Land Product Validation (LPV) Sub-group Meeting

Michael Cosh – (USDA) –Chair
Fabrizio Niro – (ESA/ESRIN) – Vice Chair

Subgroup meeting
03 Oct 2023

NEXT LPV TELECON Dec 5, 2023

Attendance

Participants

Michael Cosh
Fabrizio Niro
Jaime Nickeson
Lluis Perez-Planells
Joshua Gray
John Bolten
Tomoaki Miura
Joshua Gray
Louis Giglio
Bernardo Mota
Angela Erb
Luke Brown
Victor Rodríguez-Galiano
Jorge Sanchez-Zapero
Sasha Tyukavina
Sophie Bontemps
Neha Hunka
Carrie Vuyovich
Sylvain Leblanc
Alex Gruber

Unavailable

Marie Weiss
Laura Duncanson
Else Swinnen
Kim Calders
Juha Lemmetytinen
Glynn Hulley

2023 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 (becomes Chair)
	Jaime	Nickeson	GSFC	USA	
Land Cover	Alexandra	Tyukavina	University of Maryland	USA	March 2024 (1st term)
	Sophie	Bontemps	Université Catholique de Louvain	Belgium	**Oct 2023 (2nd term)**
Biophysical	Marie	Weiss	INRA	France	**Sep 2023 (2nd term)**
	Sylvain	Leblanc	Natural Resources Canada	Canada	**Sep 2023 (2nd term)**
	Luke	Brown	University of Salford	UK	Jan 2026 (1st term)
Fire/Burn Area	Louis	Giglio	University of Maryland	USA	Sep 2023 (1st term)
	Bernardo	Mota	National Physical Lab	UK	Jan 2026 (1st term)
Surface Rad	Zhuosen	Wang	GSFC	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 2023 (1st term)
	Alex	Gruber	TU Wein	Austria	**Oct 2023** (1nd 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	Finnish Meteorologial Inst.	Finland	Sep 2023 (1st term)
Veg Index	Tomoaki	Miura	University of Hawai'i	USA	Dec 2022 (2nd term)
	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)

New Focus Areas

At the summer Plenary meeting at ESRIN, a vote was taken on a decision to add two new focus areas, to include Evapotranspiration (ECOSTRESS, GOES, LSTM, SBG, +) and Global Primary Productivity (SIF, Landsat, NISAR, +) in LPV. All were in favor of this action, and nominees to lead these new focus areas were discussed.

Two leads for Evapotranspiration have been identified and we plan to formalize this action in the coming months by onboarding the leads, identifying the community of practice for the listserv, and to begin outlining the activities toward development of validation good practice protocols for these products.

Evapotranspiration Candidates

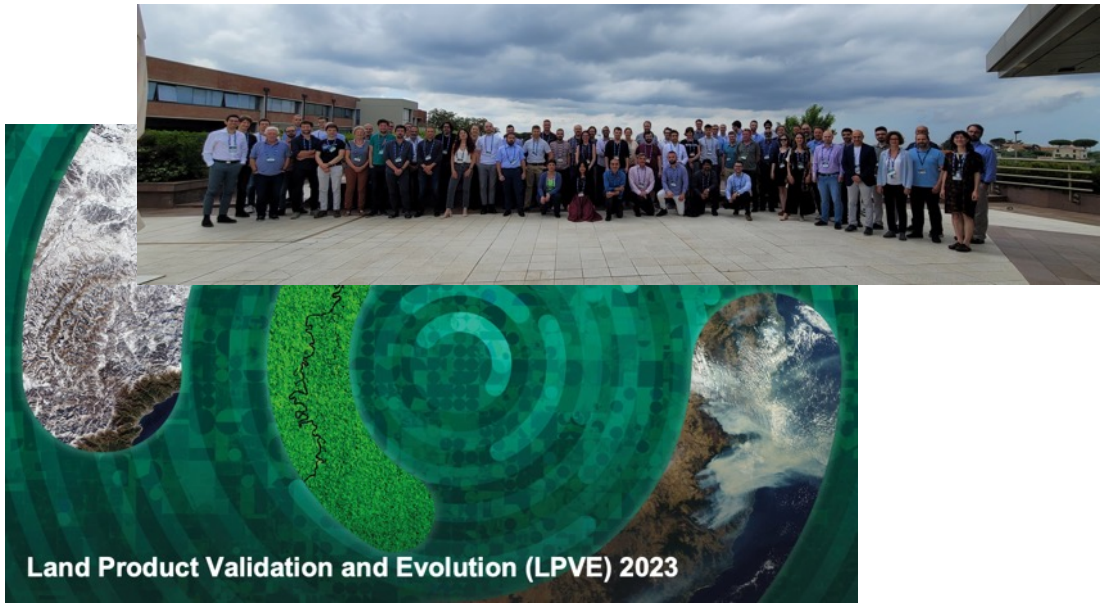
- Yun Yang, Mississippi State University (U.S.)
- Carmelo Cammalleri, Politecnico di Milano (Europe)

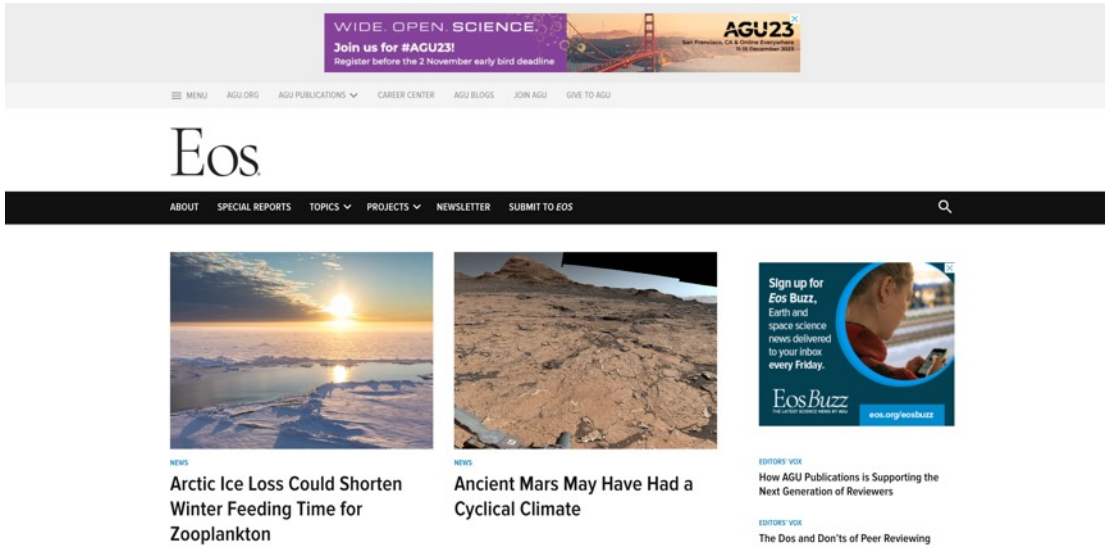
GPP/NPP Candidates - TBD

- suggest inviting Maosheng Zhao (GSFC – VIIRS GPP/NPP product lead) as the N. American lead
- EU???

EOS paper: outcomes of LPVE23 WS

- A paper was prepared by F. Niro, M. Cosh and J. Nickeson to summarize the main takeaways from LPVE23 WS
- The paper was submitted to **EOS science magazine** published by AGU
- The paper was **accepted** for publication, the provisional title is (final editing on-going): ***Trustworthy Satellite Earth Observations for Science and Society***
- The aim of the paper is to raise **awareness** about the critical role of validation in both science and societal applications and to highlight remaining challenges and data gaps, as well as stressing the need for sustainability





Validation Stages

	Validation Stage - 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** **Biomass**
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**
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** **Soil Moisture** **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**

Status of other products??

What is the status of Biomass validation?

WCGV and LPV Meetings

Upcoming WGCV Plenary

- *WGCV meeting, October 3rd, 2023…*
- *WGCV-53, March 5-8, 2024 CONAE, Cordoba, Argentina*
- *WGCV-54, Late 24/Early 25 USGS, Sioux Falls, South Dakota*

LPV Town Hall, American Geophysical Union Fall Meeting, San Francisco, California

Past LPV Plenary Meetings

- May 2016, ESA LPS, Prague, Czech Republic
- March 2018, ESA LPVE, Frascati, Italy
- April 2019, ESA LPS, Milan Italy
- May 2021, Virtual
- Sep 2022 Virtual
- June 2023, ESA Frascati
- 2024??

Protocols Status – Updates or Still on Track?

Focus Area	Protocol
Biophysical	LAI (2014) Updated LAI/FAPAR?
Fire/Burn Area	Burned Area - Targeting 2023 Active Fire – after BA
Phenology	Targeting 2023
Vegetation Index	Targeting 2023 (60%)
Land Cover	Targeting 2023 (60%)
Snow Cover	
Surface Radiation	Albedo (2019) Downward Radiation (80%)
Soil Moisture	SM (2020)
LST and Emissivity	LST (2019)
Aboveground Biomass	AGWB (2021) Update (?)

As of May 2023…

Summary - Annual Downloads					
Year	AGB	SM	Albedo	LST	LAI*
2016					53
2017				17	58
2018				104	142
2019			126	79	95
2020		102	122	106	134
2021	445	126	90	81	129
2022	188	55	48	52	93
2023	102	35	24	33	45
Totals	**735**	**318**	**410**	**472**	**749**

*missing download stats from Aug2014 - Jun2016

FA Web Status

Table looking rather stale!!

The **Home** and **Collaboration** page updates / reviews are **VERY EASY** so please can we update the dates for those boxes.

Was everyone able to view the LPV GD folder link that I sent??

