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Interactions between apparently 'primary' weather-driven hazards and their cost

John K. Hillier (1), Neil Macdonald (2), and Gregor Leckebusch (3)

(1) Dept. Geography, Loughborough University, Loughborough, UK (j.hillier@lboro.ac.uk), (2) Dept. Geography and Planning, University of Liverpool, Liverpool, UK., (3) School of Geog., Earth and Environmental Science, University of Birmingham, Birmingham, UK

A statistical analysis of the largest weather-driven hazards in the UK contradicts the typical view that each predominates in distinct events that do not interact with those of other hazard types (i.e. are 'primary'); this potentially has implications for any multi-hazard environments globally where some types of severe event are still thought to occur independently. By a first co-investigation of long (1884-2008) meteorological time-series and nation-wide insurance losses for UK domestic houses (averaging £1.1 billion/yr), new systematic interactions within a 1-year timeframe are identified between temporally-distinct floods, winter wind storms, and shrink-swell subsidence events ($P < 0.03$); this increases costs by up to £0.3 billion/yr (i.e. 26%), although impacts will be spatially variable depending upon the interplay of hazards. Memory required in the environmental system to cause these intra-annual links between event types appears to reside in soil moisture and, tentatively, sea surface temperatures. Similar, unidentified interactions between non-synchronous events are likely worldwide, and the analytical methods we have developed to identify and quantify them are suitable for application to meteorological, geological (e.g. volcanic) and cryospheric (e.g. avalanches) hazards.