CEOS WORKING GROUP ON CALIBRATION & VALIDATION

Extending EOS and CEOS WGCV Land Product Validation Sub-group activities to the HyspIRI era

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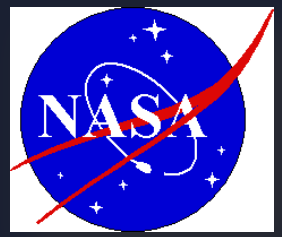

Outline

- LPV sub-group
  - Structure
  - Goals and objectives
- HyspIRI products
- Importance of scaling
- Examples HyspIRI products <--> validation
  - Biophysical
  - Land cover
  - Fire
- Test validation activities
- Things to consider…

Land Product Validation Sub-group

CEOS *(Committee on Earth Observing Satellites)*

WGCV *(Working Group on Calibration and Validation)*

Chair: Joanne Nightingale (NASA GSFC)
Vice-Chair: Gabriela Shaepman-Strub (University of Zurich)
NASA EOS Validation: Joanne Nightingale / Jaime Nickeson

6 Land Product Focus Groups

- Established in June 2009
- 2 co-leads per group
- ~3-year terms

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LPV Focus Groups

Focus Group	North America	Europe / Other
Land Cover	Mark Friedl (Boston University)	Martin Herold (Wageningen University, NL, GOFC/GOLD)
Fire (Active/Burned Area)	Luigi Boschetti (University of Maryland)	Kevin Tansey (University of Leicester, UK)
Biophysical (LAI, fAPAR)	Richard Fernandes (NR Canada)	Stephen Plummer (ESA, IT)
Surface Radiation (Reflectance, BRDF, Albedo)	Crystal Schaaf (Boston University)	Gabriela Schaepman (University of Zurich, SW)
Land Surface Temperature	Simon Hook (JPL)	Jose Sobrino (University of Valencia, SP)
Soil Moisture	Tom Jackson (USDA)	Wolfgang Wagner (Vienna University of Technology, AT)
Land Surface Phenology	Jeff Morisette (USGS)	TBD

LPV Objectives

To foster **quantitative validation** of *higher level global land products* derived from remotely sensed data, in a traceable way, and relay results so they are relevant to users

- To increase the quality and efficiency of global satellite product validation by developing and promoting international standards and protocols for:
  - Field sampling
  - Scaling techniques
  - Accuracy reporting
  - Data / information exchange
- To provide feedback to international structures (GEOSS) for:
  - Requirements on product accuracy and quality assurance (QA4EO)
  - Terrestrial ECV measurement standards
  - Requirements for future missions

