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Soil-atmosphere interactions, cloud feedback and land-sea contrast: their interactions and role in the uncertainties of regional climate projections over Europe.

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Regional climate models suggest that the European climate in summer will undergo severe changes during the 21st century in response to anthropogenic forcing. In particular, a large increase in surface atmospheric temperature and a substantial decrease in precipitation over central and southern Europe are to be expected. However, a large inter-model spread exists and the exact magnitude of those changes therefore remains poorly constrained.
An important step towards a reduction of those uncertainties lies in a better understanding of the mechanisms that impact European climate change during summer. Then, the evaluation of the models focused on those processes could help to define useful performance metrics, to give more or less weight to the models' projections according to their realism in the simulation of the key mechanisms.

Within this framework, this presentation will describe some results of the analysis of a large ensemble of regional climate projections at a resolution of 25 km over Europe for the middle of the 21st century from the European ENSEMBLES project. Our study is more specifically focused on three different mechanisms that have been described previously as potential player in European climate change during summer: soil-atmosphere interactions and in particular the role of local soil moisture on latent heat flux, cloud feedback, and the land-sea contrast in surface warming.
We will show that large uncertainties exist in how those processes affect future climate change projections over Europe in the different models, with a significant impact on simulated temperature and precipitation changes. We will also show that those different processes are in fact closely linked. Finally, we will present some potentially useful performance metrics related to those processes, as some relationships are found between how those processes impact future climate projections and how they play in the context of present-day inter-annual variability.