LAND PRODUCT

SUBGROUP REPORT

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7-10 March 2005

LPV outline

- Review of subgroup goals and objectives
- Report from LPV workshops
  - Leaf area index
  - Fire and logging disturbance in Brazil
  - Land cover harmonization
- Ongoing LPV activities
  - NASA funding for LPV activities
  - Web site update
  - CEOS Core Sites (with WGISS)
  - Special Issue – in progress
- LPV concluding remarks

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CEOS Definition

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

- 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

- Work with users to define uncertainty objectives
- Identify opportunities for coordination and collaboration
  - Through product Inter-comparisons
  - Through global test sites for systematic measurements
- Develop consensus “best practice” protocols for data collection and description
  - Workshops
  - Case studies
  - Publications *(with CEOS WGCV “endorsement”?)*
- To develop procedures for validation, data exchange and management - with a focus on land product validation core sites (done in conjunction with WGISS)
- To serve as a clearinghouse for accuracy statements on CEOS member global land products (possibly through the CEOS/WMO database?)

Big Picture

Previously: LPV provides a validation service to the Integrated Global Observation Strategy's:

Global Terrestrial Observation System and

Global Carbon Observing System

Implications:

- Focus Products: Biophysical, Land Cover, Fire Disturbance, & Albedo
- Working in conjunction with GOFC/GOLD's regional networks
- Need to integrate with TEMS, GT-Net, & UN's GLC-net

Proposed: LPV provides a validation service to GEOSS

Strategy for developing protocols

LPV is working toward protocols with three steps:

- Workshops (kick off, strategy/work plan, results)
  - Bringing together producers, users, and validation experts to initiate discussion, establish the “state of the art”, and consider core sites or regions for validation activities
- Case studies (previously) - Inter-comparisons (currently)
  - Posted on the LPV web site
  - First step in developing a more formal protocol
- Publication(s) (special issue)
  - Peer review document with details pertaining to the validation of a given global land product.

"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 Darmstadt (geostationary) 2004	Toulouse 2001 Percent cover: 2005
Decide on Sites				
Develop data sharing infrastructure	Frascati, Italy Privette et al. 2001	EGU, Vienna 2005		Boston U 2004
Field Campaigns & individual product analysis	Montana August 2004			
Synthesis of results	Current, on-going research			

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Topical workshops

- **Results workshop for LAI-intercomparison**
  - 16 August 2004, University of Montana, Missoula, USA
  - Established an agreement for data sharing and a paper submitted to the special issue
- **Ground-based Accuracy Assessments for Fire Occurrence and Deforestation Events**
  - 26 July 2004, Brasilia
  - Part of the Large scale study of the Biosphere and atmosphere in Amazonia (LBA)
- **GOFC-GOLD/FAO Workshop on Harmonization of Global Land Cover Product**
  - 15-16 July 2004, FAO in Rome
  - A manuscript on this issue has been submitted to the special issue

Upcoming…

- **Albedo/BRDF Intercomparison**
  - 2005 Avignon, France
- **Continuous Fields validation**
  - late summer 2005, location to be determined…