Focus Area	Home Page	Product table	Collaboration Page	References	Listserv	Letters to Community
Land Cover	May 2021	Sept 2022	May 2021	Sep 2021	Sep 2022	Oct 2022
Biophysical LAI/Fpar	Nov 2021	Nov 2021	Nov 2021	Aug 2022	Oct 2019	Sept 2019
Surface Rad/Albedo	Mar 2021	Jan 2023	Mar 2021	Oct 2022	May 2020	May 2020
LST/Emissivity	Mar 2021	Nov 2021	Mar 2021	Feb 2023	April 2019	
Fire/Burn Area	May 2021	Aug 2022	Mar 2020	Aug 2022	Mar 2020	
Soil Moisture	Mar 2021	Feb 2019	Mar 2021	Sep 2022	Dec 2020	Dec 2020
Phenology	Apr 2021	July 2020	Apr 2021	Oct 2022		
Snow Cover	Oct 2021	Jan 2021	Oct 2021	Oct 2021	Oct 2019	
Vegetation Index	May 2021	Nov 2021	May 2021	May 2021	May 2019	
Biomass	Apr 2021	Oct 2021	Apr 2021	Apr 2021	Sep 2020	Sept 2020

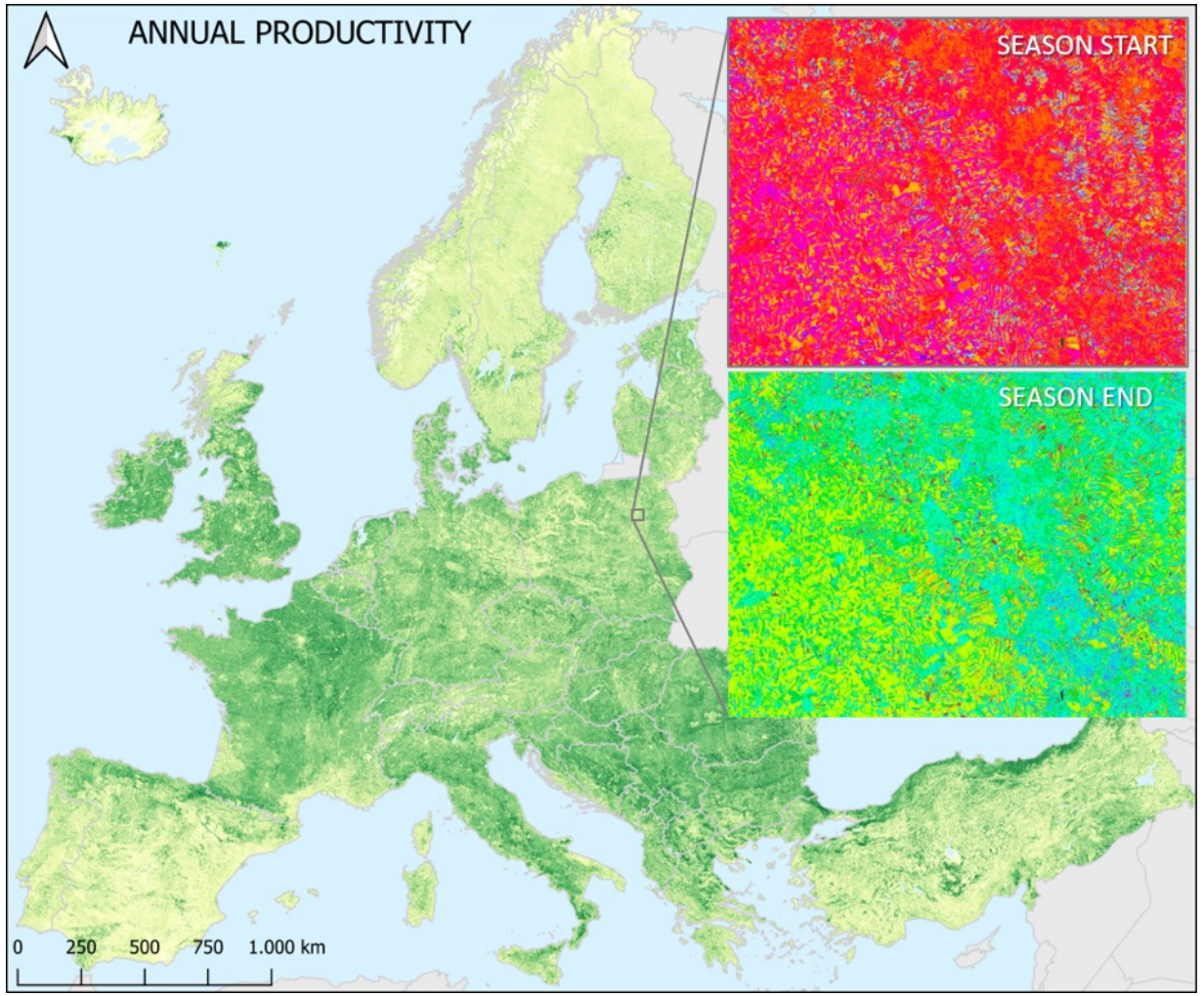
Focus Area Reports

- Land Surface Phenology
- Snow
- Biomass
- Soil Moisture
- Vegetation Indices
- Land Cover
- Biophysical (LAI/FAPAR)
- Fire/Disturbance
- LST&E
- Surface Radiation

Land Surface Phenology

- Victor et al have finished validating the new HR-VPP product from CLMS for southern Europe (10 m LSP and veg productivity). Manuscript in prep
- Josh tracking down S. American flux-site data for GPP-based validation, particularly for new geostationary LSP products from X. Zhang's group at SDSU
- Both: continuing to solicit chapter leads for protocol, some progress on a lead for UAV chapter

HR-VPP Copernicus Land Monitoring Service



Snow (1/3)

Recent Publications

Remote Sensing of Environment 274 (2022) 112988

Contents lists available at ScienceDirect

Remote Sensing of Environment

journal homepage: www.elsevier.com/locate/rse

Benchmarking algorithm changes to the Snow CCI+ snow water equivalent product

C. Mortimer [a,*], L. Mudryk [a], C. Derksen [a], M. Brady [a], K. Luojus [b], P. Venäläinen [b], M. Moisander [b], J. Lemmetyinen [b], M. Takala [b], C. Tanis [b], J. Pulliainen [b]

[a] Climate Research Division, Environment Climate Change Canada, Toronto, Canada
[b] Finnish Meteorological Institute, Helsinki, Finland

ARTICLE INFO

Editor: Menghua Wang

ABSTRACT

The European Space Agency (ESA) Snow Climate Change Initiative (CCI+) provides long-term, global time series of daily snow cover fraction and snow water equivalent (SWE). The Snow CCI+ SWE Version 1 (CCIv1) product is built on the GlobSnow algorithm, which combines passive microwave (PMW) data with in situ snow depth (SD) measurements to estimate SWE. While CCIv1 remains algorithmically similar to the most recent GlobSnow product (GlobSnow Version 3), Snow CCI+ SWE Version 2 (CCIv2) incorporates two notable differences. CCIv2 uses updated PMW data from the NASA MEaSUREs Calibrated Passive Microwave Daily EASE-Grid 2.0 Earth Science Data Record and is generated in EASE-Grid 2.0 with 12.5 km grid spacing. It also adjusts SWE retrievals in post-processing by incorporating spatially and temporally varying snow density information. Due to the phased product development framework CCI+ employs, proposed changes between CCIv1 and CCIv2 were implemented in a series of step-wise developmental datasets. Using these developmental datasets, we analyze how changes to input PMW and SD data and the snow density parameterization affect the resulting SWE product. Using in situ snow courses as reference data, we demonstrate that the correlation and RMSE of the CCIv2 developmental product improved 10% (0.10) and 12% (5 mm), respectively, relative to CCIv1. The timing of peak snow mass is shifted two weeks later and a temporal discontinuity in the monthly northern hemisphere snow mass time series associated with the shift from the Special Sensor Microwave/Imager (SSM/I) to the Special Sensor Microwave Imager/Sounder (SSMIS) in 2009 is also removed.

1. Introduction

Multi-product snow water equivalent (SWE) ensembles provide more accurate information compared to individual component datasets (Mortimer et al., 2020). Ideally, these ensembles should be composed of fully independent datasets derived from unique data sources, models, and algorithms to maximize sampling across a range of uncorrelated product errors. In reality, the majority of available SWE products are derived from snow models of variable complexity driven by modern-era reanalyses (e.g. Brun et al., 2013; Reichle et al., 2017; Slivinski et al., 2019), with the assimilation of point snow depth (SD) measurements in some cases (Kobayashi et al., 2015; Hersbach et al., 2020). These reanalysis-driven datasets tend to be highly correlated with each other (Mudryk et al., 2015), which is not ideal for characterizing uncertainty. The reliance on products which include reanalysis in building a multi-product SWE ensemble is only partially mitigated through the use of remote sensing.

Previous analysis shows that products derived solely from passive microwave (PMW) remotely sensed data, without the inclusion of conventional surface snow depth observations, do not meet user accuracy requirements with respect to retrieval skill and are poorly correlated in space and time with all other SWE products (Mortimer et al., 2020). Only the GlobSnow product, which combines satellite passive microwave data with in situ snow depth measurements, made a meaningful contribution to multi-product SWE ensembles in the analysis of Mortimer et al. (2020). The GlobSnow algorithm (originally described in Takala et al., 2011) was recently adapted to generate the first version of the European Space Agency (ESA) Snow Climate Change Initiative (CCI+) SWE product. GlobSnow Version 3 (GSv3; described in detail in Luojus et al., 2021) incorporated enhancements to the HUT microwave emission model used in the retrieval (Lemmetyinen et al., 2011; Cohen et al., 2015). Snow CCI+ SWE Version 1 (CCIv1) remains algorithmically

Remote Sensing of Environment 295 (2023) 113648

Contents lists available at ScienceDirect

Remote Sensing of Environment

journal homepage: www.elsevier.com/locate/rse

Evaluating MODIS snow products using an extensive wildlife camera network

Catherine Breen [a,*], Carrie Vuyovich [b], John Odden [c], Dorothy Hall [d], Laura Prugh [a]

[a] Department of Environmental and Forest Sciences, University of Washington, Seattle, WA, USA
[b] Hydrological Sciences Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD, USA
[c] Norwegian Institute for Nature Research, Post Office Box 5685 Torgarden, Trondheim, Norway
[d] Earth System Science Interdisciplinary Center, University of Maryland College Park, College Park, MD, USA.

