Land Product Validation (LPV) Sub-group Meeting

Fernando Camacho – (EOLab/U. Valencia) – Chair
Vice Chair – Michael Cosh (USDA)

Subgroup meeting
5 May 2020

NEXT LPV TELECON 07 July 2020

Attendance

Participants

Michael Cosh
Jaime Nickeson
Zhuosen Wang
Pontus Olofsson
Frank Göttsche
Sophie Bontemps
Laura Duncanson
Gareth Roberts
Joshua Gray
John Bolten
Chris Crawford
Victor Rodríguez-Galiano
Dominique Carrer
Tomoaki Miura
Else Swinnen
Thomas Nagler
Hongliang Fang
Sylvain Leblanc

Unavailable

Fernando Camacho
Marie Weiss
Andrew Edwards
John Armston
Glynn Hulley
Mat Disney

Proposed agenda items

- Welcome
- New LPV focus area leads
- COVID-19 impact on cal/val activities
- LPV Work Plan : 19-LPV-01 update validation stage table
- How to improve our communication with stakeholders?
- Focus Area review and update status
- Focus Area Reporting

Status of Working Group

More progress to report!! ☺

After announcing the results of our vote to instate Mike as vice-chair, this week we have two (!) new co-leads joining us.

John Bolten of NASA/GSFC is filling the newly vacant Soil Moisture focus area lead role that Mike left. And Chris Crawford from the USGS at EROS, in Sioux Falls, SD will be joining Thomas on the Snow focus area, a role that has been vacant for far too long.

We FINALLY have a full complement in our WG for the first time in a over 2 years. That is the first time this has happened, so it is good to be whole again.

Welcome John and Chris!

Please introduce yourselves to the group.

COVID-19 impact on cal/val activities

- **LPV Special Session at AGU / next LPV Plenary meetings– postponed to 2021**

- **CEOS WGCV Plenary meetings**
  - WGCV-46 Pasadena –> Virtual meeting (11 and 15, May 2020)
  - WGCV-47 Sochi → Virtual meeting (July 2020, week TBD)
- **CEOS WP 20-22 (in revision)**
  - CV-20-01: Surface Reflectance measurement Intercomparison Exercise for vegetation (**SRIX 4Veg ,** previously S3R) delayed to Q1/2021-Q4/2022 (ESA FRM4Veg project postponed to 2021)
  - CV-20-02 : BRIX-2 – TBD (@Laura, any news?)
- **ESA FLEX campaign 2020 → postponed 2021**

LPV Work Plan 2019-2022

Task: 19-LPV-01
Revise the LPV table to better describe the fiducial reference concept

Proposed modification:
1- Improve consistency with the number of reference sites in each stage
2- Introduce a reference to good practices procedures
3- Introduce the FRM concept to better indicate the need of in-situ measurements with know uncertainties to validate
(this is a kind of goal right now, which could motivate agencies and RIs to develop these networks)

Let us know your comments by email, to close this action.

	Validation Stage - Definition and Current State
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.
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 consistency with similar products has been evaluated over globally representative locations and time periods. Results are published in the peer-reviewed literature.
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 ~~from~~ by 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~~. Validation procedures follows community-agreed good practices 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.
4	Validation results for stage 3 are systematically updated when new product versions are released and as the time-series expands. Uncertainties in the product and its associated structure are quantified using fiducial reference measurements with known uncertainties over a global network of sites (typically > 30) and time periods (when possible).

Improve communication with Stakeholders

- How might we improve communication with stakeholders ?
- The current mechanism to communicate with CEOS agencies is through the WGCV plenary meeting (every 9 months) and through our LPV plenary meeting (every 1-2 years) to define priorities with stakeholders.
- We have also our newsletters, but unfortunately, newsletters are not delivered regularly for many focus areas.
- In addition, our telecon notes are a nice piece of information on land product validation activities that could help to follow LPV updates in timely manner. Do you consider it valuable to share our notes through our website?
- Others: twitter?

Annual Web Site and Listserv Review

- At this rate our annual update is going to run into the next one, the original status lists for updates were sent last April!
- Please recall that **new content is not required**, but please review current content.
- Before sending newsletter to your community, please make sure your listserv information is current. If you know a colleague has moved institutions, make sure we have the updated address. Please add colleagues (post docs or other collaborators) not currently on your list who may not be aware of LPV yet.

Focus Area Review/Update Status

Status of updates by focus area.

Some only need a review, changes are not required, just assure all is current!

Action needed!!

