



Towards an event-based quantitative model for interacting hazard events

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Every year individual hazards and hazard interactions in the UK have the potential to cause damage to infrastructure, including socio-economic losses. On 28th July 2014, flash flood, lightning, hail and heavy rain occurred together, leading to travel disruption and housing damages. There is a real interest across academia and industry about quantifying natural hazard interactions; in particular, safety is an overriding priority for EDF Energy and it is important that their infrastructure is adequately protected against natural hazards.

Here we use the grey- and peer-review literature to critically identify, compare and contrast current research available for the quantification of hazard interactions inside a considered event. Interaction relationships between hazards can be modelled using different approaches, including (i) mechanistic, (ii) empirical, and (iii) probabilistic. When addressing more than two hazards, we are looking to move beyond standard models for interacting hazards and instead focus on multi-hazard events. There are two ways of dealing with multi-hazard events. One following a site specific approach, i.e. all hazards are analysed separately at a given location which does not account for potential interactions. The other approach is an event-based approach which allows us to analyse more than one hazard at a time with several different hazards occurring together. The latter approach is explored in more detail in the work presented here. We define multi-hazard events as natural events during which there is a strong probability of observing more than one individual hazard. The aim is to display such an event as a probabilistic network of interrelated variables. Within this framework, we want to explore a novel way to model multi-hazard events including several variables. As a case study, we shall present the interaction structure between hazards within a thunderstorm. We focus on thunderstorms hitting the south east of the UK (like the event observed on 28th July 2014).