WGCV-54

Land Product Validation Subgroup

Michael Cosh

Agenda Item 2.9

WGCV-54, USGS, Sioux Falls, SD USA

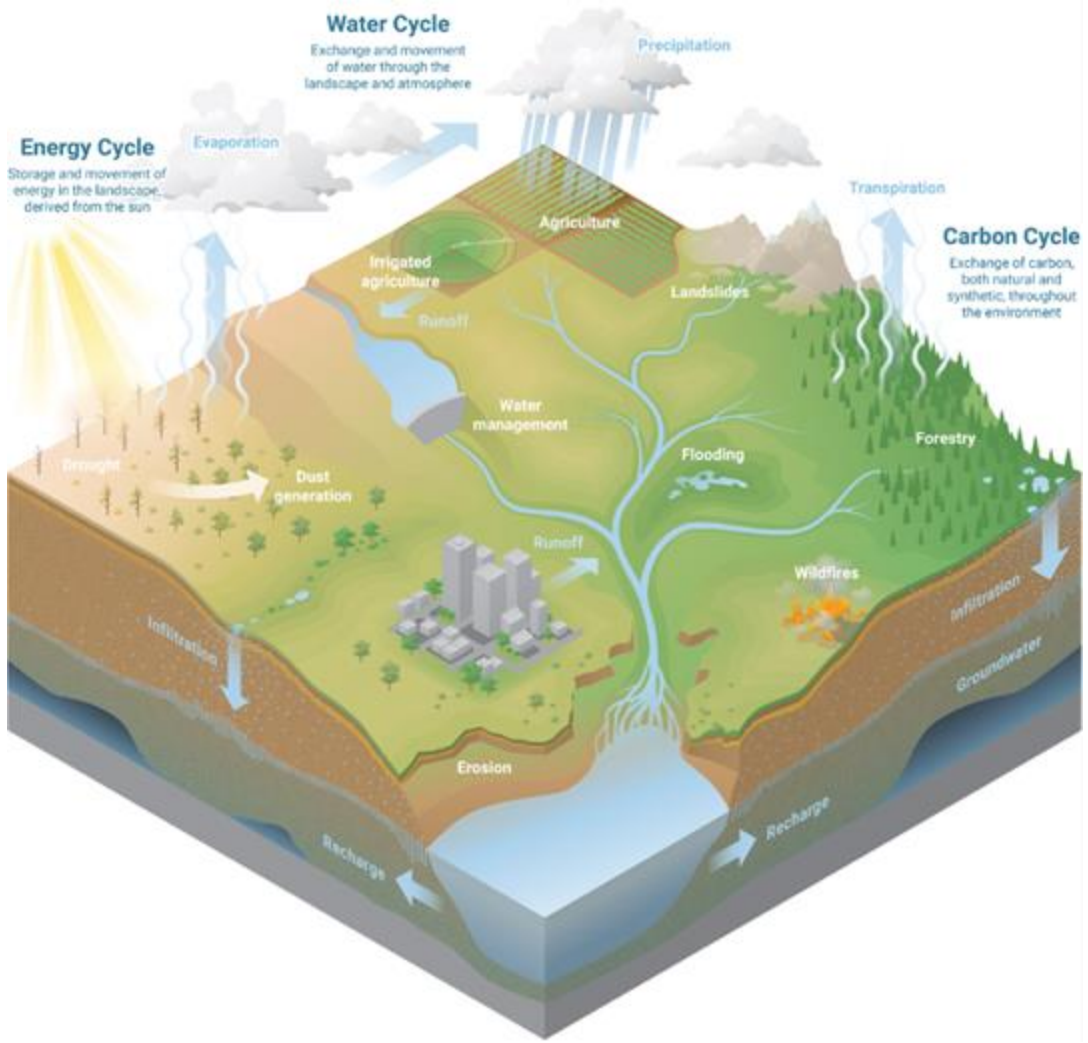
October 15-18, 2024

CEOS
Committee on
Earth Observation Satellites

Focus Areas

12

Focus Area
Biophysical
Fire/Burn Area
Phenology
Vegetation Index
Land Cover
Snow Cover
Surface Radiation
Soil Moisture
LST and Emissivity
Aboveground Biomass
Evapotranspiration
GPP/NPP



Focus Area Leads

	First Name	Last Name	Institution	Institution	End of Term
Admin	Michael	Cosh	USDA	USA	Apr 2025
	Fabrizio	Niro	ESA	Italy	Apr 2025 (promotion to Chair)
	Jaime	Nickeson	GSFC	USA	
Land Cover	Alexandra	Tyukavina	University of Maryland	USA	March 2027 (2nd term)
	Nandika	Tsendbazar	Wageningen University	Netherlands	April 2027(1st term)
	Sophie	Bontemps	Université Catholique de Louvain	Belgium	Ex-officio
Biophysical	Richard	Fernandes	Natural Resources Canada	Canada	Apr 2027 (last term)
	Hao	Tang	University of Maryland	USA	April 2027 (1st term)
	Luke	Brown	University of Salford	UK	Jan 2026 (1st term)
Fire/Burn Area	Louis	Giglio	University of Maryland	USA	Sep 2026 (2nd term)
	Bernardo	Mota	National Physical Lab	UK	Jan 2026 (1st term)
Surface Rad	Zhuosen	Wang	UMass Boston	USA	ex-officio
	Angela	Erb	UMass Boston	USA	Jan 2026 (1st term)
	Jorge	Sanchez-Zapero	EOLab	Spain	Jan 2026 (1st term)
Soil Moisture	John	Bolten	NASA GSFC	USA	Apr 2026 (2nd term)
	Alex	Gruber	TU Wien	Austria	Sept 2026 (1st term)
LST	Glynn	Hulley	NASA/JPL	USA	July 2024 (2nd term)
	Lluis	Perez Planells	Karlsruhe Institute of Technology	Germany	Sept 2026 (1st term)
Phenology	Joshua	Gray	North Carolina State University	USA	Jan 2025 (2nd term)
	Victor	Rodríguez-Galiano	University of Seville	Spain	Aug 2025 (2nd term)
Snow Cover	Carrie	Vuyovich	NASA GSFC	USA	Jan 2026 (1st term)
	Juha	Lemmetyinen	FMI	Finland	Sept 2026 (1st term)
Veg Index	Simon	Kraatz	USDA	USA	Apr 2027 1st term
	Tomoaki	Miura	University of Hawai'i	USA	Ex-officio
	Else	Swinnen	VITO	Belgium	Apr 2023 (2nd term)
Biomass	Laura	Duncanson	UMD/GSFC	USA	ex-officio
	Kim	Calders	Ghent University	Belgium	Feb 2026 (1st term)
	Neha	Hunka	UMD	USA	Feb 2026 (1st term)
ET	Yun	Yang	Mississippi State	USA	~Jan 2027 (1st term)
	Carmelo	Cammalleri	Politecnico di Milano	Italy	~Jan 2027 (1st term)
GPP/NPP	Arthur	Endsley	University of Montana	USA	Sept 2027 (1st term)
	Alvaro	Moreno Martinez	University of Valencia	Spain	Oct 2027 (1st term)

LPV Validation Stage Status

Validation Stages - Definition and Current State		Variable
0	No validation. Product accuracy has not been assessed. Product considered beta.	
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.	**Snow** **Fire Radiative Power**
2	Product accuracy is estimated over a significant (typically > 30) 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 its consistency with similar products, has been evaluated over globally representative locations and time periods. Results are published in the peer-reviewed literature.	**fAPAR** **Phenology** **LAI** **Biomass**
3	Uncertainties in the product and its associated structure are well quantified over a significant (typically > 30) set of locations and time periods representing global conditions by comparison with reference in situ or other suitable reference data. Validation procedures follow community-agreed-upon good practices. Spatial and temporal consistency of the product, and its consistency with similar products, has been evaluated over globally representative locations and time periods. Results are published in the peer-reviewed literature.	**Vegetation Indicies** **LST & Emissivity** **Active Fire** **Burned Area**
4	Validation results for stage 3 are systematically updated when new product versions are released or as the interannual time series expands. When appropriate for the product, uncertainties in the product are quantified using fiducial reference measurements over a global network of sites and time periods (if available).	**Land Cover** **Albedo** **Soil Moisture**

Focus Area Protocols Update

Focus Area	Protocol
Biophysical	LAI(2014)
Fire/Burn Area	Burned Area Targeting 2025 Active Fire next
Phenology	Targeting end of 2024
Vegetation Index	Targeting end of 2024
Land Cover	Revision of first public comment -> WGCV 55
Snow Cover	
Surface Radiation	Albedo(2019) Global Downward Radiation Product Validation Best
Soil Moisture	SM(2020)
LST and Emissivity	LST (2019)
Aboveground Biomass	AGWB(2021)
Evapotranspiration	
GPP/NPP	

Biophysical

- Definitions:
  - 3 Geomatics Canada Open Files (version controlled DOI labelled)
  - Revised LAI, FAPAR to conform with current GCOS definitions.
  - Added FCOVER corresponding to FAO definition.
  - Added definition of “Related Quantities” to each definition to increase clarity in community.

