



## Validation practices for satellite-based Earth observation data across communities

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The validation of satellite-based measurements and their uncertainties is a challenge common to all Earth Observation (EO) communities, each of which attempts to assess the fitness-for-purpose of the satellite dataset for specific scientific or public-service applications, and to ensure the traceability of the measurements to fundamental standards such as the *Système International d'Unités* (SI). We report here on the activities and outcomes of an International Space Science Institute (ISSI) team, organized and led by the late Alexander Löw, who brought together land, ocean, and atmosphere validation experts, with the aim to share expertise and tools across EO communities. Besides two workshop meetings held at the ISSI headquarters in Bern, Switzerland, a key achievement was the joint writing of a review paper (Loew et al., *Reviews of Geophysics*, v55, 2017). We present here the main messages and some key illustrations from this work, e.g. on terminology that is in line with metrological practices, on traceability requirements for reference data, and on basic and advanced comparison metrics and methods. A specific focal point of the team, and of this contribution, is the issue of scale mismatch between ground-based reference data and satellite remote sensing observations. Since neither spatio-temporal resolution nor sampling pattern ever perfectly agree between reference and satellite data products, the resulting comparison uncertainties must be minimized with appropriate co-location schemes. Moreover, in many cases, non-reducible mismatch errors must be quantified to obtain uncertainty budget closure in the comparison. We end by stressing the need for clearly defined user requirements to allow translation of validation results into an assessment of the fitness-for-purpose of the EO data products.