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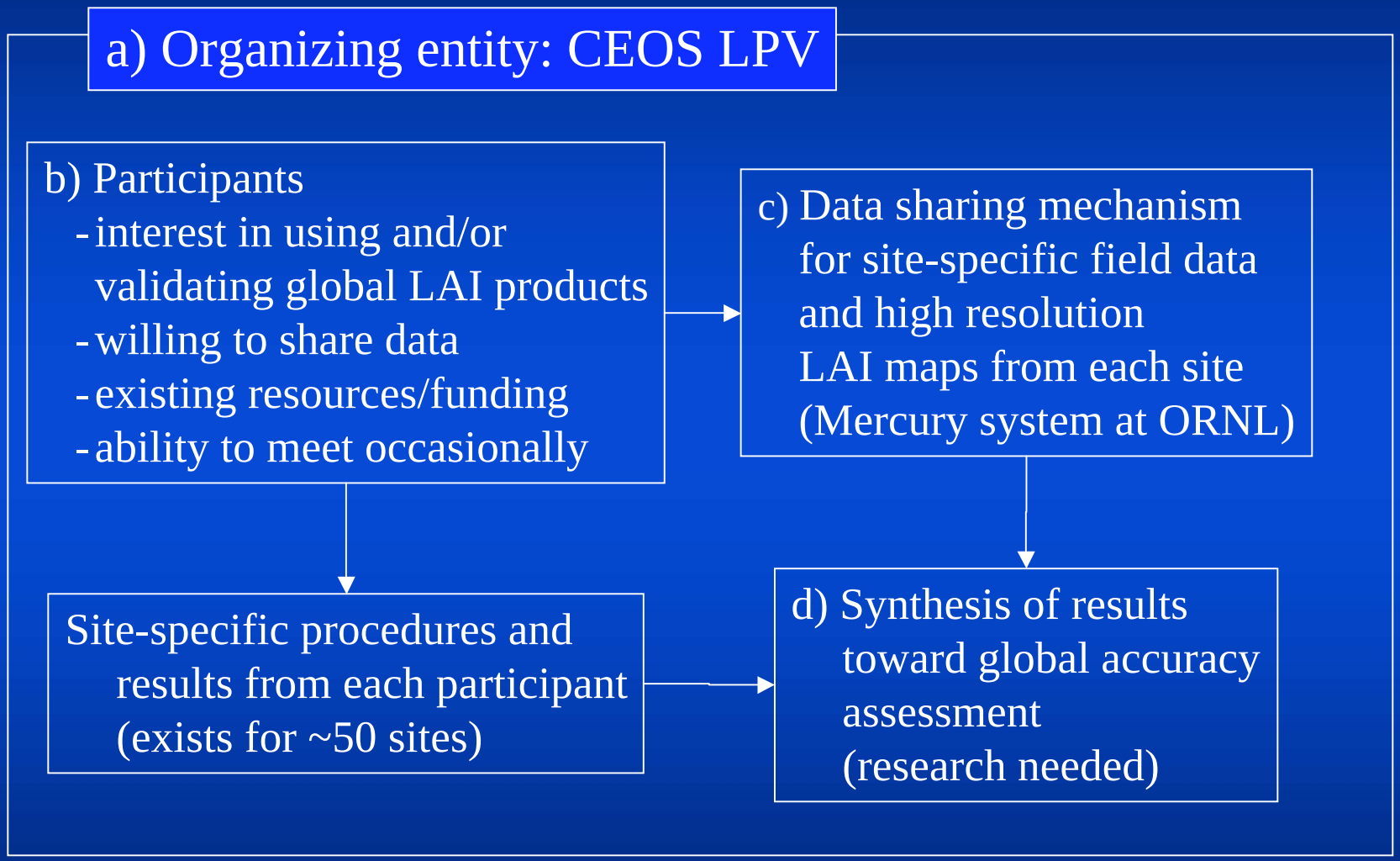
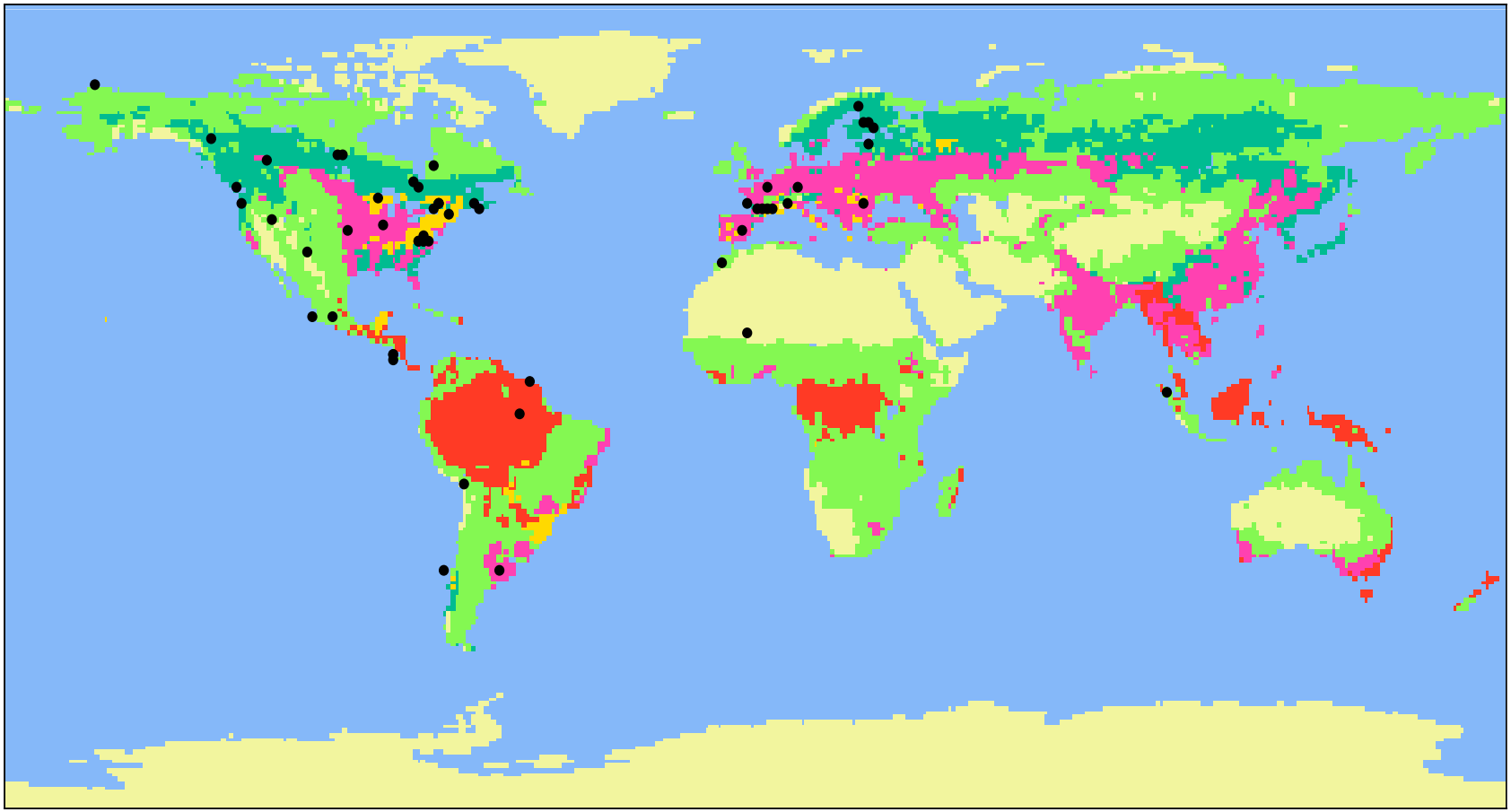
Background on LAI intercomparison

- The initial research efforts to validate global Leaf Area Index products included the European “VALERI” program, the NASA-funded “BigFoot” program, BU’s interest in validating its own product and Canada’s validation of their country LAI product (Privette et al. 1998)
- CEOS LPV brought these and additional efforts together for its initial “intercomparison” (Privette et al., 2001)
- Currently, nine groups are participating and sharing LAI-field data and high-resolution LAI images covering 56 sites (Morisette et al., 2004)
- Collaboration involves sharing data, software, and ideas.