- Revised Product List
  - Deleted 20 (mainly different resolutions of same products)
  - Added new products: 6 LAI, 8 FAPAR, 8 FCOVER; including 7 <100m resolution continental products.

- CEOS Validation Stage Assessment
  - Assessed validation stage by continent.
  - Geomatics Canada Open File summarizing findings
    - A total of 22 LAI products, 17 fAPAR products and 8 fCOVER products were identified and evaluated in terms of continental scale CEOS validation stage.
    - Stage 3 validated products are currently available for Europe and North America at >=250m resolution and for regions of North America above 40degrees at 20m resolution. Stage 2 validated >250m resolution products are also available for Africa and Asia and it is likely these will soon achieve Stage 3. Stage 1 validate products are available for South America and Australia/Oceania.
  - Up to LPV to decide how to update product validation stage table – suggest it be uniform across variables.

- Outline of new good practice document for medium resolution products including fCOVER.

Biophysical

Good Practices Update

- Discussions on proposed new sections
  - Revise *Definitions*
    - inclusion of FAPAR, FCOVER
  - Revise *In Situ Reference Estimates*
    - include new sensor and tech development (e.g. terrestrial laser scanner)
  - Add new section on high resolution data products
    - high resolution vs. ESU
  - Add new section on 3D data products
    - lidar

Fire/Burn Area

Validation Protocol Status

- Update of 11-page 2010 draft burned area validation protocol ongoing
- Currently 34 pages
- Engaged additional section authors
- Discussion-ready draft for GOFC Fire Implementation Team meeting (17-18 Sep.) and 13th EARSeL Workshop on Forest Fires (19-20 Sep.) in Milan
- Active Fire protocol to follow

DRAFT

Committee on Earth Observation Satellites

Working Group on Calibration and Validation
Land Product Validation Subgroup

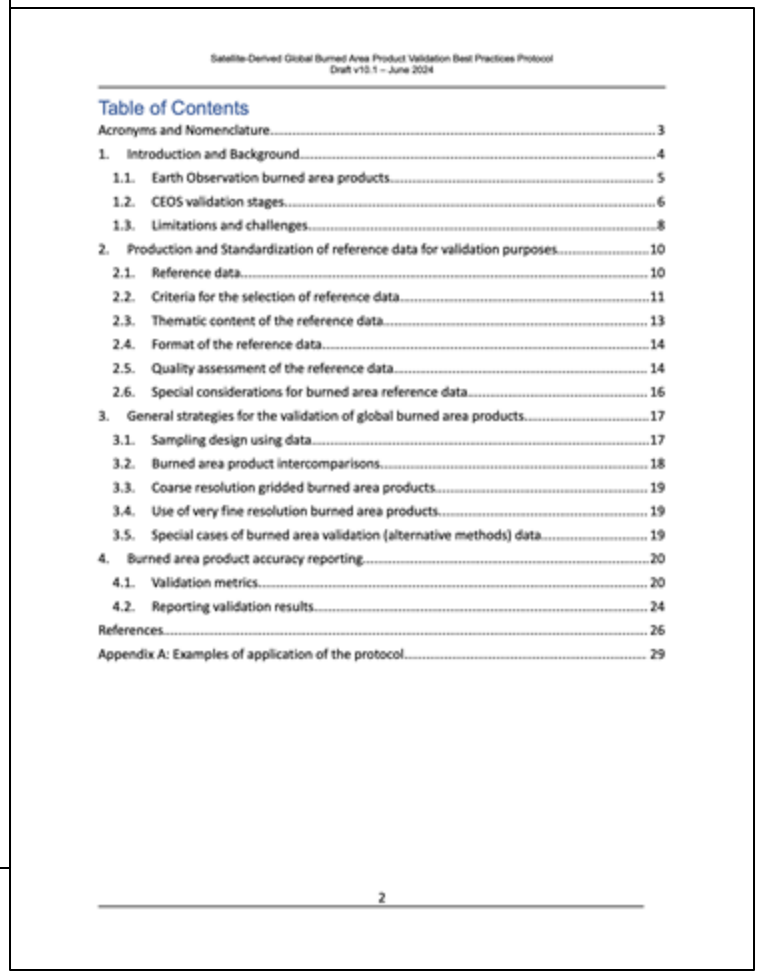
Satellite-Derived Global Burned Area Product Validation Best Practices Protocol

Version 10.0 – June 2024

Editors: *

Authors: B. Mota, L. Giglio, L. Boschetti, D. P. Roy, S. V. Stehman, J. V. Hall, M. Humber, K. Vadrevu, M. Padilla, M. Zubkova.

Citation: *, 2024, Satellite-Derived Global Burned Area Product Validation Best Practices Protocol



Satellite-Derived Global Burned Area Product Validation Best Practices Protocol
Draft v10.1 – June 2024

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Phenology

- Copernicus Land Monitoring Service (CLMS) has signed a new contract for the continuation and evolution of the High-Resolution Vegetation Phenology and Productivity (HR-VPP) product suite:
  - Consortium comprises VITO, in partnership with Lund University, Joanneum Research, and Space4Environment.
  - Calibration report to be published in autumn 2025

- Review paper: Gong et al. Satellite remote sensing of vegetation phenology: Progress, challenges, and opportunities. ISPRS J. Photo. Rem. Sens.

- Special Issue in the journal “Forest”: Vegetation and Remote Sensing Phenology in Deciduous Forests.
  - Deadline for manuscript submissions: 31 October 2025

Vegetation Indices

Protocol Development

- Formed a small group of VI experts to review the outline (November 2022)
  - Carolien Toté (VITO, Belgium)
  - Kamel Didan (University of Arizona, USA)
  - Molly Brown (University of Maryland, USA)
  - Kazuhito Ichii (Chiba University, Japan)
- Held a kick-off meeting with the expert group (December 15, 2022)
- Held a 2nd meeting to the group's review comments/suggestions (Jan 2023)
- Revised the outline and shared the revised outline with them (March 2023)
- Completed the first complete draft (December 3, 2023)
- Had the group review one more time (December 2023 - January 2024)
- Reviewed and updated the VI listserv list (May 2024)
- Plan to send the draft protocol document for the community feedback (August 2024)

Land Cover

Guideline document update:

Version 0.1 is ready, sent out for community review on August 30th, 2024

Next steps:

Revisions due on October 1st, 2024

Expected completion of Version 1.0:
Winter 2024 – 2025

Editors and chapter leads will address reviewers' comments

One round of revisions is planned
(no re-review)

Authors: Tyukavina, A.[1], Bontemps, S.[2], Foody, G.[3], Stephen V. Stehman[4], See, L.[5], Olofsson, P.[6], Tsendbazar, N.[7], Radoux, J.[2], Komarova, A.[1], Serre, B.[8], Song, X-P.[1], d'Andrimont, R.[9], Koren, G.[10], Potapov, P.[1], Bullock, E.[11], Campbell., P.[12,13], de Bruin, S.[7], Defourny, P.[2], Friedl., M.A.[14], Fritz., S.[5], Hansen, M.[1], Herold, M.[7,15], Lamarche, C.[2], Lesiv, M.[5], Mané, L.[16], Meroni, M.[9], Nickeson, J.[12], Pelletier, F.[8], Pickens, A.[1], Reiche, J.[7], Shchepashchenko, D.[5], Tarrio, K.[14], Verhegghen, A.[9], Woodcock, C.[14], Xiao, X.[17]