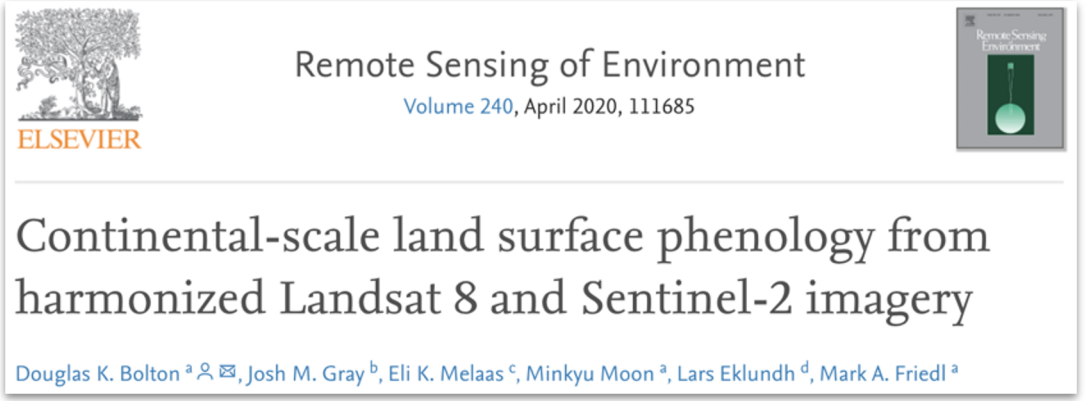
Focus Area	Letter sent to leads	Home Page Review / Update	Products Reviewed/ Updated	Collaboration Review/ Update	References Updated	Listserv review/ update	Letters to community
Landcover	Apr 2019					Oct 2019	
Biophysical LAI/Fapar	Apr 2019	July 2019	July 2019	July 2019	July 2019	Oct 2019	Sep 2019
Surface Rad/Albedo	Apr 2019	Dec 2019	Oct 2019	Dec 2019	Dec 2019	Dec 2019	Draft Ready
LST/Emissivity	Apr 2019	Apr 2019	Apr 2019	Apr 2019	Apr 2019	Apr 2019	
Fire/Burn	Apr 2019		Mar 2020		Mar 2020		
Soil Moisture	Apr 2019		Feb 2019		Sep 2019	Sep 2019	
Phenology	Apr 2019				Apr 2020		
Snow Cover	Apr 2019					Oct 2019	
Vegetation Index	Apr 2019	Sep 2019	May 2019	Sep 2019	May 2019	May 2019	
Biomass	Apr 2019	Apr 2019	Mar 2020	Apr 2019	Apr 2019	Oct 2019	

Focus Area Reports

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

Land Surface Phenology

- Advanced Phenological Information Services Meeting
  - Excellent new tools for obtaining integrated phenology data: rNPN, Phenosynth, Dacqre, AppEEARs
  - Synthesis paper in progress
- Bolton et al. RSE paper on HLS Pheno
  - Data available to public soon
- New submission of a review paper:
  - Rodriguez-Galiano, V. & Dash J. Land surface phenology as indicator of global terrestrial ecosystem dynamics: a systematic review. Submitted to “Methods in Ecology and Evolution”
- MCD12Q2 C6.1
  - 2015 FluxNet analysis – MS in progress
  - “Two decades of MODIS LSP” MS for special Aqua/Terra RSE - submitted next week
  - C6.1 code validated at Goddard, in-production
  - “INCA” data going to LPDAAC for public consumption
  - Web site updates



Surface Radiation (1/2)

LPV website updated and newsletter on progress.

Past meetings

- 05/05 – KO meeting of EUM project for the intercomparison of NDVI products, and the analysis of the value added of the use of BRDF normalisation for the calculation of NDVI (albedo like) – Leader EolabAnnual
- F2F COPERNICUS/C3S meeting in Toulouse (France) for the generation of C3S Albedo Climate Data Record V2 (1981-today). -> postponed due to current situation.

