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Early heat warnings for European workers

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The European HEAT-SHIELD project aims at increasing the thermal resilience of European workers in the context of global warming. As part of technical solutions to counter the heat-induced risk to workers' health and productivity we aim at providing robust meteorological heat predictions on different temporal scales and tailor the forecasts to specific needs of key European industries.
We here present a prototype system of a European early-warning system for heat stress episodes several weeks ahead based on operational forecast products of the European Centre for Medium-Range Weather Forecasts (ECMWF). The wet bulb globe temperature (WBGT) is applied as primary heat stress indicator. Ensemble forecasts of WBGT are used to derive daily probabilities of WBGT exceeding certain thresholds. The choice of appropriate thresholds allow to produce tailored heat risk predictions for different working sectors in consideration of different work intensities. Based on forecasts of the past 20 years, we analyze the performance of the predictions against an extensive European-wide observation data set. The results demonstrate that appropriate post-processing of forecast model output is essential for achieving skillful heat event predictions beyond 10 days lead time. Best forecast performance is found around the Baltic Sea and in Eastern Europe where skill (referenced against climatological forecasts) extends to lead times of about 20 days.