HyspIRI Products

Existing Val Methods

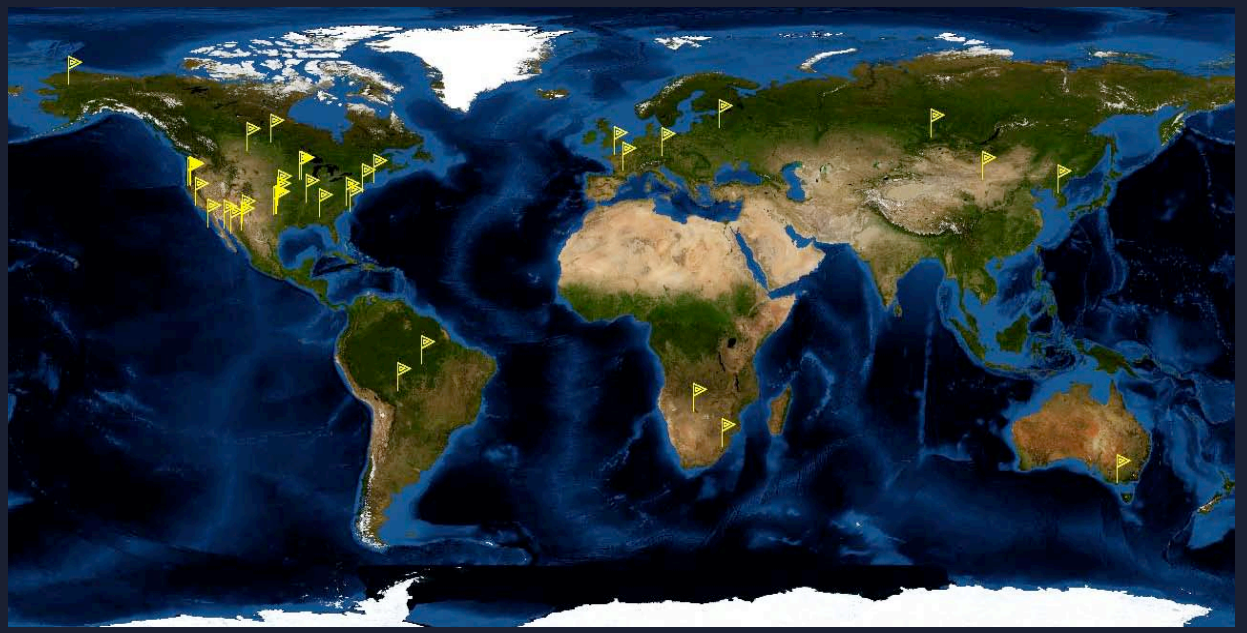
Research Required

LPV Focus Group / Product	VSWIR L 2/ 3	VSWIR L4	VSWIR Global	TIR L4	SWIR / TIR
LAND COVER					
Fractional land cover / veg cover					
Disturbance, PFT, hazard susceptibility					
SURFACE RADIATION					
Surface Reflectance					
Albedo					
BIOPHYSICAL					
Gross / Net Primary Production					
fPAR					
LAI					
Water content, LUE, Pigments					
FIRE					
Detection of Fire events					
Fire fuel loads					
LAND SURFACE TEMPERATURE					
LST					
Emissivity					
Evapotranspiration					

HyspIRI product ↔ Validation

- Methods and structures in place for validation of most land products (field sampling, sites, networks etc)
- Current validation activities lack:

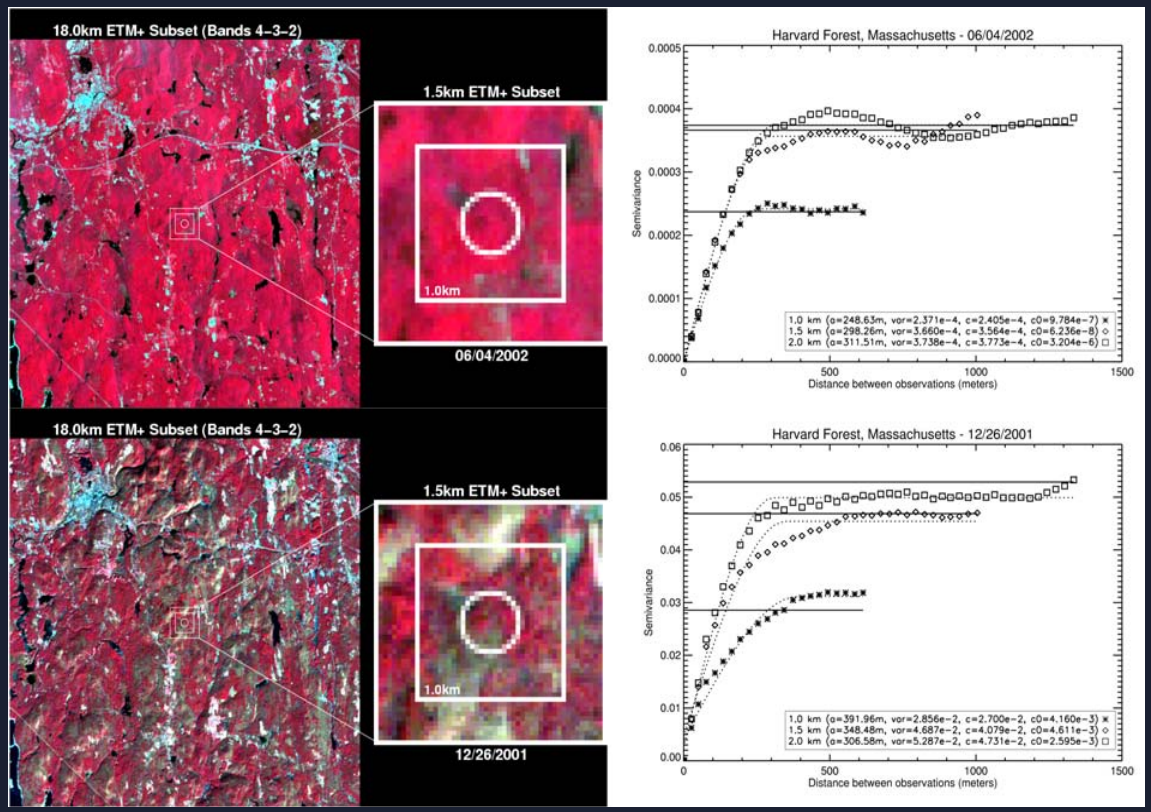
1. A consistent temporal component
   - A lot of high resolution image capture is opportunistic
2. Spatial coverage (global)



