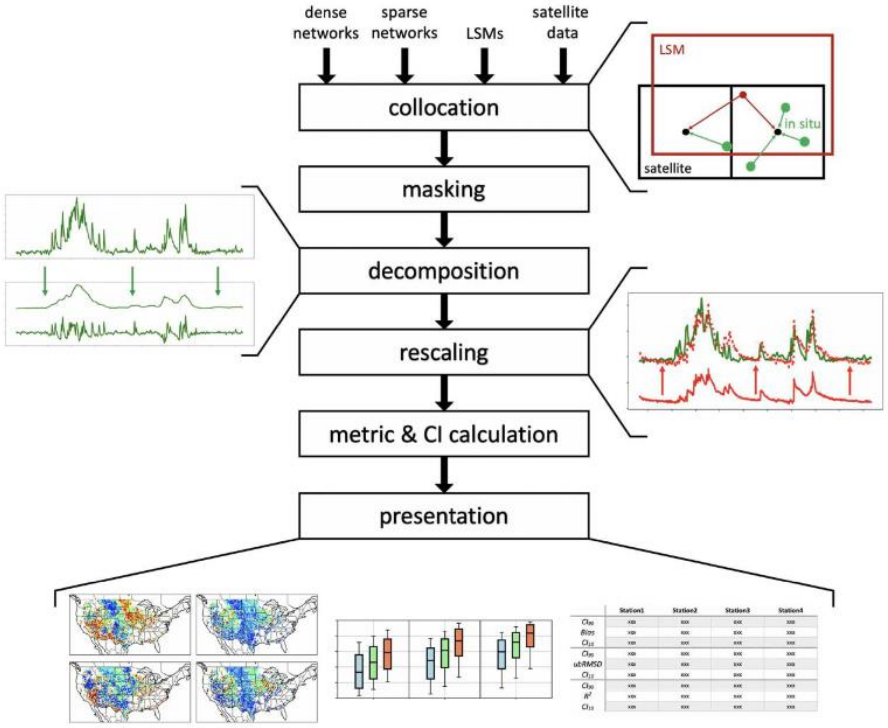
CEOS LPV Soil Moisture

John Bolten and Carsten Montzka

Good Practices Document

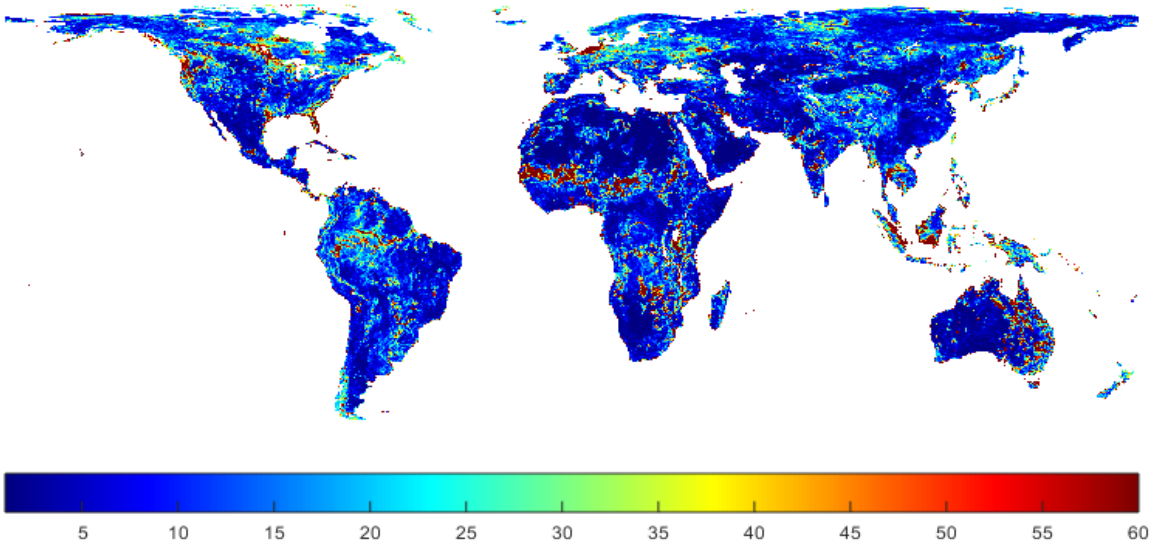
Montzka, C., M. Cosh, B. Bayat, A. Al Bitar, A. Berg, R. Bindlish, H. R. Bogena, J. D. Bolten, F. Cabot, T. Caldwell, S. Chan, A. Colliander, W. Crow, N. Das, G. De Lannoy, W. Dorigo, S. R. Evett, A. Gruber, S. Hahn, T. Jagdhuber, S. Jones, Y. Kerr, S. Kim, C. Koyama, M. Kurum, E. Lopez-Baeza, F. Mattia, K. McColl, S. Mecklenburg, B. Mohanty, P. O´Neill, D. Or, T. Pellarin, G. P. Petropoulos, M. Piles, R. H. Reichle, N. Rodriguez-Fernandez, C. Rüdiger, T. Scanlon, R. C. Schwartz, D. Spengler, P. Srivastava, S. Suman, R. van der Schalie, W. Wagner, U. Wegmüller, J.-P. Wigneron, F. Camacho, and J. Nickeson (2020). **Soil Moisture Product Validation Good Practices Protocol** Version 1.0. In: C. Montzka, M. Cosh, J. Nickeson, F. Camacho (Eds.): *Good Practices for Satellite Derived Land Product Validation* (p. 123), Land Product Validation Subgroup (WGCV/CEOS), DOI: 10.5067/doc/ceoswgcv/lpv/sm.001