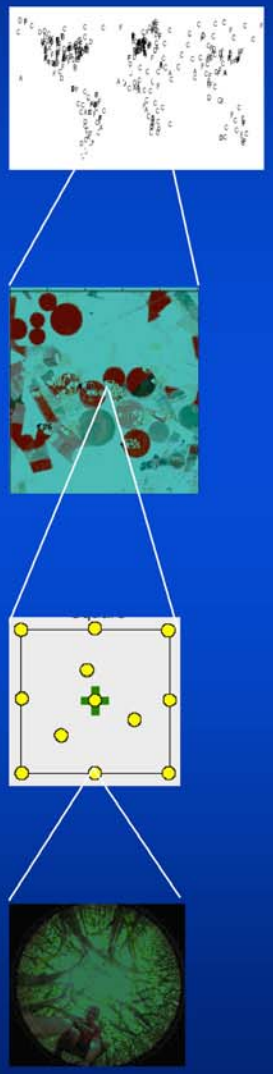
LAI workshop results: Global product validation framework



LAI intercomparison field sites



General global product validation protocol



50-100 sites

20-100 ESUs/site

10-100 measurements (Elementary Sampling Unit)

Global validation

Correlation analysis

Medium resolution products to be validated

Value(s) at the site level

Transfer function

High spatial resolution image (SPOT/ETM/ASTER …)

Value at the ESU level

Averaging

Individual measurements

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Ground-based accuracy assessment for deforestation and fire disturbance in Brazil

- Participants: Universities & Amazonian Institutes
- Presentation and participation from, Embrapa, INPE, IBAMA, NASA, CEOS, GOFC/GOLD, UMd, Universidade Federal do Acre, etc.
- Initial list of network participants

Site	Field Contact	High Res.Contact	Major Biome	Burn Seas	Experience
Paragominas, PA	Carlos Souza	Epiphano/Morisette	Dense Forest	May-Oct	DF
Sinop, MT	Carlos Souza	Epiphano/Morisette	Transition Fore	May-Oct	DF
Acre	Foster Brown	Epiphano/Morisette	Dense/Open F	Aug-Oct	DF Fire
Santarem, PA	Fernando	Epiphano/Morisette	Dense Forest	Nov-Dec	DF
NE Para	Arlete	Epiphano/Morisette	Secondary Fo	Aug-Oct	DF
Roraima	Wilfrid Schroeder	Epiphano/Morisette	Open Forest	Jan-Feb	Fire
Alto Floresta?	João Andrade - INPE	Epiphano/Morisette			

Recommendations from accuracy assessment for deforestation and fire disturbance in Brazil

- Interpret the call from the Minister of Environment for more transparency to imply that all estimates of deforestation, selective logging, and hot spots/burn areas should have explicit uncertainty estimates.
- First step for validation network is to select specific products to be validated (Burnt area and Deforestation – with specifics for these products) then establish protocol (current protocol listed on the LBA-Ecology web site)
- High resolution imagery issues:
  - Space Agencies (CEOS members) to provide access to high resolution data (ASTER, EO-1, Landsat 7 or 5, CBERS) to field site collaborators
  - Acquisition of high-res (~1m) satellite and airborne imagery necessary for more widespread accuracy assessment in critical areas.
- Integrate this effort with GOFC-GOLD and CEOS-LPV program.
- Integrate this effort with local users through information dissemination and training.
- Use producer/user collaboration to establish accuracy requirements:
  - Consider annual variability
  - Pick a target (start with 20% for deforestation)
  - What does the LBA community expect of the Prodes data set?
- Solicit funding for joint Amazon basin-wide ground-based validation (GPS, software, imagery, training, video conferencing and personnel)

