Poster Prizes

Poster Prizes 2014

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The winners of the poster prizes are below

Kelsey Mulder presenting her poster

Climatology of Tornadoes in the British Isles (1980–2012)

Presenter: Kelsey J. Mulder, University of Manchester

We present a climatology for tornadoes in the British Isles, defined here as England, Scotland, Wales, Northern Ireland, Republic of Ireland, Channel Islands, and the Isle of Man. The climatology includes the geographic distribution, annual and diurnal cycles, seasonality, intensities, and occurrence of outbreaks in tornadoes from 1980–2012 (from Tornado and Storm Research Organisation or TORRO data) as well as environmental conditions from proximity soundings (from Met Office UK High Resolution Radiosonde data).
Over the 33-year period of study, there were 1241 tornadoes reported in the British Isles over 642 tornado days (number of days in which at least one tornado occurs). This computes to a mean of 37.6 tornadoes and 19.5 tornado days annually.

Most (78.3%) British Isles tornadoes occur in England with apparent maxima along the southern coast and in the east England. Of the remaining tornadoes in the dataset, 7.0% were in the Republic of Ireland, 6.7% in Wales, 4.8% in Scotland, 1.8% in Northern Ireland, 1.2% in the Channel Islands and 0.1% on the Isle of Man. To compare tornado occurrence between countries, the average annual tornado occurrence per 10,000 km2 was computed for each country making up the British Isles. England experiences 2.3 tornadoes per year per 10,000 km2, which compares to 3.5 tornadoes per year per 10,000 km2 in Oklahoma (1991–2010) [1].

Where intensity data is known, 95.3% of tornadoes were classified as EF0 or EF1 with the rest classified as EF2. There were no tornadoes rated EF3 or greater during this time period. Similarly, most tornadoes in the United States are on lower end of the Enhanced Fujita scale, with 95% of tornadoes in the United States rated below EF3, [1]. The United States is known to have EF5 tornadoes, but these tornadoes make up only 0.1% of the database [1]. So while tornado occurrence, at least by area, is similar to parts of the United States, central US tornadoes can be stronger than those seen in the British Isles.

In the British Isles, the maximum monthly tornado frequency occurs in November. However, seasonality based on tornado frequency can be skewed due to multiple tornadoes occurring during a single day. Therefore, a tornado day analysis was conducted. Approximately half the tornado days in the British Isles occur from June to October with 23% of all tornado days occurring in August and September. This is later than the springtime maximum in the central and southern US and mid-summer in the northern US [2, 3]. Tornado outbreaks (defined as a day in which three or more tornadoes occur) occur year-round with a maximum in November and minimum in May. The highest number of tornadoes in an outbreak during the period of study was 104 tornadoes on 23 November 1981.

Proximity soundings will be examined, with the goal of understanding the environments within which tornadoes occur in the British Isles.

Citations
A Vehicle OverTurning (VOT) Model: How can an impact based model be verified?

Presenter: Rebecca Hemingway, Met Office

A Vehicle OverTurning (VOT) Module has been developed as part of a Hazard Impact Model (HIM) under the auspices of the Natural Hazards Partnership, which is a collaboration between a number of UK agencies including the Cabinet Office. The aim of the HIM is to produce early warnings for severe events that allow us to generate an overall picture of the risk to society based on probability and impact. The VOT model itself uses a combination of wind hazard, vulnerability and exposure values to generate an overall risk value termed 'Risk of Disruption'. This endeavours to communicate that the model is forecasting disruption to the road network due to a vehicle overturning during a high wind event. To verify the forecasts the model output has been compared to the time and location of actual vehicle overturning incidents on the UK road network. The recent winter storms have provided a number of interesting case studies for the VOT model however extracting actual vehicle overturning events from news reports and twitter feeds has proved laborious with inconsistent and limited results. Despite this, the model performance for the St Jude's Day (28th October 2013) and 5th December 2013 storms has been positive. The vehicle overturning incidents found through media reports for these storms corresponded well to roads highlighted as medium and high Risk of Disruption by the VOT model. This suggests that the model provides useful guidance on the Risk of Disruption during high wind events however more work is required to verify the actual risk levels. Consistency between model runs has also been investigated. The model has so far demonstrated that there is a good correlation in Risk of Disruption values between model runs. It is hoped that a more time-effective method of verification, allowing continual verification, will be developed in the near future using impact data from partner agencies, the Highways Agency, the police and media reports.

