

~~GEOSS~~ CEOS LAND PRODUCT



SUBGROUP REPORT

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ESA ESRIN, Frascati, Italy
8-11 November 2005

LPV outline



- **Review of subgroup goals and objectives**
- **Ongoing LPV activities**
 - LAI intercomparison and Manfredi work
 - Albedo workshop
 - Land cover-best practices
 - Vegetation Continuous fields
 - Special Issue – in progress
 - Future meetings
- **Accuracy Statements**

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CEOS Definition

The header features a row of five small, semi-transparent rectangular images. From left to right, they depict: a person in a white lab coat, a map of a geographical area, a satellite dish or antenna, a satellite in orbit, and a satellite image of a landscape.

Validation:

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

LPV operates under this definition, but with the understanding that validation activities should consider user accuracy needs and feedback to algorithm improvements.

Mission Statement & Goals

The header features a row of four small, semi-transparent rectangular images. From left to right: a person in a white lab coat, a satellite dish, a satellite in orbit, and a green landscape.

- to foster **quantitative validation** of *higher level global land products* derived from remote sensing data and relay results so they are relevant to users
- to increase the **quality and economy** of global satellite product validation *via* developing and promoting international standards and protocols for field sampling, scaling, error budgeting, data exchange for global land product validation
- to advocate **mission-long validation** and intercomparison programs for current and future earth observing satellites.

Objectives: with GEOSS opportunities

- Work with users to define uncertainty objectives
 - Focus on GEOSS application areas
- Identify opportunities for coordination and collaboration
 - Capitalize on field data networks coordinated through GEOSS
- Develop consensus “best practice” protocols for data collection and description
 - GEOSS could “approve/publish” related document
- To develop procedures for validation, data exchange and management - with a focus on land product validation core sites (done in conjunction with WGISS)
 - GEOSS could “approve” related activities
- To serve as a clearinghouse for accuracy statements on CEOS member global land products (possibly through the CEOS/WMO database?)

