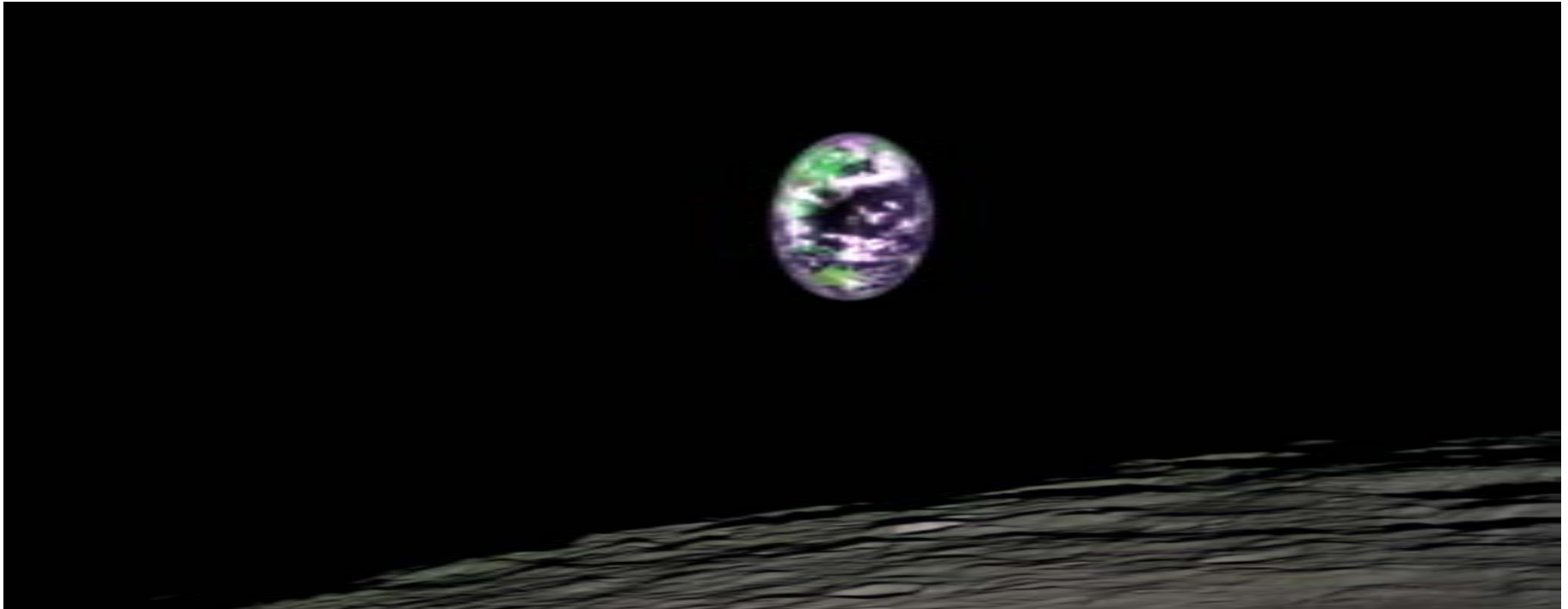


Image of Earth from the Moon acquired by the NASA Discovery Moon Mineralogy Mapper (M3) that is a guest instrument onboard the ISRO Chandrayaan-1 Mission to the Moon. Australia is visible in the lower center of the image. The image is presented as a false color composite with oceans dark blue, clouds white, and vegetation enhanced green. The data were acquired on the 22<sup>nd</sup> of July 2009.





# M<sup>3</sup> On-Orbit Spectral