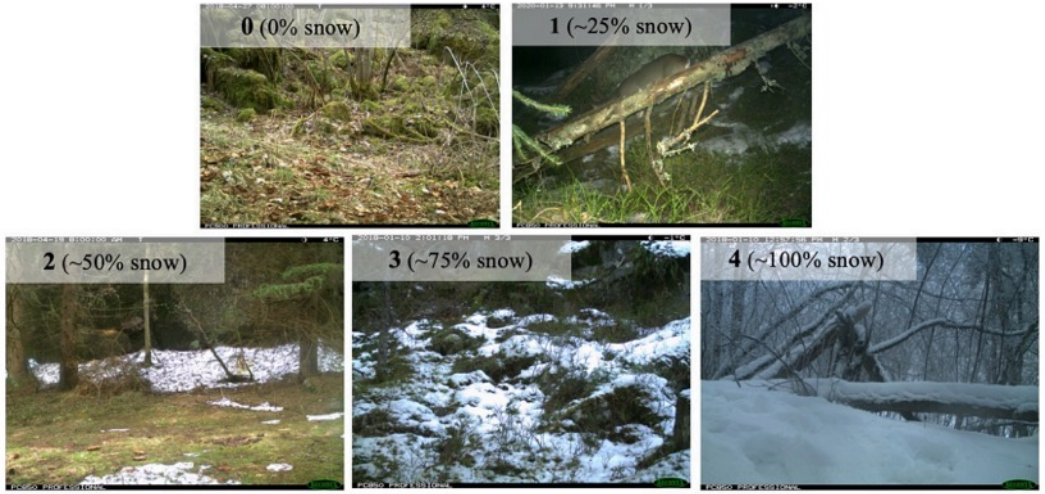


Fig. 2. Example remote camera images for snow classification. Snow cover was classified using an ordinal scale from 0 to 4, where 0 = 0% snow cover, 1 = ~25%, 2 = ~50%, 3 = ~75%, and 4 = ~100%.

Snow (2/3)

Field Measurement Schools

SNOW MEASUREMENT FIELD SCHOOL 2024

JANUARY 8 - 11, 2024

APPLICATION DEADLINE 10.18.2023

Location: AMC Highland Center at Crawford Notch in Bretton Woods, New Hampshire

https://www.cuahsi.org/workshops/snow-measurement-field-school-2024

EGU SNOW SCIENCE WINTER SCHOOL 2024

FEBRUARY 25 – MARCH 2, 2024

APPLICATIONS OPEN OCTOBER 2023

Location: FMI Arctic Research Centre, Sodankylä, Finland

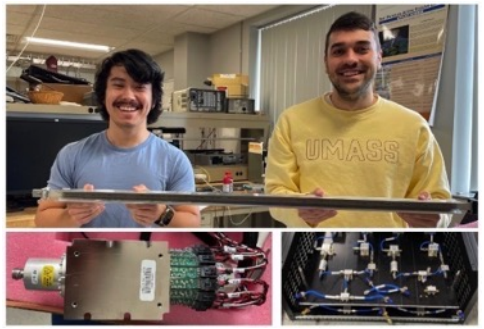
Snow (3/3)

Snow Radar Activities

- Radar remote sensing represents the best path forward for high resolution global snow water equivalent (SWE)
- Multiple airborne and ground-based radar instruments are now in place, through NASA, ESA, and Canadian programs, to test and advance SWE and snow depth retrieval algorithms
- Ongoing discussions about future activities including similar coordinated flights
- International collaboration has helped advance snow remote sensing, through activities such as NASA SnowEx, snow field measurement schools, and coordinated modeling experiments

Cryosphere Synthetic Aperture Radar (CryoSAR)

	Band	Freq (GHz)	Pol
Active	L	1.30	VV, HH, HV, VH
Active	Ku-Lo	13.50	VV, HH, HV, VH



Snow Water-equivalent Wide Swath Interferometer and Scatterometer (SNOWWI)

	Band	Freq (GHz)	Pol
Active	C	5.35	VV,VH
Active	Ku-Lo	13.60	VV,VH
Active	Ku-Hi	17.25	VV,VH

Snow Water Equivalent Synthetic Aperture Radar & Radiometer (SWESARR)

	Band	Freq (GHz)	Pol
Active	X	9.65	VV,VH
Passive	X	10.65	H
Active	Ku-Lo	13.60	VV,VH
Active	Ku-Hi	17.25	VV,VH
Passive	K	18.70	H
Passive	Ka	36.50	H

Ku-band Radar for Snow

	Band	Freq (GHz)	Pol
Active	C	5-6	VV, HH, HV, VH
Active	Ku	14-15	VV, HH, HV, VH

Aboveground Biomass

Planned update of the v1.0 of the Biomass cal/val protocol

(https://lpvs.gsfc.nasa.gov/PDF/CEOS_WGCV_LPV_Biomass_Protocol_2021_V1.0.pdf)

Version 2.0 will include:

- An update of chapters where the field has significantly moved on since v1.0
- An addition of a new chapter focused on “Measurements of aboveground biomass change”

- *Multiple map fusion/integration - TBD*

Soil Moisture (1/3)

2023 National Soil Moisture Workshop

The 2023 National Soil Moisture Workshop, held August 14 -17 at the National Agricultural Library in Beltsville, MD and was co-hosted by the U.S. Department of Agriculture (USDA) and the National Integrated Drought Information System (NIDIS).

https://www.drought.gov/events/2023-national-soil-moisture-workshop-2023-08-14

Soil Moisture (2/3)

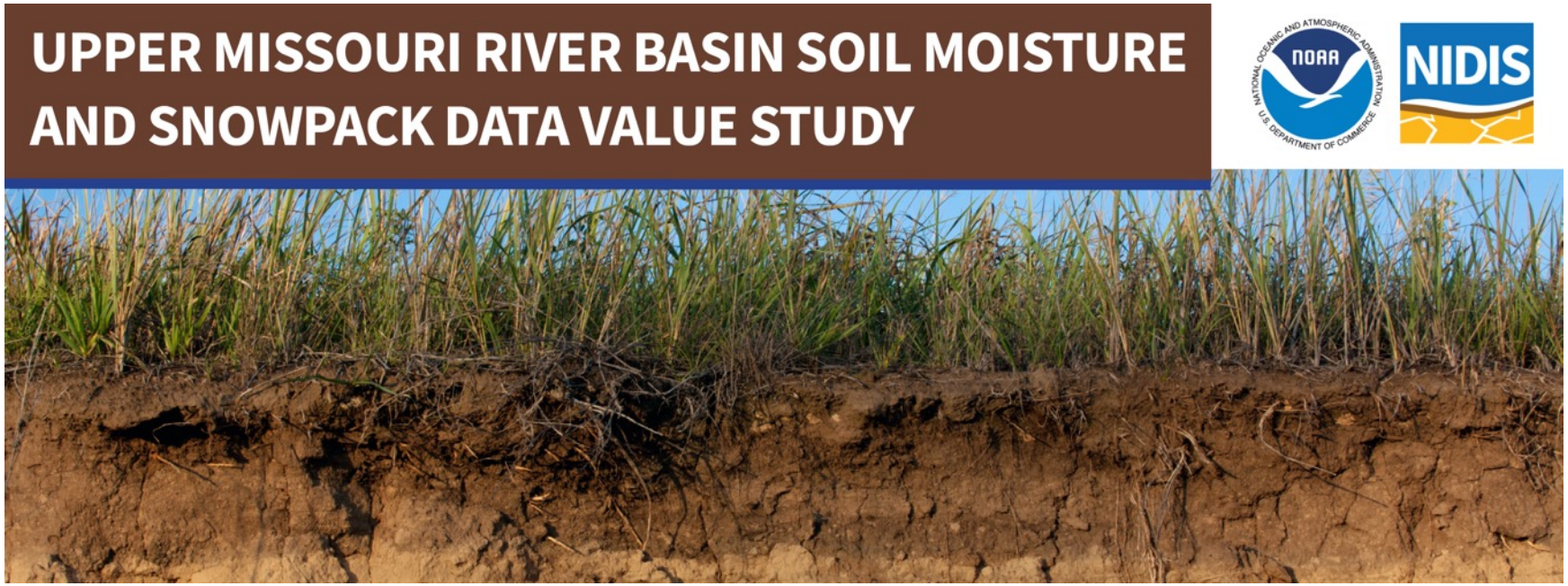
Future Events

- Science of 10-km L-band Radiometry Workshop – NASA JPL – Oct 7-9, 2023 Pasadena California

- 7th Satellite Soil Moisture Validation and Application Workshop, June 2024? USA
  - Details and location are still TBD. Possibly East Lansing at MSU, first week of June, 2024.

- NIDIS Soil Moisture/ Snow Data Value Study (next slide)

Soil Moisture (3/3)



Under Congressional direction, NOAA's National Integrated Drought Information System (NIDIS) is leading an interagency team on the ***UMRB Soil Moisture and Snowpack Data Value Study***. This high-profile study will provide a systematic examination of how the soil moisture and snowpack data generated by an expanded monitoring network in five Upper Missouri River Basin (UMRB) states will support improved monitoring of drought and flood conditions in the Basin, as well as other climate and weather applications.

While the specific focus of the study is the UMRB, study findings are expected to broadly inform our understanding of how soil moisture and snowpack data can improve hydrological and climatological applications. As such, it is a keystone project for NIDIS and the NIDIS-sponsored National Coordinated Soil Moisture Monitoring Network.

