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Tropical North Atlantic SSTs linked to European summer temperature variability?

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Surface temperatures over central Europe have shown record-breaking events during the past two decades. However, their prediction in general and in particular the seasonal prediction skill of European summer temperatures is still very limited in state-of-the art prediction systems. Recent studies find that the summer North Atlantic Oscillation (SNAO) shows some seasonal predictability for summertime European temperatures. However, while the SNAO has a north-south pressure gradient and its impact is concentrated on northern and southern Europe, it does not explain temperature variations in central Europe. Here we consider a different pattern of summer climate variability over the North-Atlantic-European sector, marked by a zonal pressure gradient. This pressure structure is part of a wave-train structure, which previously has been suggested to have an impact on central European summer temperatures (e.g., Saeed et al., 2014). Here, we show that such a wave-train is coherent with the zonal pressure structure and associated temperature variations over central Europe. We also show that this zonal pressure structure links summer temperatures in Europe with SSTs in the North Atlantic. We examine this mechanism in ERA-Interim and historical simulations of the coupled model MPI-ESM and propose that it is a baseline for the improvement of seasonal climate predictions of European summers.