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[4]College of Environmental Science and Forestry, State University of New York, Syracuse, NY, USA
[5] International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria
[6] NASA Marshall Space Flight Center, Huntsville, AL, USA
[7] Laboratory of Geo-Information Science and Remote Sensing, Wageningen University & Research, Wageningen, the Netherlands
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[13] Goddard Earth Sciences Technology and Research (GESTAR) II, University of Maryland Baltimore County, Baltimore, MD, USA
[14] Department of Earth and Environment, Boston University, Boston, MA, USA
[15] Helmholtz GFZ German Research Centre for Geoscience, Remote Sensing and Geoinformatics Section, Telegrafenberg, Potsdam, Germany
[16] Observatoire Satellital des Forêts d'Afrique Centrale (OSFAC), Kinshasa, Democratic Republic of the Congo
[17] Department of Microbiology and Plant Biology, Center for Earth Observation and Modeling, University of Oklahoma, Norman, OK, USA

Committee on Earth Observation Satellites
Working Group on Calibration and Validation
Land Product Validation Subgroup
Land Cover Focus Area

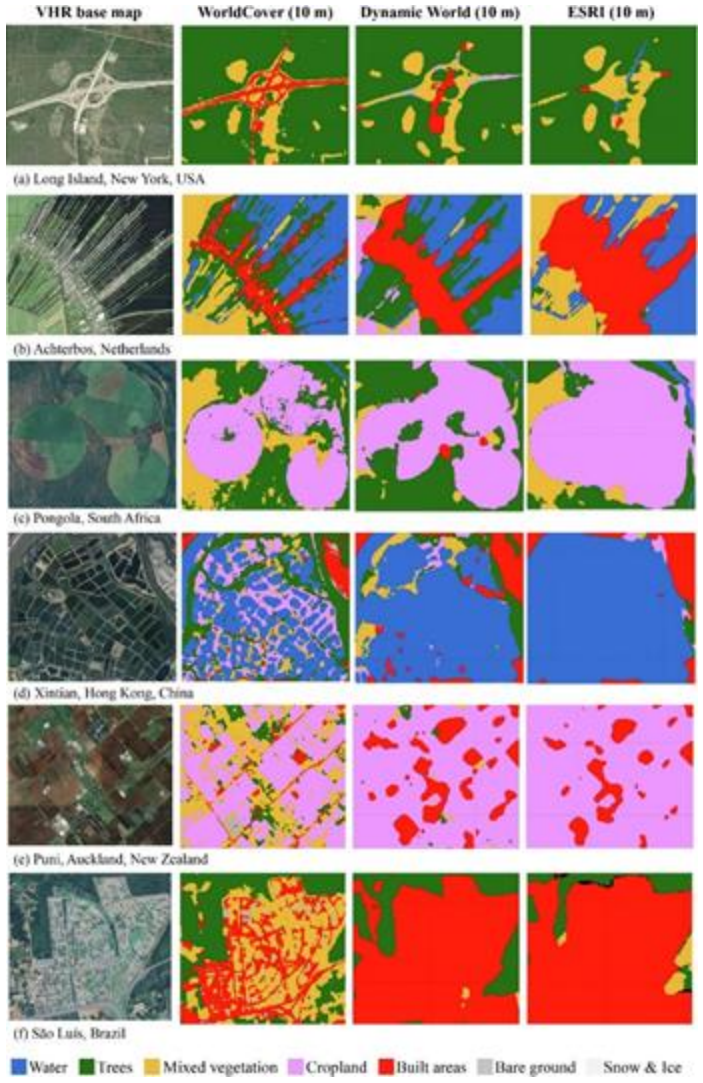
Land Cover and Change Map Accuracy Assessment and Area Estimation Good Practices Protocol

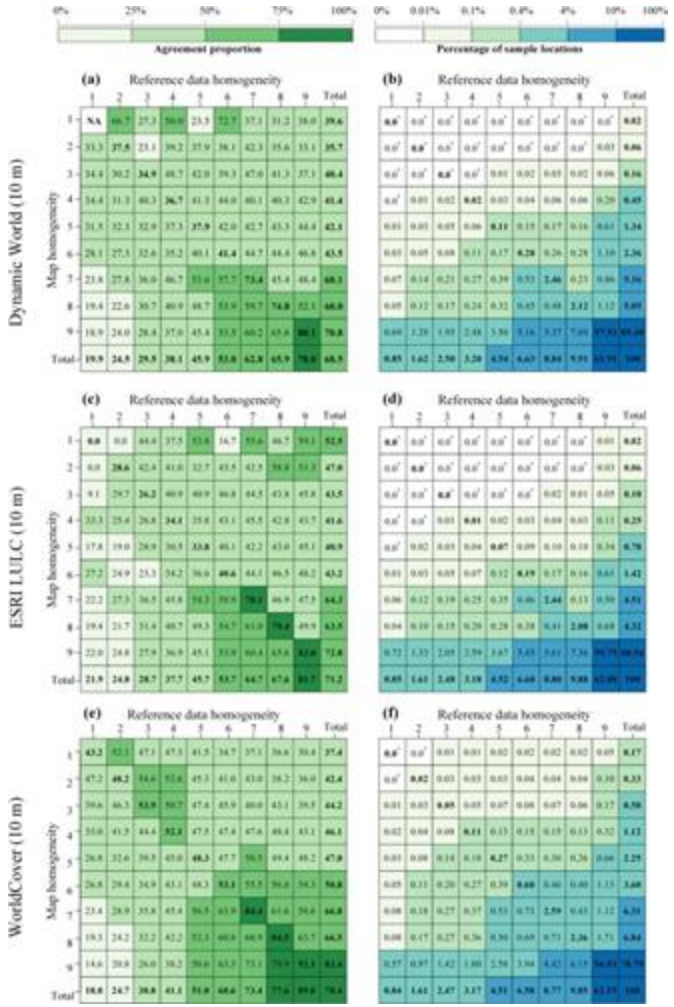
Version 0.1 - 2024

Editors: Alexandra Tyukavina, Sophie Bontemps, Giles Foody, Stephen V. Stehman, Anna Komarova, Jaime Nickeson

Chapter leads: Alexandra Tyukavina (Chapters 1 - 5), Sophie Bontemps (Chapters 1, 2, Appendix), Pontus Olofsson (Chapters 3, 5), Giles Foody and Julien Radoux (Chapter 4), Linda See and Bryant Serre (Chapter 6), Xiao-Peng Song (Chapter 7)

Land Cover





Remote Sensing of Environment
Volume 311, 1 September 2024, 114316

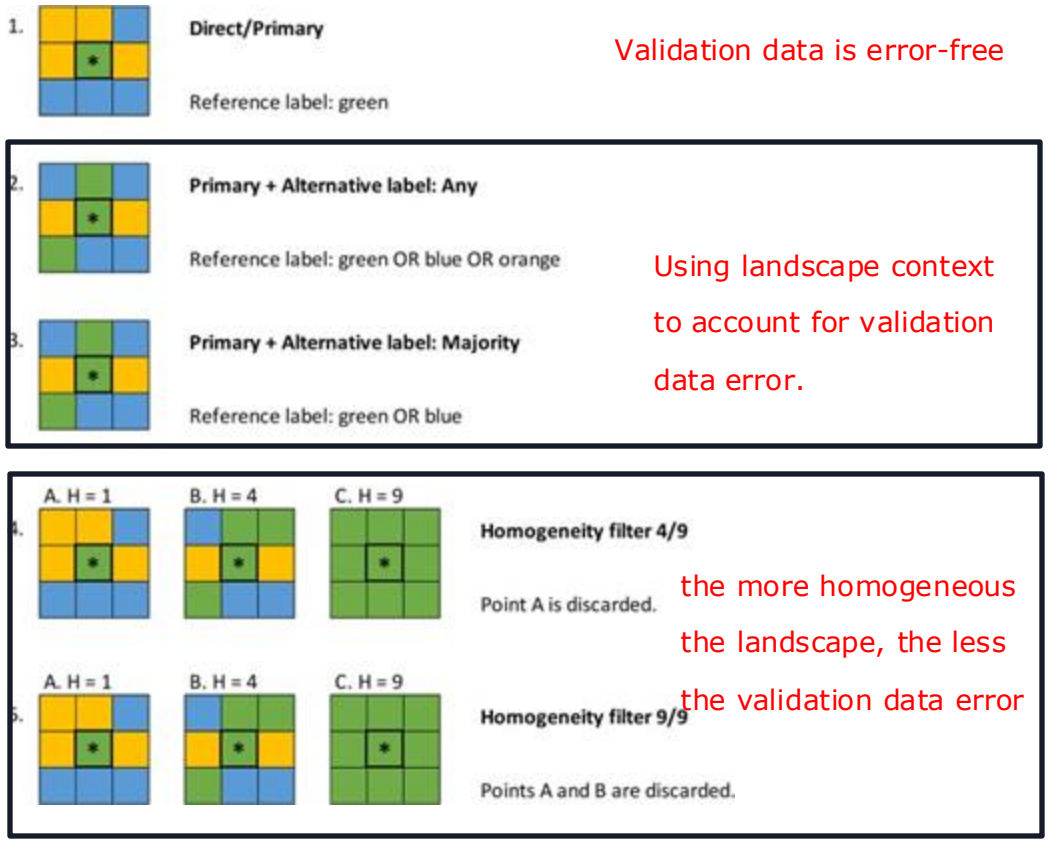
Comparative validation of recent 10m-resolution global land cover maps