Good Practices Paper

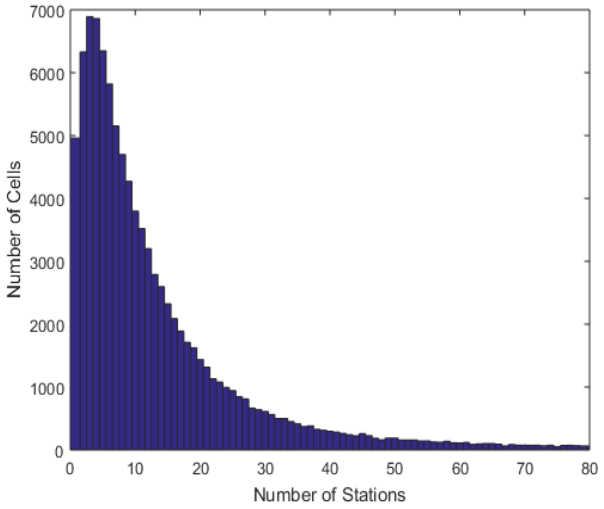


Gruber, A., G. De Lannoy, C. Albergel, A. Al-Yaari, L. Brocca, J.-C. Calvet, A. Colliander, M. Cosh, W. Crow, W. Dorigo, C. Draper, M. Hirschi, Y. Kerr, A. Konings, W. Lahoz, K. McColl, C. Montzka, J. Muñoz-Sabater, J. Peng, R. Reichle, P. Richaume, C. Rüdiger, T. Scanlon, R. van der Schalie, and W. Wagner (2020): Validation practices for satellite soil moisture retrievals: What are (the) errors? Remote Sensing of Environment 244, 111806. DOI:10.1016/j.rse.2020.111806

Number of needed stations



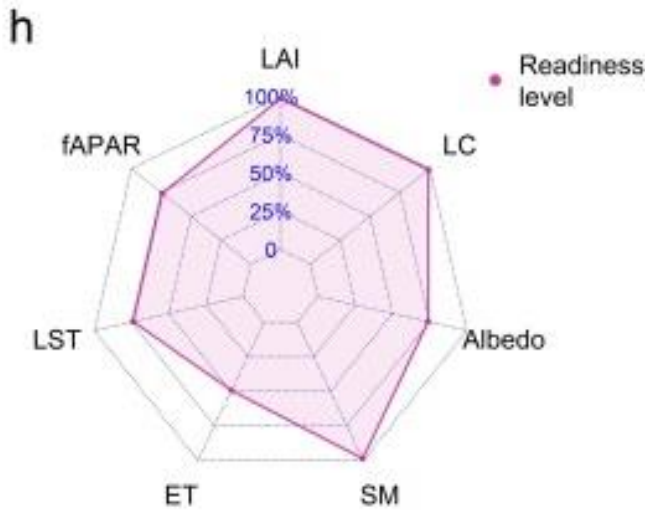
Number of stations required for adequate validation of coarse soil moisture products (here the SMAP 36km example).