LPV outline

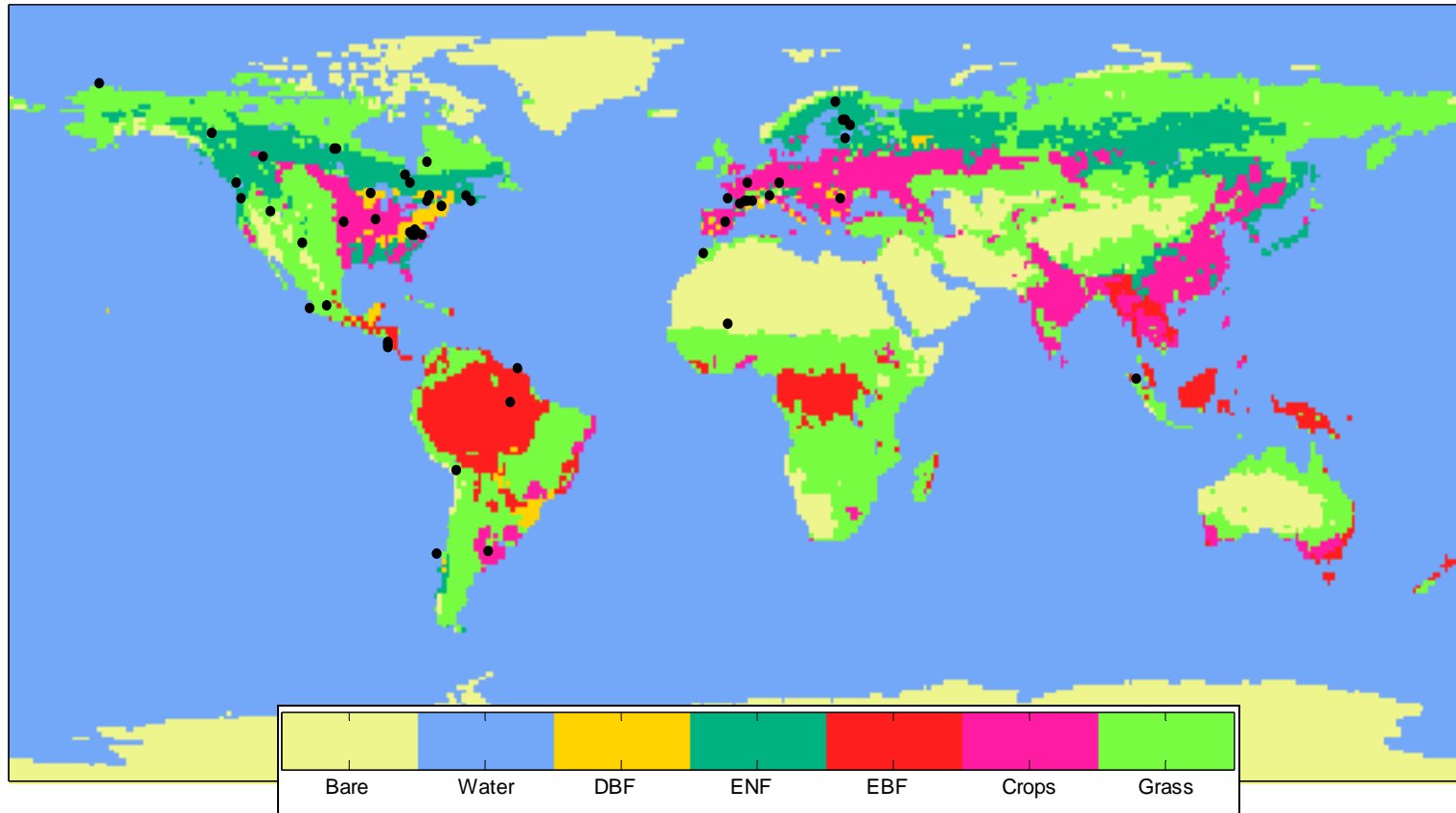


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“Intercomparison” General Timeline

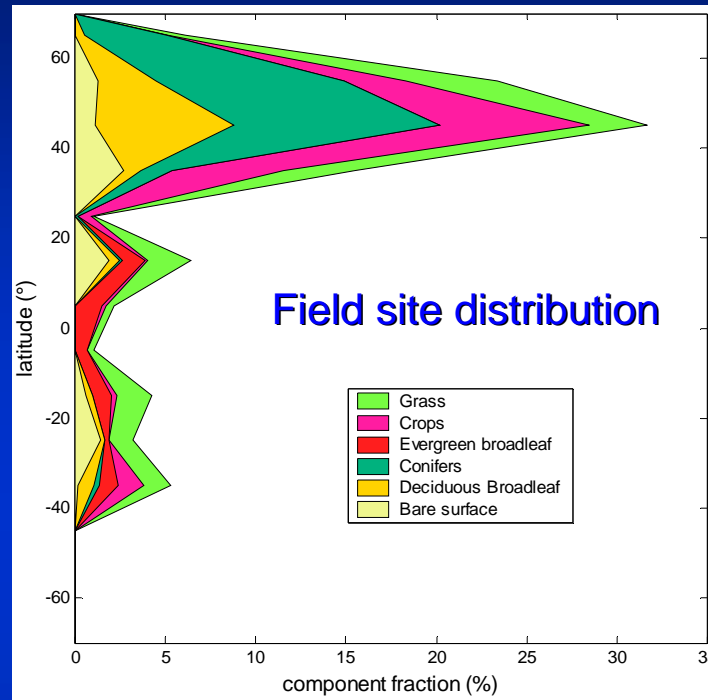
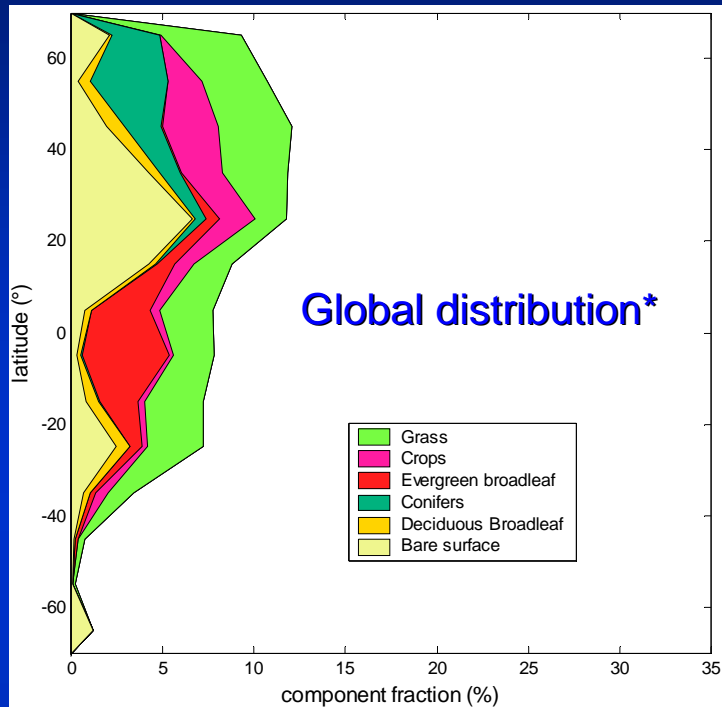
	LAI	Albedo	Fire	Land cover
Topical meeting to establish data requirements	Boston U Privette et al. 1998	Boston U Privette et al. 2002	Lisbon - fire Morisette et al. 2001	Toulouse 2001
Decide on Sites		EGU, Vienna 2005	Darmstadt (geostationary) 2004	Percent cover: 2005
Develop data sharing infrastructure	Frascati, Italy Privette et al. 2001			Boston U 2004
Field Campaigns & individual product analysis	Montana August 2004			
Synthesis of results	Current, on-going research			