Panpan Xu, Nandin-Erdene Tsendbazar, Martin Herold, Sytze de Bruin, Myke Koopmans, Tanya Birch, Sarah Carter, Steffen Fritz, Myroslava Lesiv, Elise Mazur, Amy Pickens, Peter Potapov, Fred Stolle, Alexandra Tyukavina, Ruben Van De Kerchove, Daniele Zanaga

https://doi.org/10.1016/j.rse.2024.114316

- Comparative validation of recent high-resolution global land cover maps
- Accuracy comparison – global, continental, and for 47 countries
- Assessing spatial details
- Integrating reference data uncertainty to map validation

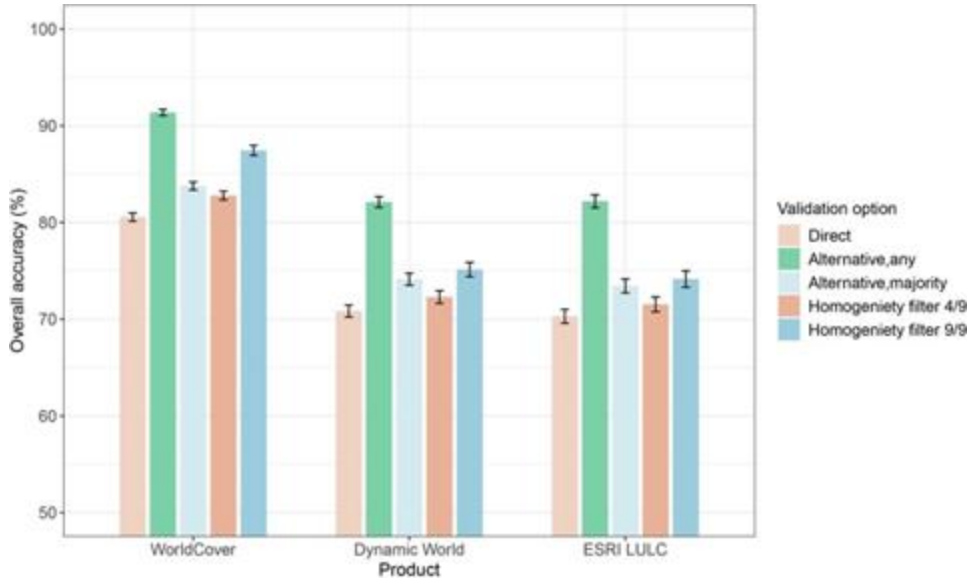
Land Cover



Validation data is error-free

Using landscape context to account for validation data error.

the more homogeneous the landscape, the less the validation data error



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- Accuracy comparison – global, continental and for 47 countries
- Assessing spatial details
- Integrating reference data uncertainty to map validation

NASA Snow Community Meeting

August 14-15, 2024, Boulder, CO

Objective: To cohesively summarize existing and ongoing snowpack monitoring efforts and identify remaining knowledge gaps and next steps for the snow community, specifically through recognition of the completion of NASA SnowEx multi-year field experiment and recent Earth System Explorers satellite mission proposals

1. Toward consensus across snow community
   - Community building
   - Snow mission requirements
   - Science questions
   - Applications
   - Next steps
2. Summarize the current state of snow sensing, modeling, and technologies
3. Outline white paper concepts for the next decadal survey

- Approximately 200 in-person and virtual attendees
- Summary report in prep now

Snow Cover

Global Climate Observing System program (GCOS)

- Current Essential Climate Variable (ECV) guidance for snow is being reviewed over the next ~6 months
- These requirements mainly focused on data requirements that are not currently met by any satellite mission
- The GCOS snow group has reached out to the snow community for input in the development of the requirements.

  Update on process:
  - Meeting July 5 to discuss review:
    - Plan to focus on the three existing snow ECV products (variables/quantities) – **Area Covered by Snow**, **Snow Depth**, **Snow Water Equivalent**.
    - As this is a GCOS initiative, it will concentrate on the GCOS requirements which are intended for **climate** monitoring
  - Preliminary requirements drafted
  - Next meeting to discuss will be scheduled for late Sept/early Oct

- We will work with this group to develop a validation protocol once the requirements are in place
- In the meantime the CEOS LPV Snow will point to the protocols developed by the SnowPEx satellite snow product intercomparison and evaluation exercise which focuses on existing SCE and SWE products

Surface Radiation

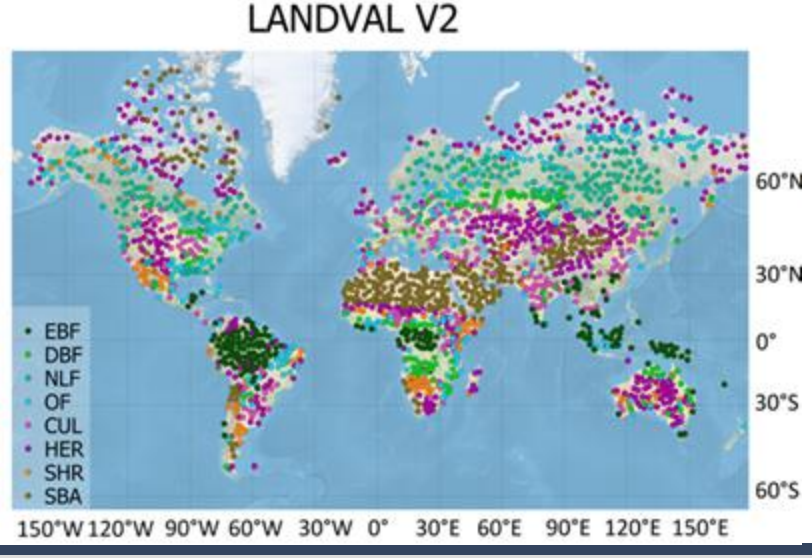
- **SALVAL:**
  - 2024 annual update has started (inclusion updated values for ground data and satellite products).
  - New sampling LANDVAL-V2 for product intercomparison will be tested in the tool: from 720 to 2000 samples.

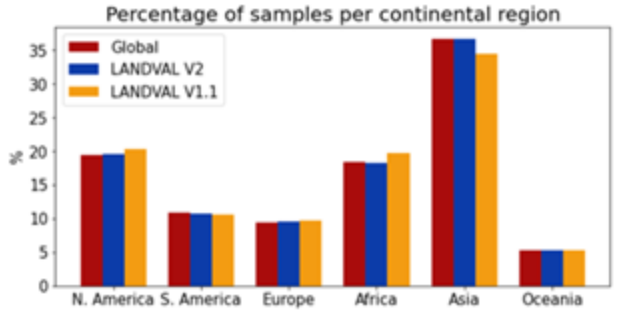
LAND VALidation (LANDVAL) V2: Representative global sampling

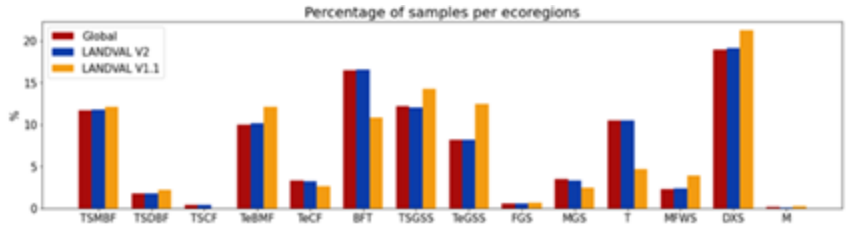
Martínez-Sánchez, Enrique[1]; Sánchez-Zapero, Jorge[1]; Camacho, Fernando[1]