Upcoming meetings

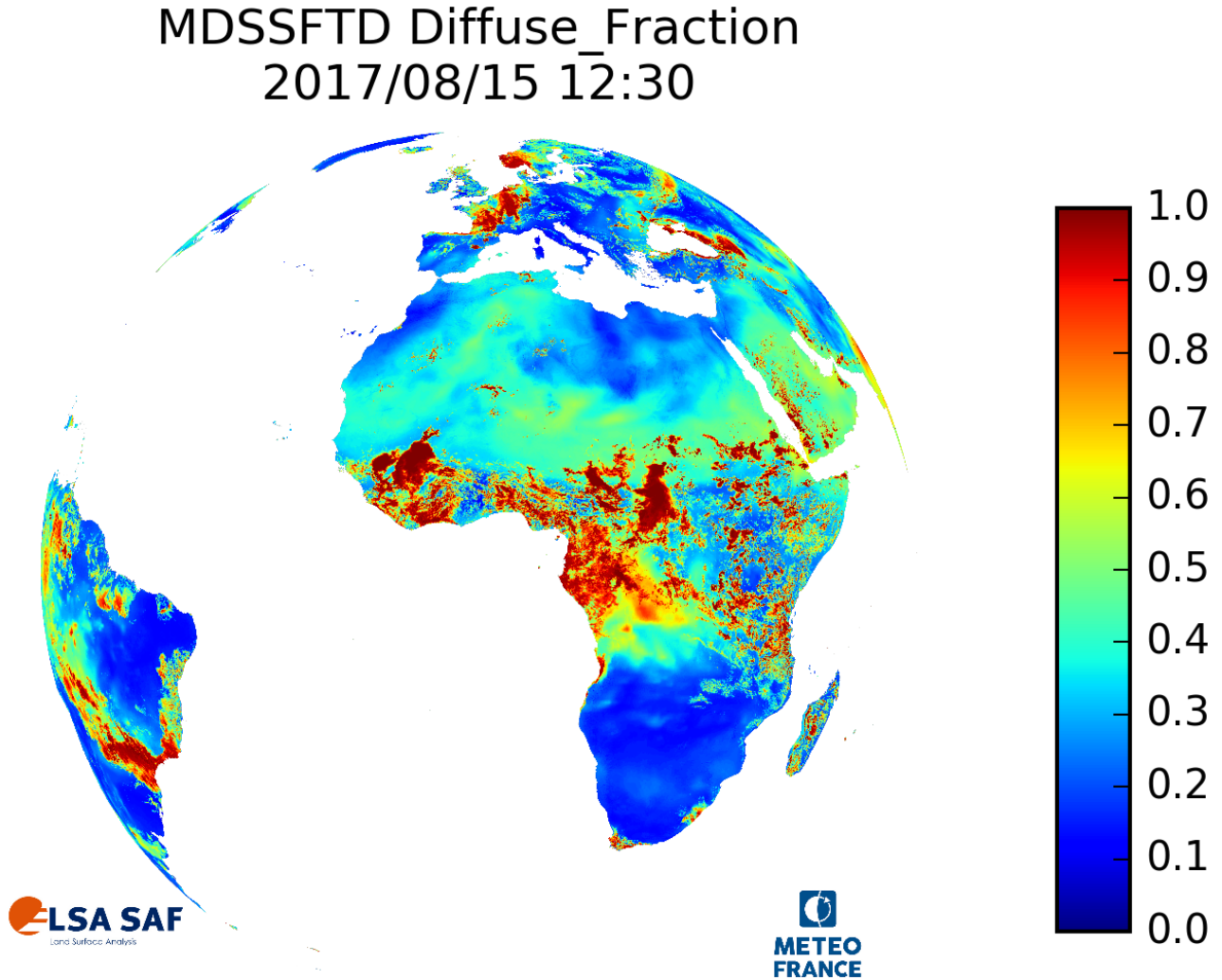
- Travels may not be possible in 2020. All meeting will be probably made remotely.

Publication

- Lellouch, Carrer et al., *Evaluation of two Global Land Surface Albedo Datasets Distributed by the Copernicus Climate Change Service and the EUMETSAT LSA-SAF* - RS / Special issue F. Camacho. MODIS and EPS albedos compare well with 5% of difference (lower performance for VGT). – Submitted and rejected.

Surface Radiation (2/2)

New EUMETSAT product under MF responsibility: MSG Total and Diffuse Downward Surface Shortwave Flux (https://landsaf.ipma.pt/en/products/longwave-shortwave-radiation/mdssftd/)



LST & Emissivity (1/4)

