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Continuous assessment of land mapping accuracy at High Resolution from global networks of atmospheric and field observatories –concept and demonstration

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In the context of global climate change and adjustment/resilience policies' design and implementation, there is a need not only i. for environmental monitoring, e.g. through a range of Earth Observations (EO) land "products" but ii. for a precise assessment of uncertainties of the aforesaid information that feed environmental decision-making (to be introduced in the EO metadata) and also iii. for a perfect handing of the thresholds which help translate "environment tolerance limits" to match detected EO changes through ecosystem modelling.
Uncertainties' insight means precision and accuracy's knowledge and subsequent ability of setting thresholds for change detection systems. Traditionally, the validation of satellite-derived products has taken the form of intensive field campaigns to sanction the introduction of data processors in Payload Data Ground Segments chains. It is marred by logistical challenges and cost issues, reason why it is complemented by specific surveys at ground-based monitoring sites which can provide near-continuous observations at a high temporal resolution (e.g. RadCalNet). Unfortunately, most of the ground-level monitoring sites, in the number of 100th or 1000th, which are part of wider observation networks (e.g. FLUXNET, NEON, IMAGINES) mainly monitor the state of the atmosphere and the radiation exchange at the surface, which are different to the products derived from EO data. In addition they are "point-based" compared to the EO cover to be obtained from Sentinel-2 or Sentinel-3.
Yet, data from these networks, processed by spatial extrapolation models, are well-suited to the bottom-up approach and relevant to the validation of vegetation parameters' consistency (e.g. leaf area index, fraction of absorbed photosynthetically active radiation). Consistency means minimal errors on spatial and temporal gradients of EO products.
Test of the procedure for land-cover products' consistency assessment with field measurements delivered by worldwide networks will be presented. The samples' extrapolation models will make use of the conventional geographic variables (e.g. major biogeographical or biomes, climatic and socio-economic zones and different ecosystem types and land cover classes, focusing on important ecosystems such as forests and grasslands). Focus will be on i. upscaling procedures, from in-situ data to land products matchup, ii. continuous calibration (spectral, radiometric) and adjustment (geometric, radiometric) of processors.