DOI 10.5281/zenodo.10559900

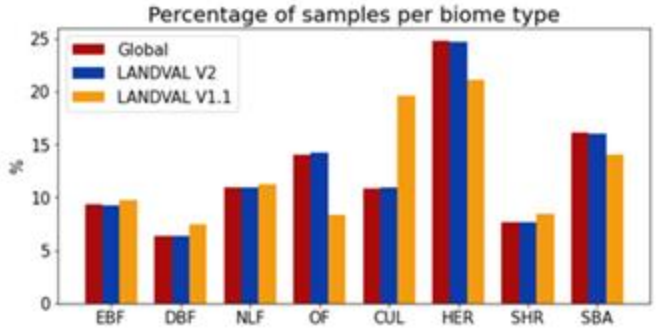
https://zenodo.org/records/10559901







- TSMBF – Tropical & Subtropical Moist Broadleaf Forest
- TSDBF – Tropical & Subtropical Dry Broadleaf Forest
- TSCF – Tropical & Subtropical Coniferous Forest
- TeBMF – Temperate Broadleaf & Mixed Forest
- TeCF – Temperate Conifer Forest
- BFT – Boreal Forest/ Taiga
- TSGSS – Tropical & Subtropical Grasslands, Savannas & Shrublans
- TeGSS – Temperate Grasslands, Savannas & Shrublands
- FGS – Flooded Grasslands & Savannas
- MGS – Montane Grasslands % Shrublands
- T – Tundra
- MFWS – Mediterranen Forest, Woodlands & Scrub
- DXS – Desert & Xeric Shrublands
- M - Mangroves



EBF – Evergreen Broadleaf Forest
DBF – Deciduous Broadleaf Forest
NLF – Needle-leaf Forest
OF – Other Forest
CUL – Cultivated
HER – Herbaceous
SHR – Shrublands
SBA – Sparse and Bare Areas

Surface Radiation

LP DAAC to Release Gap Filled MODIS Version 6.1 Albedo, BRDF, and NBAR Data Product

- Expected in Fall 2024
- The LP DAAC will announce the availability of the Terra+Aqua Combined MODIS Version 6.1 Bidirectional Reflectance Distribution Function and Albedo (BRDF/Albedo) Gap-Filled Snow-Free Daily L3 Global 30ArcSec Climate Modelling Grid (CMG) data product (MCD43GF).
- The data product includes Albedo, Bidirectional Reflectance Distribution Function (BRDF), and Nadir BRDF-Adjusted Reflectance (NBAR) data. Currently, the collection only contains data from **2013 through 2021**. The remaining historic data will be added at a later date.
- The older MCD43GF Version 6 data product will remain available until the complete MCD43GF Version 6.1 data record is available.

Soil Moisture

Relevant projects:

- Fiducial Reference Measurements for Soil Moisture (FRM4SM)
  - Direct negotiations w. ESA for a Phase 2 (2025-2026)
  - Dedicated budget to update the CEOS LPV validation good practice protocol
  - Exchange w. Copernicus Evaluation and Quality Control (EQC) framework to integrate QA4SM activities

- ESA Climate Change Initiative (CCI)
  - New satellite-only root zone soil moisture products provided in the next release
  - Proposal for new CCI AWU in preparation, important open questions regarding the validation of high-res soil moisture
  - Proposal for new CCI ET in discussion, joint forces w. ESA CCI soil moisture team
  - Potential of expanding QA4SM to validate other variables

- EURAMET Green Deal Call 2024
  - Proposal in development: “Metrology for ground-based reference measurements for satellite soil moisture validation”
  - ~3 M€ project, led by the German National Metrology Institute (Miroslav Zboril)
  - Focus: Development of soil moisture “super sites”, transferring SI-traceability from the lab into the field, aiming to get long-term funding for the operation via meteorological institutes, WMO, etc

Soil Moisture

Upcoming workshops:

- BIPM-WMO Metrology for Climate Action Workshop 2024
  - 16-18 September @ BIPM headquarters, Sevres, France.
  - Free online attendance possible: https://bipm-cenv2024.org/

- EGU General Assembly 2025
  - 27 April-2 May, Vienna, Austria
  - Several Cal/Val sessions proposed (incl. Soil Moisture)

- ESA Living Planet Symposium 2025
  - 23-27 June, Vienna, Austria
  - Several Cal/Val sessions proposed (incl. Soil Moisture)

LST and E

Upcoming Conferences

- 7th International Symposium on Recent Advances in Quantitative Remote Sensing (RAQRS'VII), Valencia, Sep 23-27
- EUMETSAT Meteorological Satellite Conference 2024. Würzburg, Germany, 30 Sep – 4 Oct.
- ECOSTRESS Science and Applications Team meeting, Pasadena, CA, 30 Sep – 2 Oct.
- EARSeL Thermal Remote Sensing Workshop. 2-4 December 2024, Leicester, UK.
- LST CCI 2024 User Workshop. 5-6 December 2024, Leicester, UK.

Project news

- TIRCALNet preparation study, coordination meeting in June 2024.
- Validation of ECOSTRESS Collection 2 LSTE products is underway.
- Analyses of thermal camera in situ measurement intercomparison campaign available.
- International science workshop on High resolution Thermal remote sensing expected in India during November 2024

LST and E

TIRCalNet Preparation Study

- Goal: Prepare the roadmap for the TIRCalNet operations.
- Cooperation between TIRCalNet Preparation Study team (Uni. Leicester, KIT, RAL Space), CNES and JPL.
- Study at La Crau site:
  - Characterization of site uncertainties: Emissivity measurements + drone flights.
  - Characterization of instruments uncertainties.
  - Characterization of atmospheric propagation approach: common methodology.

Above Ground Biomass

Committee on Earth Observation Satellites
Working Group on Calibration and Validation

Land Product Validation Subgroup

Global Aboveground Biomass Product Validation

Best Practice Protocol

Editors: Kim Calders, Neha Hunka, Laura Duncanson, David Minor, Mat Disney, John Armston, Jaime Nickeson

Protocol Update Status

- V2.0 is currently being drafted
- Some authors have provided revisions to chapters.

Above Ground Biomass

Two papers that use NASA GEDI and ESA CCI forest biomass estimates are currently in review

National Forest Biomass Assessments Enhanced with Earth Observation to Aid Climate Policy Needs

- Hunka, Neha and May, Paul and Babcock, Chad and Armando Alanís de la Rosa, José and de los Ángeles Soriano-Luna, Maria and Mayorga Saucedo, Rafael and Armston, John and Santoro, Maurizio and Requena Suarez, Daniela and Herold, Martin and Málaga, Natalia and Healey, Sean P. and Kennedy, Robert and Hudak, Andrew and Duncanson, Laura. Available at SSRN: https://ssrn.com/abstract=4910141

Intergovernmental Panel on Climate Change (IPCC) Tier 1 forest biomass estimates from Earth Observation

- Neha Hunka, Laura Duncanson, John Armston, et al. *Authorea.* March 04, 2024. **DOI: 10.22541/au.170958900.06861359/v1**