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)
  - ~~Michele Meroni (JRC, Italy)~~
  - Kazuhito Ichii (Chiba University, Japan)
- Held a kick-off meeting with the expert group (December 15, 2022)
  - Group members charged to review the outline and provide feedback
- Held a 2nd meeting to review comments/suggestions from the expert group (January 31, 2023)
  - Co-leads charged to revise the outline and incorporate the comments
- Revised the outline, following comments/suggestions from the expert group and shared the revised outline with them (March 15, 2023)
- Writing up the first complete draft (current)

Co-lead Recruitment

- Plan to ask several people for interest after the first protocol draft is ready for community-wide feedback

Land Cover (1/1)

Cropland Validation Workshop

- 12-14 September 2023, National Agricultural Library, Beltsville, MD;
- Co-hosted by CEOS LPV and GEOGLAM;
- 47 participants from 9 countries (USA, Belgium, Canada, UK, Netherlands, France, Italy, Germany, Austria);
- 10 presentations sharing cropland validation and area estimation experience;
- 4 discussion topics (Cropland typology, sampling design, response design, quality metrics): keynote presentations and breakout group discussions followed by report backs; notes taken.

Land Cover (2/2)

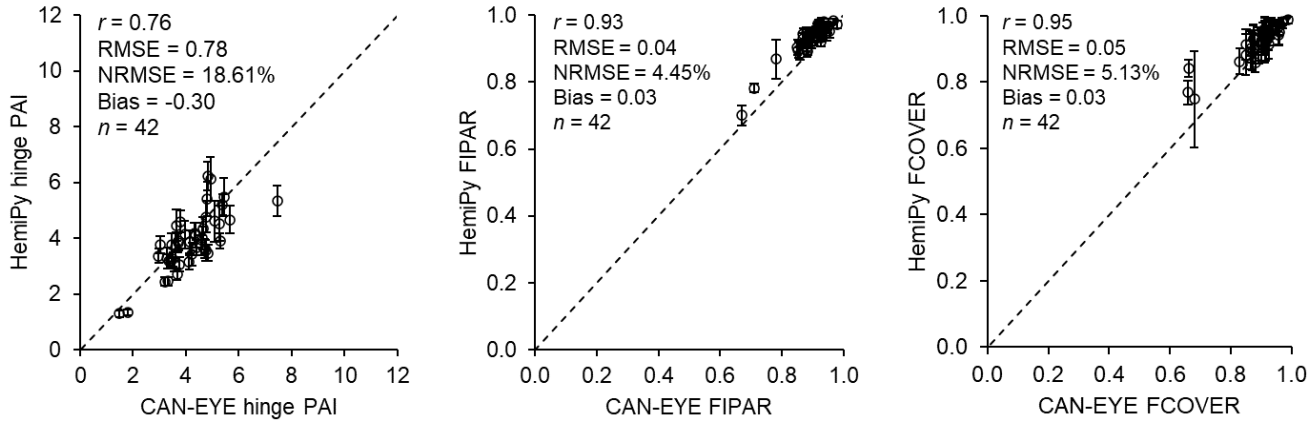
Outcomes and future steps:

- Formulated minimum requirements/critical components for cropland validation (not inventing the wheel, but rather communicating the basics to the cropland community).
- Agreed on the publication structure (community guidelines/good practices for cropland and crop type validation).
- **Peer-reviewed publication, Sophie Bontemps – lead author**, everyone is invited to contribute. Tentative timeline for submission to the journal – **Spring 2024**.
- Summary of this publication will be included in the general LC validation guidelines.
- Useful take-homes for the general LC validation guidelines, e.g. need to include the section on the key validation requirements early on, more clarity on spatial accuracy/uncertainty assessment, etc.
- We had a chance to talk to the LC validation guidelines contributors face-to-face! Need to keep the momentum to finalize the first draft of the LC guidelines by the end of 2023.

Biophysical (1/5)

HemiPy released & published

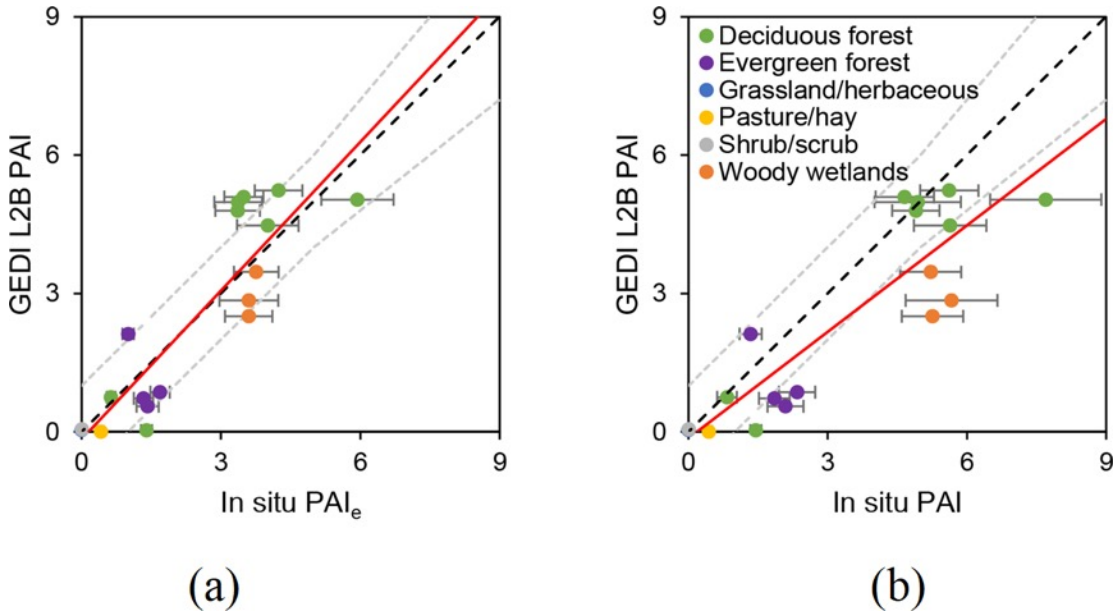
- Open source Python tool for automated DHP processing (as used by GBOV)
- Incorporates provision of uncertainties (FRM4VEG recommendations)
- Verified against simulated images, litterfall data & CAN-EYE
- Available on GitHub & published in Methods in Ecology & Evolution: https://doi.org/10.1111/2041-210X.14199



Biophysical (2/5)

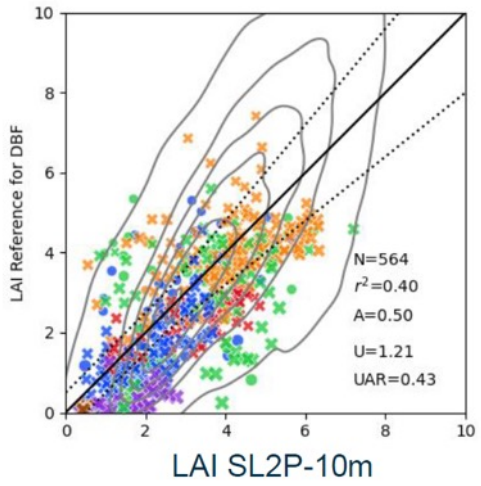
Stage 1 Validation of GEDI PAI published

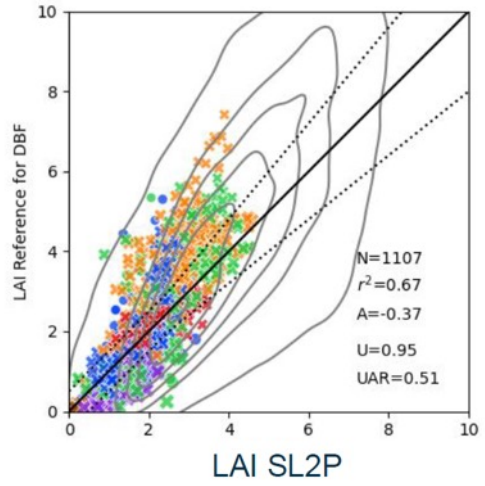
- Initial validation of GEDI L2B PAI using GBOV data
- Published in IEEE Geoscience & Remote Sensing Letters: https://doi.org/10.1109/LGRS.2023.3319528

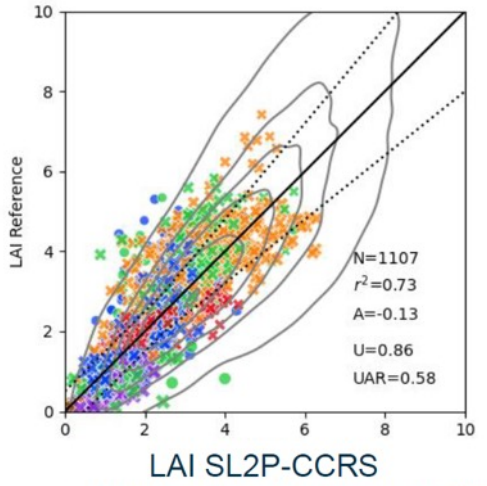


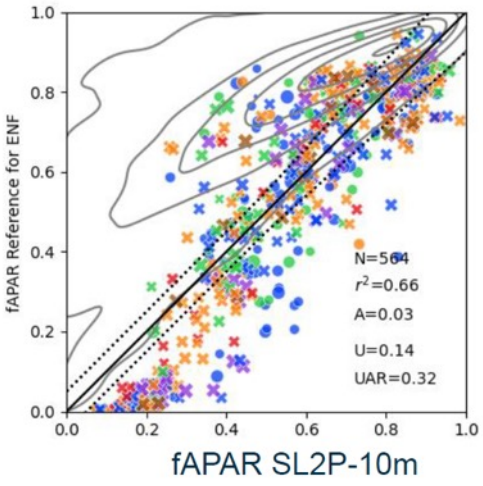
Biophysical (3/5)

