

CEOS WGCV Land Product Validation Update

(September 08 - April 09)

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CEOS WORKING GROUP ON CALIBRATION & VALIDATION



Outline

- *Objectives and Goals*
- *LPV group structure*
- *Ongoing activities*
- *Planned activities*



Land Product Validation Group

- **CHAIR:** Frederic Baret (INRA, France)
- **VICE-CHAIR:** Sebastien Garrigues (CNES, France)
- **NASA Validation:** Joanne Nightingale / Jaime Nickeson
(Innovim / GSFC)



Mission Statement

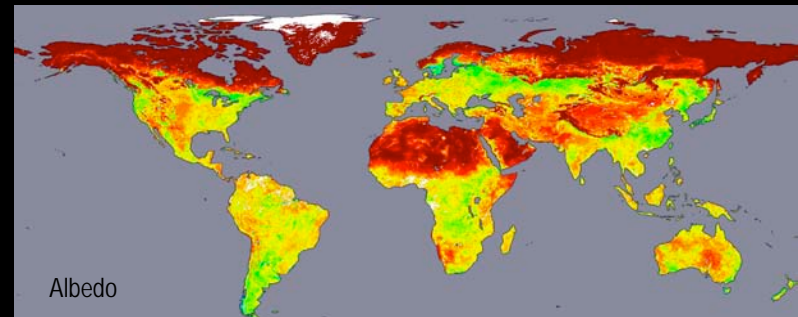
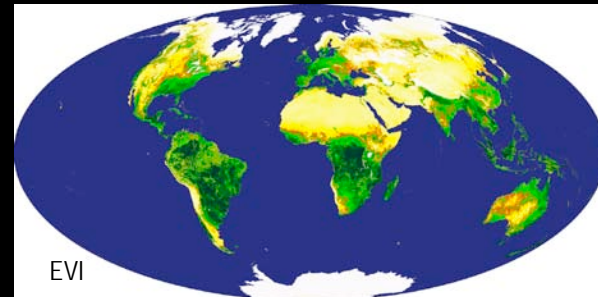
To foster **quantitative validation** of *higher level global land products* derived from remotely sensed data, in a traceable way, and to relay results so they are relevant to users

LPV Goals

- 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 (GEO/GEOSS) for:
 - Requirements on product accuracy and quality assurance (QA4EO)
 - Terrestrial ECV measurement standards
 - Definitions for future missions

Products Targeted

- Land cover / dynamics (phenology)
- Fire
 - Active
 - Burned area
- Biophysical characteristics
 - LAI / fPAR
 - NDVI / EVI
- Energy
 - Surface reflectance
 - Albedo
- Land Surface Temperature
- Soil Moisture



Images courtesy NASA Visible Earth Gallery

LPV Structure

Structural problem:

- Many diverse satellite-derived land products
- Community is large and scattered
- Need to focus on **product groups**
- Need to promote **international collaboration**

Solution: *Land Product Validation Focus Groups*

- **Coordinated team leaders**
- **Connect community members**
- **Capture expertise**
- **Provide international partnerships / collaboration**

LPV Structure cont.

Focus Group	North America	Europe (Other)
Land Cover / Dynamics	Mark Friedl (Boston University)	Martin Herold (GOFC/GOLD)
Fire	Luigi Boschetti (University of Maryland)	Kevin Tansey (University of Leicester, UK)
Biophysical	Joanne Nightingale / Richard Fernandes (NR Canada)	Stephen Plummer (ESA/ESRIN, IT)
Surface Radiation	Crystal Schaaf (Boston University)	Gabriela Schaepman (University of Zurich, SW)
Land Surface Temperature	Ana Pinheiro (NOAA)	Jose Sobrino (University of Valencia, SP)
Soil Moisture	Tom Jackson (USDA)	Wolfgang Wagner (Vienna Uni of Technology, AT)

Structure cont.

- Focus group leads meeting at the Global Vegetation Workshop (Montana, June 2009)
 - Define short and long-term goals of LPV sub-group
- 1. Communication / data - information dissemination
- 2. Data set maintenance / updating (field sites)
- 3. Validation Protocol Development
- 4. Product Inter-comparisons

Structure cont.

Communication:

- Process for data / information collection and sharing
- Mailing lists
- Group communication via LPV wiki
- Information sharing via LPV website

LPVS WG

VIEW EDIT

FrontPage

last edited by Jaime Nickeson 2 wks ago

Welcome to the Main Page for the LPVS Working Group!

