



Using expert elicitation to assess or forecast natural hazards: a systematic review

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Expert elicitation (EE) is a technique to quantify the knowledge of experts based on their theoretical or practical experience on a topic of interest. Here we do a systematic review of EE to understand its role in assessing or forecasting natural hazards. Although the EE procedure was formalized in the early 1960s, different terminologies are used in the literature for expert elicitation. We first explore the use of EE in different fields including the medical sciences, agricultural sciences and environmental sciences, and noted commonalities in their use. After identifying all the words that are used synonymously for EE, we gathered together 55 sources (44 peer-reviewed papers and 11 grey literature) that use EE with natural hazards, and did a systematic review including: study location, hazard studied, what was assessed, methodology used, comparison of EE results with other types of evidence, uncertainty quantification, number of experts used, and purpose of study (theoretical vs practical). Based on our review we found the following: (i) the Cooke method has been used in 60% of the research studies; (ii) the number of experts involved in the process of doing EE for each study was generally between 10-20 experts, with one research study as an anomaly that used 100 experts ; (iii) elicitation of expert knowledge has not been used in S Asia as much as it has in Europe, UK and US; (iv) about 50% of the studies did not confront their results against other sorts of evidence; (v) 60% of the studies quantified the uncertainty associated with the EE results. We would suggest the following for the use of EE in the context of natural hazards: (i) a minimum of 10 experts from diverse fields should be involved in any procedure involving experts; (ii) the results from an EE procedure should be confronted against other evidence, where possible, to further refine the results ; (iii) given that EE has been effectively used in the assessment of individual hazards, there is scope to apply it for multi-hazard and/or risk assessment; (iv) EE methods might be useful in regions (e.g., S Asia) where there is data scarcity, low-resolution data or causal links are not well understood.