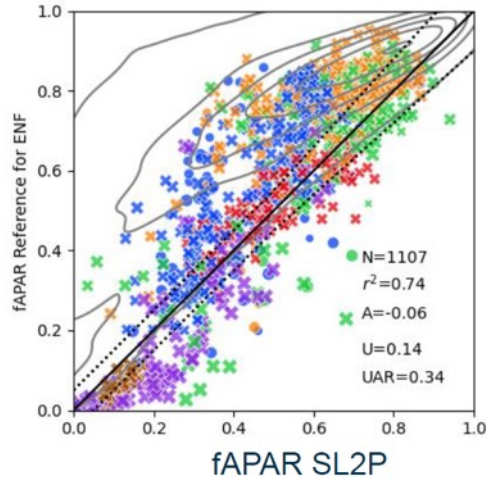
L. Brown & R. Fernandes each presented updated SL2P validation results at 6th S2VT:

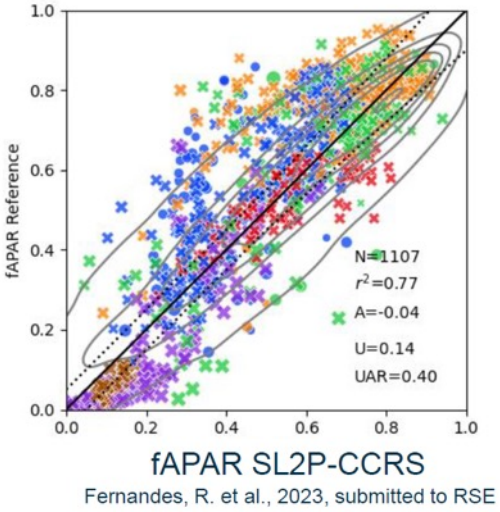












SL2P-CCRS trained with 4SAIL2H (heterogeneous semi-discrete RTM)

Reduces bias but not precision

Biophysical (4/5)

- ESA CCI+: Multisensor CDR at 1km and 300m
  - annual meeting review this week
  - OPTISAIL model applied to VEGETATION/PROBAV
  - Validation against GBOV+DIRECT + benchmark with VIIRS & CGLS

- New European « project RemoTrees » (KOM December 2023)
  - Install automated stations into « hard to reach areas »
  - Transmittance, soil moisture and tree parameters
  - EOLAB => process transmittance to derive LAI/fAPAR
  - Site list not yet finalized

Biophysical (5/5)

Workshops

- AGU 2023 session: Radiative Transfer in Soil, Snow and Vegetation: Observations, Modeling, Inversion, and Applications

  One topic is :

  “field measurements and remote sensing observations from optical (including SIF), thermal to microwave”

- Workshop « Remote Sensing In Climatology – ECVs and their Uncertainties »

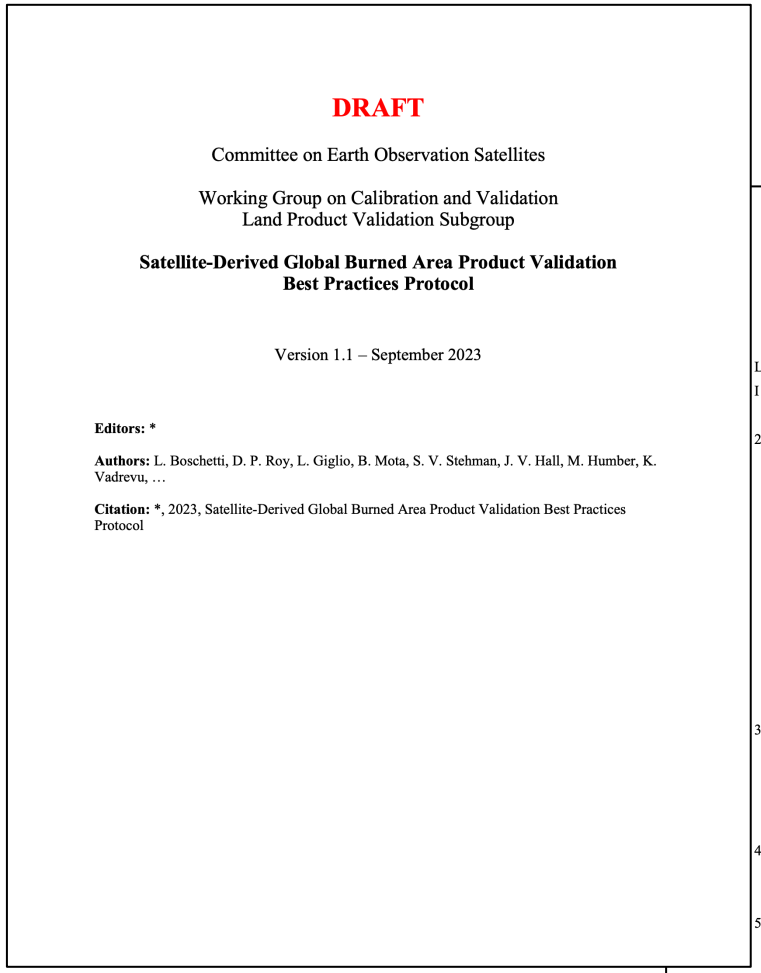
  13-17 Nov 2023, ISSI, Bern

  Talk by F. Camacho on standardized validation of terrestrial ECVs

Fire Disturbance (1/4)

Validation Protocol Status

- Update of 11-page 2010 draft burned area validation protocol ongoing
- Currently 17 pages
- Circulate full draft prior to next GOFC Fire IT meeting in Nov. 2023
- Active Fire protocol to follow



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Committee on Earth Observation Satellites

Working Group on Calibration and Validation
Land Product Validation Subgroup

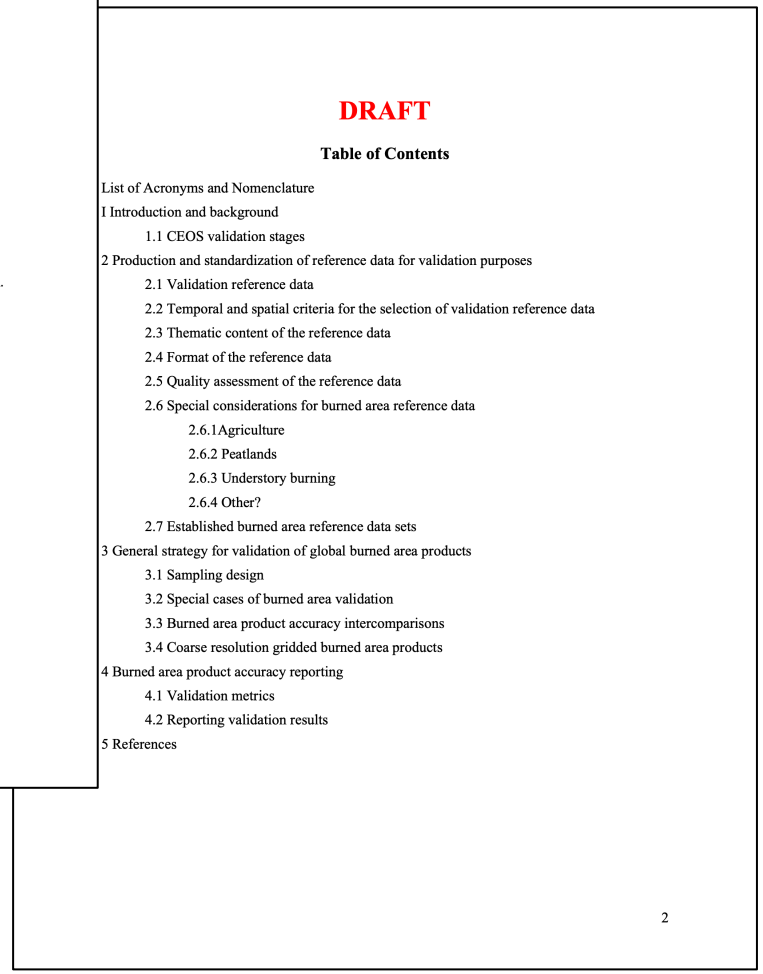
Satellite-Derived Global Burned Area Product Validation Best Practices Protocol

Version 1.1 – September 2023

Editors: *

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

Citation: *, 2023, Satellite-Derived Global Burned Area Product Validation Best Practices Protocol



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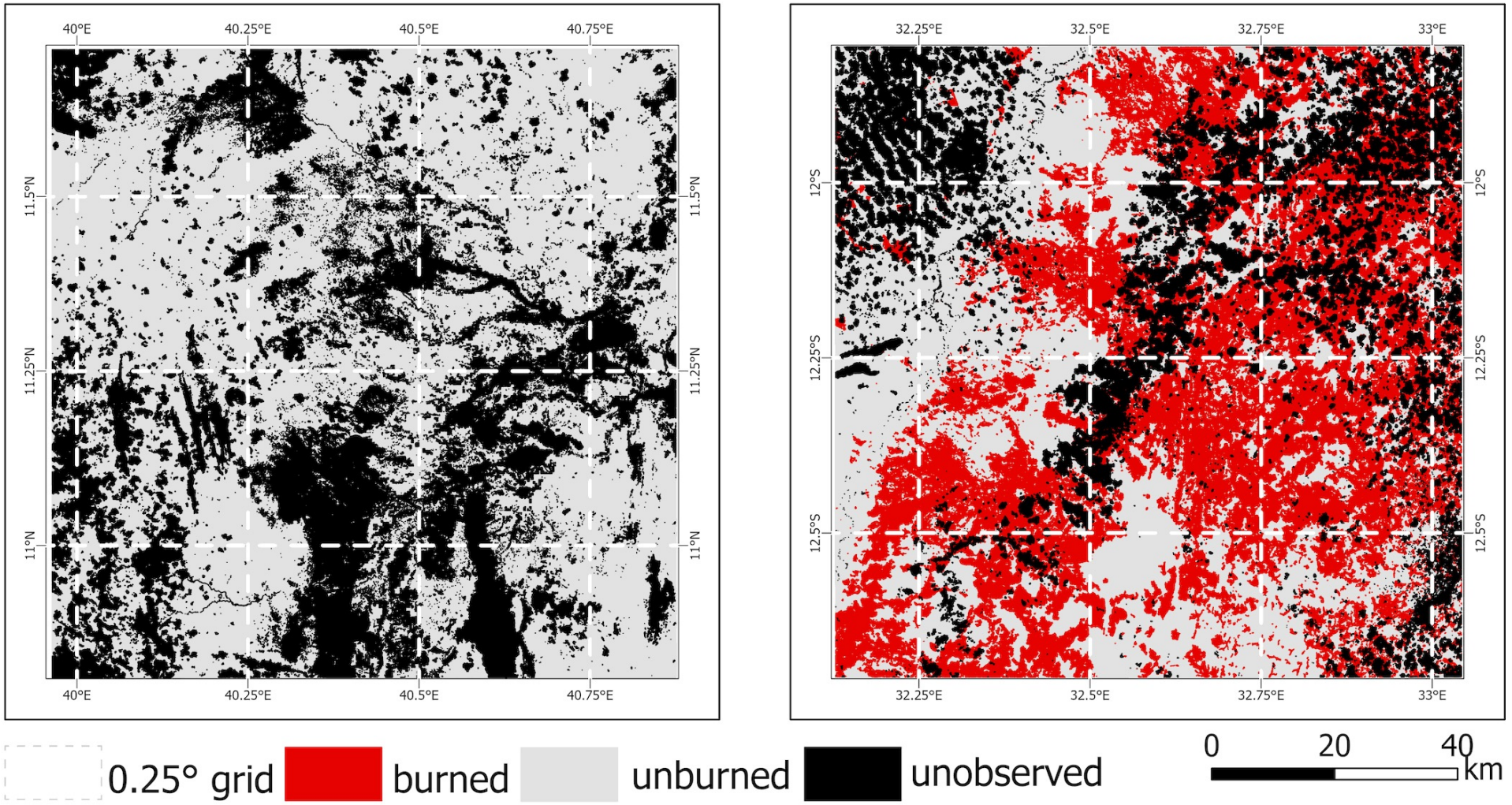
Fire Disturbance (2/4)

