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QA4SM - An Online Validation Service for EO Soil Moisture Data Users and Producers

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Soil Moisture Data Validation

Data validation is an integral part of most satellite soil moisture (SM) related studies. Data produces need to verify the correctness of their products, and users are interested in identifying the best data for their application.

Best practice guidelines for satellite SM validation exist (Gruber et al., 2020), but are often not strictly followed. QA4SM implements these best practices in a powerful and easy-to-use **online validation tool**.

Quality Assurance for Soil Moisture
Validation of satellite soil moisture products against in-situ and model reference data
See results | Sign up | or | Log in

QA4SM offers a wide range of datasets and settings to customize a validation run. Users can share their validation runs, reproduce the results of other users and assign digital object identifiers (DOIs) to their outputs to make them citable.

Try it at https://qa4sm.eu

Data Selection

1
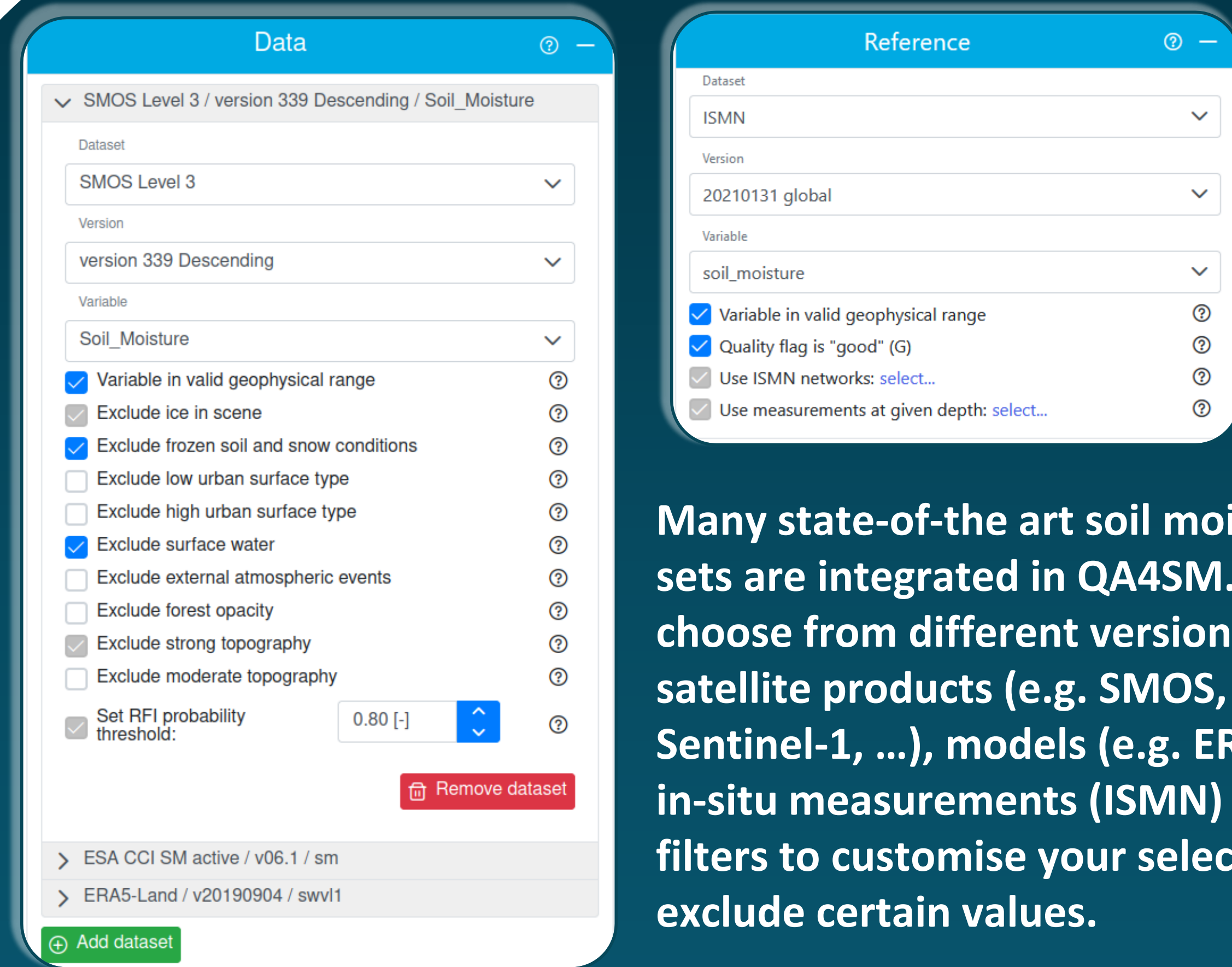
Many state-of-the art soil moisture data sets are integrated in QA4SM. You can choose from different versions of satellite products (e.g. SMOS, SMAP, Sentinel-1, …), models (e.g. ERA5) and in-situ measurements (ISMN) and apply filters to customise your selection or exclude certain values.
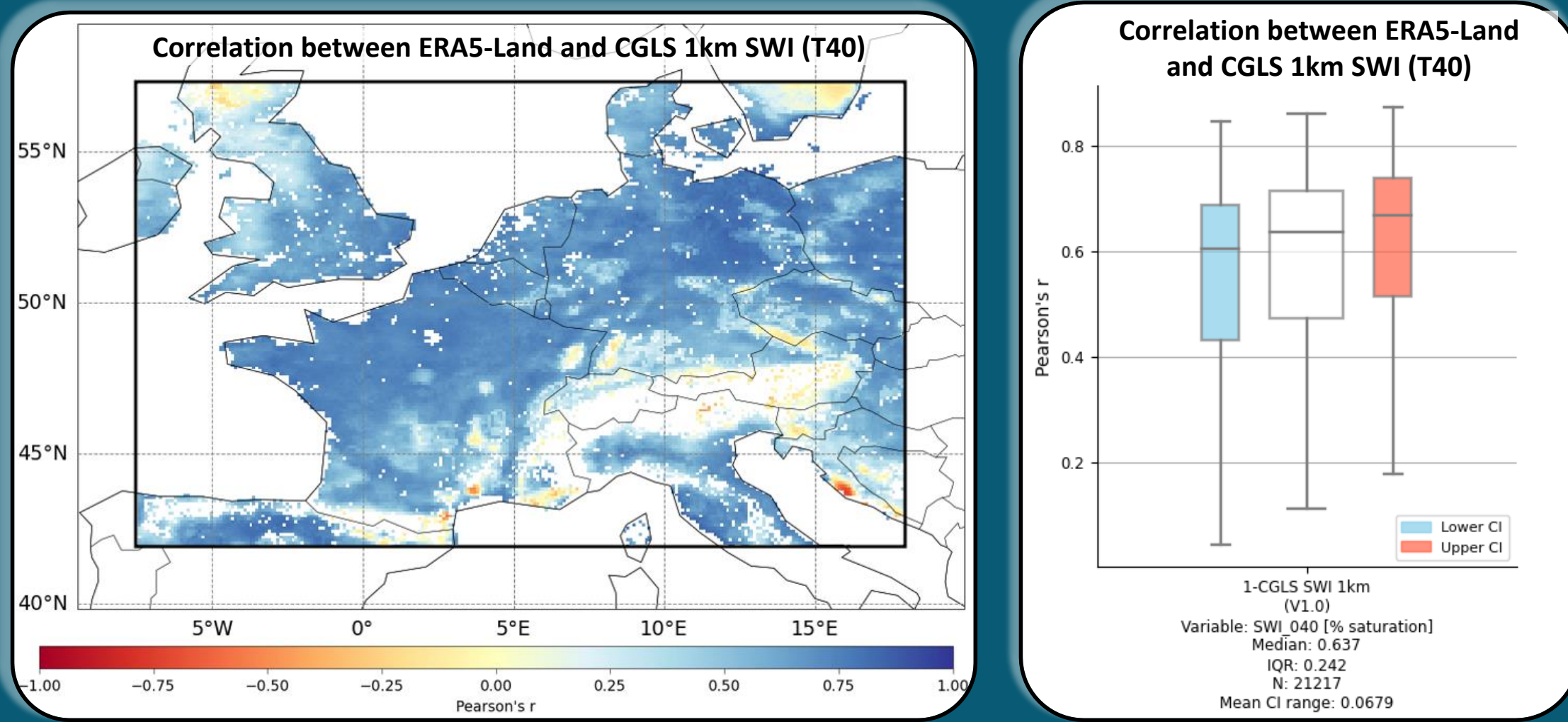
The possibility to upload your own data is foreseen for the near future.