LAI Intercomparison sites: 9 groups and 56 sites



Validation of global moderate resolution LAI Products: a framework proposed within the CEOS Land Product Validation subgroup, Morisette...Privette... Nickeson, et al, in press, TGARS special issue

Representative nature of site networks

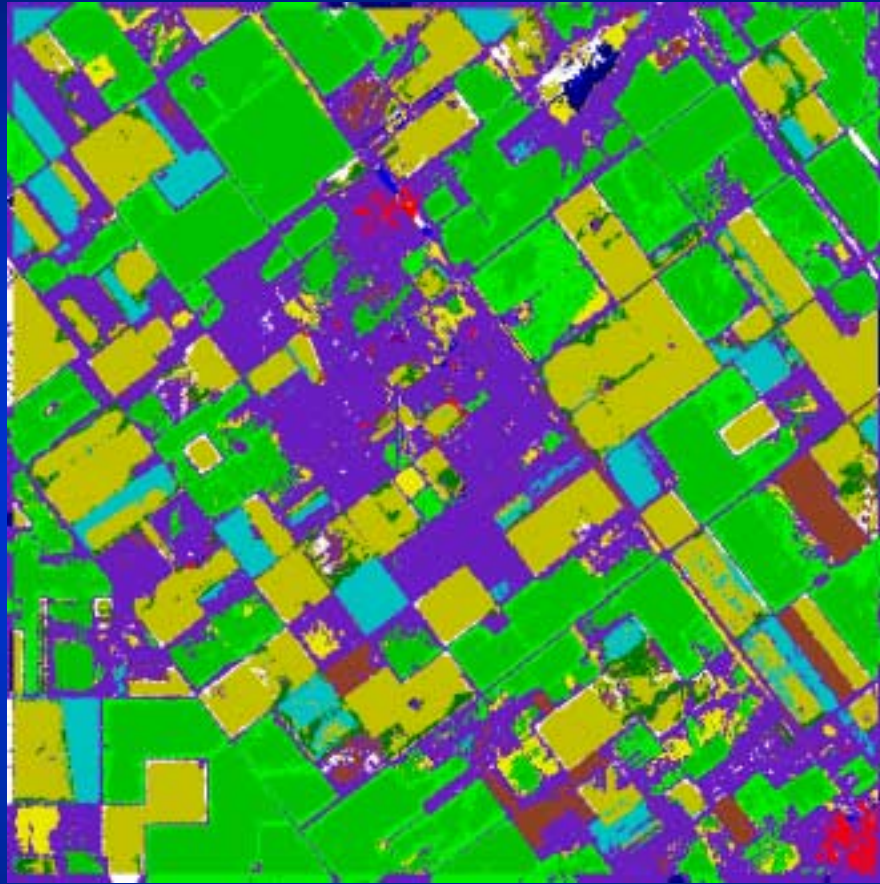


- VALERI (27)
- CCRS (27)
- BIGFOOT (9)
- Others (35)
- **TOTAL= 100**

Benchmark Land Multi-site Analysis and Inter-comparison of Products (BELMANIP) proposes to combine Aeronet, Fluxnet & field sites, plus 78 additional sites for a globally representative sample.

Evaluation of the representativeness of networks of sites for the validation and inter-comparison of global land biophysical products. Proposition of the CEOS-BELMANIP, Baret, Morisette, et al, in press, TGARS special issue

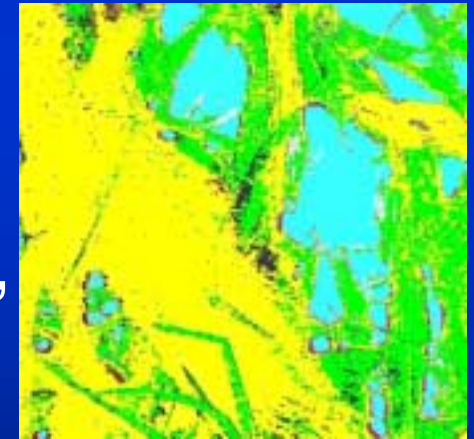
Manfredi results



Photo



“Caneye”
results



Analysis of Uncertainties of LAI Retrievals from LAI-2000, AccuPAR and DHP Optical Instruments over Croplands of Cordoba, Argentina