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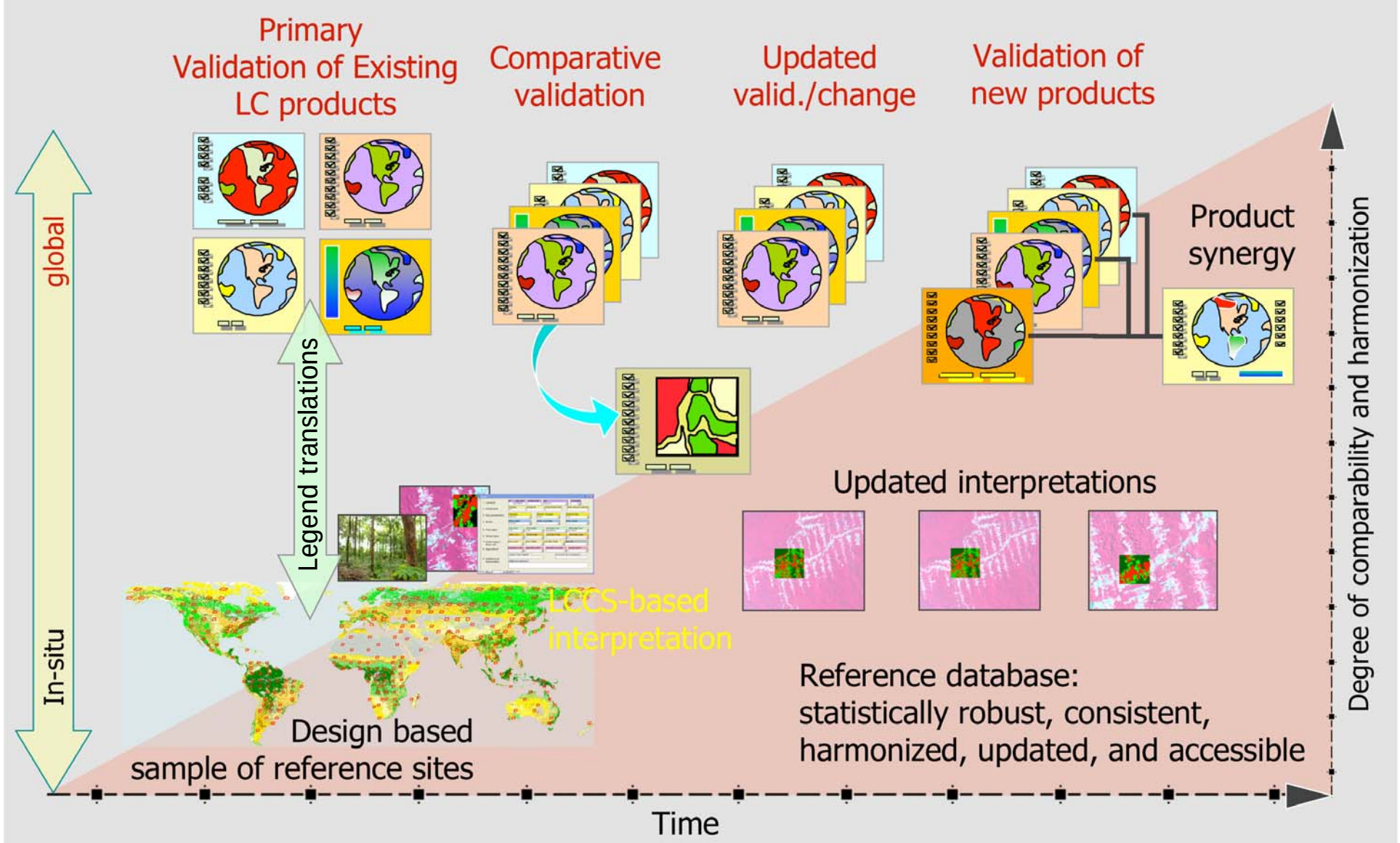
Harmonization of Global land cover product

- **Harmonization resources:**
  - Capacity building and web-based resources (LCCS)
  - Raise awareness and foster use of harmonized products
- **Harmonization experiences for existing datasets:**
  - Develop legend translation protocols/case studies
  - Translated legends: IGBP/CORINE/GLC2000/Anderson/IPCC ...
  - Compatibility/Comparability of datasets
- **Harmonization in future mapping products:**
  - Impact on future projects and operational programs
  - Standardized legend generation (e.g. MERIS products)
  - Consider inconsistencies in previous maps
- **Harmonization and validation are parallel efforts**

information provided by :

Martin Herold and Chris Schmullius, GOFC GOLD Land Cover Project Office

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



information provided by Martin Herold and Chris Schmullius, GOFC GOLD Land Cover Project Office

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Albedo/BRDF Intercomparison

2005 Avignon, France
Co-chairs: Fred Baret, Crystal Schaaf, Jeff Privette, Jeff Morisette

This workshop will build on the discussions held at the first LPV workshop on Albedo Products held in Boston, USA in October 2002.

The goals of this day and a half workshop are to design and initiate a validation and comparison exercise for the various satellite-derived land surface albedo products which are now available from a number of instruments.

It is hoped that participants from a number of long term field sites will be willing to work with satellite albedo producers for one or more designated periods to provide an assessment of the operational products. While these would primarily be "virtual" campaigns - utilizing existing field and satellite data resources - the LPV will be able to provide limited support for posting data and comparisons and facilitating communication on the web.

To register: e-mail to albedo_2005@avignon.inra.fr by 15 March 2005 (registration for the EGU is also required, deadline for early registration is 8 April 2005).

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NASA funding for LPV activities

"Maintaining and Refining NASA's Land Product Validation Infrastructure"

