Land Product Validation (LPV) Sub-group Update

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Contributions by focus area co-leads

WGCV-37
17-20 February 2014, ESA/ESRIN, Frascati

Status LPV at WGCV-36

Achievements (since WGCV-36)

1. Restructuring LPV
   - 2 (+1) focus area co-leads replaced
   - Regular sub-group telecons (1st Tuesday every 2 months)
   - Minutes and action items
   - Regular sub-group meetings (every 18 months)
   - Fixed terms for focus area co-leads, terms on wiki for internal info (3yrs, max. 2x; long standing co-leads start of 2nd term 03/2014)
2. First 'good practices' protocol (LAI) released!
3. Online Validation Exercise (OLIVE on CEOS CalVal portal) manuscript ready (lead by M. Weiss, F. Baret)
4. Participation in LPVE (Land Product Validation and Evolution)
   Initiated by B. Bojkov, ESA/ESRIN, Jan 2014
   LPV overview + 12 presentations by LPV members
5. LPV subgroup meeting, Jan 2014 (1.5 days)

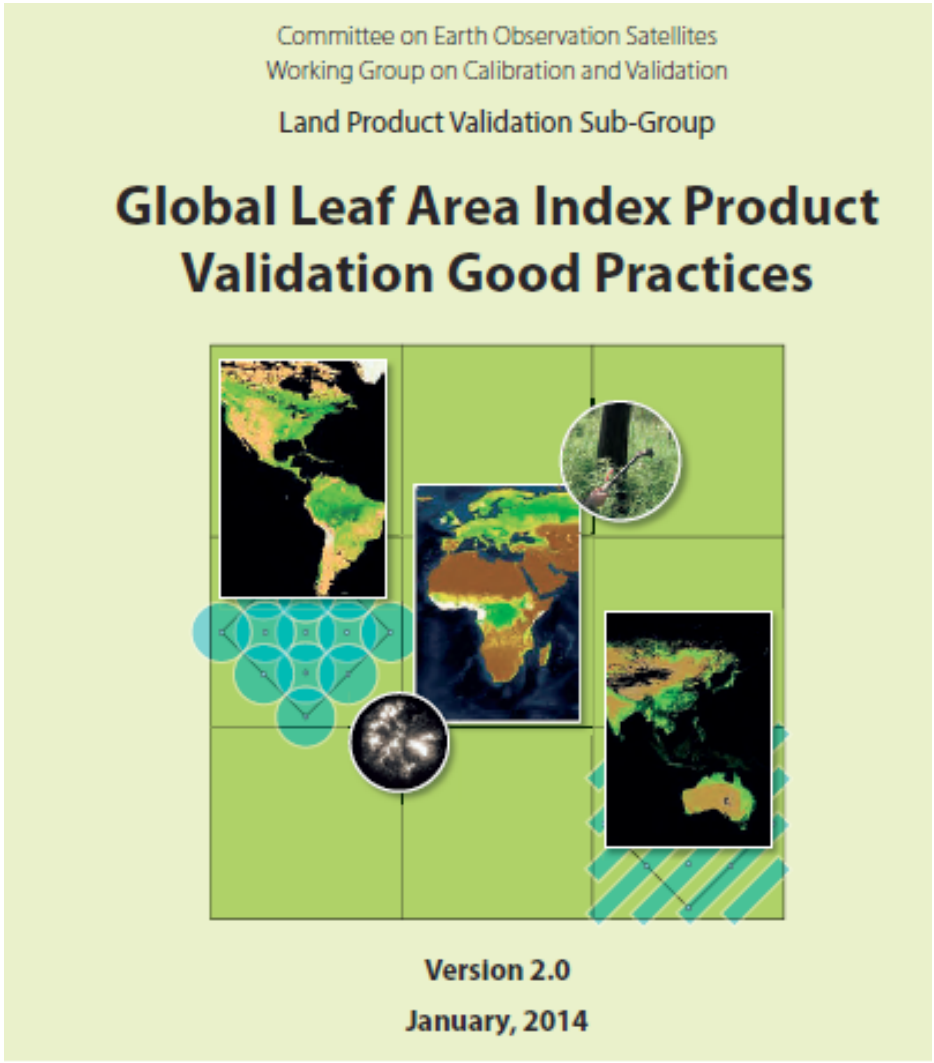
Update Focus Area Co-leads

* ECV

Snow cover (T5)*, Ice	(Dorothy Hall) (NASA GSFC)	Tao Che (Chinese Academy of Sciences)
Surface radiation (Reflectance, BRDF, Albedo (T8)*)	Crystal Schaaf (U. Massachusetts)	Xavier Ceamanos (Meteo France)
Land cover (T9)*	Pontus Olofsson (Boston University)	Martin Herold (Wageningen University, NL)
FAPAR (T10)*	Arturo Sanchez-Azofeifa (U. Alberta)	Nadine Gobron (JRC, IT)
Leaf area index (T11)*	Oliver Sonnentag (Richard Fernandes)	Stephen Plummer (Harwell, UK)
Fire (T13)* (Active Fire, Burned Area)	Luigi Boschetti (University of Maryland)	Kevin Tansey (University of Leicester, UK)
Land surface temperature*	Simon Hook (NASA JPL)	Jose Sobrino (University of Valencia, SP)
Soil moisture*	Tom Jackson (USDA)	Wolfgang Wagner (Vienna Uni of Technology, AT)
Land surface phenology	Matt Jones (U of Montana)	Jadu Dash (University of Southampton, UK)

Supported by Jaime Nickeson, NASA GSFC

LAI Validation Good Practices Version 2



- Printed version
  -> Thanks, NPL!
- On LPV website soon:
  1. Digital version of protocol
  2. Reviewer comments and responses
  3. Recommendations to
     - CEOS/WGCV/LPV
     - LAI producers
     - Research community
     - Validation teams
- Living document
- Field component to be further developed by new LAI co-lead (Oliver Sonnentag)

OLIVE Manuscript and LPV Recommendations

1 On Line Validation Exercise (OLIVE): a web based service for the validation of
2 medium resolution land products. Application to FAPAR products

Submitted to EGU Biogeosciences in Dec 2013, not in review, resubmission to Remote Sensing planned (open access)

Outcome of discussion about OLIVE within LPV, Jan 2014

- Concept of OLIVE is important for LPV activities
  - Common metrics, common reporting, precious in situ data archiving
  - LAI, FAPAR, albedo, phenology as main potential users
