CEOS LAND PRODUCT

validation

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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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: 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?)
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• Accuracy Statements
### Intercomparison General Timeline

<table>
<thead>
<tr>
<th>LAI</th>
<th>Albedo</th>
<th>Fire</th>
<th>Land cover</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topical meeting to establish data requirements</strong></td>
<td><strong>LAI</strong></td>
<td><strong>Albedo</strong></td>
<td><strong>Fire</strong></td>
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<tr>
<td>Frascati, Italy Privette et al. 2001</td>
<td>EGU, Vienna 2005</td>
<td></td>
<td>Boston U 2004</td>
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<td>Montana August 2004</td>
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<tr>
<td>Current, on-going research</td>
<td></td>
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</table>

- **Field Campaigns & individual product analysis**
- **Synthesis of results**
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
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

*ECOCLIMAP global classification
Manfredi results

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

LPV report to WGCV 24 plenary
### Albedo/BRDF Intercomparison

**Proposed:**
- "Virtual experiments" (inter-compare 2002-2003 data for 5 sites)
- "Real experiment" (2006?)

<table>
<thead>
<tr>
<th>Sensors</th>
<th>Platform</th>
<th>Spatial resolution</th>
<th>Satellite revisit time</th>
<th>Spectral domain</th>
<th>Temporal resolution of product</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODIS</td>
<td>Terra/Aqua</td>
<td>1 km</td>
<td>1 day</td>
<td>0.3-5.0</td>
<td>16 days</td>
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<tr>
<td>MISR</td>
<td>Terra</td>
<td>0.275-1 km</td>
<td>8 days</td>
<td>0.4-1.0</td>
<td>8 days</td>
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<tr>
<td>MERIS</td>
<td>ENVISAT</td>
<td>0.3-1.2 km</td>
<td>2-3 days</td>
<td>0.4-1.0</td>
<td>10 days</td>
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<tr>
<td>VEGETATION</td>
<td>SPOT 4-5</td>
<td>1 km</td>
<td>1 day</td>
<td>0.4-2.4</td>
<td>10 days</td>
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<tr>
<td>POLDER</td>
<td>ADEOS 1-2</td>
<td>6 km</td>
<td>1 day</td>
<td>0.4-1.0</td>
<td>10 days</td>
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<tr>
<td>PARASOL</td>
<td>MYRIADE</td>
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<td>1 day</td>
<td>0.4-1.0</td>
<td>10 days</td>
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<tr>
<td>SEVIRI</td>
<td>MSG</td>
<td>1-3 km</td>
<td>15 min</td>
<td>0.4-1.6</td>
<td>1-10 days</td>
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<td>GOES</td>
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<td>ISCCP (climatology)</td>
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<tr>
<td>ECOCLIMAP (climatology)</td>
<td>1 km</td>
<td>NA</td>
<td>0.3-3.0</td>
<td>30 days</td>
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</tbody>
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Framework for joint GOFC-GOLD/CEOS Harmonization/Validation initiative

- Primary Validation of Existing LC products
- Comparative validation
- Updated valid./change
- Validation of new products

Legend translations

Design based sample of reference sites

LCOS-based interpretation

Updated interpretations

Reference database: statistically robust, consistent, harmonized, updated, and accessible

Time

Degree of comparability and harmonization

global

In-situ

information provided by Martin Herold and Chris Schmullius, GOFC GOLD Land Cover Project Office
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)
• 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”.

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<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
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<tbody>
<tr>
<td>Announcement</td>
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<td>Validation papers</td>
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<td>submissions</td>
<td>reviews</td>
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<tr>
<td>User perspective papers</td>
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<td>submissions</td>
<td>reviews</td>
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<tr>
<td>Publication date</td>
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<td>March 2006 -&gt;</td>
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LPV report to WGCV 24 plenary
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 Nickeson
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• Accuracy Statements
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
Satellite Systems and Requirements
(The Official CEOS/WMO Online Database)
Data source: CEOS/WMO database, release February 2003, Version 2.5

- Observational requirements (WMO, WCRP, GCOS, GOOS, GTOS, IGBP, ICSU, UNEP)
- Space Agency and Missions
- Missions and Instruments
- Instruments
- Parameters measured by a space-based instrument
- Parameters measured by a surface-based instrument
- Instruments that measure a parameter

You are visitor number 08015 to this page

Last updated on 15 April 2003
CEOS/WMO database, potential framework

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

Producer maintained validation page

CEOS/WMO data base

WGCV subgroup page

... supporting materials

- Title, author, abstract
- Figures/captions
- Tables/captions
MODIS example: “Accuracy Statements” (1/3)
Accuracy Statement for each product

MODIS example: “Accuracy Statements” (2/3)
Support material for each Accuracy Statement - updated by product PI and validation community