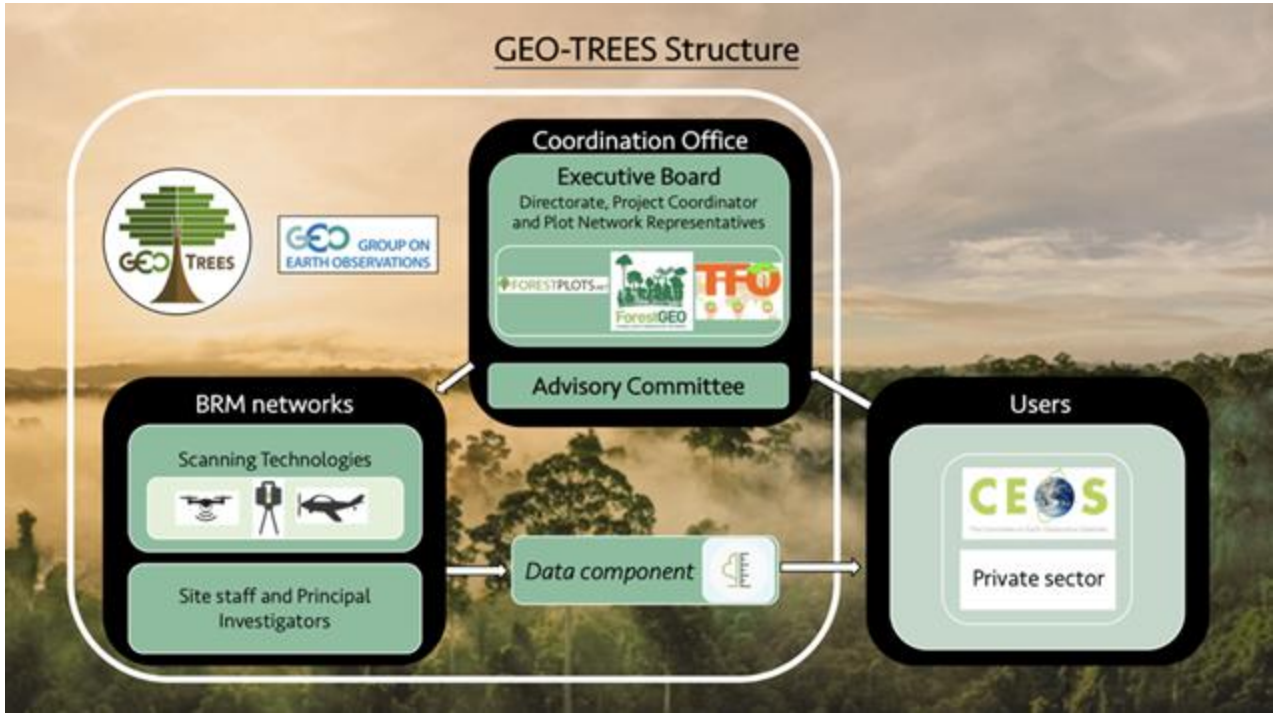
- Results to be submitted to the IPCC Emission Factors Database in October 2024

CARB-21-03

- Forest Biomass Reference Network (GEO-TREES) (CARB-21-03)

  In Progress…The project office is up and running via funding from the French government. https://geo-trees.org and is actively soliciting funding, with various opportunities in the pipeline.

  Nothing concrete as yet in terms of actual funding for data collection, but likely in the near future.



Evapotranspiration

Workshops:

- AGU Chapman conference:
  - The Energy Balance Closure Problem: Causes, Corrections, and Implications (Sep 14-19, 2025 Boulder)
- International Science Workshop on High-Resolution Thermal Earth Observation (Nov. 19-21, 2024 India, abstract and registration due 9/30)
- ECOSTRESS Science Team meeting (Sep 30-Oct 2, 2024 Pasadena, LA)

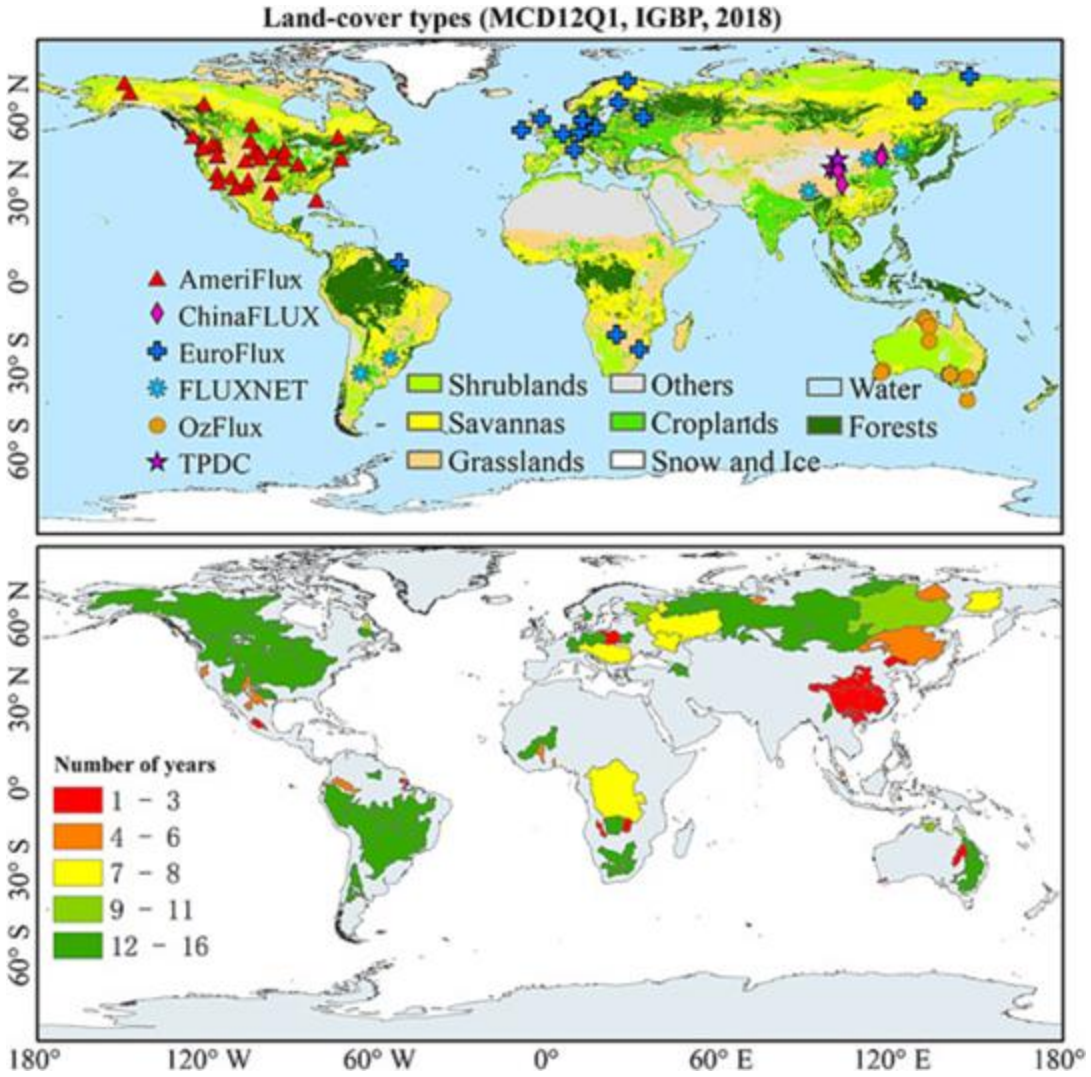
Publications (large regional or continental product):

- Evapotranspiration and surface energy fluxes across Europe, Africa and Eastern South America throughout the operational life of the Meteosat second generation satellite (https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/gdj3.235)
- A brief history of the thermal IR-based Two-Source Energy Balance (TSEB) model – diagnosing evapotranspiration from plant to global scales (https://www.sciencedirect.com/science/article/pii/S0168192324000662)
- Spatial-temporal patterns of land surface evapotranspiration from global products (https://www.sciencedirect.com/science/article/pii/S0034425724000774#f0060)

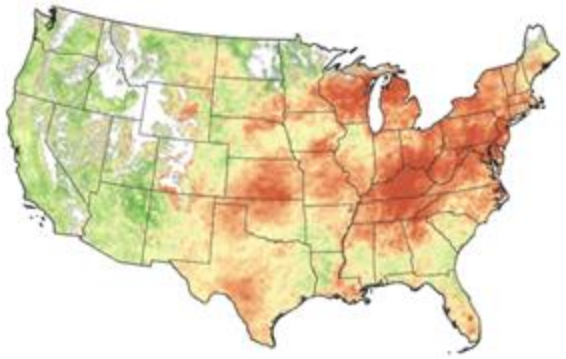
Evapotranspiration

Tang et al., 2024 RSE
https://www.sciencedirect.com/science/article/pii/S0034425724000774#f0010