- Implementation needs improvement (operability and transparency not high enough in current version!)
  - Code needs to be accessible for rewriting/ adding components (e.g. metrics, in situ data format)
  - Space agencies should provide satellite data subsets and interfacing for automatic upload in the future
  - LPV has expertise to compile doi-assigned reference datasets for each product (processing and quality check of available in situ data and creation of 'golden standard')

Focus Area Level Activities (Selection)

Land cover	Global reference database overview and new world-wide database in prep with 500 sites	
FAPAR	Validation workshop	Jan 2014
Leaf area index	1st protocol release	Jan 2014
Land surface temperature	Paper out on quantifying uncertainties in land surface temperature and emissivity retrievals from Aster and MODIS	
Soil moisture	Validation workshop, follow-up 2014	July 2013
Land surface phenology	Manuscript to standardize phenocam monitoring	

LPV Sub-group Meeting Jan 2014

Participants (16)

chair and vice-chair, min. 1 co-lead per focus area, WGCV vice-chair (A. v. Bargen), guests ESA (B. Bojkov, A. Burrini, F. Gascon)

Goals of meeting were

- Synthesis of ECV/product validation status -> 0.5 day
  (GCOS requirements, validation stage, uncertainty/accuracy, references, validation data sets)
  -> baseline for a corresponding publication
- Exchange on validation methods used for each ECV -> 0.5 day
- Discuss various LPV items (eg interaction GCOS, global supersite selection, expansion of LPV, website)

Get together, discuss, reflect where to go with LPV!

Exchange experience!

Get new ideas for validation from other focus areas!

Validation Stage of Products (LPV Hierarchy)

Stage 1	Product accuracy is assessed from a small (typically < 30) set of locations and time periods by comparison with in situ or other suitable reference data.
Stage 2	Product accuracy is estimated over a *significant set of locations and time periods* by comparison with reference in situ or other suitable reference data. *Spatial and temporal consistency of the product with similar products has been evaluated over globally representative locations and time periods.* Results are published in the peer-reviewed literature.
Stage 3	Uncertainties in the product and its associated structure are well quantified from comparison with in situ or other suitable reference data. Spatial and temporal consistency of the product with similar products has been evaluated over globally representative locations and time periods. *Uncertainties are characterized in a statistically robust way over multiple locations and time periods representing global conditions.* Results are published in the peer-reviewed literature.
Stage 4	Validation *results for stage 3 are systematically updated* when new product versions are released and as the time-series expands.

