



Evaluation of the ERA5-based UTCI on mortality data in Europe

Aleš Urban (1), Claudia Di Napoli (2,3), Fiorella Aquacotta (4,5), Hannah Cloke (2), Jan Kyselý (1,6), and Florian Pappenberger (3)

(1) Institute of Atmospheric Physics CAS, Prague, Czech Republic (urban@ufa.cas.cz), (2) Department of Geography and Environmental Science, University of Reading, Reading, United Kingdom, (3) Forecast Department, European Center for Medium Range Weather Forecast, Sheffield, United Kingdom, (4) Centro interdipartimentale sui rischi naturali in ambiente montano e collinare - NatRisk, Turin, Italy, (5) Department of Earth Sciences, University of Turin, Turin, Italy, (6) Global Change Research Institute CAS, Brno, Czech Republic

The study was conducted on behalf of the MCC Collaborative Research Network (<http://mccstudy.lshtm.ac.uk/>).

Background: The Multi-City Multi-Country (MCC) network is an international collaboration of research teams working on a program aiming to produce epidemiological evidence on associations between weather and health. Sharing epidemiological and meteorological data allows the MCC members to investigate environment-health relationships across national boundaries. ERA5 is a novel climate reanalysis product from the ECMWF (European Centre for Medium-Range Weather Forecasts). It provides estimates of surface and atmospheric parameters at much higher resolution (31 x 31 km) than any previous climate reanalyses. From ERA5 parameters the Universal Thermal Climate Index (UTCI) can be computed as a gridded parameter at the ERA5 resolution for the whole European continent. **Methods:** Using daily mortality data from European members of the MCC Collaborative Research Network, we explored the potential of the ERA5-based UTCI as a health-related tool by evaluating UTCI-mortality relationships in 20 cities across 10 European countries. Distributed Lag Nonlinear Models (DLNM) were used to analyse exposure-response relationships between mortality and UTCI in selected cities calculated from (i) the ERA5 reanalysis and (ii) station-based data. Meta-analysis was used to pool the results for each city to bigger groups according to climate zones. **Results and Conclusions:** The first results suggest that ERA5-based UTCI is a useful tool for heat- and cold-related mortality assessment. The comparison of the exposure-response relationships between the ERA5- and station-based UTCI is an important step towards the development of a pan-European health-hazard warning system that would be able to assess thermal conditions in locations where high-quality station data are not available.