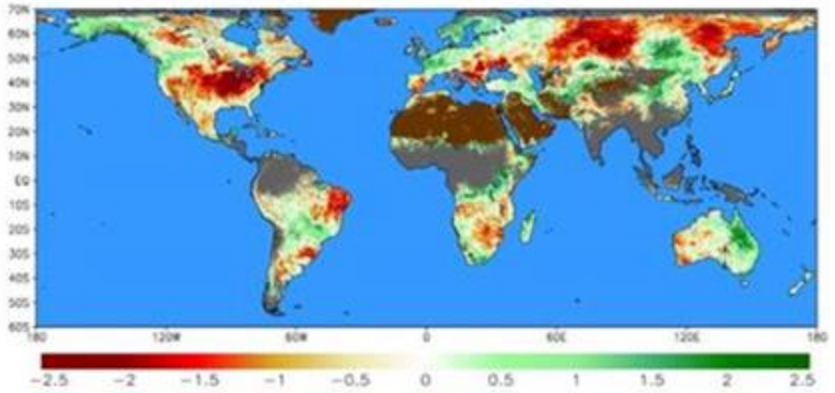
Category	Name	Time Coverage	Spatial Resolution
Remote Sensing-based	EB-ET	2000-2007	5km/day
	SSEBop	2003-now	1km/month
	3T	2001-2020	0.25°/day
	GLEAM	1980-2022	0.25°/day
	PT-JPLsm	2002-2017	36km/month
	ET-Monitor	2001-2019	1km/month
	MOD16A2	2001-now	500m/8-day
	NTSG	1983-2018	0.25°/month
	BESS	2001-2015	1km/8-day
	PML-V2	2000-2020	500m/8-day
	PEW	1982-2018	0.1°/month
Reanalysis-based	CFSR	1979-2010	0.3°/sub-daily
	CFSV2	2011-now	0.2°/sub-daily
	ERA5-Land	1950-now	0.1°/sub-daily
	GLDAS V2.1	2000-2023	0.25°/sub-daily
	JRA-55	1958-now	0.56°/sub-daily
	MERRA-2	1980-now	0.5,0.625°/sub-daily
	NCEP-R2	1979-now	1.9°/sub-daily
Hybrid-based	DOLCE	1980-2018	0.25°/month
	GLASS	1982-2018	1km/8-day
	REA	1980-2017	0.25°/day
Machine Learning-based	SGAN	1982-2019	1km/month
	DLBH	2003-2019	0.25°/daily
	FLUXCOM	2001-2015	0.083°/month
Water balance-based	WB-MTE	2001-2013	0.5°/month
	TerraClimate	1958-2015	4km/month



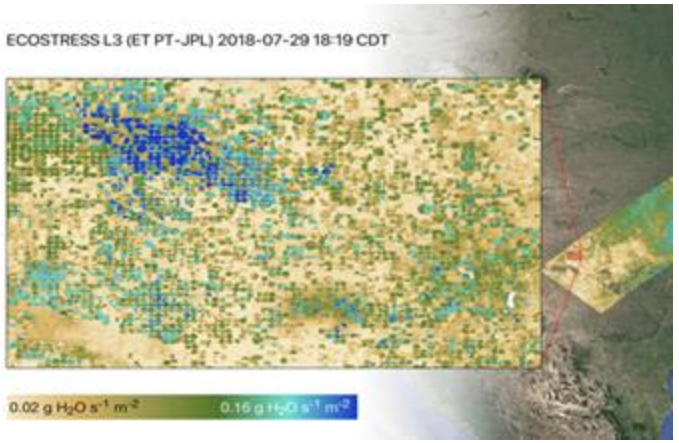
Evapotranspiration



Evaporative Stress Index



SERVIR Global ESI



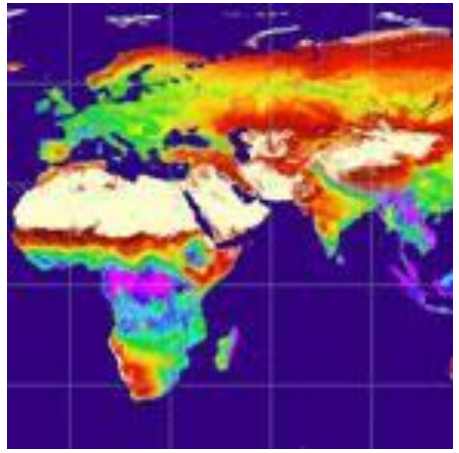
ECOSTRESS

GPP/NPP

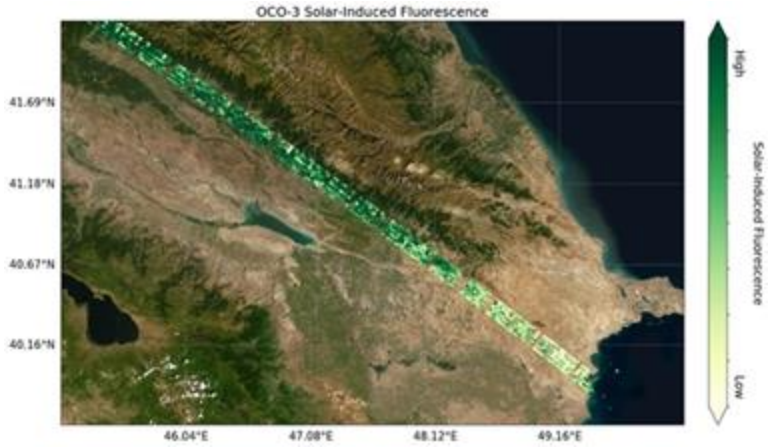
- WGCV to consider potential for GPP/NPP land product Focus Area within LPV

  MODIS GPP/NPP uses FPAR, Land Cover, modelled products (LST), etc.

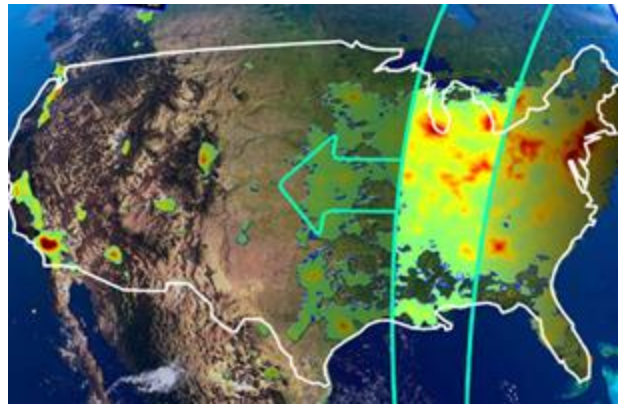
  New missions as well with GPP/NPP implications



