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## SATELLITE-BASED CLIMATE SERVICES FOR SOIL MOISTURE, DROUGHT, AND IRRIGATION

### Abstract

Soil moisture is an important controlling factor in many physical, biological and hydrologic processes that take place on the land surface and at the land-atmosphere boundary. Its monitoring is critical for several areas of socio-economic benefit, including food security, epidemiology, ecosystem services and water resources management.

Various microwave satellite missions provide global soil moisture data but putting present observations into a historical perspective calls for long-term data products. The European Space Agency's Climate Change Initiative (ESA CCI) combines multiple microwave satellite missions into a long-term, harmonized soil moisture Climate Data Record covering almost 45 years. Its operational, short-latency production has been established in the Copernicus Climate Change Service (C3S), with the goal of generating and distributing soil moisture climate data with short latency for operational applications.

Several prototype services exploit these operationally produced soil moisture products to produce novel datasets that are close to the end user. One of them is the Global Gravity-based Groundwater Product (G3P.eu), which uses C3S soil moisture in combination with terrestrial water storage observations and other C3S products to derive a long-term dataset of groundwater variations. In addition, various drought applications profit from these soil moisture climate data records, often in combination with other long-term observational datasets, e.g. of plant productivity or vegetation water content. Ultimately, they can be used to quantify historic and actual irrigation water volumes.

This presentation will give an overview of the CCI and C3S soil moisture climate services and derived applications, and identify shortcomings in current observing systems that need to be prioritized to further promote public and private user uptake.