Process

Computations are preformed on powerful cloud infrastructure.

Different metrics are computed (e.g. Correlation Coefficients, unbiased Root-Mean-Square-Differences, Bias, … and more).

3

Correlation between ERA5-Land and CGLS 1km SWI (T40)

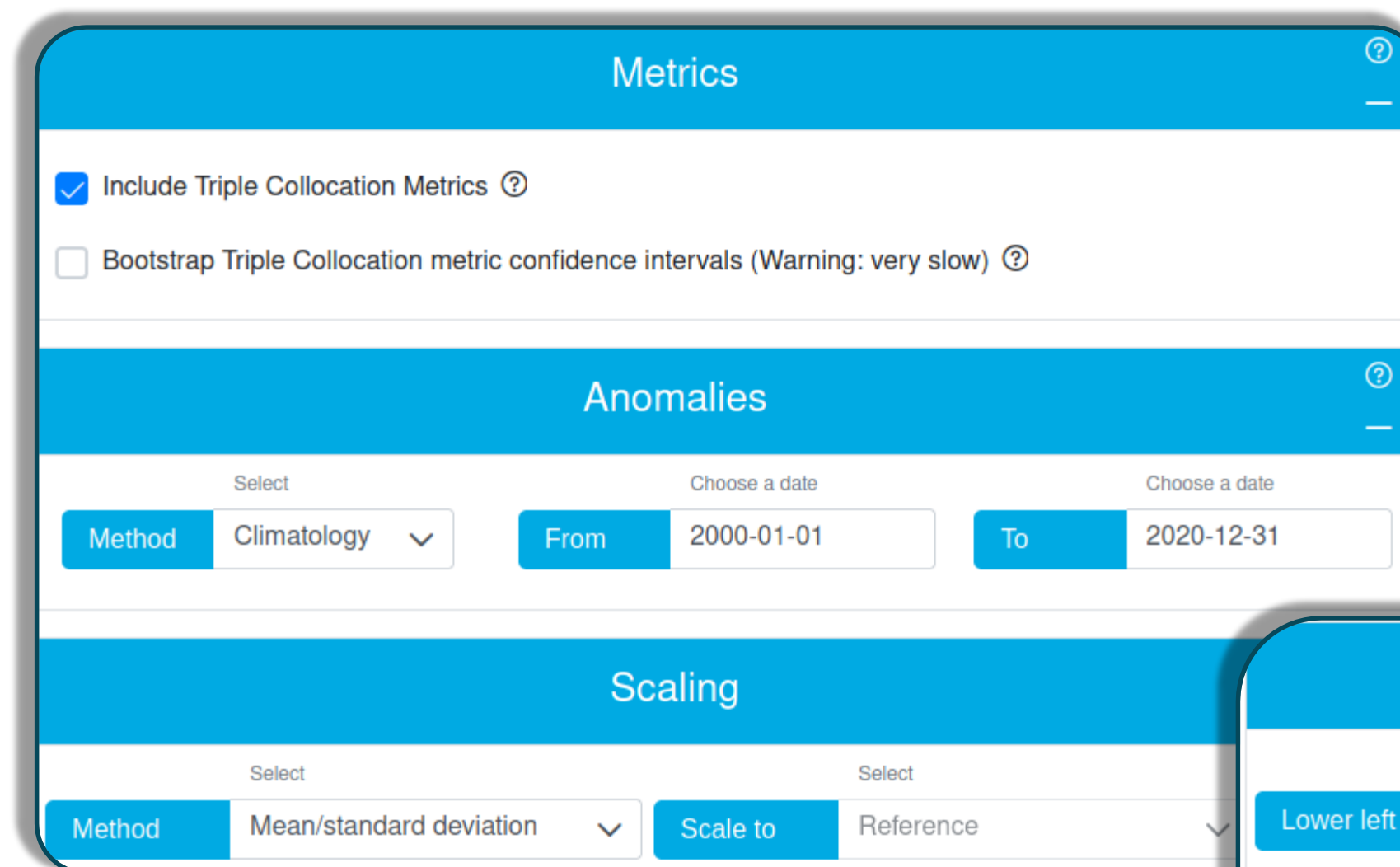Correlation between ERA5-Land and CGLS 1km SWI (T40)

Validation results are provided as summary statistics and (downloadable) plots.