MODIS GPP/NPP



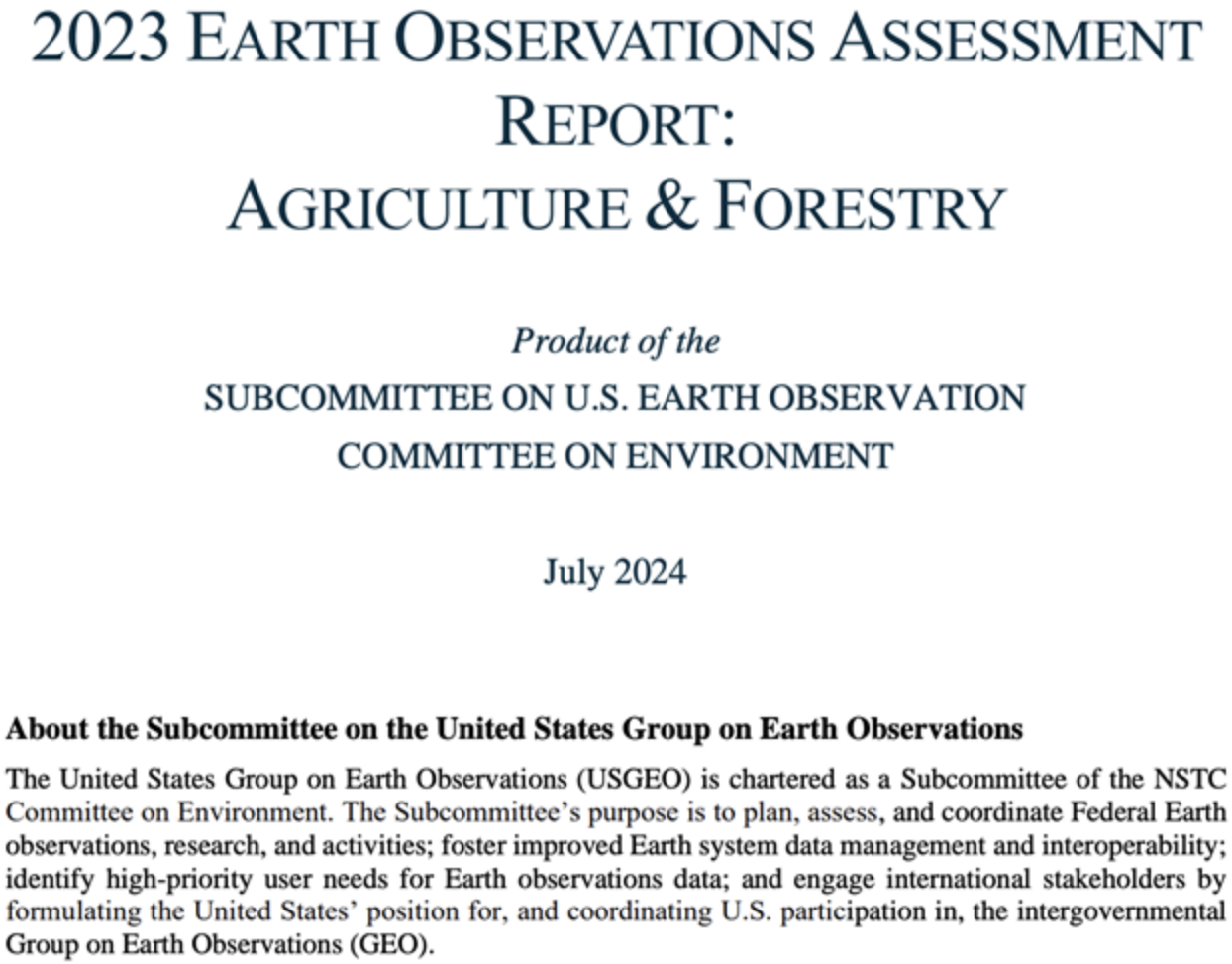
OCO2 and OCO3



TEMPO

GPP/NPP - Gross Primary Production/Net Primary Production

Earth Observation Assessment



2023 EARTH OBSERVATIONS ASSESSMENT REPORT: AGRICULTURE & FORESTRY

Product of the

SUBCOMMITTEE ON U.S. EARTH OBSERVATION

COMMITTEE ON ENVIRONMENT

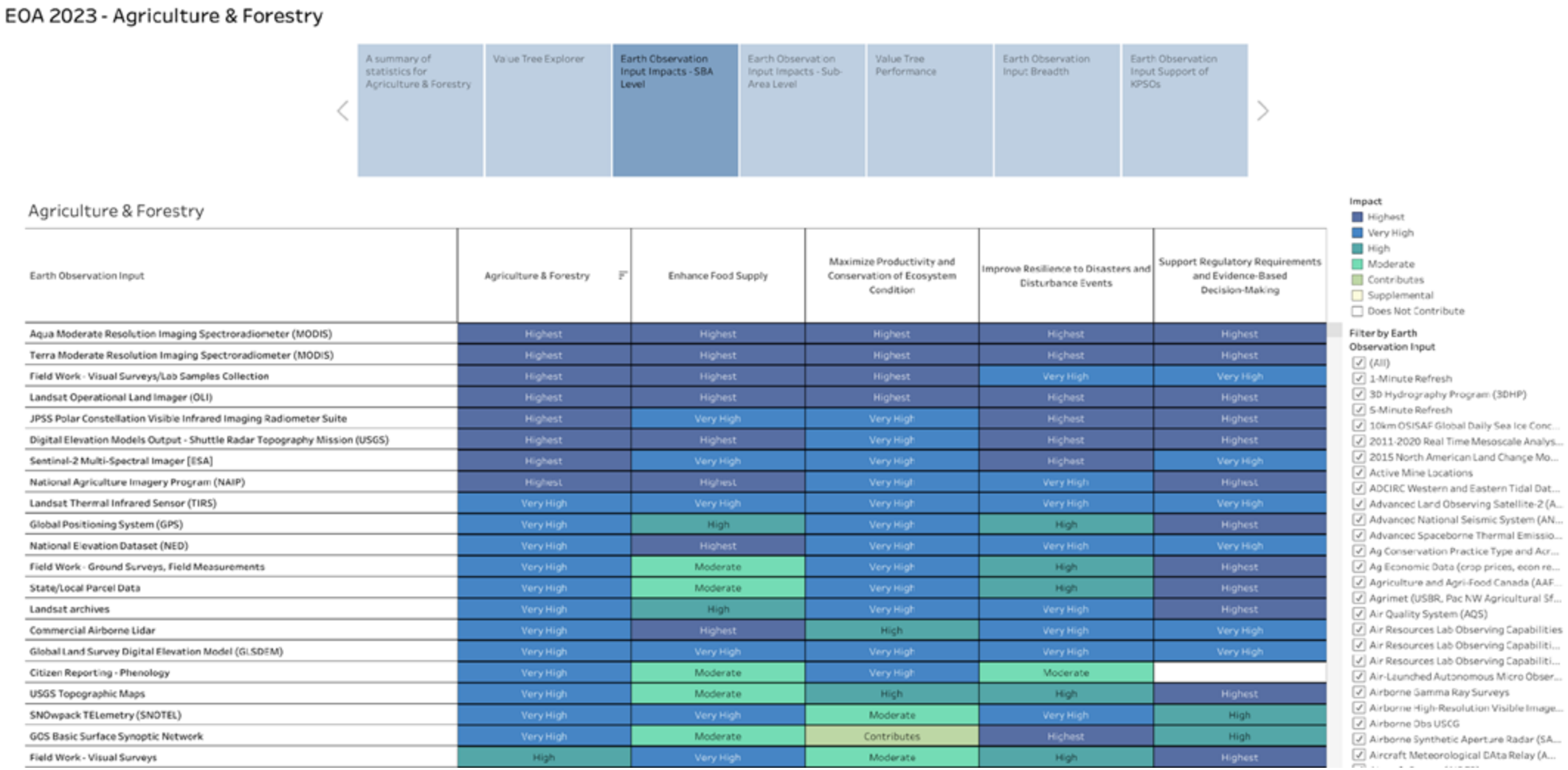
July 2024

About the Subcommittee on the United States Group on Earth Observations

The United States Group on Earth Observations (USGEO) is chartered as a Subcommittee of the NSTC Committee on Environment. The Subcommittee's purpose is to plan, assess, and coordinate Federal Earth observations, research, and activities; foster improved Earth system data management and interoperability; identify high-priority user needs for Earth observations data; and engage international stakeholders by formulating the United States' position for, and coordinating U.S. participation in, the intergovernmental Group on Earth Observations (GEO).

2023:	Agriculture and Forestry Climate
2024:	…
2025:	…
2026:	…
2027:	…
2028:	Agriculture and Forestry Climate
2029:	…

Earth Observation Assessment



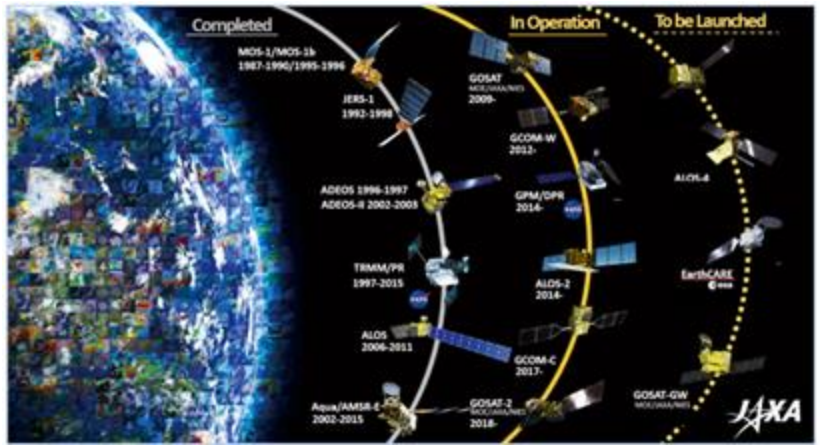
https://usgeo.gov/eoa/

LPV Contributing Satellites Review

There is a need for a review on satellites which contribute to LPV development, not just in primary, but in ancillary datasets, both public and commercial

Challenges:

- Moving Target: Aqua, Terra
- Decommissioning cycles, GEDI, ECOSTRESS
- Commercial transparency
- Interdependencies of products on multiple satellites
- Constellations



Discussions