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Does realistic land surface initialization improve sub-seasonal precipitation and air temperature forecasts?

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To forecast air temperature, precipitation and other meteorological parameters weeks to months in advance, prediction systems must take advantage of Earth system components that are predictable at such long time scales or that have a memory for several weeks. These components can transfer the predictability to the atmosphere. The ocean is a famous example with its thermodynamic memory. But the ocean has limited impact in many regions (e.g., continental midlatitude areas during summer). In these regions, soil moisture is accordingly more important. This is also the case in the Mediterranean region in present climate, and is expected to become more significant in Central Europe in coming decades (Seneviratne et al. 2006).

The second phase of the Global Land-Atmosphere Coupling Experiment (GLACE-2) is aimed at quantifying the degree to which realistic land surface initialization contributes to the seasonal forecasting of temperature and precipitation. For this purpose, different seasonal forecast systems and climate models (e.g. ECHAM5-JSBACH) were used to perform the same set of simulations (Koster et al., subm.). First results, which focus on North America, show significant contributions to the temperature prediction skill out to two months across large areas of the continent. The contributions to skill are much weaker for precipitation but they are still significant (Koster et al., subm.). We will present these first results, with a focus on the simulations performed with ECHAM5-JSBACH.

References:

Koster, R.D., et al., 2009: The contribution of Land Surface Initilization to Subseasonal Forecast Skill: First results from the GLACE-2 Project, subm. to GRL

Seneviratne, S.I., D. Lüthi, M. Litschi, and C. Schär, 2006: Land-atmosphere coupling and climate change in Europe. Nature, 443, 205-209.