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We had some excellent posters at the conference and the poster prize winners are listed below, with their abstracts
Improving estimates of greenhouse radiative forcing

Presenter: Maryam Etminan, University of Reading

There are different sources of uncertainty in greenhouse gas radiative forcing and ways in which estimates need to be improved, one of which is updating simplified expressions for CO2, N2O, and CH4 radiative forcing used, for example, in IPCC reports. As CO2 absorption bands overlap with those of both N2O and CH4, it is necessary to find out the effect of these gases on CO2 forcing. This has previously been neglected in simplified expressions. A narrow band radiation model is used to calculate CO2 forcing. Results reveal that the presence of N2O and CH4 reduces CO2 forcing, although the effect of CH4 on CO2 forcing is negligible. The percentage reduction of CO2 forcing by N2O increases as CO2 base concentration increases. The reason is that at high CO2 concentrations, the main CO2 absorption bands become saturated and absorption at the edges of CO2 bands has a relatively more important role; as these edge regions overlap with N2O, an increase in N2O has a bigger effect on the CO2 forcing. Similar experiments are performed to investigate the effect of CO2 on CH4 and N2O forcing. Results show that the impact of CO2 on CH4 forcing is negligible compared to the effect of N2O, as only a minor overlapping occurs between the CH4 absorption bands and the weak limit lines of CO2. Moreover, in an atmosphere with higher amount of CO2, the forcing due to N2O is reduced. The impact of CO2 on N2O forcing is similar to CH4, although this effect was neglected in earlier simplifies expressions. These results indicate that it is necessary for simplifies expressions to account for the effect of CO2 amount on N2O forcing and vice versa.
Predicting the opening of Arctic Sea Routes

Presenter: Nathanael Melia, University of Reading

The Arctic region is experiencing rapid climate change. The ability to predict the future state of the Arctic environment on seasonal to inter-annual timescales would be of great value to a wide range of policymakers and stakeholders, with consequences for adaptation in the Arctic and beyond. Reduction in summer sea ice coverage in the Arctic enables shipping to use the Arctic as a short cut between the North Atlantic and Pacific basins with significant economic benefits. The aim of this project is to both predict and quantify the predictability of the opening of the Arctic Sea Routes on monthly to inter-annual time scales.

Summary and Prediction of European Windstorm Footprint Characteristics

Presenter: Laura Dawkins, University of Exeter

This study has investigated how best to summarise windstorm footprints, and how well such summary statistics can be predicted from simpler track information. As part of the Extreme Wind-Storm (XWS) catalogue project, footprints of 43 historic extreme storms have been created using reanalysis-forced runs of the Met Office 25km resolution regional model. The footprint is defined as the maximum 3s gust at each grid point over Europe/E. Atlantic over a 72 hour period covering the passage of the storm. Footprints have often been summarised using Storm Severity Indices (SSIs) defined as the cube of the excess wind speed above a threshold summed over the spatial domain. This study has found that for each of the 43 storms, the wind speed excesses at each grid point are well characterised by the 2-parameter Generalised Pareto distribution. These two parameters vary considerably from storm to storm and provide a good summary of the mean cubed wind speed excesses for each storm. Linear regression has been used to try to predict SSI from simple track variables such as maximum wind speed and/or minimum pressure for each storm. The best predictor was found to be maximum wind speed over land but it fails to account for much variance in SSI most likely due to the spatial complexity of the footprints. Furthermore, a simple loss model involving population density in Europe shows that SSI alone is not a good predictor of loss due to the large spatial variation in population density (i.e. a severe storm could easily miss heavily populated areas).

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