Histogram of global number of stations required to adequately estimate the mean soil moisture in a SMAP 36 km grid cell.

Montzka, C., H. R. Bogena, M. Herbst, M. H. Cosh, T. Jagdhuber, and H. Vereecken (in press): Estimating the number of reference sites necessary for the validation of global soil moisture products. IEEE Geoscience and Remote Sensing Letters. DOI:10.1109/LGRS.2020.3005730

Analyzed Operational Readiness

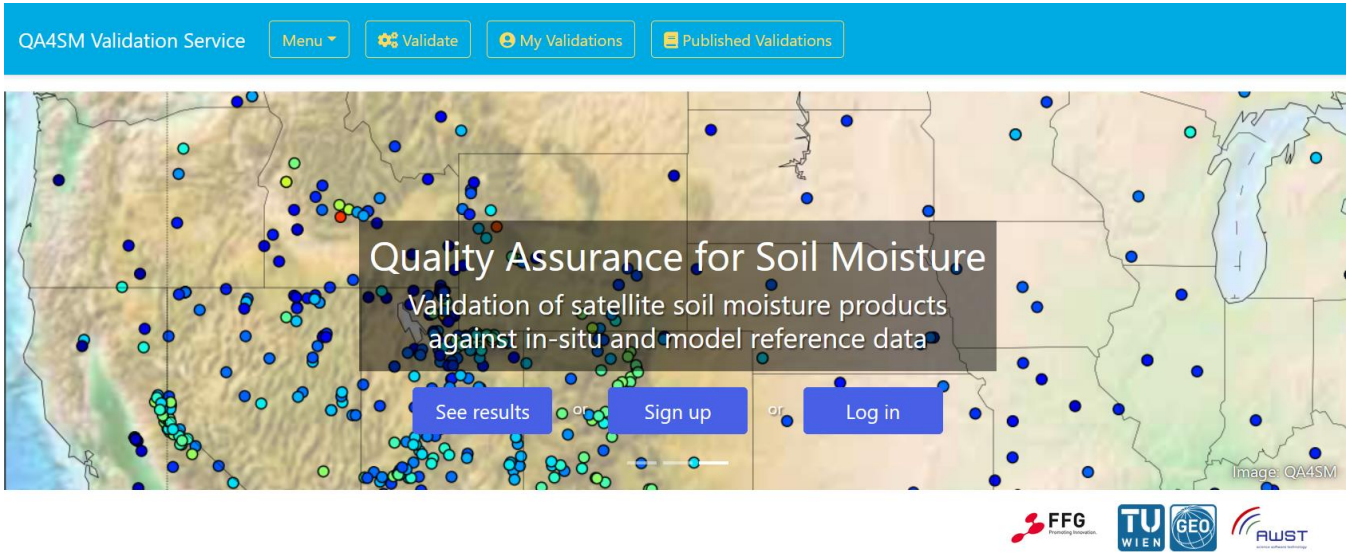


Bayat, B., F. Camacho, J. Nickeson, M. Cosh, J. Bolten, H. Vereecken, and C. Montzka (2021): Toward Operational Validation Systems for Global Satellite-Based Terrestrial Essential Climate Variables. International Journal of Applied Earth Observations and Geoinformation 95, 102240. DOI:10.1016/j.jag.2020.102240

International Soil Moisture Network (ISMN)

- 71 networks contributed so far with 2843 stations!
- Developing methods that allow to qualify as Fiducial Reference Measurements

QA4SM Online Validation Tool



Overview QA4SM

The Quality Assurance for Soil Moisture (**QA4SM**) service provides the user with:

- An easy-to-use interface for comparing satellite soil moisture data against land surface models and the international soil moisture network
- A traceble and consistent methodology for all comparisons
- Various filtering and scaling options to assess the impact of these on the validation results
- Traceable validation results in netCDF format and as visualisations (graphs and maps)

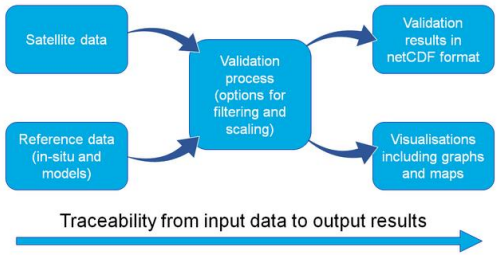
The overall aim is to **bring together methodologies and protocols** used for the validation and quality control of soil moisture data products and provider users with **traceable validation results**.