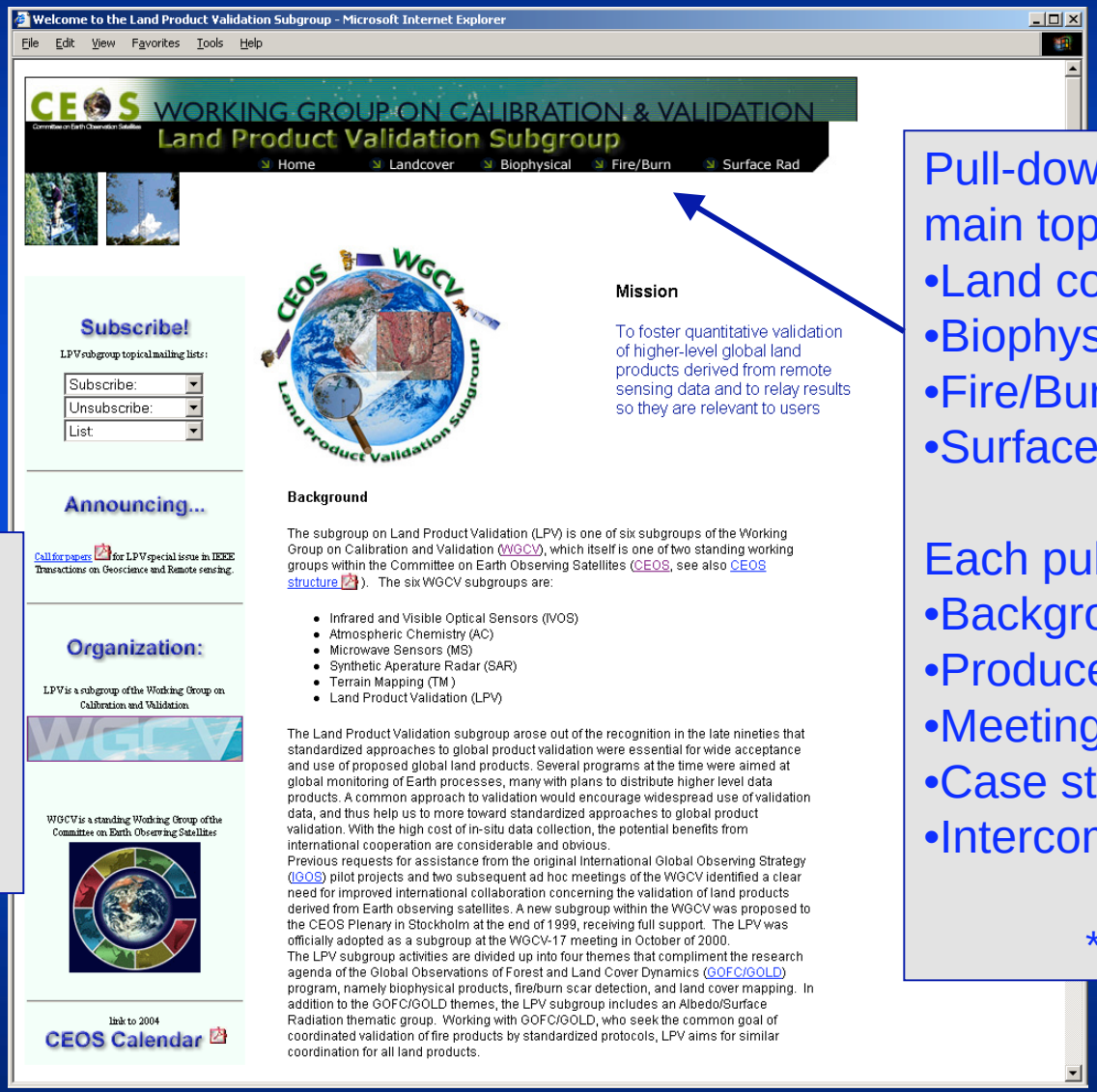
Funding for:

- post-doc research position (Sebastien Garrigue) and
- LPV workshops
- web infrastructure
- data for "Core Sites"

Three years of support: 2004-2006

http:landval.gsfc.nasa.gov/LPVS

Matches WGCV page layout and graphic



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

Quick links to:
- Listserves
- Announments
- WGCV
- CEOS and
- CEOS calendar

web curator: Jaime Nickeson

CEOS Core Sites

"CEOS Core Sites": WGISS Test Facility
Joint project between CEOS Working Group on Cal/Val and Working Group on Information Systems and Services

The WGCV 22nd plenary established, for the long term sustainability of this effort, it must be a distributed system where each space agency stages data and derived-products from their sensors.

More on this tomorrow…

CEOS Core Sites: “MoU request”

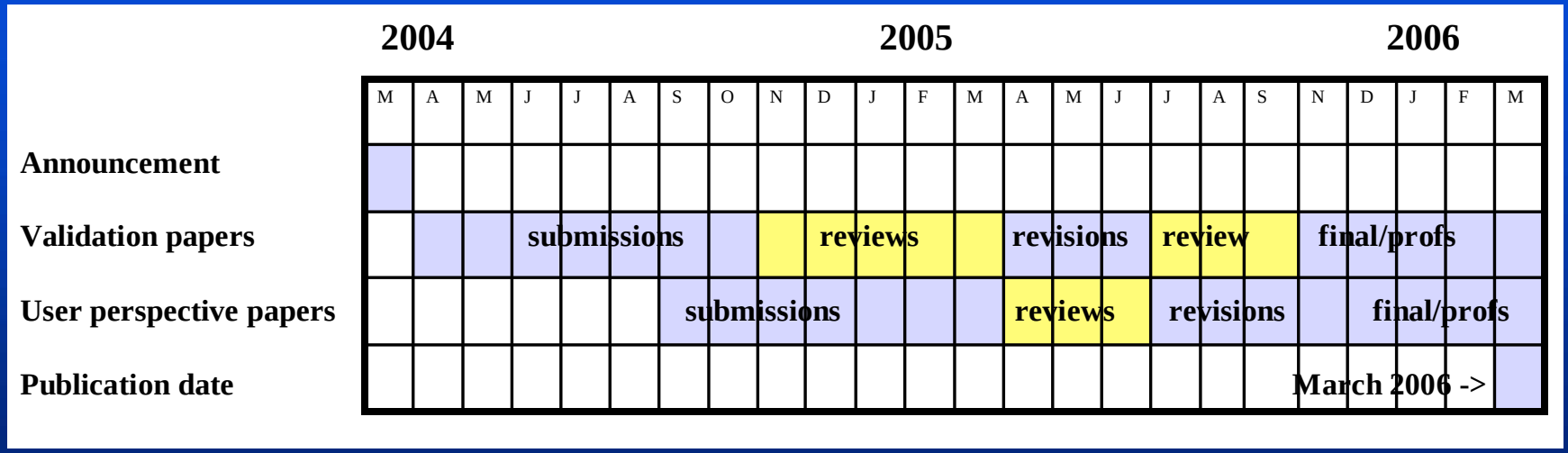
Request from DLR to establish the DEMMIN test site.