Difficult to validate coarse resolution global burned area products (e.g., GFED). Below are two examples of Stroppiana et al. (2022) Sentinel-2 reference maps for sites in Africa superimposed with GFED grid.

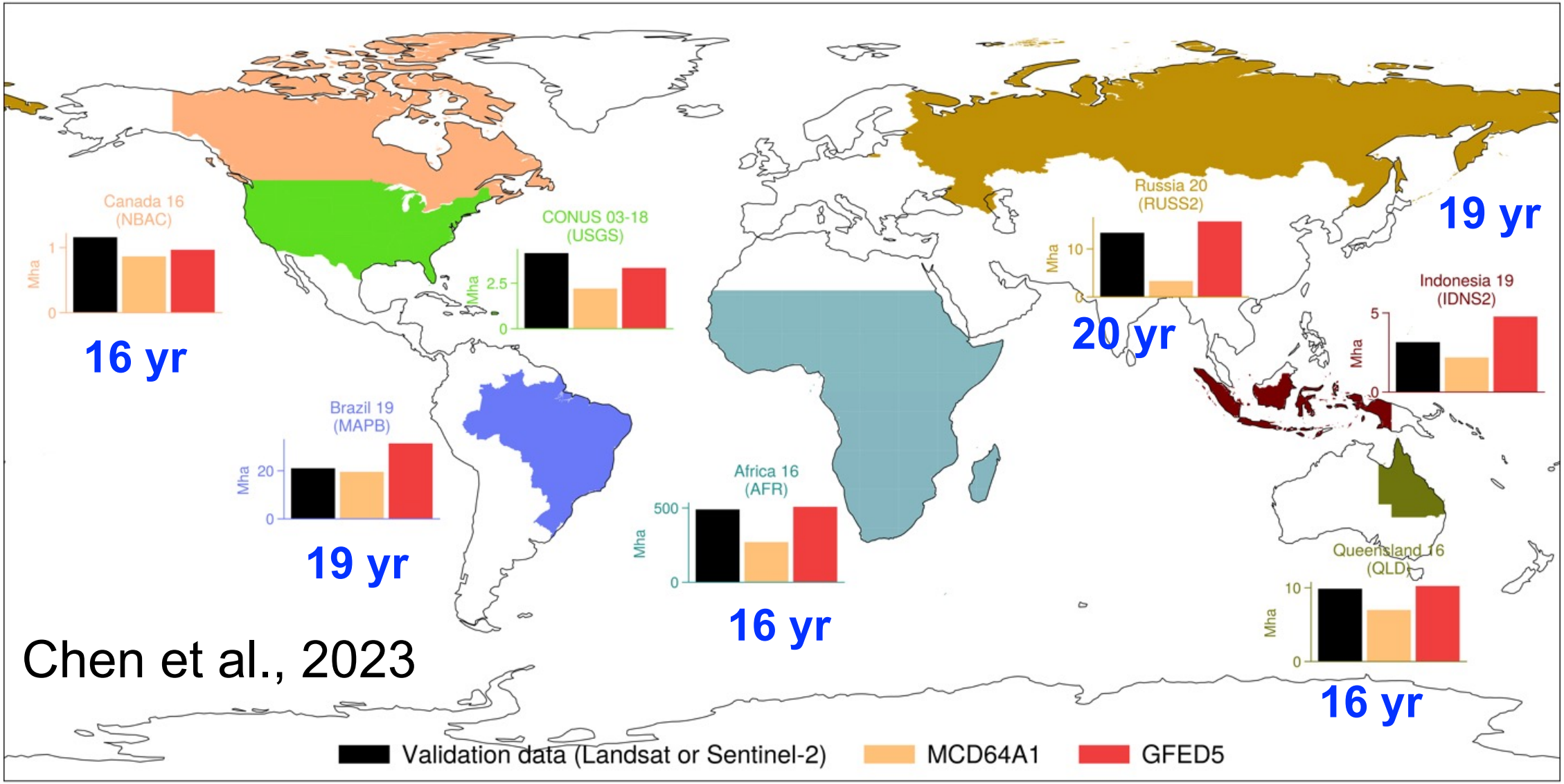


F. Argueta

Reference maps from Stroppiana, D., et al., 2022, "FireCCI_Africa_2019_S2: reference fire perimeters obtained from Sentinel-2 imagery over Africa continental for the year 2019", https://doi.org/10.21950/VKFLCH, e-cienciaDatos, V1

Fire Disturbance (3/4)

Figure 10. Evaluation of GFED5 burned area using independent products from fine-resolution imagery...



https://essd.copernicus.org/preprints/essd-2023-182/

Fire Disturbance (4/4)

Recent Publications – Active Fire

- Xu, W., & Wooster, M. J., 2023, Sentinel-3 SLSTR active fire (AF) detection and FRP daytime product-Algorithm description and global intercomparison to MODIS, VIIRS and landsat AF data. *Science of Remote Sensing*, 7, 100087.

Recent Publications – Burned Area

- Neves, A. K., Campagnolo, M. L., Silva, J. M., & Pereira, J. M., 2023, A Landsat-based atlas of monthly burned area for Portugal, 1984–2021. *International Journal of Applied Earth Observation and Geoinformation*, 119, 103321.
- Mamgain, S., Karnatak, H. C., & Roy, A., 2023, Forest fire burnt area extraction using fuzzy integration of multi-sensor satellite data for the Himalayan state. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, 48, 285-291.
- Zubieta, R., Ccanchi, Y., & Liza, R., 2023, Performance of heat spots obtained from satellite datasets to represent burned areas in Andean ecosystems of Cusco, Peru. *Remote Sensing Applications: Society and Environment*, 32, 101020.
- Hosseini, M., & Lim, S., 2023, Burned area detection using Sentinel-1 SAR data: A case study of Kangaroo Island, South Australia. *Applied Geography*, 151, 102854.
- Fernández-García, V., & Kull, C. A., 2023, Refining historical burned area data from satellite observations. *International Journal of Applied Earth Observation and Geoinformation*, 120, 103350.

LST & Emissivity (1/6)

