

Land Product Validation (LPV)

Validation Stages



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Some History

- Morisette et al., 'Overview of MODIS LAND team' Poster, AGU 2002

MODIS Product validation definition and stages

Validation: Estimates of accuracy and product uncertainty have been obtained through comparisons with independent data. The extent of validation and attendant confidence in the products are described below. The results of the product validation are published or in the process of being published in the peer-reviewed literature. The validation data are available. Scientific use is recommended and encouraged commensurate with the stages of validation achieved.

- **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 in a systematic and statistically robust way representing global conditions.

- Baret et al., The Earth Observer, 2009
 - Addition of Stage 4 (systematic and regular update for new data versions and as time series expands).
 - Some rewording of Stage 2 (widely distributed set of locations -> globally representative locations) – currently under evaluation

Table 2. The revised four-stage CEOS Land Product Validation Hierarchy

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

Latest Version on LPV Website

	Validation Stage - Definition and Current State	Variable
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.	Fapar Snow Cover Phenology LST & Emissivity Fire Radiative Power
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 and consistency with similar products has been evaluated over globally representative locations and time periods. Results are published in the peer-reviewed literature.	Leaf Area Index Burned Area
3	Uncertainties in the product and its associated structure are well quantified from comparison with reference in situ or other suitable reference data. Uncertainties are characterized in a statistically rigorous way over multiple locations and time periods representing global conditions. Spatial and temporal consistency of the product and with similar products has been evaluated over globally representative locations and periods. Results are published in the peer-reviewed literature.	Land Cover Albedo Soil Moisture
4	Validation results for stage 3 are systematically updated when new product versions are released and as the time-series expands.	

Purpose of LPV Validation Stages

- Useful to assess validation level of a variable and push all products to that level (suite of products from different sensors)
- Working tool for LPV to identify main bottlenecks (methodological versus in situ data and documentation level)
-> flexibility to adapt validation stage table to needs
- Less sophisticated than Bates' maturity matrix –
 - LPV table only addresses the accuracy aspect of the Bates maturity model which covers more dimensions (scientific maturity, preservation maturity, and societal applications maturity)
 - No constraints on data record length as in Bates matrix (not climate focused, therefore shorter data records are acceptable)