Validation Stage (2010)

Variable	Sensors	Validation Stage
Land Cover	MODIS, MERIS, SPOT VEGETATION, AVHRR	2-3
Active Fire	MODIS, AVHRR, METEOSAT SEVIRI, ATSR	2-3
Burnt Areas	MODIS, ATSR, AVHRR, SPOT VEGETATION	2
LA		
fA		
Albedo	SPOT VEGETATION, METEOSAT 2-7, POLDER 1-3, ADEOS1-2, MODIS, MISR, MSG SEVIRI, CERES	1-2
Soil Moisture	SMMR, SMM/I, ERS, TRMM TMI, AMSR-E, SMOS MIRAS, SMAP, WindSat	1
LST/ Emissivity	ASTER, METEOSAT, MSG SEVIRI, MODIS	1
Phenology	MODIS, MERIS, AVHRR, multi-source	1

Update based on sub-group meeting report

Nightingale et al., ESA-iLEAPS 2010

Validation Protocols – Lessons

- Protocol writing advanced mainly through funded projects (eg ESA-CCIs)
- Peer-reviewed publications are more rewarding for university-based co-leads

-> both concepts are supported by LPV!

- Poste state of the art validation methods/ papers on website rather than waiting for ‘perfect’ protocol (ev. several protocol stages in the future)
- Protocols covering intercomparison and validation (incl. in situ methods) in one document might be too extensive
- Better planning of protocol release in the future
  (structure of protocol, citation, CEOS publication strategy, website posting)

Status Protocols

Snow cover (T5)*, Ice	Starting
Surface radiation (Reflectance, BRDF, Albedo (T8)*)	First draft 2014
Land cover (T9)*	Strahler 2006, Olofsson in revision (RSE) -> www
FAPAR (T10)*	Review best practices
Leaf area index (T11)*	Releasing phase (citation, doi in progress) -> www
Fire (T13)* (Active Fire, Burned Area)	Version 2009 (first section ok), sampling missing; active fire pending, sensor-specific, list references
Land surface temperature*	Validation protocol LST-CCI (D. Ghent) as draft, to be extended by field measurements (lead J. Sobrino)
Soil moisture*	SMAP cal/val plan part as start
Land surface phenology	Review methods

Protocol Citation and Reference Data DOI

Request to WGCV vice-chair on CEOS publication strategy

- Protocols – standard citation
- Reference data sets – doi assignment
  Digital object identifier (DOI)
  Reference data set version identifiable and citable, new version with new doi
  Existing in situ data sets need quality control and preprocessing!

Purpose

-> Transparency of validation procedure

-> Unambigous identification and citation

-> Upcoming protocols within LPV with similar reference

-> Increase visibility of LPV/WGCV/CEOS output

Global Validation Supersites

- Need for recommendation of few supersites to CEOS now clear to focus area leads (thanks to F. Gascon!)
- Each focus group will come up with a few sites, synthesis at LPV level into recommendation towards CEOS
- Stage 4 validation requires data from existing, product-specific in situ networks, >> 100 sites in total (e.g. Albedo – selected BSRN and Fluxnet sites, soil moisture very different sites)
- LPV sees benefit of few supersites for evaluation of integrated measurement-3D radiative transfer modelling approaches, for testing sampling designs, testing product algorithms with well-characterized sites

Interaction with GCOS and GEO

- GCOS plans
  - Progress report - end 2015
  - Draft outline for new GCOS IP (implementation plan) – COP20 Dec 2015
  - Final GCOS IP – end 2016
- Way forward for LPV with GCOS (example fire)
  - Current GCOS fire product definition does not allow straight forward quantitative validation (issues with variable definition, metrics, etc.)
  - LPV fire co-leads will work on suggestion for updated definitions to be tested by climate community, to be ready with consensus for new IP
- GEO
  - Validation activities might be suggested by member states of GEO
  - Generally LPV is welcoming additional support for validation
  - Interest of LPV to guarantee that validation efforts follow state of the art methodology and common metrics, reporting
  - close coordination of GEO and CEOS activities needed at all levels.

Extension of LPV Focus Areas

Upcoming requests for extension of focus areas

- Biomass
- CEOS Carbon Task force document (several variables)

Agreement within LPV for establishment of new focus areas

- Product needs to be operational and ready for quantitative validation
- Strong support needed from scientific community for leading the focus area
- In case of biomass, LPV is observing developments of products, will re-evaluate establishment of focus area when products are ready for evaluation. In meantime, Martin Herold will observe development in framework of GOFC-GOLD and act as contact point within LPV for biomass validation.

LPV Outreach

- International meetings to communicate to users
  - General idea – alternating sessions at EGU and AGU
  - AGU 2012 - 2 oral, 1 poster session on validation
  - Watch out for validation session at AGU 2014!!

- LPV website http://lpvs.gsfc.nasa.gov/

  -> input collected, update end of March by Jaime, Miguel

Outlook

- Continue with protocol and publications on good validation practices
- Continue with coordination of international validation activities
- Increase LPV visibility
  Write-up planned paper on overview of validation status for products covered by LPV
- Methods
  Follow-up integration of measurements and modelling for validation

Thank you for listening!