Session: B2 Oral presentation

Constraints on temperature during the 2003 European heatwave

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Summer 2003 saw the most extreme temperatures in Southern and Central Europe since records began. Many regions experienced a large number of deaths due to the elevated temperatures; and attribution studies have determined that human activity has at least doubled the risk of such a heatwave, compared to a non-industrial scenario. It is suggested that, other, non-linear processes could also have amplified Summer 2003 temperatures: feedbacks between reduced cloud cover and soil moisture may have prevented the usual convective disruption of the high pressure system, leading to a prolonged bout of high temperatures. This study built upon previous attribution studies by attempting to further understand the change in risk of a heatwave due to anthropogenic influences and diagnosed the mechanisms that allowed the 2003 event to be so severe. To facilitate this analysis the 2003 event was modelled with large ensembles of the ECMWF IFS model, which were performed at higher resolution than previous studies, with improved simulation of land-surface processes. The results support the theory that a feedback between soil moisture and temperature acted to amplify the already excessive temperatures in Summer 2003. Also, the relationship between the variables involved in this feedback are sensitive to certain land-surface properties, which implies that if the same factors that caused the 2003 event occurred in a different location a different event could have been seen. The temperatures seen in 2003 are also shown to be sensitive to Atlantic sea surface temperatures: had the Atlantic not been so warm, this event may not have occurred. It is imperative to understand the factors leading to extreme heatwave events when attempting to predict changes in extreme events in the future and the impacts they will have. Improving predictions of impacts of extreme climatic events will aid more effective planning for the future, so as the climate changes the financial losses and loss of human lives as seen in 2003 can be minimised during future events.