K. Swanson, S. Garrigues, N.V. Shabanov, J. Morisette and R.B. Myneni, in progress.

Albedo/BRDF Intercomparison

Proposed:

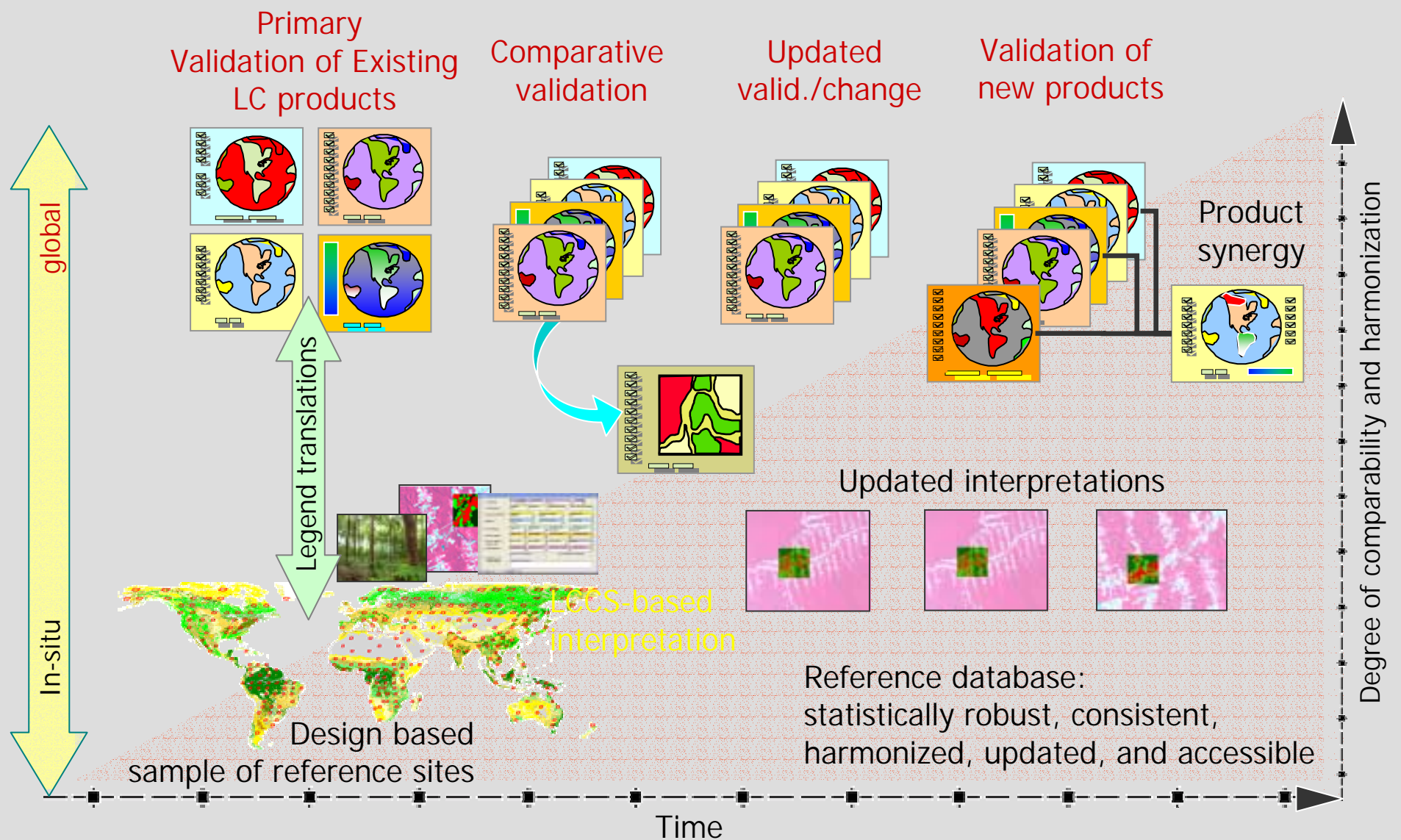
“Virtual experiments” (inter-compare 2002-2003 data for 5 sites)

“Real experiment” (2006?)