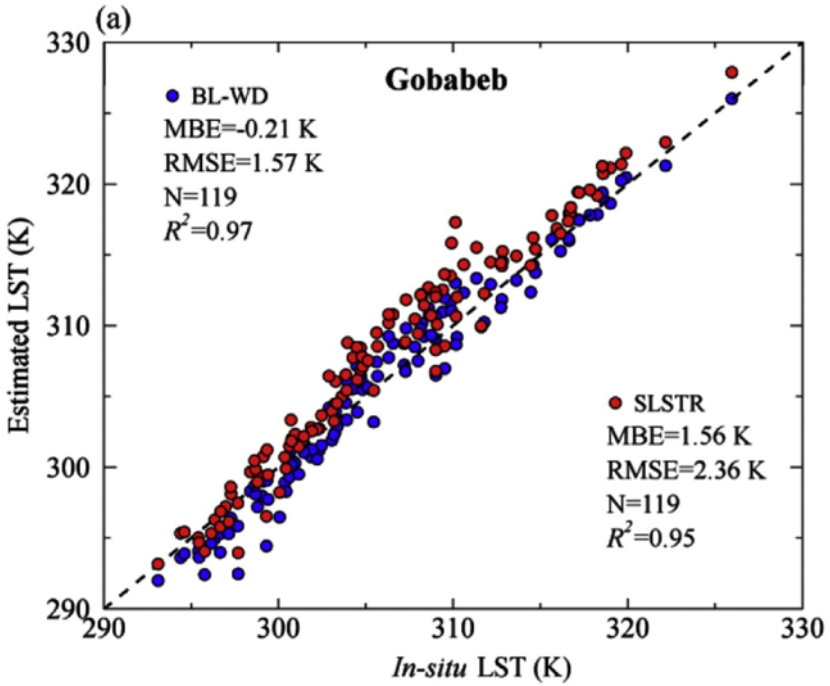
COVID-19 and conferences

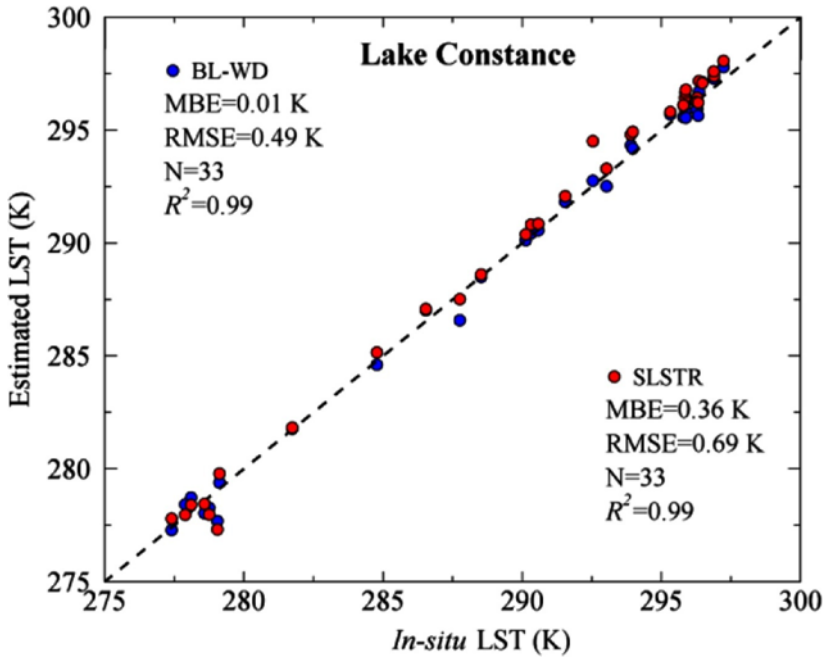
- EGU General Assembly 3-8 May 2020: **on-line**
- LST CCI User Workshop (24-26 Jun 2020): **on-line**
- Recent Advances in Quantitative Remote Sensing (RAQRS) Symposium: **moved to 20-24 Sep 2021**
- AGU Fall meeting**, 7-11 Dec 2020: Format TBD**
  - **Temperature Session: Taking the Temperature of the Earth**
- 6th Sentinel-3 Val Team meeting: **moved to 14-17 Dec 2020**
- EUMETSAT Conference: 28 Sep - 2 Oct 2020 (unchanged)

LST & Emissivity (2/4)

Validation Paper

- Yang, J., Zhou, J., Göttsche, F.-M., Long, Z., Ma, J., and Luo, R. (2020), Investigation and validation of algorithms for estimating land surface temperature from Sentinel-3 SLSTR data. Int. J. Applied Earth Observation and Geoinformation, vol. 91, doi: 10.1016/j.jag.2020.102136 (open access)





Trained & compared 17 split window algorithms: nine selected

BL-WD: Becker and Li (1990) - Wan and Dozier (1996)

