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Assessing health risks in Croatia for cases of severe weather via UTCI and PET

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As our climate is changing due to global warming, severe weather is expected to increase in frequency and it's intensity. Out of many examples of severe weather, we are focusing on cold and heat waves which greatly affect people causing increased mortality and morbidity. Also, some of the most important climate modifiers in Croatia are the Adriatic, the Mediterranean, the Dinarides orography, and the Pannonian plain. Because of this, the strongest winds in the Adriatic coast of Croatia are jugo and bora which can sometimes reach gale strength. They are associated with different weather conditions and can also have an impact on morbidity. For example, people describe a favorable impact on health and mood during most cases of moderate bora and unfavorable during moderate jugo episodes.

In this work, we are exploring the potential of the Universal Thermal Climate Index (UTCI) and Potential Equivalent Temperature (PET) as severe weather-related health risk indicators in Croatia. The UTCI and PET are bioclimate indices that use human heat balance models to represent the thermal stress and comfort that is induced in the human body by meteorological conditions. For a couple of continental, maritime, and mountain stations in Croatia UTCI and PET are calculated from measurements. The exception is the mean radiant temperature which is estimated from the Rayman model based again on the measurements of global radiation, air temperature, and relative humidity. The distribution of all-cause death counts at different UTCI and PET values is investigated to determine a more appropriate measure of health risk.

The UTCI and PET are calculated for the domain over Croatia for the selected cases of a heat wave, a cold wave, and strong wind episodes. The meteorological data used for the calculation of UTCI and PET are hourly NWP model ALADIN-HR output values of air temperature, relative humidity, wind speed, and mean radiant temperature. The UTCI and PET are compared and show good agreement. Results for the cases of strong wind show UTCI sensitivity to the wind but depend on the air temperature primarily.