Sensors	Platform				
MODIS	Terra/Aqua	1 km	1 day	0.3-5.0	16 days
MISR	Terra	0.275-1 km	8 days	0.4-1.0	8 days
MERIS	ENVISAT	0.3-1.2 km	2-3 days	0.4-1.0	10 days
VEGETATION	SPOT 4-5	1 km	1 day	0.4-2.4	10 days
POLDER	ADEOS 1-2	6 km	1 day	0.4-1.0	10 days
PARASOL	MYRIADE	6 km	1 day	0.4-1.0	10 days
SEVIRI	MSG	1-3 km	15 min	0.4-1.6	1-10 days
Meteosat	GOES	2.25 km	30 min	0.4-0.8	10 days
ISCCP	(climatology)	60 km	NA	0.3-3.0	30 days
ECOCLIMAP	(climatology)	1 km	NA	0.3-3.0	30 days

Baret, F., C. Schaaf, J. Morisette, and J. Privette, “Report on the Second International Workshop on Albedo Product Validation”, 2005, Earth Observer, May/Jun 2005, 17(3)13-17.

Framework for joint GOFC-GOLD/CEOS Harmonization/Validation initiative



CEOS “best practices” document

Global Land Cover Validation: Recommendations for
Evaluation and Accuracy Assessment of Global Land
Cover Maps

Edited by: Strahler

Authors: Boschetti, Foody, Friedl, Hansen, Herold,
Mayaux, Morisette, Stehman, Strahler, & Woodcock

Primary finding:

- Call for global inter-comparisons

- “Hybrid” statistical sampling using fixed sites

- Confidence layers (model-based accuracy)

Vegetation Continuous Fields

- Use sampling IKONOS:ETM+/ASTER for global validation for 2000 era
- Use JAXA's PRISM on ALOS
 - Request acquisition schedule and data access plan from JAXA

LPV “Special Issue” – ongoing

- Special Issue: describing the state of the art research on both protocol and results for validation and accuracy assessment of global land products (Liang, Baret and Morisette, eds.)
- Several members from the user community have submitted notes for each section on the implication for the uncertainty/validation of the products - our first attempt to solicit “user feedback”.

	2004											2005								2006				
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	N	D	J	F	M
Announcement																								
Validation papers				submissions					reviews				revisions		review		final/profs							
User perspective papers						submissions							reviews		revisions		final/profs							
Publication date																		March 2006 ->						

Potential upcoming meetings

- FAO Agricultural monitoring (March '06)
- Validation of Vegetation index
 - Time series and continuity
 - phenology metrics
 - Time and location TBD
- Global Vegetation Monitoring
 - Proposed multi-sensor workshop
 - Missoula Montana
 - Week of August 7th?
(or the week after IGARSS)

Inter-sensor workshop: GEOSS focus

- *Strategic Activities*
Engage “CEOS, IGOS-P, GCOS, GBIF and WCRP to develop mechanisms for aligning the strategic plan and activities of these organization with GEOSS 10 year-Implementation plan targets” (p.4).
- *User interface and user requirement development*
proposes (TASK 10) “a planning meeting for a workshop to be co-hosted by GEO...in 2006, to identify initial concept and plan of action to develop a biodiversity monitoring system” (p.6).
- *Continuity of Critical Observations*
Prepare of “a letter from GEO Co-Chairs to CEOS regarding (five) critical items”, two of which are
“Identifying core product from MODIS, MERIS, AASR, VEGETATION and SeaWiFS for which continuity and quality improvements have to be insured” and
- “Ensuring coherence of mission requirements among future EO systems, including Sentinels, METOP, NPOESS, etc.” (p.9)