EOS Land Validation Core Sites

Importance of Scaling

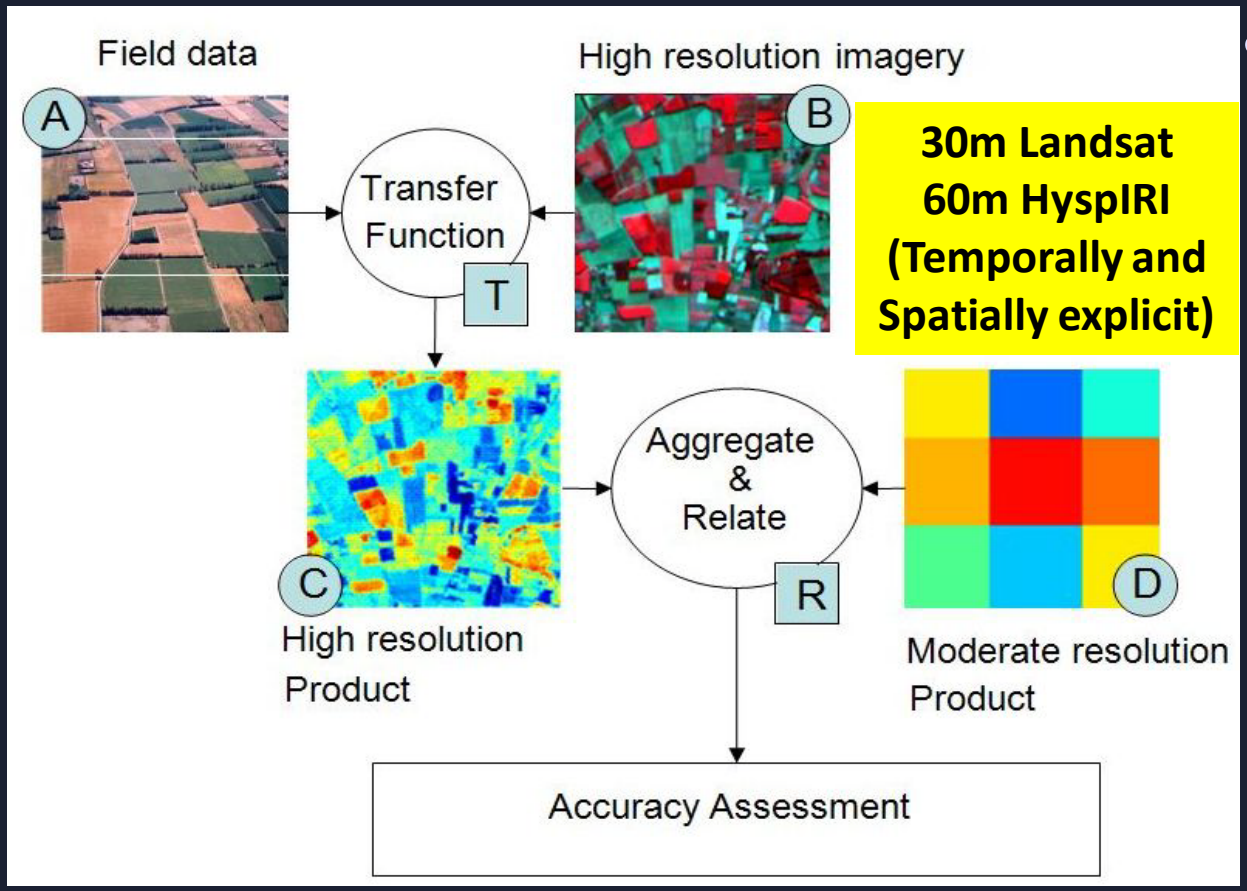
- Point to Pixel validation is unacceptable
- Site characterization using Landsat ETM - representativeness, homogeneity and seasonal consistency for validation
  - HyspIRI will provide enhanced spatial / temporal capabilities for assessing validation sites