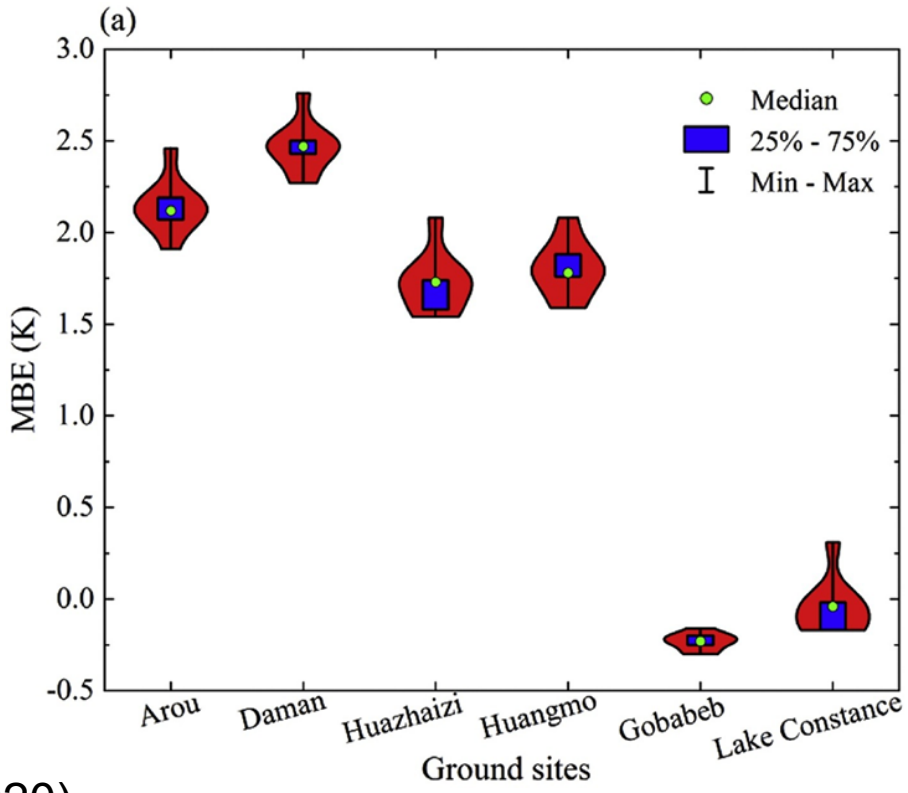
SLSTR: Copernicus LST product (Prata, 2002; Remedios et al., 2012)

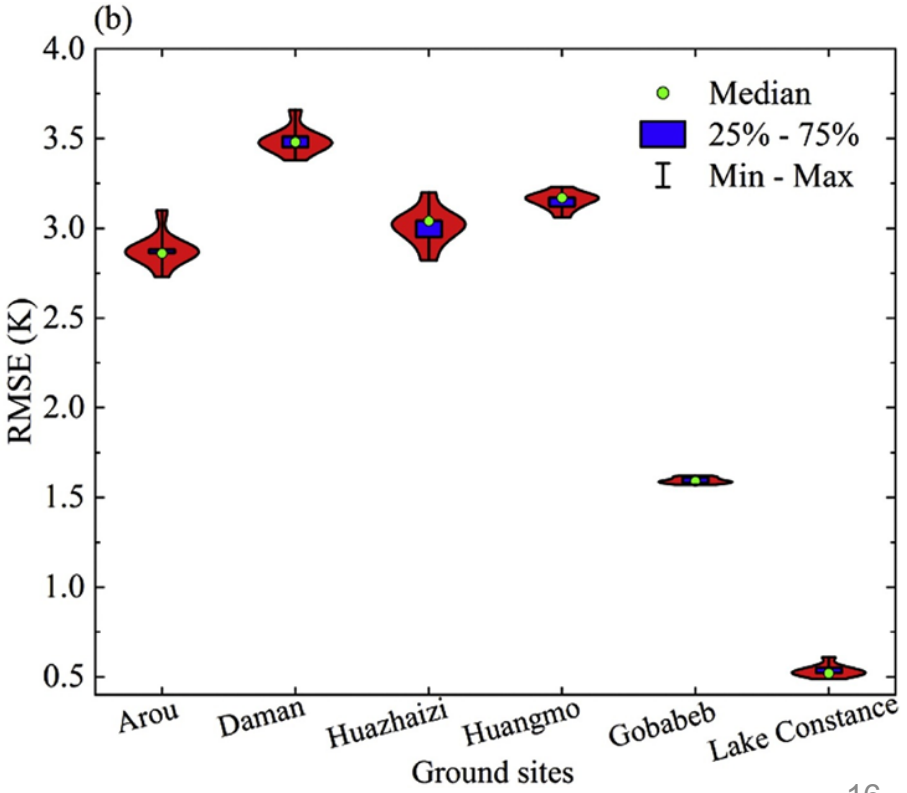
LST & Emissivity (3/4)