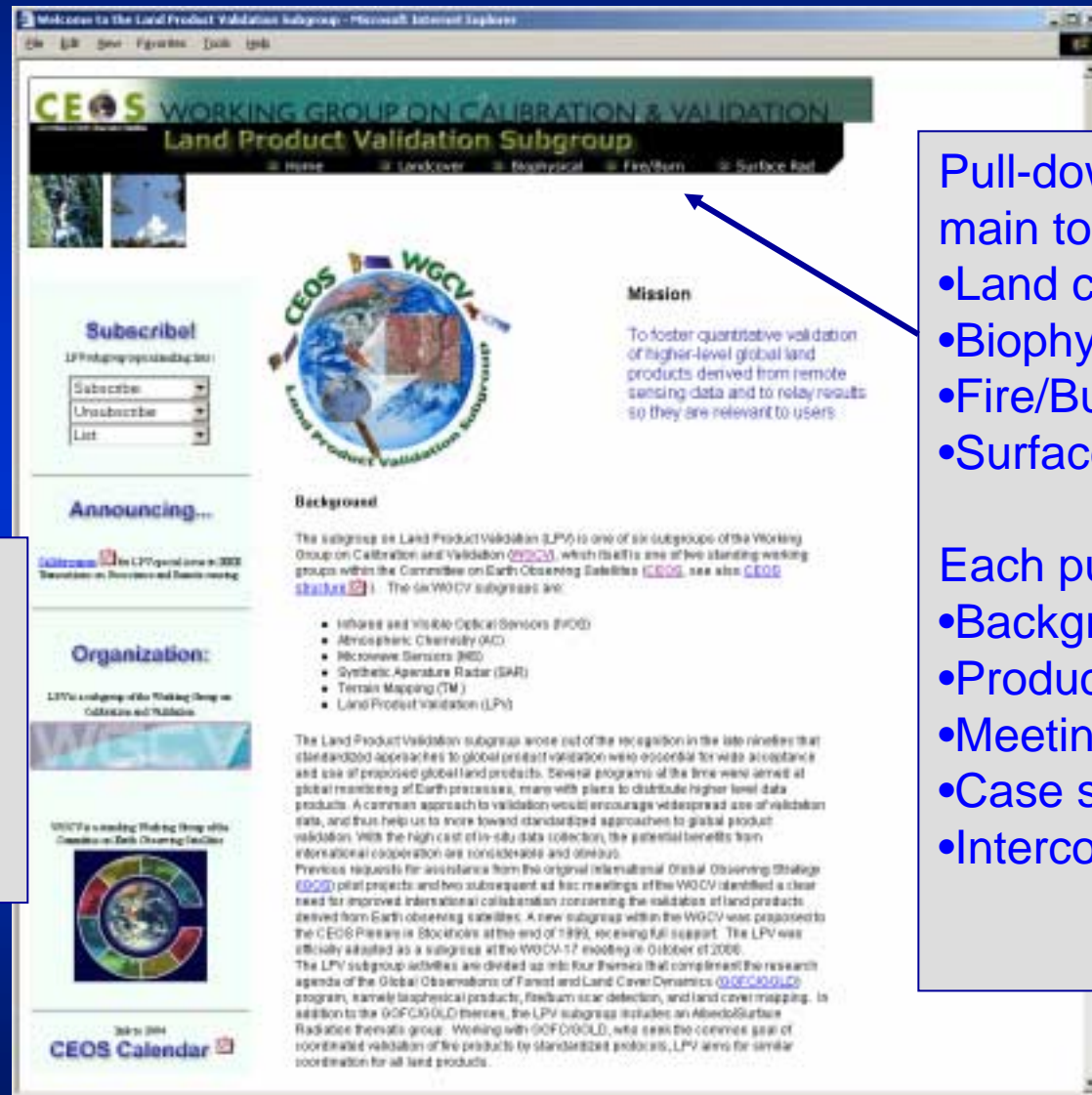
<http://earthobservations.org/docs/GEO%200107R%20WPT%20REPORT.pdf>

http://landval.gsfc.nasa.gov/LPVS

Matches WGCV
page layout and
graphic

Quick links to:

- Listserves
- Announcements
- WGCV
- CEOS and
- CEOS calendar



Pull-down menu for
main topical areas:

- Land cover
- Biophysical
- Fire/Burn
- Surface Radiation

Each pull-down lists:

