EGU24-11565, updated on 12 Sep 2024
https://doi.org/10.5194/egusphere-egu24-11565
EGU General Assembly 2024

Advancing soil moisture estimation across scales: insights from the SoMMet Project

Sadra Emamalizadeh[1], Alessandro Pirola[2], Cinzia Alessandrini[2], Anna Balenzano[3], and Gabriele Baroni[1]

[1]DISTAL, University of Bologna, Italy
[2]Arpae Emilia Romagna, Italy
[3]National Research Council of Italy (CNR)

The accurate estimation of soil moisture is fundamental for understanding hydrological processes and optimizing water resource management, particularly in agricultural areas. The SoMMet project, a joint research project within the Programme 'European Partnership on Metrology' of EURAMET, contributes significantly to this field by developing and establishing a metrological framework for soil moisture measurements covering lateral scales ranging from the decimetre to kilometre. Among the different research activities, the project aims to compare and harmonize various soil moisture observation methods, addressing their uncertainty, sensing volume, and systematic effects. This involves a systematic review of methods, comparison of their spatial and temporal characteristics, and the development of a harmonization approach.

In line with these activities, in this contribution we present the comparison performed between a remote sensing product, Soil Water Index (SWI) by Copernicus Global Land Service (CGLS), and soil moisture estimated by ground-based Cosmic-Ray Neutron Sensors (CRNS). The study, conducted in 4 sites in Northern Italy, spans the entire growing season of 2021 and incorporates SWI data at multiple depths. We explore the correlation between vegetation vigor (NDVI) and soil moisture trends to understand the spatial mismatch among soil moisture products. The results show a general good correlation between remote sensing and ground measurements. The agreement between the two soil moisture observations, however, is not consistent in time. The differences are mainly attributed to the role of the vegetation.

This research is pivotal for identifying representative spots for ground measurements, enhancing the utility of soil moisture products across applications. In conclusion, our abstract showcases the importance of advancing soil moisture estimation methods, addressing uncertainties and representativeness. The integration of metrological principles, harmonization approaches, and comparisons between different observation methods demonstrates the holistic approach in enhancing our understanding of soil-water dynamics.