Geophysical Research Abstracts
Vol. 19, EGU2017-5390, 2017
EGU General Assembly 2017

Identifying and quantifying dependencies between time-lagged risks of multiple types

John K. Hillier

Loughborough University, Department of Geography, Loughborough, Leicestershire, United Kingdom (j.hillier@lboro.ac.uk)

Multiple types of hazard exist (e.g. earthquake, flood, snow), each potentially causing risk. These may be linked, dependent, or interact. Comparing 'events' of different types, however is non-trivial as their extent (e.g. <48h to 1-yr, 1 km to 100 km) and drivers of any damage (e.g. water depth, wind speed) are commonly not directly comparable. Events may also be separated by time-lags. Broadly, interactions occur in a number of different ways: i) a hazard with itself in isolation including spatial and temporal patterns (e.g. clustering .... A-A-A.....A-A-A), ii) clearly associated secondary hazards (e.g. tsunami after earthquake or storm surge during winter storms) (A&B together), iii) cascades and hazard chains (e.g. A->B->C), or iv) mutually underlying cause (i.e. C influences types A and B). This talk will consider how to identify, quantify, and start to understand dependencies between time-lagged risks of multiple types in the context of this last type of interaction, although the methods used may be more generally applicable. Particularly useful are loss data (e.g. £, time, lives), which implicitly make hazards comparable [1], and a number of statistical methods that have been adapted for multi-hazard purposes. Interactions can modify losses with respect to an assumption of independence by (i.e. >£0.3 billion, 26%), be identified in short time-series (10-15 yrs), and give at least some additional insights into physical processes.

[1] Hillier, J. K., Macdonald, N., Leckebusch, G., Stavrinides (2015) Interactions between apparently primary weather-driven hazards and their cost. *Env. Res. Lett.* **10**, 104003, doi:10.1088/1748-9326/10/10/104003