Roman et al. 2010

Scaling of Biophysical Products

- LAI, fPAR, GPP, NPP, Albedo
- Protocol for ground sampling, scaling and validation of LAI, fPAR and albedo products in preparation



- HyspIRI will provide enhanced spatial / temporal capabilities for scaling activities (bridge 30m – 250m/1km+ gap)

Enhanced Land Cover

- EOS, GOFC-GOLD, LPV, FCT
- Land cover validation protocol from 2006 being updated
- Global land cover validation exercise in progress
- HyspIRI will bring enhanced land cover classification accuracy
- Better land/water boundary maps
- Definition of functional types which will improve biophysical models used to generate GPP/NPP products

Fire

- EOS, LPV, GOFC-GOLD Fire
- Protocol for Burned Area product validation in preparation
- Current methodology uses 2 sequential Landsat ETM+ images retrieved within the persistence time of the burned area
- Limited spatial and temporal capability of Landsat acquisitions
- Will provide improved validation data for coarse resolution fire products

Image 1: 3 Sept 2001

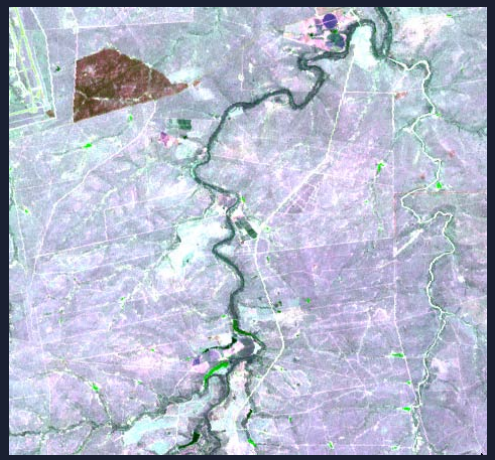
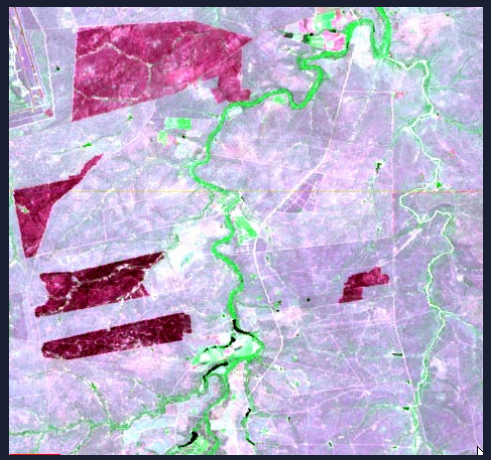
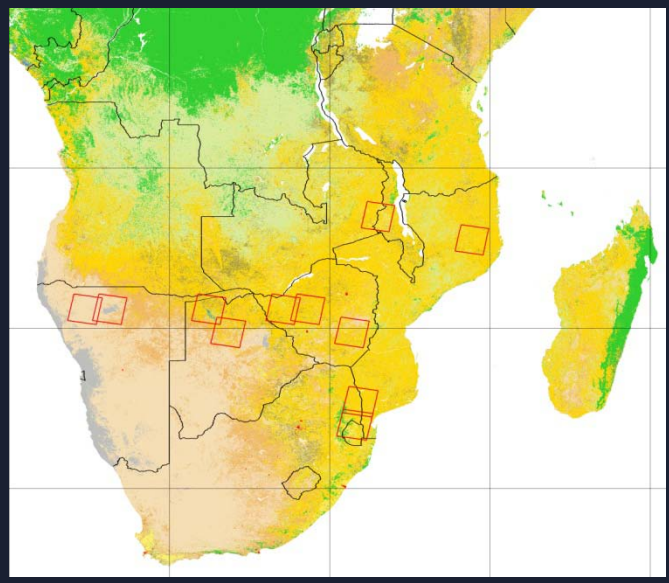