This is the home page of the Land Product Validation Working Group Wiki, where members can view and edit information and documents in a central location, hopefully with a bit less email and document versions passing back and forth. Comments are available at the bottom of each page.

Links to LPV WG pages are listed below

- [Montana Global Vegetation Workshop](#)
- [Montana LPV Sub-group leads workshop](#)
- [General LPV lead and WG activities and info](#)
- [Burned Area Protocol Development](#)
- [New Web page for LAI Intercomparison data access](#)
- [Land Surface Temperature \(LST\) Group](#)

NASA GODDARD SPACE FLIGHT CENTER + NASA Homepage

CEOS WORKING GROUP ON CALIBRATION & VALIDATION

Land Product Validation Subgroup

Home Landcover Biophysical Fire/Burn Surface Rad

Current LPV Chair: Frédéric Baret (INRA)
Vice-Chair: Sebastien Garrigues (CNES)

LPV Mission

To foster quantitative validation of higher-level global land products derived from remote sensing data and to relay results so they are relevant to users

Validation is the process of assessing, by independent means, the quality of the data products derived from the system outputs

Background

The subgroup on Land Product Validation (LPV) is one of six subgroups of the Working Group on Calibration and Validation (WGCV), which itself is one of two standing working groups within the Committee on Earth Observation Satellites (CEOS, see also CEOS structure [2]). The six WGCV subgroups are:

- Infrared and Visible Optical Sensors (IVOS)
- Atmospheric Chemistry (AC)
- Microwave Sensors (MS)
- Synthetic Aperture Radar (SAR)
- Terrain Mapping (TM)
- Land Product Validation (LPV)

The Land Product Validation subgroup arose out of the recognition in the late nineties that standardized approaches to global product validation were essential for wide acceptance and use of proposed global land products. Several programs at the time were aimed at global monitoring of Earth processes, many with plans to distribute higher level data products. A common approach to validation would encourage widespread use of validation data, and thus help us to more toward standardized approaches to global product validation. With the high cost of in-situ data collection, the potential benefits from international cooperation are considerable and obvious.

Previous requests for assistance from the original International Global Observing Strategy (IGOS) pilot projects and two subsequent ad hoc meetings of the WGCV identified a clear need for improved international collaboration concerning the validation of data products derived from Earth observing satellites. A new subgroup within the WGCV was proposed to the CEOS Plenary in Stockholm at the end of 1999, receiving full support. The LPV was officially adopted as a subgroup at the WGCV-17 meeting in October of 2000.

A general consensus now exists within the CEOS community to identify the three stages of validation for satellite products. The guidelines for the CEOS Hierarchy of Validation are:

Stage 1 Validation	Product accuracy has been estimated using a small number of independent measurements obtained from selected locations and time periods and ground-truth/field program effort.
Stage 2 Validation	Product accuracy has been assessed over a widely distributed set of locations and time periods via several ground-truth and validation efforts.
Stage 3 Validation	Product accuracy has been assessed, and the uncertainties in the product well-established via independent measurements made in a systematic and statistically robust way that represents global conditions.

The LPV subgroup activities are divided up into four themes that compliment the research agenda of the Global Observations of Forest and Land Cover Dynamics

LPV is a subgroup of the Working Group on Calibration and Validation.

<http://lpvs.gsfc.nasa.gov/>

Ongoing Activities: Direct Validation Data

- CEOS Validation sites
 - Represent globally extensive or important biomes
 - Provide validation field, airborne and satellite data