Conferences

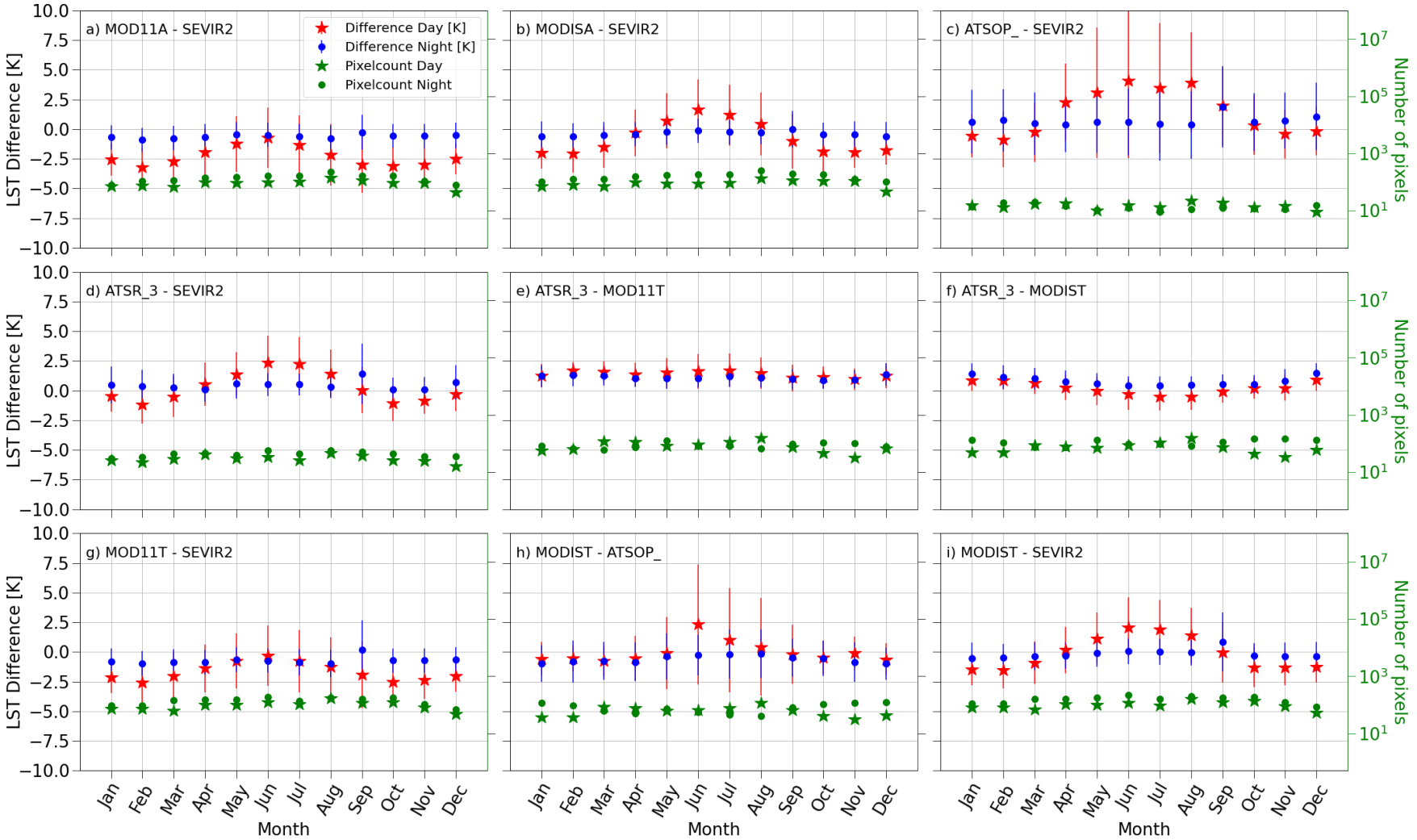
- EUMETSAT Met. Satellite Conference, Malmö, Sweden, 11-15 Sep 2023
- CEOS WGCV IVOS 35 meeting. Oberpfaffenhofen, Germany, 25 – 29 Sep 2023
- ECOSTRESS Science Team Meeting, Ventura, CA, 13-17 Oct, 2023
- TIR Product Harmonization Meeting, ESTEC, Noordwijk, 14-16 Nov, 2023
- Sentinel-3 Val. Team (S3VT) meeting, Darmstadt, Germany, 5-7 Dec 2023

Project News

- ECOSTRESS resumed 5-band acquisitions in March 2023
- ECOSTRESS Collection 2 LST&E products released in Nov 2022
  - New L2 data in UTM projection, cloud optimized geotiffs (COG)
  - Improved cloud and water masks
  - Improved geolocation matching accuracy
- Surface Biology and Geology (SBG) TIR component in Phase-A and approaching System Requirements Review (SRR) in early November

LST & Emissivity (2/6)

Retrieval consistency between LST CCI satellite data products over Europe and Africa (Pérez-Planells et al., 2023)



Day-time (red stars) and night-time (blue dots) monthly aggregated median differences and RSD for all satellite-satellite inter-comparisons in the period 2008-2010 over Europe.

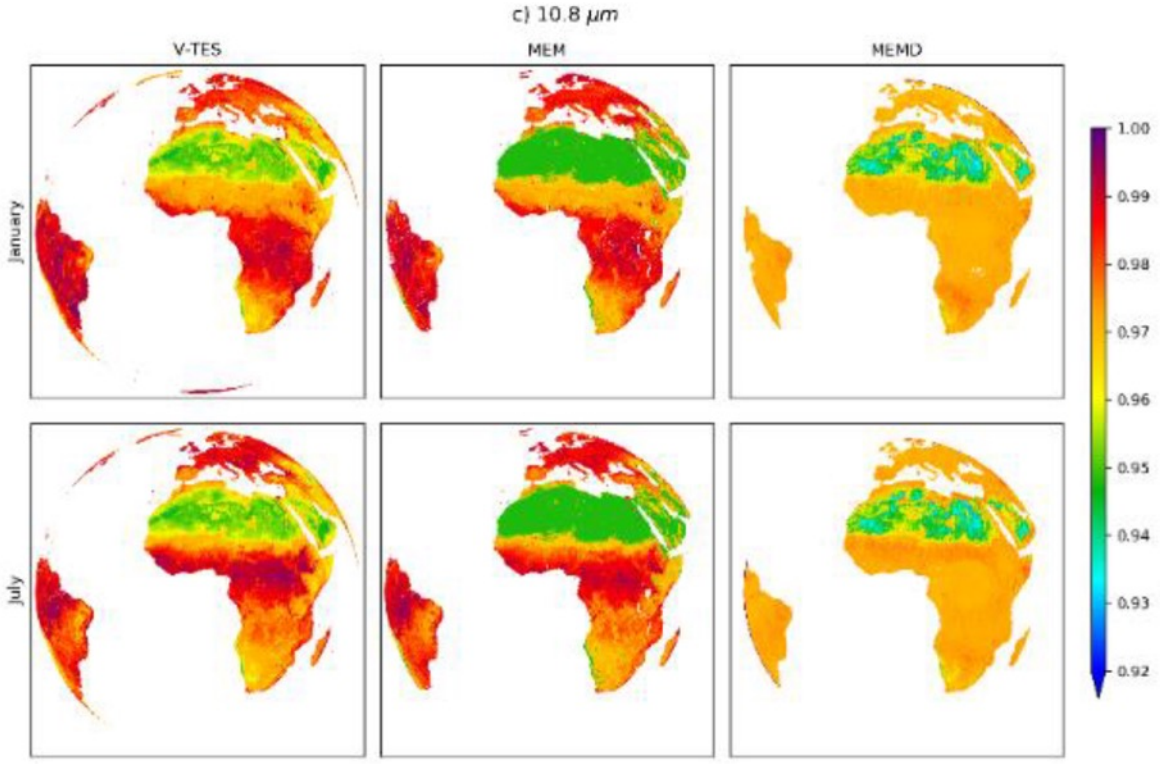
These results were extended for all continents and shown in the LST_cci PVIR report.

https://admin.climate.esa.int/documents/2200/LST-CCI-D4.1-PVIR_-_i3r1_-_Product_Validation_and_Intercomparison_Report.pdf

LST & Emissivity (3/6)

A combined Vegetation cover and Temperature Emissivity Separation (V TES) method to estimate land surface emissivity (Ermida et al., 2023)

- New methodology for emissivity retrieval which combines VCM and TES (V-TES)
  - Validation against laboratory spectra at 4 sites.
  - Inter-comparison against existing products (MEM & MEMD from LSA-SAF, CAMEL and IASI).

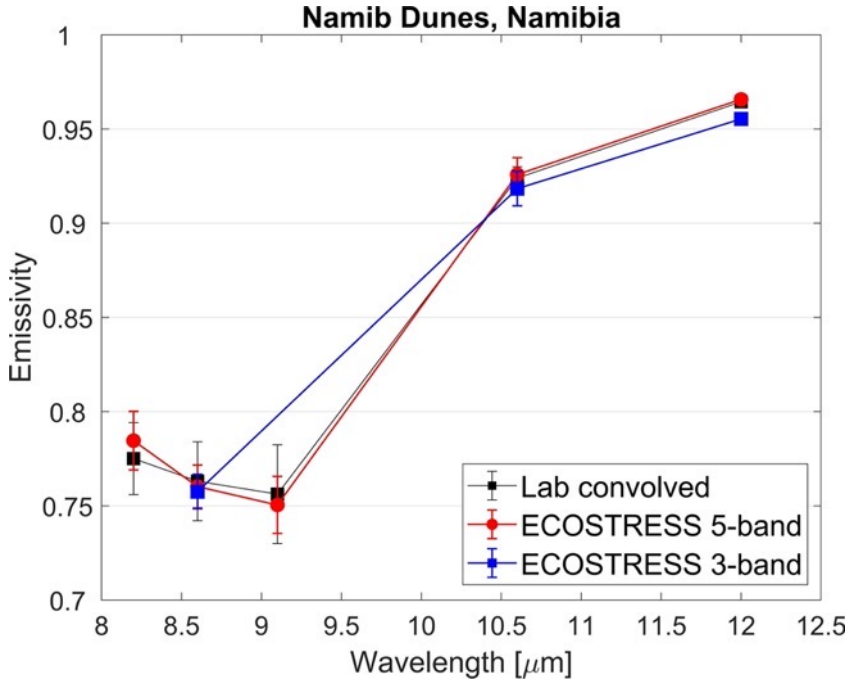


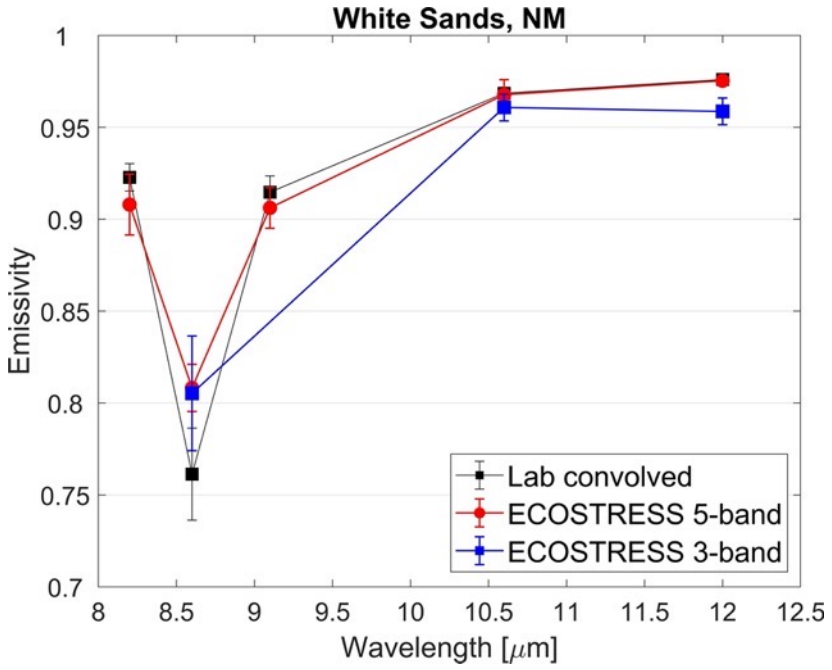
Emissivity maps for the months of January (upper panels) and July (lower pannels) as given by the V-TES (left panels), MEM (middle pannels) and MEMD (right panels) products, for channels a) IR3.9, b) IR8.7, **c) IR10.8**, d) IR12.0 and e) BB (3-14 μm). (Adapted from Ermida et al., 2023)

