

Attribution of recent changes in European temperature variability

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Changes in occurrence and intensity of midlatitude extreme weather has been an important topic in recent years. In particular, Europe has experienced many extreme temperature events in the past two decades. While a lot of attention has been given to the attribution of specific extreme temperature events, uncertainty remains regarding a precise attribution of multi-decadal changes in European temperature variability and extremes. For instance, a robust quantification of external and internal driver influence on temperature variability changes is still lacking.

Based on observational datasets and all- and single-forcing CESM1 large ensembles, we present and discuss attribution results regarding changes in European temperature variability and extremes during the 1950-to-2018 period. We find that significant changes in temperature variability have only occurred in summer months (July and August) and October. While anthropogenic forcing can explain a large fraction (>50%) of summer changes, internal variability is the dominant driver in October. We then discuss the separate influence of greenhouse gases and aerosols on summer temperature variability changes. Finally, we revisit the role of two mechanisms that have been suggested in the literature as being key mechanisms for changes in summer temperature variability: 1. land-atmosphere interaction and soil moisture availability 2. changes in circulation including increased atmospheric flow waviness related to Arctic sea-ice loss.