QA4SM is supported by the Austrian Space Application Programme.

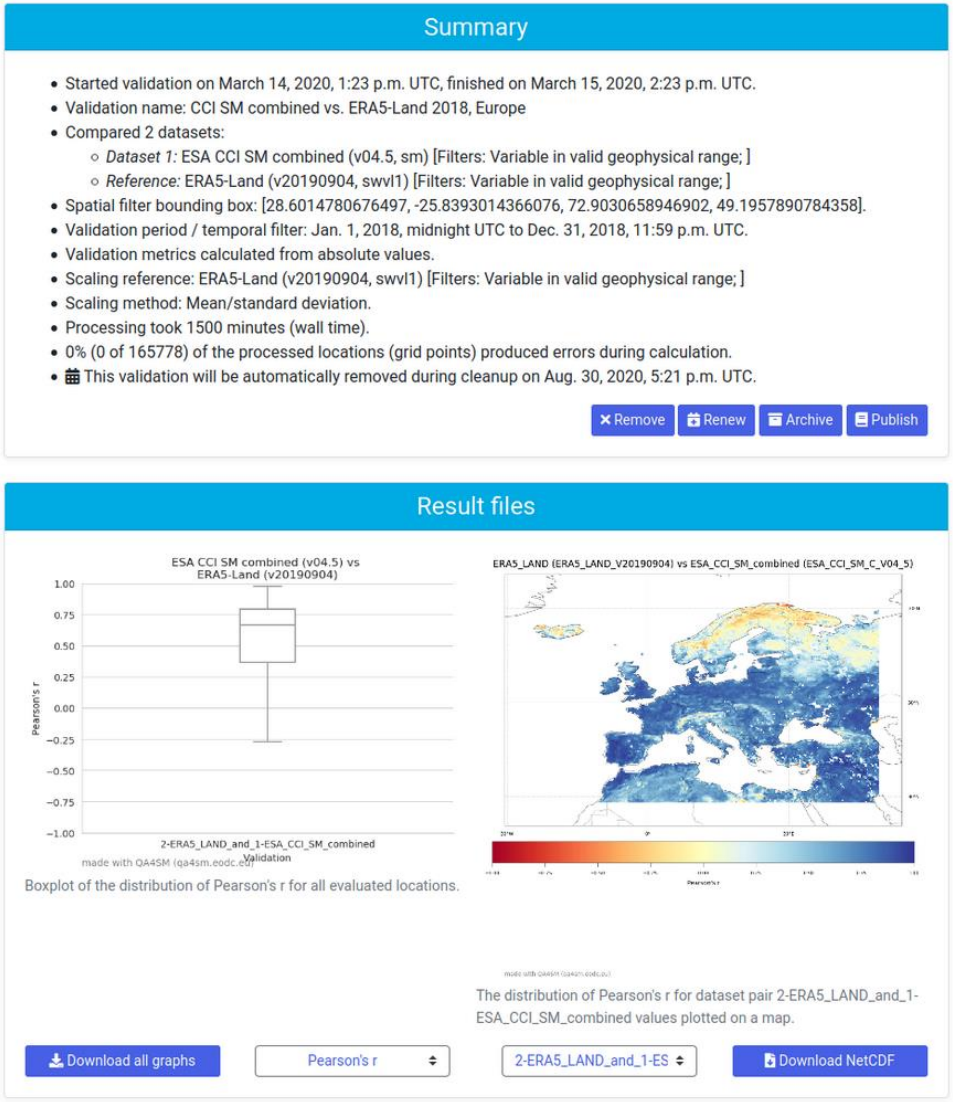
News

2021-05-05

- Version v1.5.1 released
  For all changes see the release notes

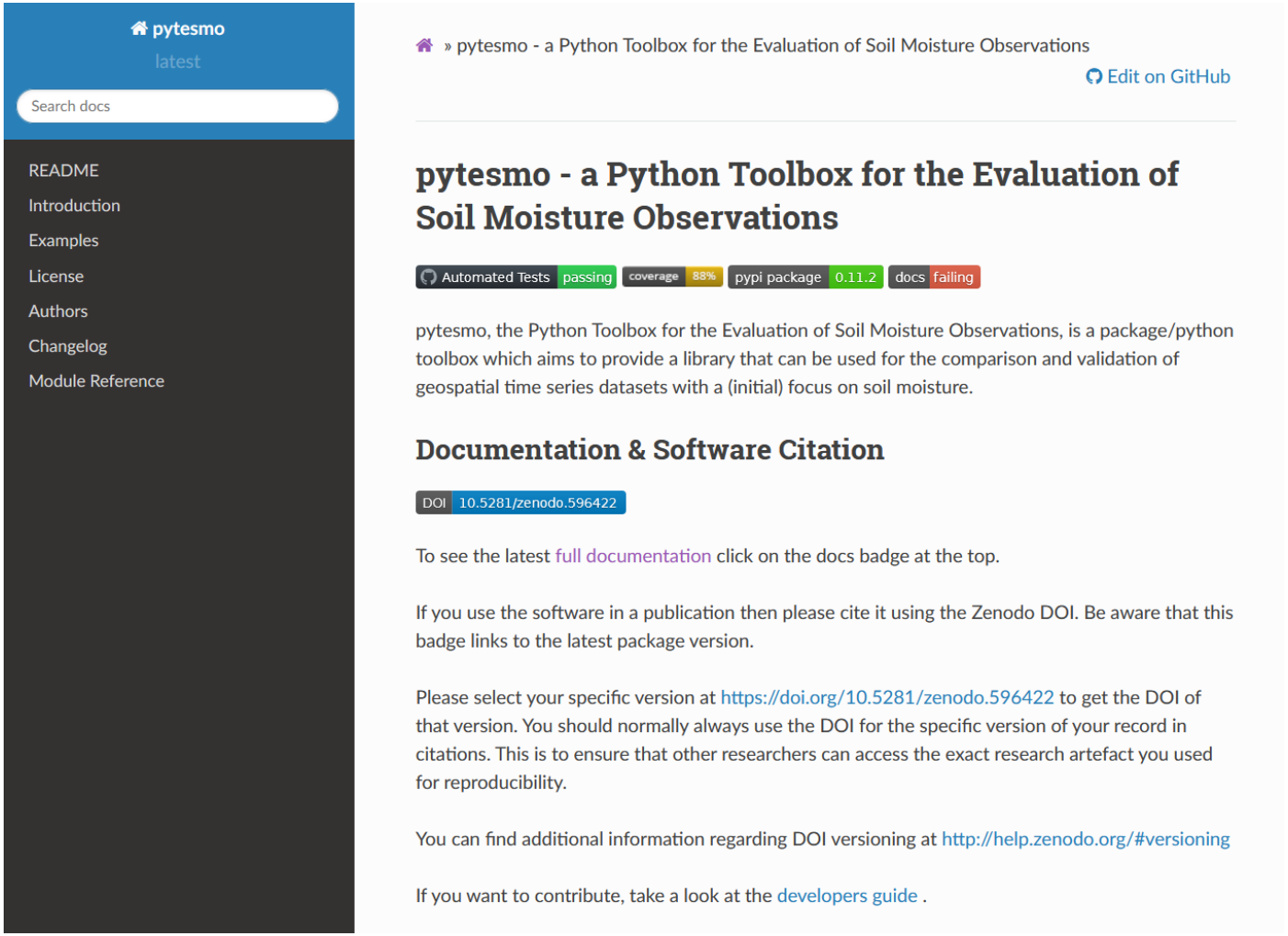


QA4SM Online Validation Tool



- Based on ISMN and SM simulations (ERA5_Land, GLDAS, ESA CCI)
- Traceble and consistent methodology
- Various filtering and scaling options
- Standardized validation reports (provided in netCDF format and as visualisations)

Python toolbox for validation



Workshops

- 6th Satellite Soil Moisture Validation and Application Workshop, likely postponed to Spring 2022, Perugia, Italy (now planned to be in person and virtual). Details TBD.
- 7th Satellite Soil Moisture Validation and Application Workshop, Fall 2022, New Orleans, USA
- 2021 National Soil Moisture Workshop Virtual. August 18-19, 2021. US-focused workshop to discuss applications research and new concepts related to soil moisture monitoring. National Coordinated Soil Moisture Monitoring Network.

Other

- National Coordinated Soil Moisture Monitoring Network (NCSMMN) Strategy document was formally approved by NOAA, will be available soon on drought.gov.