DOI 10.1109/TGRS.2023.3301615

LST & Emissivity (4/6)

ECOSTRESS started acquiring data in all 5 TIR bands again in May 2023



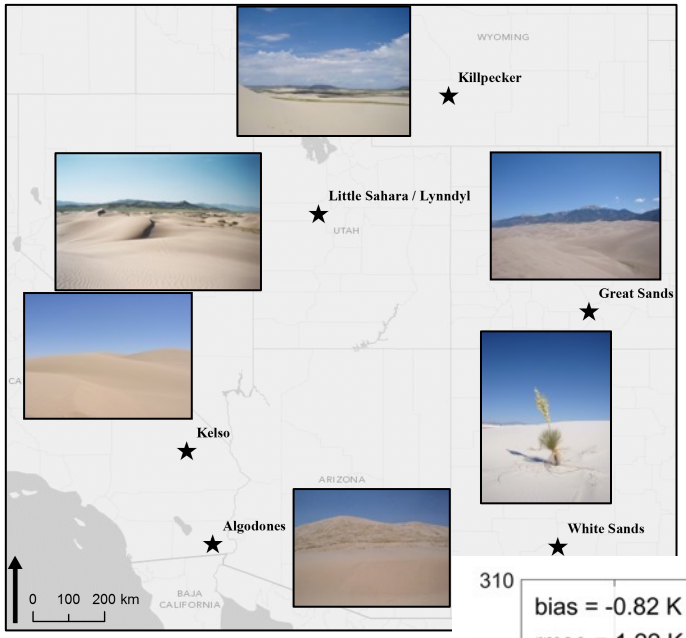


- Improves LST accuracy ➡ improved ET accuracy
- Improves emissivity accuracy and surface composition mapping
- Enables synergies with EMIT

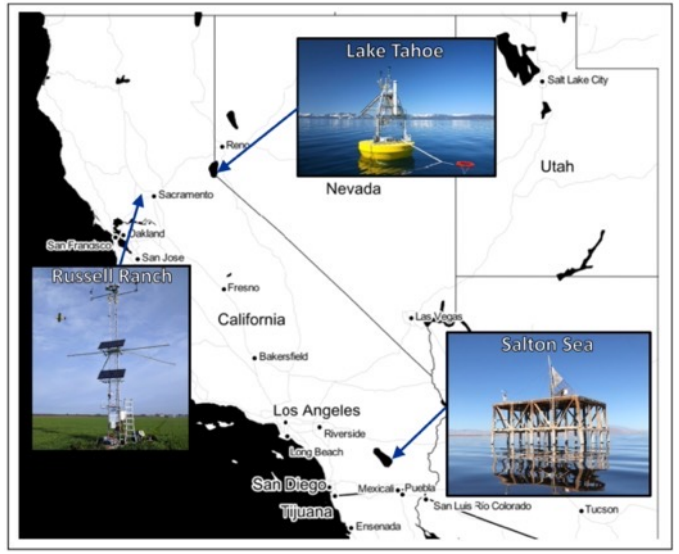
LST & Emissivity (5/6)

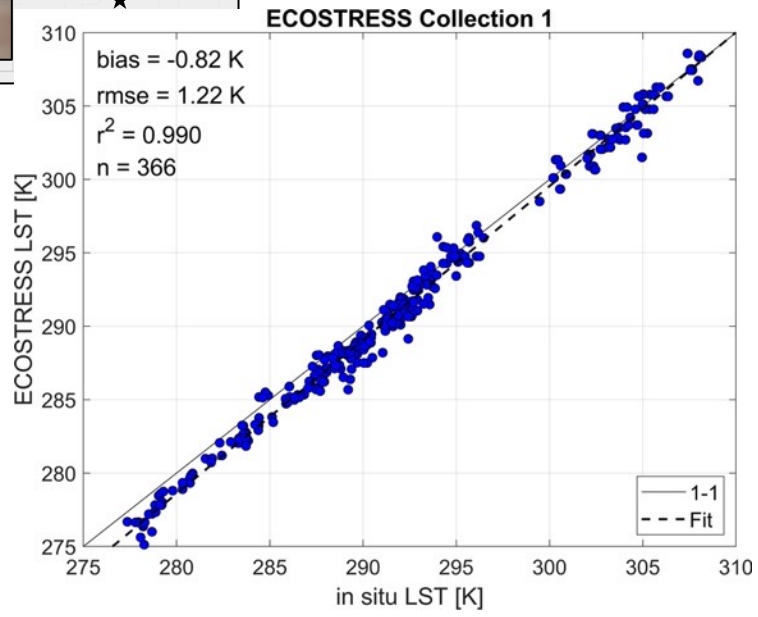
Assessment of cold bias correction in ECOSTRESS Collection 2

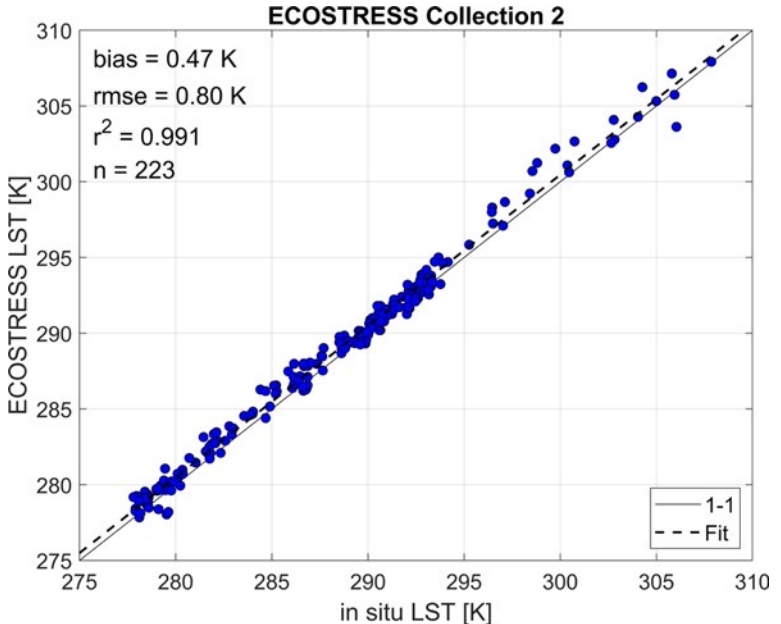
Pseudo-invariant sand dune sites



JPL automated cal/val sites



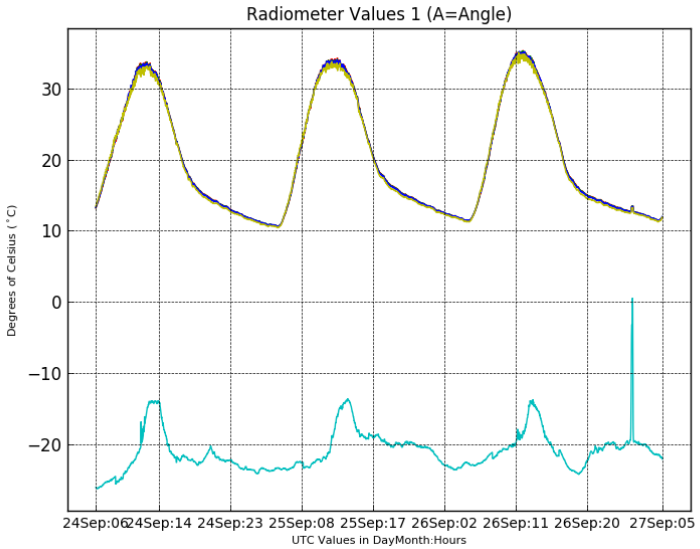




LST & Emissivity (6/6)

New LST validation site –

La Crau, France



Recent Publications

- Pérez-Planells et al. (2023), Retrieval Consistency between LST CCI Satellite Data Products over Europe and Africa. Remote Sensing, 15, 3281. DOI: 10.3390/rs15133281
- Ermida et al. (2023), A combined Vegetation cover and Temperature Emissivity Separation (V TES) method to estimate land surface emissivity, IEEE Transactions on Geoscience and Remote Sensing, 61, 4407318, DOI: 10.1109/TGRS.2023.3301615
- Meng et al. (2023), Investigation and validation of two all-weather land surface temperature products with in-situ measurements, Geo-spatial Information Science, DOI: 10.1080/10095020.2023.2255037

Surface Radiation

Surface radiation: Angela Erb, Jorge Sánchez-Zapero, Zhuosen Wang

- Annual update of Surface ALbedo VALidation (SALVAL) Platform
  - https://calvalportal.ceos.org/web/guest/salval → moves albedo validation to stage 4
  - Update MODIS 6.1 Albedo - Processed and available
  - Update VIIRS v2 Albedo - Not publicly available (currently reprocessing)
  - Update number of sites from 99 (REALS) stations to 180 (REALS_V2) stations

- Special Issue:
  - "Remote Sensing of Solar Radiation Absorbed by Land Surfaces“
  - Deadline for manuscript submissions: 31 October 2023
  - https://www.mdpi.com/journal/remotesensing/special_issues/V7S2F2XJ36

- Outstanding tasks:
  - Update product list, website, newsletters
  - Review albedo protocol in response to the latest GCOS requirements and update, if needed
  - Spectral albedo validation
  - HLS:Landsat:Sentinel-2 Albedo processing