



## **Evaluation of Mechanisms of Extreme Temperatures Over Europe**

Ioana Colfescu, Gabi Hegerl, and Simon Tett

University of Edinburgh, School of GeoSciences, Edinburgh, United Kingdom (ioana.colfescu@ed.ac.uk)

Central Europe and United Kingdom monthly-scale changes in location, intensity and probability of temperature extreme events are quantified and compared for three different periods using 20th Century Reanalysis version 2c ensemble mean. The extreme events calculation is based on a composite analysis and the temporal linear trend for each region is considered to be a good approximation of the externally forced component while the remaining part to be internal variability. For hot and cold events of five and three days composites of all occurrences above and below the 95th and 5th respectively are calculated for 1920-1950, 1951-1980 and 1981-2011 for the internal and total components. The circulation patterns associated with the extreme events are calculated as the composites of the 500mb geopotential height found at each occurrence of cold or hot temperature event. Differences between the composites of the most recent period and the other two are analysed for both temperature and circulation. A Mann-Whitney test is used to evaluate the statistical significance of the differences. Preliminary mechanisms for the changes found are evaluated using radiation, sensible heat flux lead-lag correlations with respect to the events.

Our findings suggest no changes in the temperature and their associated circulation patterns for hot events over the regions of study. The inclusion of the trend ( i.e external forcing) doesn't overall change the temperature patterns either for these regions. However areas where the differences are found to be significant are seen in the North Atlantic and Greenland when trend is included and suggest an overall warming for these regions. For the cold events significant cooling over Europe and heating over Greenland is found with respect to 1920s while cooling over the central Atlantic can be seen with respect to the 1950s period. The associated circulation patterns show a consequent strengthening of the circulation over Greenland and a weakening over Scandinavia. In comparison to the 1950s heating of the North Atlantic seen in the recent period is found to be suppressed when the external forcing is not removed.