Comparison of nine split-window algorithms

Name of site	Longitude, Latitude	Elevation (m)	Land cover type	Instrument			Measurement	
				Model	Height (m)	Diameter of FOV (m)	Period	Interval (min)
Arou	100.46 °E, 38.05 °N	3033	Subalpine meadow	Kipp & Zonen CNR4	5	37	2017	10
Daman	100.37 °E, 38.86 °N	1556	Cropland	Eppley PIR	12	90	2017	10
Huazhaizi	100.32 °E, 38.77 °N	1731	Desert steppe	Kipp & Zonen CNR1	6	45	2017	10
Huangmo	100.99 °E, 42.11 °N	1054	Desert	Kipp & Zonen CNR1	6	45	2017	10
Gobabeb	15.05 °E, 23.55 °S	450	Gravel plain	KT15.85 IIP	25	4	2018	1
Lake Constance	9.44 °E, 47.61 °N*	395	Water	KT15.85 IIP	8	1.3	2018	3 (orig.: 15 s)

Note: * latitude and longitude centered on the ferry's route.





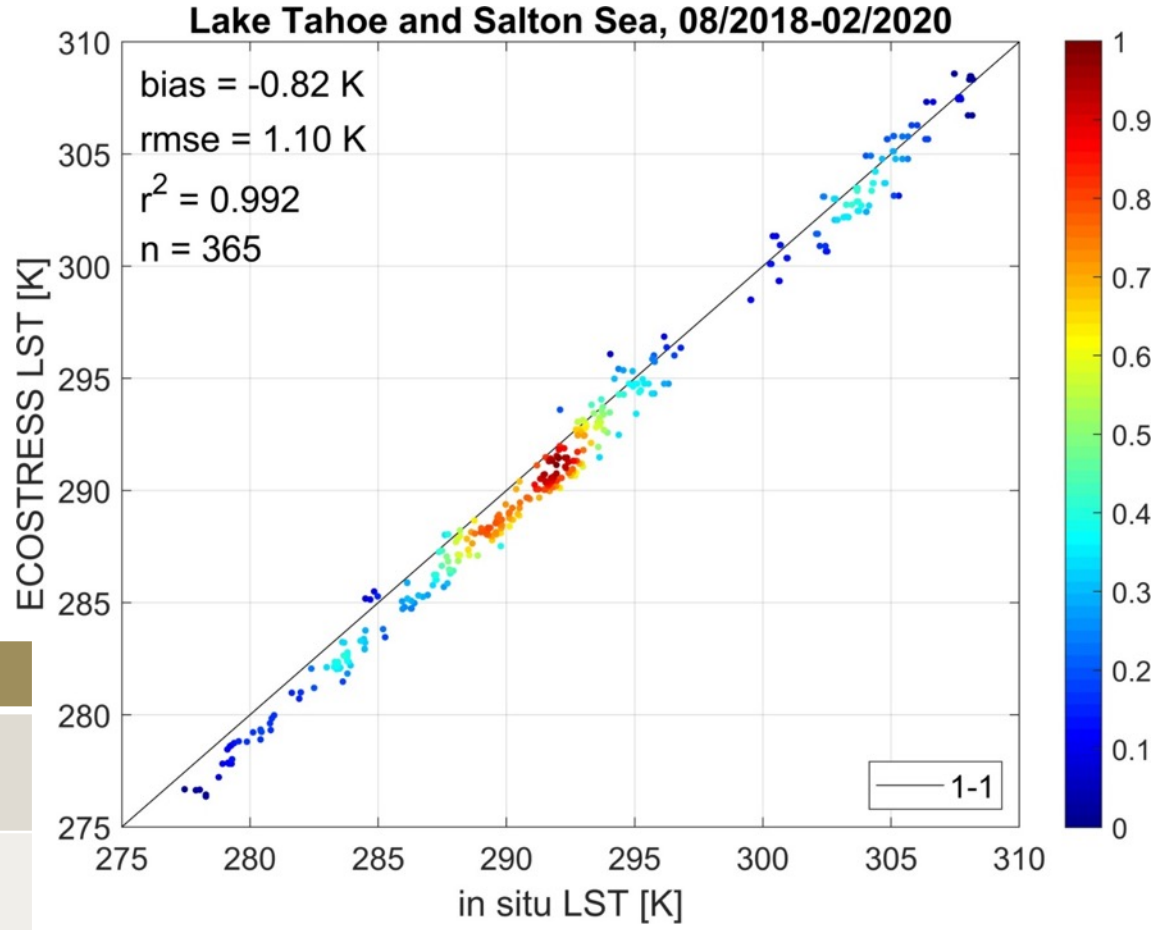
From: Yang et al. (2020)

LST & Emissivity (4/4)

Inherent cold bias in ECOSTRESS LST being addressed

Testing with new gain/offset radiance calibration

Date	Site	LST	New Cal bias	Old Cal bias
20180729 T014550	TB1	294.94 K	**0.04 K**	-1.50 K
20200128 T065500	SS1	288.61 K	**0.09 K**	-1.13 K
20190305 T114909	Gobabeb	329.6 K	**-0.22 K**	0.01 K
20180803 T011700	Gobabeb	280.9 K	**0.21 K**	-2.06 K



Soil Moisture

Thank you to Mike Cosh for all your work during the last three years! And welcome to John Bolton!

