



## Analysis of Soil Moisture Memory in Europe

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Over land a significant amount of water is stored in the soil, of which soil moisture in the top meter has the largest influence on the atmosphere through various interactions. Soil moisture shows similar long-term memory effects as sea-surface temperatures (SST) as a result of its integrative behaviour (e.g. Seneviratne et al, 2010). Nevertheless soil moisture initialization is generally not considered in operational seasonal forecasting. It would be especially promising in the midlatitudes where seasonal soil moisture variations are large and seasonal predictions based on SST initialization only have generally limited or no significant skill (in particular in Europe), due to the lack of regular SST oscillation patterns such as those impacting tropical climate. Recent research suggests that a realistic soil moisture initialization can improve subseasonal forecast skill significantly in regions with high-quality precipitation data and strong land-atmosphere coupling (Koster et al. 2010a,b; van den Hurk et al. 2010).

We present here a comprehensive analysis of soil moisture memory characteristics in Europe, based on available measurements from various regions across the continent. The analysis considers temporal and spatial variations in soil moisture memory, as well as its dependency on the soil moisture regime. The analysis is based on models proposed by Delworth and Manabe (1988) and Koster et al. (2001) as well as an extension thereof. The findings are also compared with memory characteristics of the Community Land Model and the Simple Biosphere Model based on simulations over the continent. This allows us to identify respective strengths and weaknesses of the land models, which is particularly relevant for the possible development of seasonal forecasting applications.

### References

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