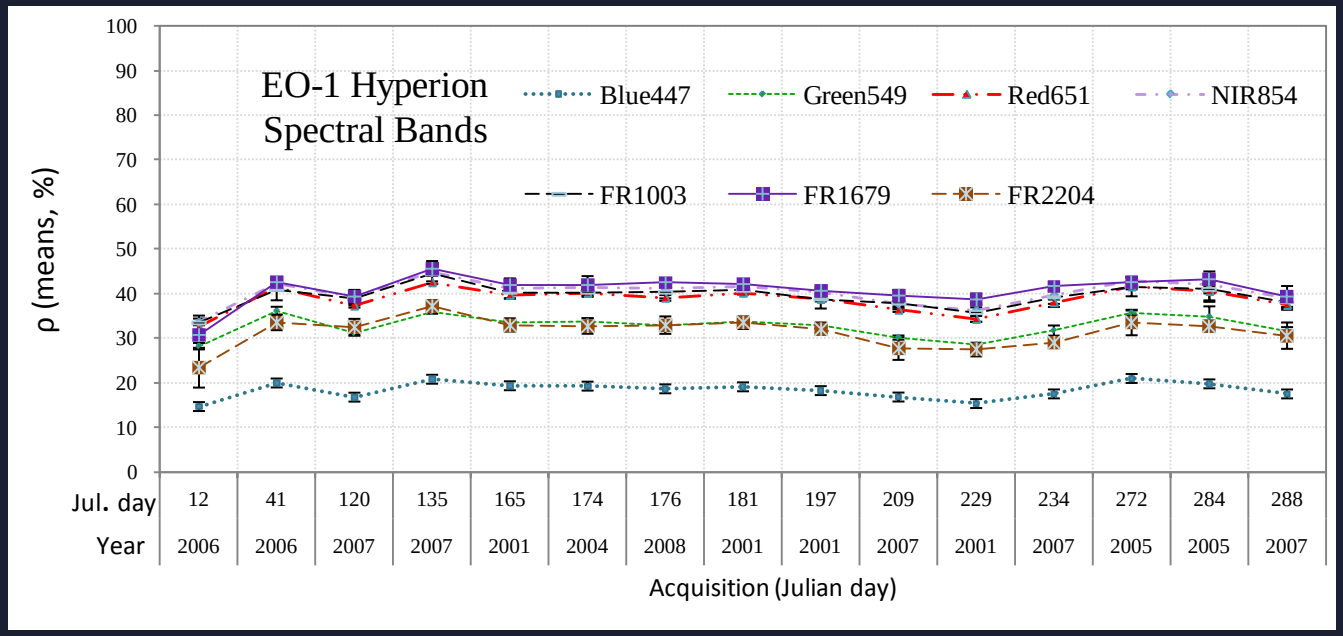
Image 2: 5 Oct 2001





Test Validation Activities

- Use of Hyperion for validation approach testing
  - Hyperion archive being collected at Core Sites



Temporal variation in spectral characteristics, Railroad Valley, NV

Similar datasets are being assembled at other CEOS Cal/Val and LPV sites

- Airborne measurements for validation and scaling
  - AVIRIS, AVIRISng, MASTER, HyTES, etc
- North America through the seasons
- International campaigns

Things to Consider….

- Methods and structure in place for validation of most land products
- Require more! / improvement boosted by validation campaigns for new sensors / products
- Important to understand products and ways of validating now, approach networks (Fluxnet, NEON etc), design field campaigns, leverage existing data sources
  - How will we validate new products / What do we need??
- Ensure validation protocols written by LPV sub-group are relevant to HysplRI (coordination and collaboration)

For more information

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