- Background
- Producers *
- Meetings
- Case studies
- Intercomparisons

* input needed

web curator: Jaime Nickeson₁₉

LPV outline



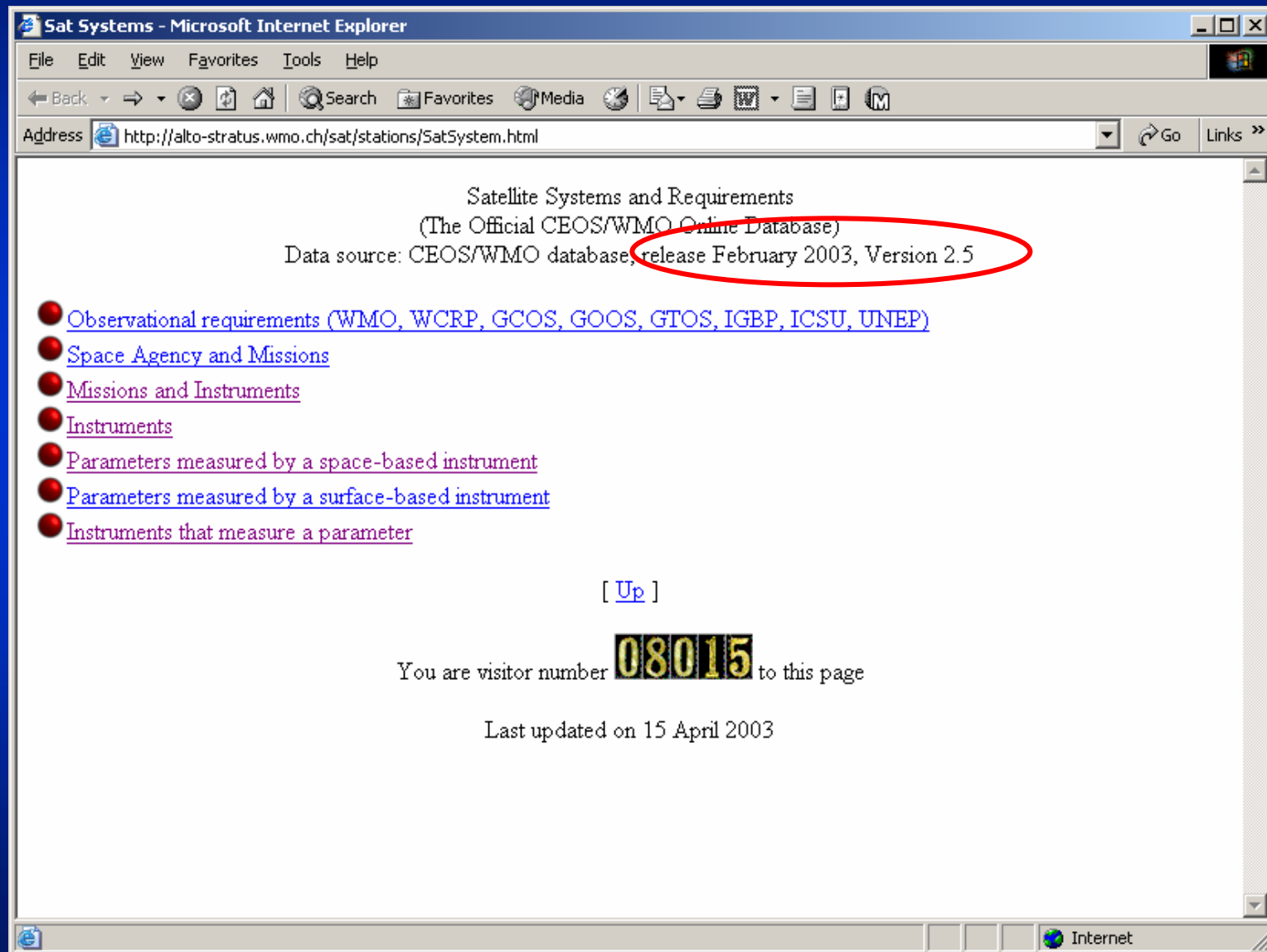
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Accuracy statements

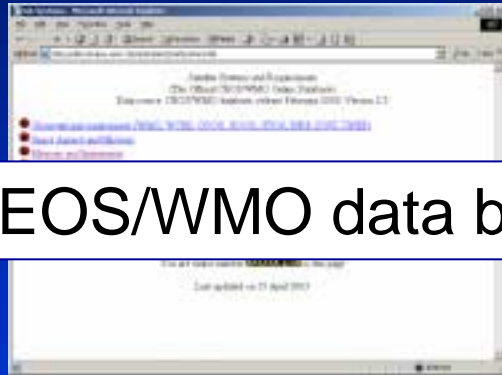


- Should be “user-oriented” and supported with peer-review literature
- Standardize/summarize information for each product
- MODIS land team had planned to update CEOS information for MODIS land products

CEOS/WMO page



CEOS/WMO database, potential framework

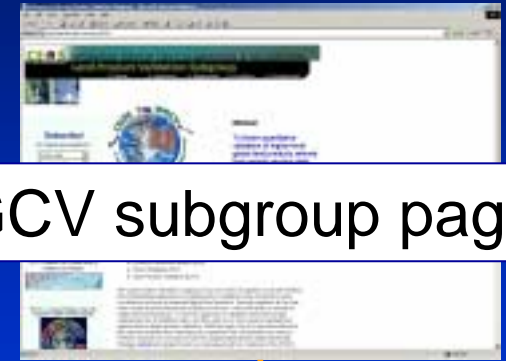


CEOS/WMO data base

Link to
accuracy
statement
for each
product

- Overall accuracy statement
- Link to QA information
- List of support material

Producer maintained validation page



WGCV subgroup page

... supporting materials

- Title, author, abstract
- Figures/captions
- Tables/captions

MODIS example: "Accuracy Statements" (1/3)