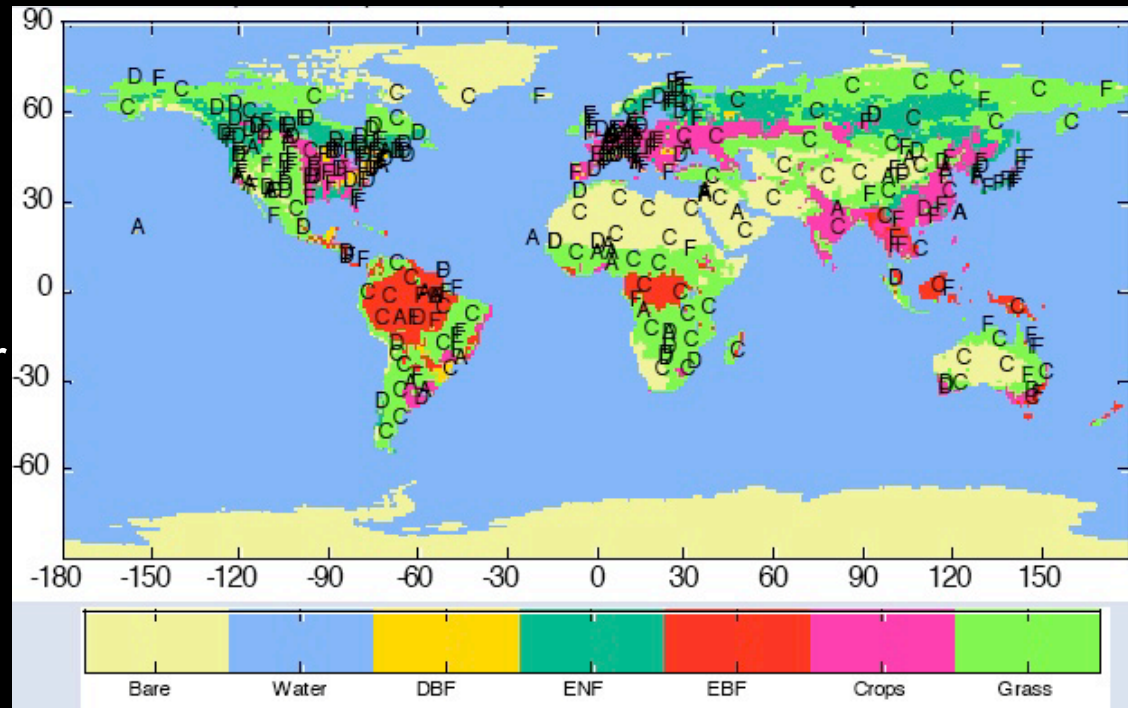


Direct Validation Data cont.

- BELMANIP

- Primarily developed for LAI inter-comparison work
- Sites representative of vegetation types, globally distributed
- Built on existing networks such as EOS Core Sites, FLUXNET, AERONET and VALERI

- Stratified by GLC2000 land cover
- Cross-check with Google Earth
- Homogeneous areas for product inter-comparison
- BELMANIP V2 = 420 sites



Ongoing Activities: Validation Protocols

Validation protocol development:

- Methods to develop validation “*Protocols*” - defining “*best practice*” for direct validation of land products in relation to data, methods, accuracy reporting
- Process for community approval and CEOS endorsement
- Ensuring classification of products via validation hierarchy:

Stage 1: Accuracy estimated using a small number of independent measurements obtained from *selected* locations and time periods.

Stage 2: Accuracy has been assessed over a *widely distributed* set of locations and time periods.

Stage 3: Accuracy has been assessed, and the uncertainties in the product well-established via independent measurements made in a *systematic and statistically robust* way that represents *global* conditions

Validation Protocols cont.


- “Best practice” for land product validation
 - Current knowledge
 - Available data
 - Tools and methods
 - Tested and repeatable
 - Peer-reviewed
 - CEOS endorsed/published
 - “Living” documents

GLOBAL LAND COVER VALIDATION:
RECOMMENDATIONS FOR EVALUATION AND
ACCURACY ASSESSMENT OF
GLOBAL LAND COVER MAPS



2006

GOFC-GOLD GLOBAL ORGANIZATION OF FOREST AND LAND COVER DYNAMICS



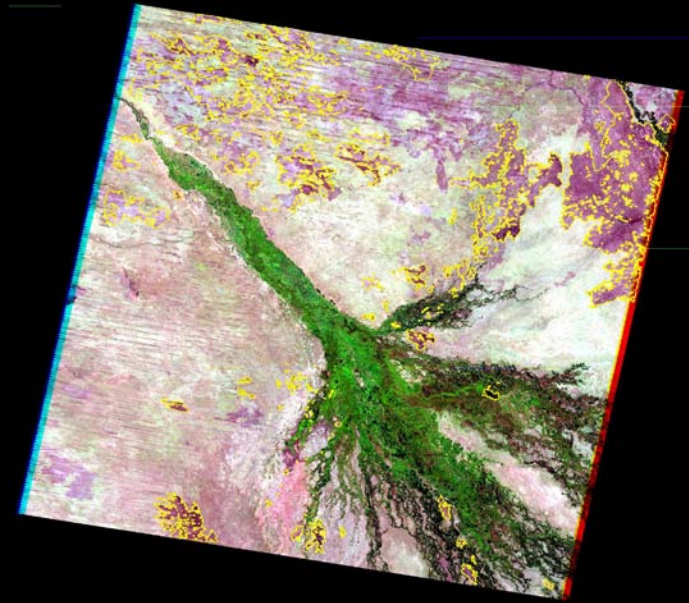
EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

2006 EUR 22156 EN

Validation Protocols cont.