Expert users can download results in NetCDF format (for further processing).

2 Customise Settings

Metrics

Anomalies

Scaling

(↓Fig.) You can specify a temporal and/or spatial subset of data to evaluate, the window size to temporally match them, and activate Triple Collocation Analysis with Bootstrapping to compute confidence intervals for all validation metrics.

Spatial Subsetting

Temporal Subsetting

(↑Fig.) QA4SM provides different scaling methods (e.g. CDF matching) to account for biases between datasets.

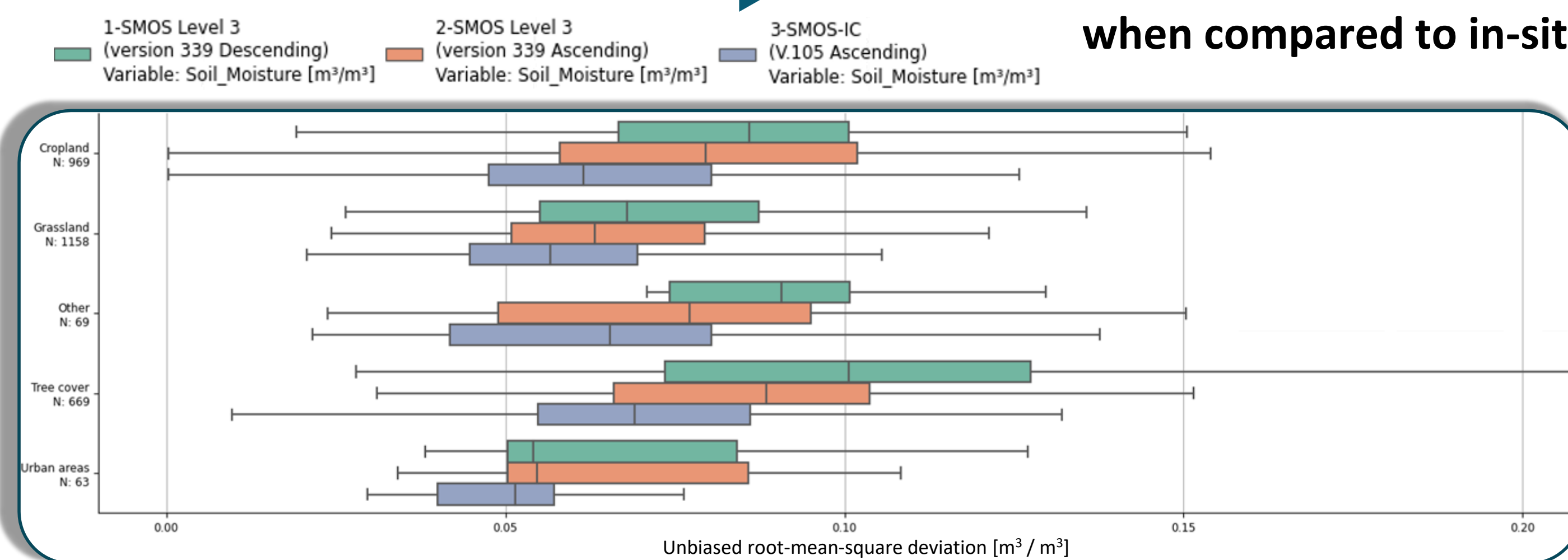You can evaluate anomalies (relative to a chosen climatological reference period) or absolute values.
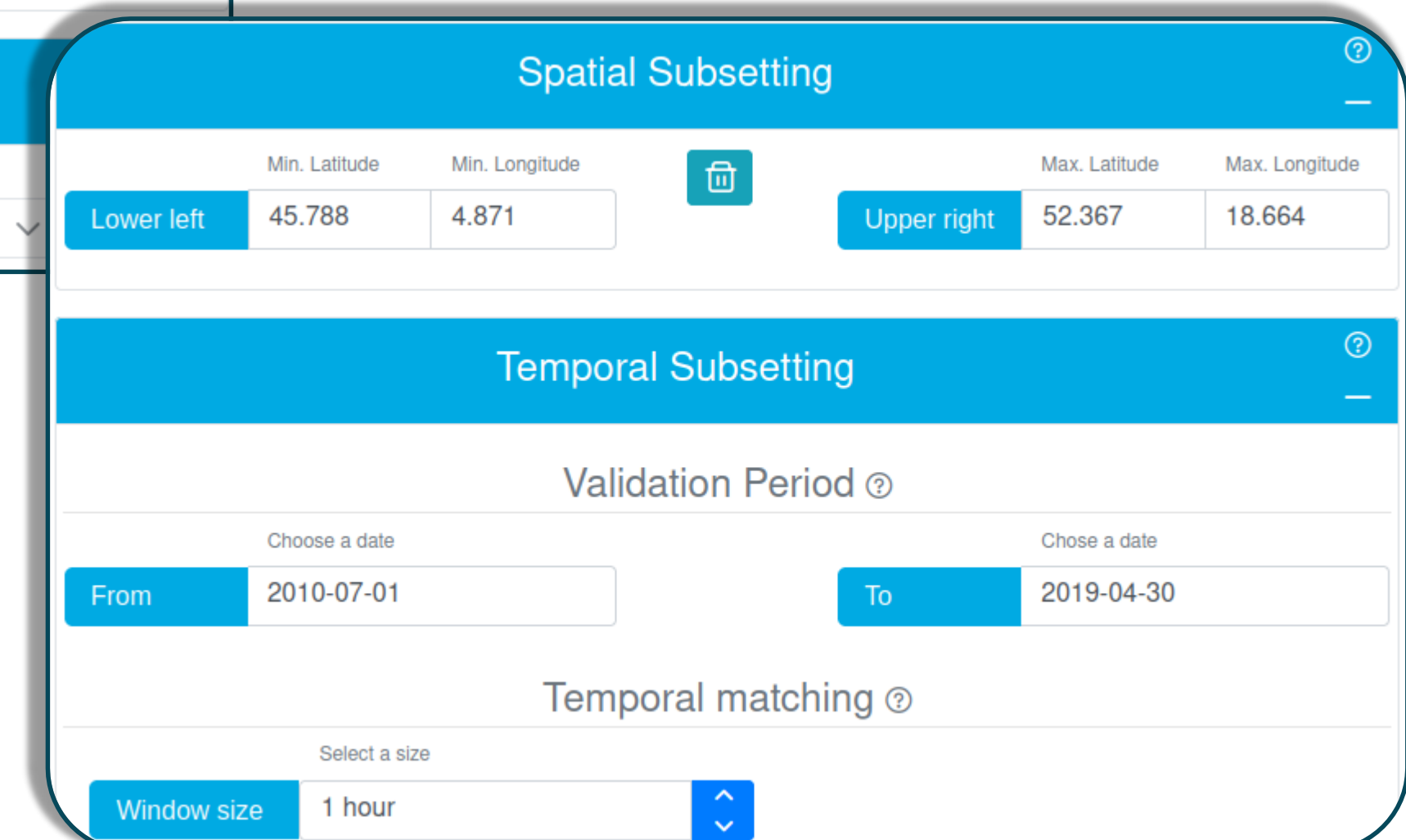
Analyse, Download & Share 4