Activities:

- Best Practices Protocol: Closed the authors revision, preparation for submission to LPV secretary
- Bagher Bayat and Carsten Montzka (both Jülich) are finalizing an overview paper about „Towards Operational Validation Procedures for EO-based Long-term Global Terrestrial Essential Climate Variables" for submission to Fernandos SI in Remote Sensing

Workshops:

(CoronaVirus impacting meetings?)

- National Soil Moisture Workshop (U.S.) August 12-13, 2020, Beltsville, MD.
- 6th Satellite Soil Moisture Validation and Application Workshop, Sept 15-17, 2020, Perugia, Italy
- SMOS for Climate symposium was postponed to 9-11th March 2021 at the Eden project, UK
- 7th Satellite Soil Moisture Validation and Application Workshop, Fall 2022, New Orleans, USA

Vegetation Indices

- Conducted a JPSS VIIRS VI product validation exercise with phenocam data and RadCalNet (https://www.radcalnet.org/) data
- No progress to report on the intercomparison protocol
- VITO is currently preparing in the Copernicus Global Land Service a Sentinel-3 based NDVI (BRDF-corrected) that is spectrally consistent with PROBA-V 300 m NDVI (also BRDF-corrected). Both products should be available after this summer.

Snow

Welcome to Chris Crawford to the LPV subgroup!

Update on Snow Products:

ESA SNOW-CCI (released by Nov 2019):

- Global / daily SWE products 1978-2018, PMW (25 km); Version 1; available at ESA CCI Portal
- Global / daily Snow Extent from MODIS, AVHRR and S3 Version 1, and SWE V1.1 product planned for Oct. 2020

EEA High Resolution Snow Extent Product from Sentinel-2

- 20m, near real time; Europe; planned for May 2020)
- User Consultation WS, September 2020

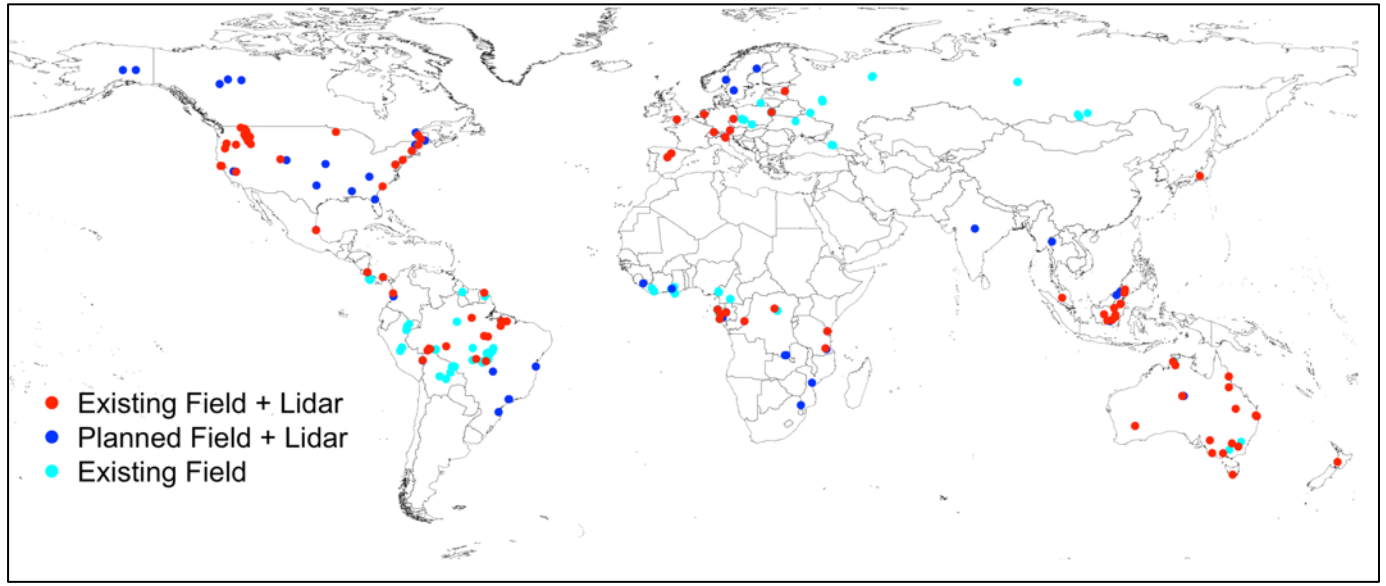
Upcoming relevant Workshop:

