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Characterising freeze in the UK: applications for the insurance industry

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The UK winters of 2009-2010 and 2010-2011 were characterised by prolonged and widespread low temperatures. This was challenging for the UK insurance industry and organisations such as the emergency services, the Highways Agency and British Gas who had to manage the extra demands that resulted. In the 6-day period running to Christmas Eve 2010, British Gas reported 100,000 boiler repair call-outs, whilst those 190,000 homes and businesses left with frozen and subsequently burst pipes contributed to the ABI's estimated £ 900 million in insured losses for December 2010 alone; the highest payout by the industry for damages associated with cold weather. Unfortunately, the severity of these winters made the difference between profit and loss for some primary UK insurance companies. To enable better pricing of premiums in the future, insurance companies are looking to understand the potential risk from cold waves at a local, postcode-level, whilst reinsurance firms seek to determine the accumulated loss across the UK associated with spatially coherent events. Other industry sectors also strive to improve their understanding of weather extremes for planning and management.

Underpinning this is the need to statistically characterise the physical hazard. Aimed primarily at the re/insurance industry, we have applied an established methodology for developing statistical event sets and applied this to generate a UK freeze event set. An event set provides a stochastic set of several thousand events over 10's of 1000's of years and is typically applied within probabilistic catastrophe models. Our method applies extreme value theory and dependence modelling to explain low-temperature relationships across the UK and over time using historical records. The resulting event set represents the spatial and temporal dependence of cold waves in the UK and is modelled against household factors that increase the vulnerability to freezing conditions, such as property type, age and condition. By presenting our methodology, we illustrate some of the complex spatial and temporal relationships in UK freeze events and place the past two winters into a statistical context. Furthermore, we demonstrate the application of event sets within catastrophe modelling and risk mapping services.