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Understanding differences in land-atmosphere interactions between pan-European convection-permitting and parametrised climate models

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Increasingly, we are using high-resolution convection-permitting models for climate projections but these models are less well understood in terms of the interaction between soil moisture, precipitation and evapotranspiration. The work was motivated by the discovery of warm, dry biases in summer in the 2.2 km convection-permitting model over France and eastern Europe compared to the 12 km convection-parametrised model that were associated with drier soils. We analyse several 12 km and 2.2 km versions of the Met Office Unified Model including sensitivity tests relating to soil hydraulics, land cover type and runoff model. We conduct similar tests using the land surface only to compare results between online and offline versions as the absence of some feedbacks can also produce differences.