Art. 1 Purpose of this Memorandum of Understanding

The purpose of this MoU is to establish the framework for cooperation between the Parties in the activities of WGCV´s Land Product Validation subgroup. Annex 1 to this MoU contains the basic technical data of DLR´s DEMMIN test site and high-resolution data products generated from this test site. Annex 1 forms an integral part of this MoU.

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.)
- Over 20 papers have been submitted, covering land cover, burned area, biosphysical (VI, LAI, fAPAR, GPP)
- Several members from the user community have agreed to write a note for each section on the implication for the uncertainty/validation of the products (land cover, fire/burn), but still need an article on biosphysical parameters.



Terrestrial Observing Panel on Climate "Implementation Plan"

Requested by "Conference of the Parties – 9"

"Section F: Terrestrial Domain" forwarded for comment to LPV through Alan Belward

WGCV mentioned 19 times, LPV explicitly mentioned once

Special issue should provide "state-of-the-science" for several parameters listed in section F, Table 12:

- Snow cover (Glaciers)
- Albedo
- Land use (historical)
- Land cover
- LAI/FAPAR
- Land Surf. Temp.
- Biomass
- Fire disturbance

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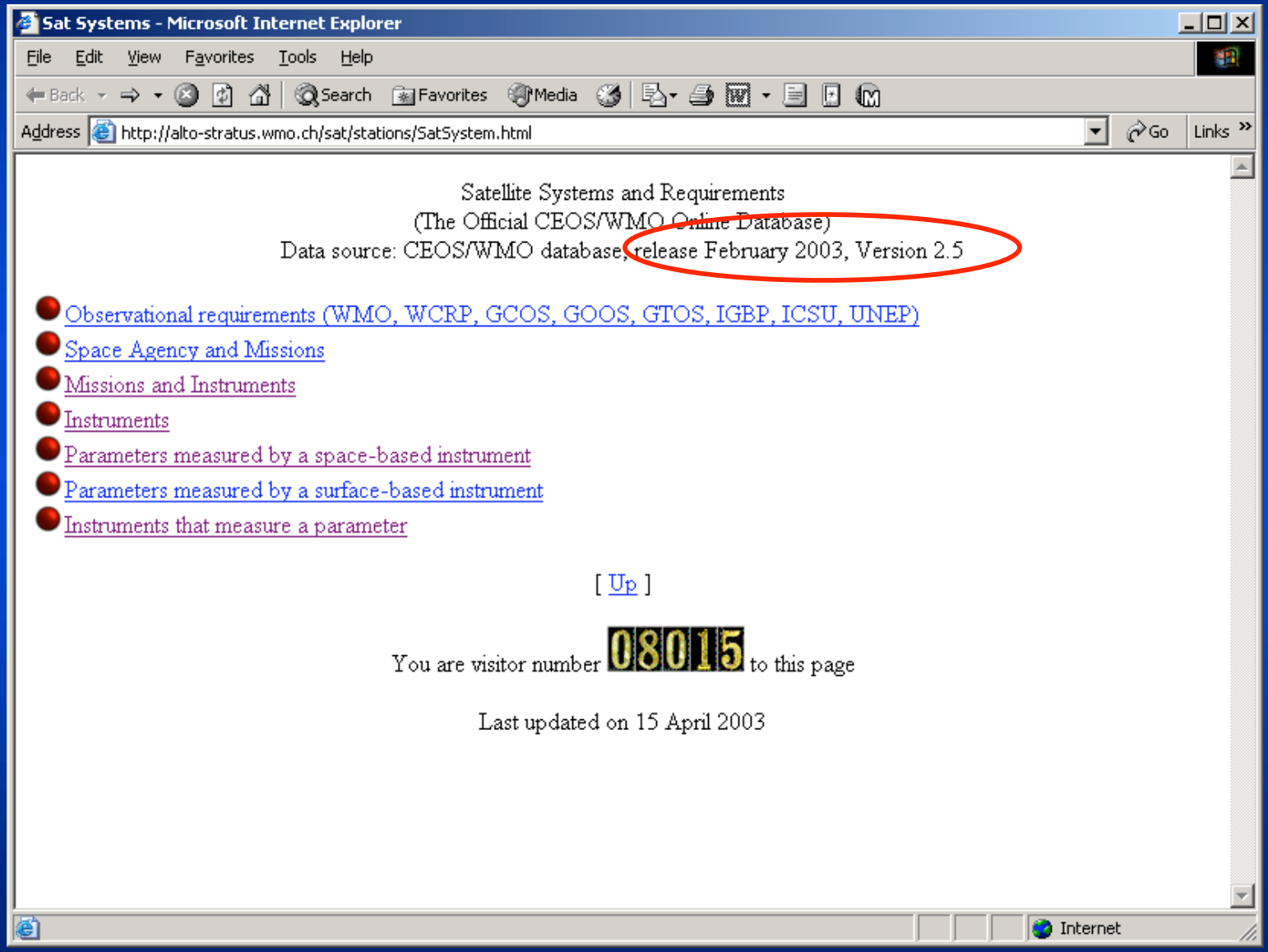
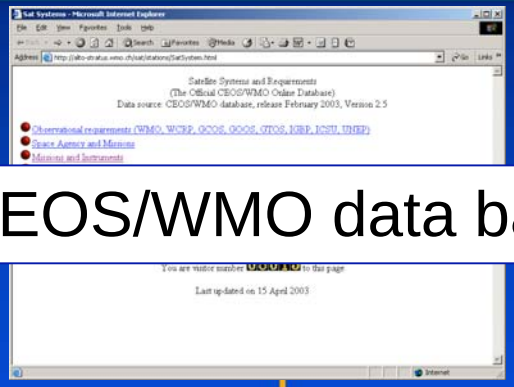
Accuracy statements