Burned Area Product

- Boschetti & Roy 2008
 - Validation of moderate spatial resolution continental - global scale burned area products
 - MODIS, AVHRR, SPOT-Veg, GLOBCARBON, ATSR (L3JRC, GBA2000)



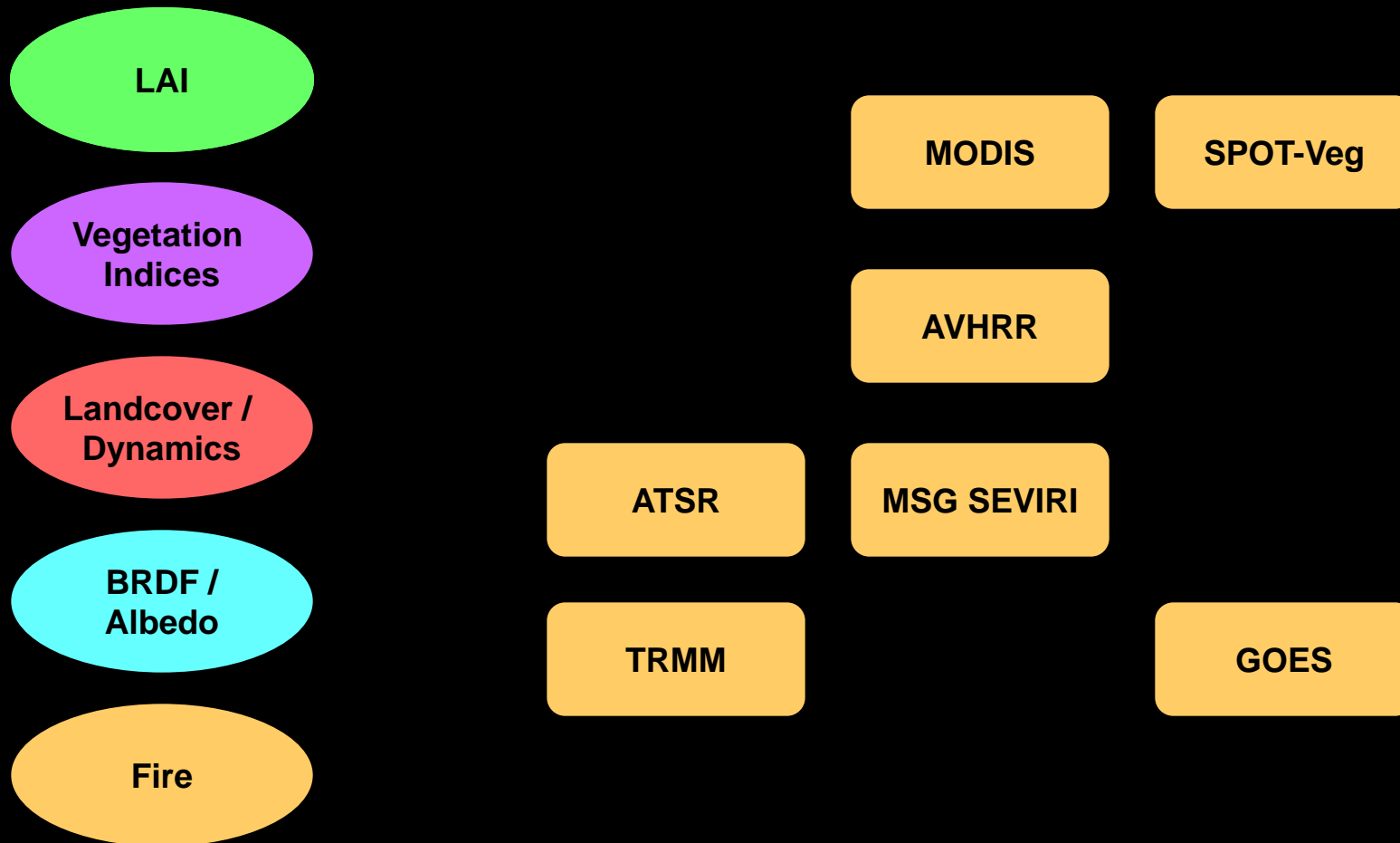
Yellow vectors = ETM+ interpreted burned areas occurring between two ETM+ acquisitions

WGCV Process:

1. Fire LPV community comments
2. Journal review-style address
3. Posting back to entire LPV community
4. Endorsement by WGCV (at Plenary meeting)
5. Publish on LPV webpage and in CEOS communications