The recently added aggregation of results by metadata groups (e.g. land-cover / climate class, soil type, …) shows how environmental factors influence the quality of satellite SM observations when compared to in-situ measurements.

(←Fig.) This example shows the different performance of two SMOS SM retrieval algorithms, resp. orbits for 5 land-cover groups (by ubRMSD).

Interested?

Join our **workshop on June 7th** in Perugia (Italy) as part of the "6th Satellite Soil Moisture Validation and Application Workshop" or **online**!

Workshop Registration

Fill out the short ↑ **registration form** with more details now …

… or contact us at **support@qa4sm.eu**

(→Fig.) This comparison shows the difference in correlation with ERA5 SM between SM from passive (SMAP) and active (ASCAT) sensor observations (note the difference for deserts and rainforest).
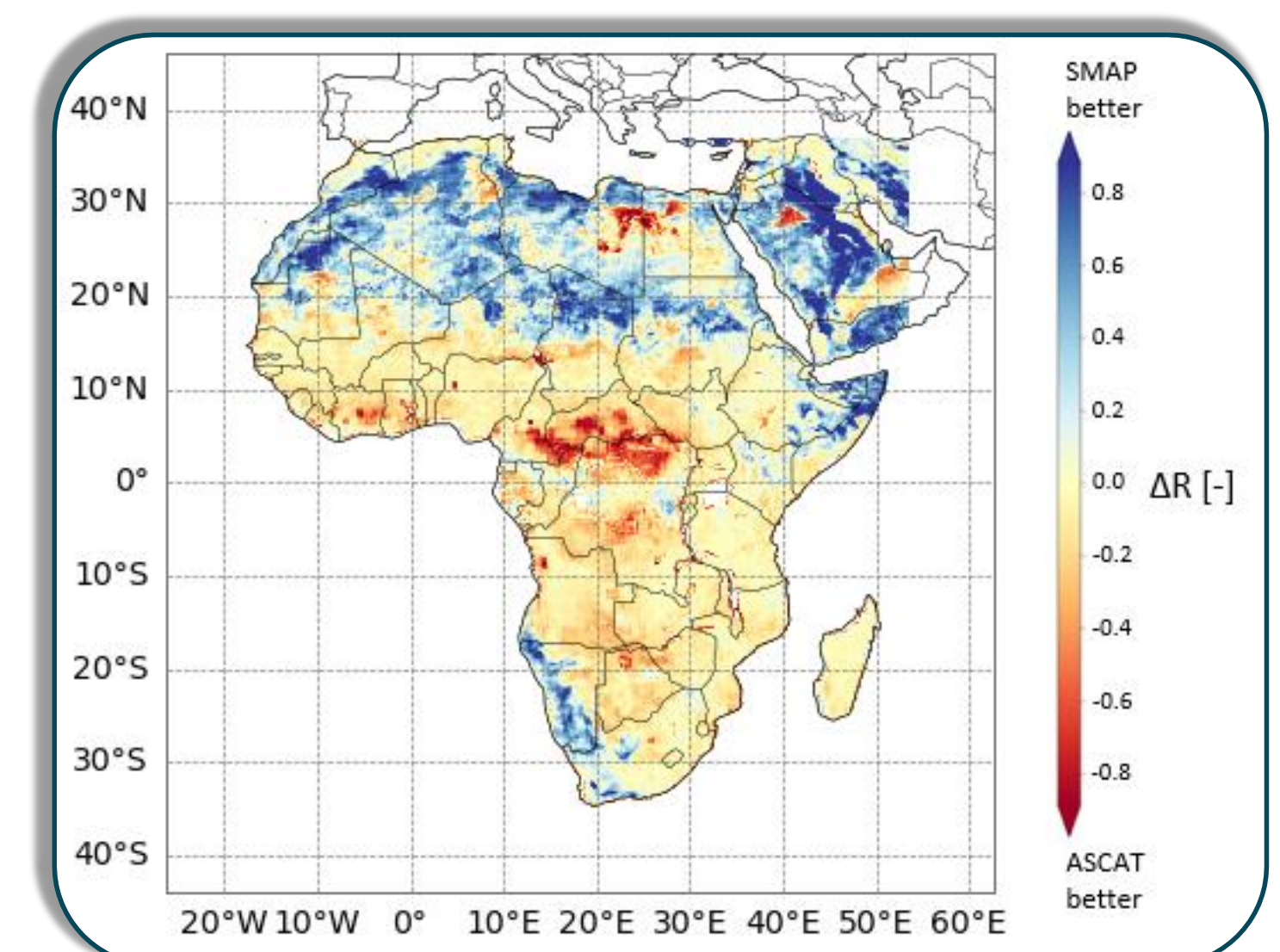
You can publish your validation results. This will archive them on an external platform and assign a Digital Object Identifier (DOI) to make them unique and citable.

Your results will be traceable and reproducible by other users of the service.

References
Gruber, A., De Lannoy, G., Albergel, C., Al-Yaari, A., Brocca, L., Calvet, J.C., Colliander, A., Cosh, M., Crow, W., Dorigo, W., and others 2020. Validation practices for satellite soil moisture retrievals: What are (the) errors? Remote Sensing of Environment, 244, p.111806.