Simulation of historic European tornado events using the 20th Century Reanalysis

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The 20th Century Reanalysis is an attempt to provide three dimensional picture of the state of the atmosphere back into the 19th century. It uses only surface pressure observations and monthly sea surface temperatures through an ensemble Kalman filter to give an ensemble of likely conditions for the global atmosphere at 6 hour intervals and horizontal grid spacing on the order of 1 degree latitude and longitude and relatively resolution in the vertical. We have taken those descriptions and used them to initialize a 4-km horizontal grid spacing version of the Weather Research and Forecasting (WRF) model for a number of cases of tornadoes in the 20th century in Europe. Forecasts run for 24-48 hours and are run much the same was as experimental high-resolution forecasts are currently made. Cases we have modelled include the June 1968 tornado at Pforzheim, Germany, the 1967 outbreak in France and the low countries, the August 1925 tornado at Borculo, Netherlands, and the 1916 Wiener Neustadt tornado. We hope to look at other cases before the conference. In all cases, tracks of high values of updraft-helicity are seen that would be associated with supercells. Not all are in the right location, but certainly the numerical models would have provided guidance that would have been helpful for operational forecasters. The combination of the Reanalysis and the WRF provides an opportunity to understand conditions for historical cases much farther back in time than other methodologies.