Land Product Inter-Comparisons

- Similar products derived from different sensors

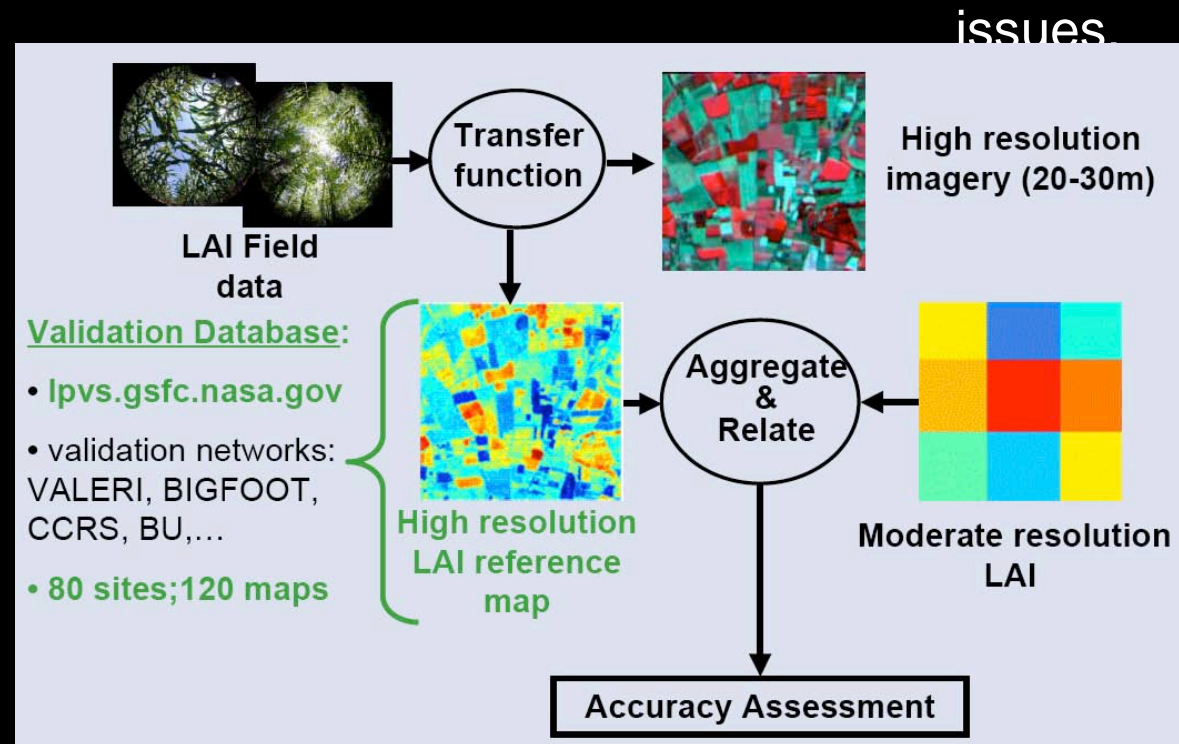


Inter-comparisons cont.

Direct validation is both time & resource intensive

- Often existing field data are not representative of global and seasonal variability
- Field data collection - opportunistic / expensive
- Science networks I.e. FLUXNET, difficult to get data
- Complex scaling

often
resolution
is used



Inter-comparison cont.

- Relative validation:
 - Evaluation of spatial & temporal *consistency* between products
 - Highlights regions/temporal periods where detailed direct validation studies are warranted
- Completed LAI product inter-comparison at 10km spatial resolution (Garrigues et al.)
- LAI product inter-comparison at 1km resolution in progress (Weiss et al.)
 - Next products:
 - Land cover
 - Land cover dynamics / Phenology?
 - Albedo?
 - Surface Reflectance?

LPV Meetings 2009-2010

- Albedo meeting - Beijing, March 2009
- WGCV-30 Plenary - Brazil, May 2009
- Global Vegetation Workshop - Montana, June 2009
- Fire products - 2009?
- Soil moisture, TBD - 2010?
- Temporal signatures, TBD - 2010
- More TBD by Focus Group leads and community requirements



Priorities 2009 - 2010

1. Organization (focus group leads)
2. Burned Area Protocol endorsement at WGCV-30
3. Selecting next product for protocol document development
4. Finalizing LAI inter-comparison work
5. Selecting / starting next product inter-comparison
6. Enhancing global validation field site network



Val-i-da'tion *n.*

A process associated with the collection and production of intelligence that confirms that an intelligence collection or production requirement is sufficiently important to justify the dedication of intelligence resources, does not duplicate an existing requirement, and has not been previously satisfied