- 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

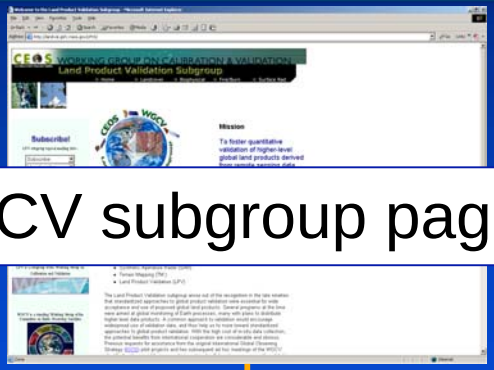
CEOS/WMO page



CEOS/WMO database, potential framework



CEOS/WMO data base



WGCV subgroup page

Link to accuracy statement for each product

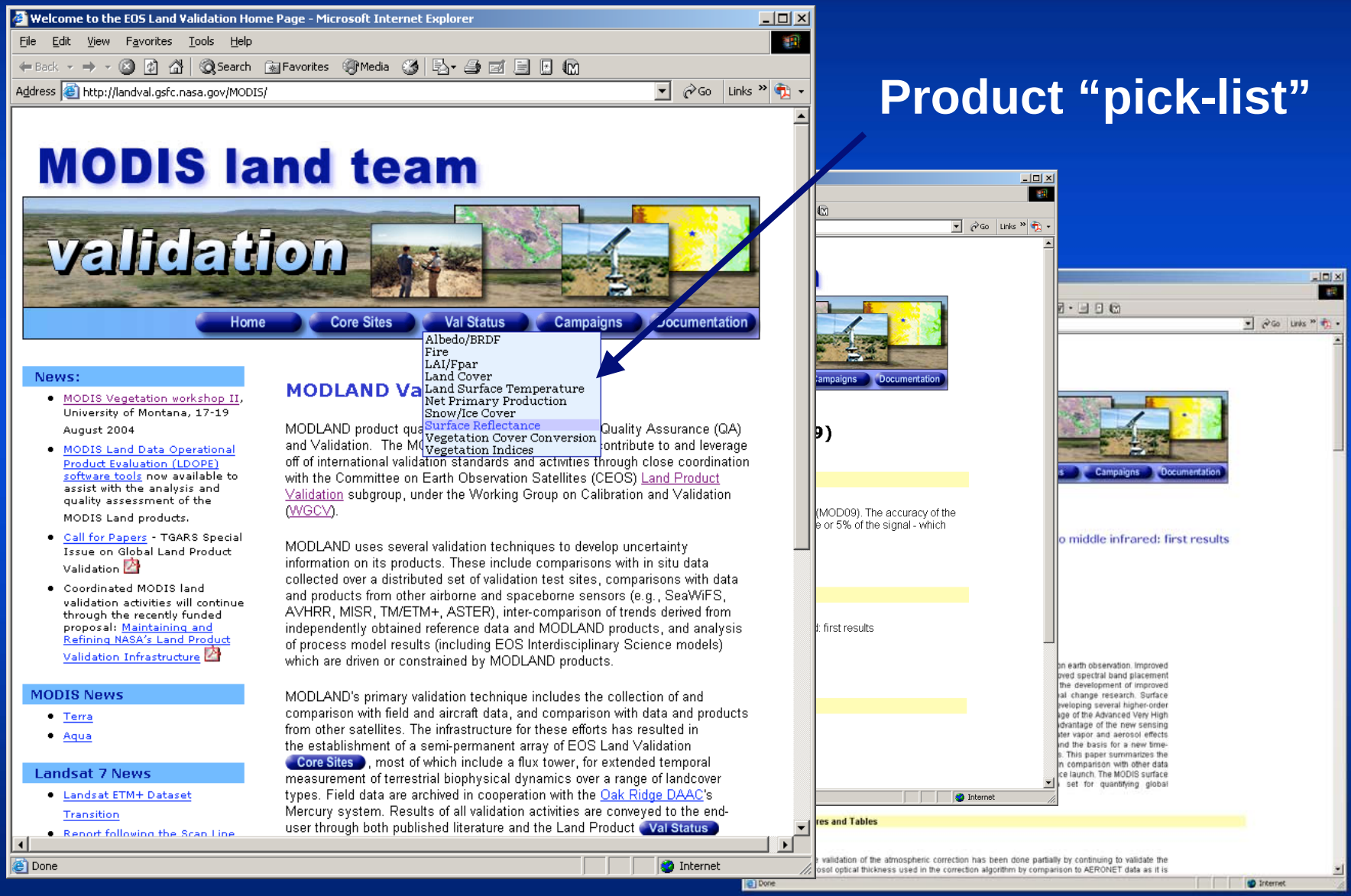
- Overall accuracy statement
- Link to QA information
- List of support material

