



Spatial representativeness of soil moisture using in-situ, remote sensing and land-reanalysis data

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This study investigates the spatial representativeness of absolute soil moisture dynamics and its temporal anomalies over North America. To determine the robustness of the method and accuracy of the results, we first inter-compare the findings using in-situ observations, remote-sensing soil moisture of the recent ESA CCI ECV-SM (v02.0) and land-surface model (ERA Interim/Land) estimates. It is shown that for absolute soil moisture, ECV-SM and ERA Interim/Land perform similarly, with ERA-Land showing slightly more similarity to in-situ, while for the anomalies ECV-SM showed more similarity in spatial representativeness with the in-situ data. When taking into account all grid cells of ECV-SM and ERA-Land to calculate spatial representativeness, the found patterns are comparable for about 50% of the grid cells for absolute values and 60% for the anomalies. The differences in spatial representativeness between the single products can be related to the products source characteristics, i.e. for ECV-SM low similarities are found in topographically complex terrain and areas with dense vegetation, while for ERA-Land a smoothing effect of topography likely influences the meteorological forcing and consequently soil moisture and its representativeness. A first application for climate research is conducted by relating the spatial representativeness to teleconnection patterns. It is found that the temporal dynamics of soil moisture in areas of high spatial representativeness can be related to such large scale meteorological forcing.