Welcome to the EOS Land Validation Home Page - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://landval.gsfc.nasa.gov/MODIS/>

MODIS land team validation

Home Core Sites Val Status Campaigns Documentation

News:

- [MODIS Vegetation workshop II](#), University of Montana, 17-19 August 2004
- [MODIS Land Data Operational Product Evaluation \(LDOPPE\) software tools](#) now available to assist with the analysis and quality assessment of the MODIS Land products
- [Call for Papers](#) - TGARS Special Issue on Global Land Product Validation
- Coordinated MODIS land validation activities will continue through the recently funded proposal: [Maintaining and Refining NASA's Land Product Validation Infrastructure](#)

MODIS News

- [Terra](#)
- [Aqua](#)

Landsat 7 News

- [Landsat ETM+ Dataset Transition](#)
- [Report following the Scan Line](#)

MODLAND Validation

MODLAND product quality and Validation. The MODLAND team contributes to and leverages off of international validation standards and activities through close coordination with the Committee on Earth Observation Satellites (CEOS) [Land Product Validation](#) subgroup, under the Working Group on Calibration and Validation (WGCV).

MODLAND uses several validation techniques to develop uncertainty information on its products. These include comparisons with in situ data collected over a distributed set of validation test sites, comparisons with data and products from other airborne and spaceborne sensors (e.g., SeaWiFS, AVHRR, MISR, TMVETM+, ASTER), inter-comparison of trends derived from independently obtained reference data and MODLAND products, and analysis of process model results (including EOS Interdisciplinary Science Models) which are driven or constrained by MODLAND products.

MODLAND's primary validation technique includes the collection of and comparison with field and aircraft data, and comparison with data and products from other satellites. The infrastructure for these efforts has resulted in the establishment of a semi-permanent array of EOS Land Validation [Core Sites](#), most of which include a flux tower, for extended temporal measurement of terrestrial biophysical dynamics over a range of landcover types. Field data are archived in cooperation with the [Oak Ridge DAAC's](#) Mercury system. Results of all validation activities are conveyed to the end-user through both published literature and the Land Product [Val Status](#)

Product "pick-list"

- Albedo/BRDF
- Fire
- LAI/Fpar
- Land Cover
- Land Surface Temperature
- Net Primary Production
- Snow/Ice Cover
- Surface Reflectance**
- Vegetation Cover Conversion
- Vegetation Indices

Product "pick-list"

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MODIS example: "Accuracy Statements" (2/3)

Accuracy Statement for each product

The screenshot displays the EOS Land Validation website. The main header reads "EOS Land Validation core sites". Below this, the "Status for: Surface Reflectance (MOD09)" section is highlighted. The "General Accuracy Statement" section states: "Validation of [stage 1](#) has been achieved for the surface reflectance product (MOD09). The accuracy of the MOD09 operational surface reflectance product is better than 3% reflectance or 5% of the signal - whichever is greatest, with slight variation from band to band." The "Supporting Studies" section lists a paper by Eric F. Vermote, Nadine Z. B. Salas, and Christopher O. Justice, titled "Atmospheric correction of MODIS data in the visible to middle infrared: first results". The "Additional Validation and Product Quality" section provides links to various product quality documents for MOD09A1, MOD09A2, and MOD09A3. A blue arrow points from the "MODIS land team validation" header to the "General Accuracy Statement" section.

EOS Land Validation
core sites

Status for: Surface Reflectance (MOD09)

General Accuracy Statement

Validation of [stage 1](#) has been achieved for the surface reflectance product (MOD09). The accuracy of the MOD09 operational surface reflectance product is better than 3% reflectance or 5% of the signal - whichever is greatest, with slight variation from band to band.

Product status updated on October 2003

Supporting Studies:

Title: Atmospheric correction of MODIS data in the visible to middle infrared: first results
Author: Eric F. Vermote, Nadine Z. B. Salas and Christopher O. Justice
Source: Remote Sensing of Environment, 88, 97-111
[View Summary Results From This Document](#)

Additional Validation and Product Quality

[EOS Land Validation: From Product Quality Documentation for MOD09A1 - Tans](#)
[Product Quality Documentation for MOD09A2 - Tans](#)
[Product Quality Documentation for MOD09A3 - Tans](#)

[http://modis.land.gsfc.nasa.gov/](#)

Summary Figures and Tables

Figure 1: The validation of the atmospherically corrected has been done partially by comparing to validate the aerosol optical thickness used in the correction algorithm to comparison to SPOTNET data as it is

MODIS example: "Accuracy Statements" (3/3)

Support material for each Accuracy Statement
- *updated by product PI and validation community*