… supporting materials

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

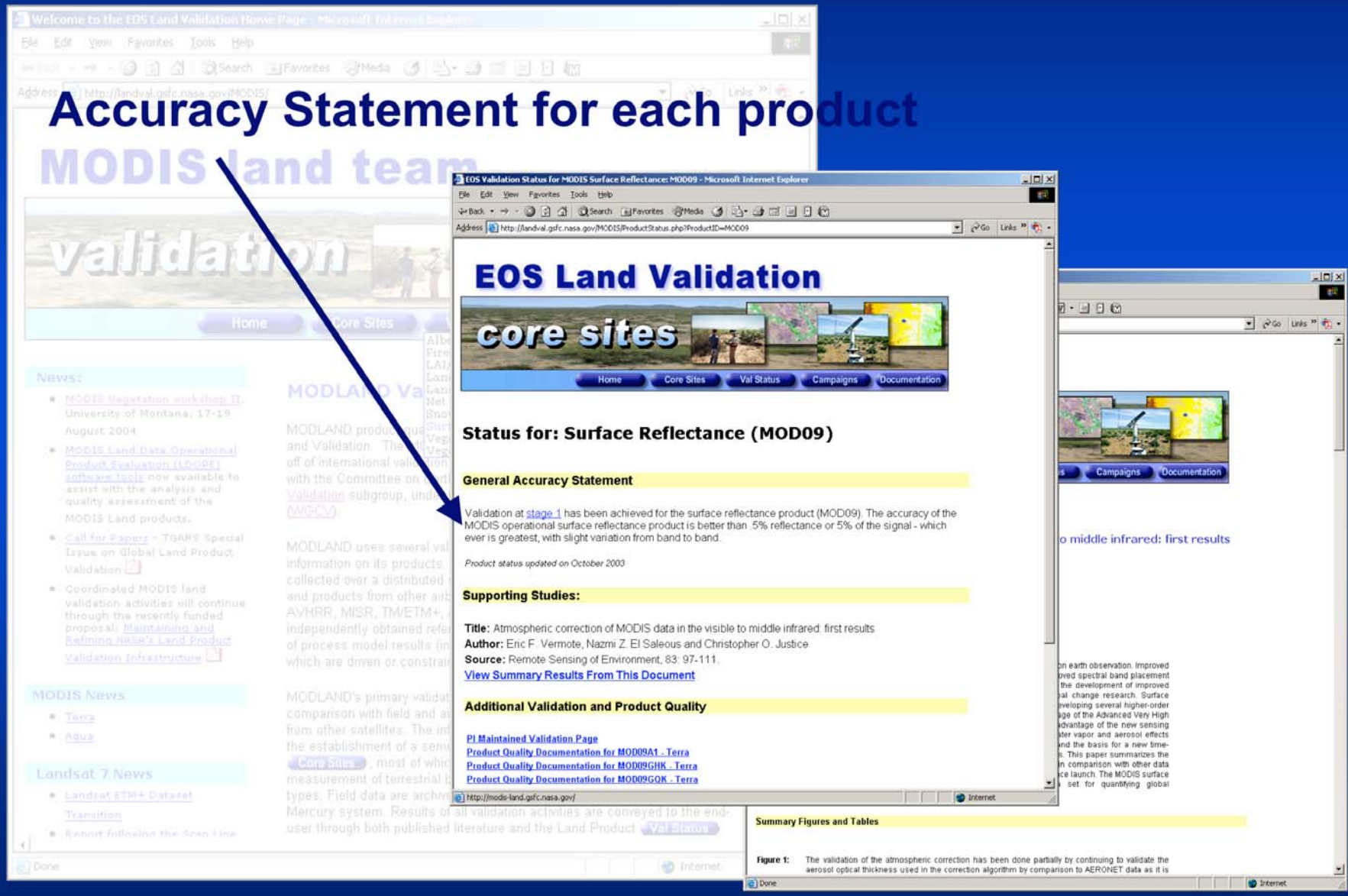
Producer maintained validation page

MODIS example: “Accuracy Statements” (1/3)



Product “pick-list”

MODIS example: “Accuracy Statements” (2/3)



MODIS example: “Accuracy Statements” (3/3)

Support material for each Accuracy Statement

- updated by product PI and validation community

LPV outstanding issues

- Defining user accuracy requirements remains a challenge.
- There are no established standards on how to relay product accuracy to users.
- LPV covers many satellite and many products. Membership is not well defined, LPV could benefit from a call from membership from CEOS
- Perhaps WGCV has not been consistent among subgroups ("land"/ "atmosphere" or "biophysical"/"atmospheric chemistry")
- Multi-sensor products offer great potential. The related algorithms will require an understanding of the accuracy of each sensor's input.

LPV recommendations

- Continue with “recommendation 3” on the convergence to LCCS, perhaps explicitly listing some of the steps documented in the GOFC/GOLD/LPV harmonization of land cover
- CEOS WGCV develop a plan to share background information and data acquisition and access for new satellite data (CHRIS/PROBA, CBERES-2, Disaster Monitoring Constellation) – related to WTF
- CEOS members should continue to provide mechanism for field-data sharing (example: the NASA-sponsored MERCURY system)

references

Morisette, J. , C. Justice, J. Pereira, J.M. Grégoire, and P. Frost, 2001, "Report from the GOFC – Fire: Satellite Product Validation Workshop", *Earth Observer,* September/October, v. 13, n. 5, p. 15-18..(available on-line at *http://eospso.gsfc.nasa.gov/eos_observ/9_10_01/Sept_Oct01.pdf*

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