

Understand the impact of climate change on compound wind & inland flood risk in North-western Europe

Lead Supervisor: Prof Len Shaffrey, University of Reading, Department of Meteorology

Email: L.C.Shaffrey@reading.ac.uk

Co-supervisors: Dr Kevin Hodges, Dr Richard Dixon (Visiting Research Fellow), Department of Meteorology, University of Reading

Extratropical storms passing over North-western Europe are typically wind and rain bearing, which means European winters are frequently wet and windy. Individually, strong winds and inland flooding can pose substantial risks to life, infrastructure, and property. Recent events include the inland flooding in the North of England in the winter of 2015/16 and the strong winds in October 2013, both of which led to substantial damage in the UK and North-western Europe. However, only a few studies have attempted to understand how wind and flood hazards might occur together, i.e. how they might pose compound risks. In addition, there is very little understanding of how climate change will impact on compound flood-wind risks in North-western Europe even though climate models project that winter flood and wind risk will both increase in the future. The PhD studentship will address the following research questions:

1. What is the present-day risk from compound wind and inland flood hazards in North-western Europe?
2. What large-scale atmospheric processes drive compound wind-flood events and risk (e.g. large-scale modes of atmospheric variability such as the North Atlantic Oscillation)?
3. How will climate change impact on compound wind-flood events and risks in the future?

In addition, the catastrophe models used in the insurance industry to assess damage typically model the wind and inland flood hazards independently. This means that the compound impact of wind and flood hazards are being missed, potentially leading to a systematic under-estimation of insurance risk.



Flooding in Carlisle during December 2015

The PhD study will approach these research questions by i) analysing the present-day risk of compound wind-flood risk in North-western Europe in historical observational datasets and ii) use the high-resolution climate model output (~25km atmospheric resolution) from the HighResMIP ensemble to assess present-day and future risks from compound wind-flood risks. Furthermore, the studentship will investigate the impacts of compound wind-flood risks by developing a simple insurance loss model. The supervisory team already has substantial expertise in simple insurance loss models and will be able to guide the student to develop such a model to emphasise the industry applicability of these results.

Training opportunities:

A CASE award with an insurance company is being discussed and as part of the studentship and a three-month placement will be offered. The aim of the placement will be to develop a very simple insurance loss model for compound wind-flood risk. The placement will give the student an excellent opportunity to interact with industry practitioners and gain understanding of the needs of the insurance industry for weather and climate information.

Student profile:

This project would be suitable for students with a degree in physics, mathematics or a closely related environmental or physical science. An interest in natural hazard risks and interacting with the financial industry would be advantageous.

Funding particulars:

CASE funding with the insurance industry is being discussed, which will supplement the research support to the studentship by a minimum of £1000 p.a. for three years.

<https://research.reading.ac.uk/scenario/>