

Monitoring and forecasting heat and cold waves in Europe

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Extreme temperature anomalies such as heat and cold waves may have a strong impacts on the human activities and health. The heat waves in Western Europe in 2003 and in Russia in 2010, or the cold wave in South-Eastern Europe in 2012 have generated a considerable amounts of lost and in total several hundreds of people died.

Providing an operational system to monitor and forecast extreme temperature anomalies in Europe is thus a primordial importance to help decision makers, users and emergency services to trigger different type of emergencies depending the intensity of a current event or the uncertainties of a forecasts.

In this study, the development and the validation of a complete tool of monitoring and forecasting extreme temperature anomalies are presented and allow providing seamless information with the uncertainties associated. In the first part of the study, the methodology applied, dealing with persistent quantiles of T_{min} and T_{max} above 0.85, will be presented. The climatology of the extreme events from 1995 to now will be then exposed, highlighting the spatial and temporal variabilities of the hazard. The uncertainties of the observation will be also discussed by comparing three different sets of observations. In the second part of the study, the assessment of the predictability of heat and cold waves will be presented. Thanks to a relative good reliability of the forecasted temperature, there is a benefit of using the forecasts to predict heat and cold waves. With some (temporal and spatial) uncertainties, the model is able to predict extreme waves up to 15-day lead time. Nevertheless, the prediction of the onset with a daily accuracy is a big challenge. So far, there is no significant signal after 6-day lead time.