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Propagation of soil moisture memory into the climate system

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Soil moisture is known for its integrative behaviour and resulting memory characteristics. Associated anomalies can persist for weeks or even months into the future, making initial soil moisture an important potential component in weather forecasting. This is particularly crucial given the role of soil moisture for land-atmosphere interactions and its impacts on the water and energy balances on continents.
We present here an analysis of the characteristics of soil moisture memory and of its propagation into runoff and evapotranspiration in Europe, based on available measurements from several sites across the continent and expanding a previous analysis focused on soil moisture [1]. We identify the main drivers of soil moisture memory at the analysed sites, as well as their role for the propagation of soil moisture persistence into runoff and evapotranspiration memory characteristics. We focus on temporal and spatial variations in these relationships and identify seasonal and latitudinal differences in the persistence of soil moisture, evapotranspiration and runoff. Finally, we assess the role of these persistence characteristics for the development of agricultural and hydrological droughts.

[1] Orth and Seneviratne: Analysis of soil moisture memory from observations in Europe; submitted to J. Geophysical Research.