EC ESA EO for Polar Science Workshop, ~~17-19 June 2020~~, 28 – 30 October2020 Copenhagen

Above Ground Biomass (1/2)

GEDI height products came online in January 2020!!
Plans are in development to validate early GEDI biomass products following the CEOS LPV biomass protocol.

ESA and NASA continue to fund coordinated field and airborne campaigns ideal for multi-mission validation but **there remain many spatial data gaps, and old datasets require updating.**



- Multi-mission group is collating and sharing existing high-quality reference datasets
- Collection of new forest field data (+lidar) is critical to bolster biomass product uptake for science and policy
- New data should be made public, coordinated through mature existing field plot networks where possible, and collected following the CEOS LPV biomass protocol
- Preference to fill existing spatial and temporal data gaps
- Follow examples from AfriSAR, ABoVE, TERN, ESA's ForestScan

Above Ground Biomass (2/2)

Updates:

- biomass protocol still in final revision stage
- subgroup has been formed to create a ‘business case’ for presentation at the virtual SIT meeting in September; including cost estimates for global field and lidar campaigns coordinated between LPV, CEOS member agencies, and forest plot networks
- BRIX2 has been approved to run on the ESA-NASA MAAP, with a launch meeting in Europe in January, second meeting in the US in fall 2021.
- GEDI and ICESat2 still functioning nominally; Vegetation product is the most downloaded from ICESat-2.
- GEDI’s biomass product expected to come out in fall 2021
- coordinates field and lidar campaign planning continues between GEDI, Icesat2, NISAR, ESA BIOMASS, and ALOS2 although 2020 field campaigns halted fromCovid19.

Land Cover

- Very slow progress due to Covid lockdown…
- Global LC products validation
  - New products and activities identified
  - Website to be updated (products database + reference document)
- Update of the validation protocol – no major progress :-(
- Link with GEOGLAM Essential Agriculture Variables (EAV's)
  - Working meeting (GEOGLAM / JECAM) from June 2020 postponed

Biophysical

- Website update
  - VIIRS LAI product added to product list,
  - C3S, CGLS Biophysical product updated
- References
  - Fuster, B.; Sánchez-Zapero, J.; Camacho, F.; García-Santos, V.; Verger, A.; Lacaze, R.; Weiss, M.; Baret, F.; Smets, B. Quality Assessment of PROBA-V LAI, fAPAR and fCOVER Collection 300 m Products of Copernicus Global Land Service. Remote Sensing. 2020, 12, 1017. https://www.mdpi.com/2072-4292/12/6/1017
- Meetings **postponed**
  - RAQRS 6th, Univ. of Valencia, Spain. Sep 20-24, 2021.
  - ISPRS, Nice, France, Jul 4-10, 2021
  - IGARSS'20 Waikoloa, Hawaii, USA. Jul 19-24, 2020 (?).
- China's Terrestrial Ecosystem Observation Infrastructure (http://www.cnern.org.cn/)
  - Initiative to upgrade the nation's terrestrial ecosystem monitoring network in the next 10 years
  - Suggested a biophysical measurement plan at 30 supersites over China (H.F.)
- *Remote Sensing* special issue
  - "Remote Sensing of Biophysical Parameters" (deadline: Nov 27, 2020)
    Editors: J. GarcíaHaro (U. Valencia), H. Fang (CAS), and M. Campos-Taberner (U. Valencia)
    http://www.mdpi.com/journal/remotesensing/special_issues/Biophysical_Parameters

Fire/Burned Area

Covid-19 has resulted in validation activity being delayed until at least next year

- Sentinel-3 FRP product validation activities in South Africa and Canada on hold

Special issues with a fire component

- "Fire in the Earth System"
  - JGR : Earth Surface (8th April 2020 – 8th May 2021)
    - (https://agupubs.onlinelibrary.wiley.com/hub/jgr/journal/21699011/features/call-for-papers)
- "The role of fire in the Earth system: Understanding Interactions with the Land, Atmosphere, and Society"
  - Proposed inter-EGU journal (ESD/BG/ACP/GMD/NHESS)
  - June 2020 to Dec 2021