Trends in soil moisture extremes from a 32-years multi-satellite dataset

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Long-term trends in water cycle components are expected to occur as a result of higher mean temperatures. In addition, changes in extreme events are anticipated to take place as a result of atmospheric warming. Soil moisture with its position at the interface between the atmosphere and the land surface is likely to be subject to these trends. In-situ measurements of soil moisture are often not representative for larger areas while soil moisture products based on satellite data usually only cover recent time periods. Novel sensor fusion techniques have however led to datasets covering a time span of more than 20 years.

In the framework of the "Water Cycle Feasibility Study" (WATCHFUL) funded by the European Space Agency (ESA), trends in surface soil moisture extremes are assessed from a dataset that has been derived by combining data from active and passive microwave sensors and which spans a period of 32 years. Trends in extreme values are usually assessed by fitting an extreme value distribution but the use of other methods like quantile regression is also evaluated. The consistency of the retrieved trends is checked against reanalysis data and observations of related water cycle components such as precipitation, evapotranspiration and streamflow.