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On the factors contributing to heat waves in Europe. A global large ensemble approach with MPAS

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The European summer heat wave of 2003 with record-breaking temperature anomalies was brought into connection with a blocking Omega circulation pattern, soil moisture deficit and high sea surface temperature, especially in the Mediterranean Sea. We investigate the potential factors influencing extreme heat waves in Europe with a very large ensemble obtained from multiple global integrations of the Model for Prediction Across Scales (MPAS). The global MPAS runs are performed in approximately 60 km resolution with sea surface temperature (SST) and sea ice extent from ERA-Interim data as boundary condition initialized on different days.

The contribution investigates the results obtained from a total of 540 simulations. It concentrates on the regional SST and weather patterns and moisture obtained in simulations contributing to the upper 10% of the resulting probability density function (PDF) of the summer daily mean and maximum temperature. The investigation considers in total eight standard evaluation domains in Europe as defined in the PRUDENCE project.