

Table 2. Examples of five diverse evidence categories with examples for each one that might indicate the relevance of a given multi-hazard interaction. We use an asterisk (*) to indicate the examples of evidence that are used in this paper (grouped into evidence types A to E; see Sect. 2.1).

Evidence category	Examples
1. Publications and reports	<ul style="list-style-type: none"> – Peer-reviewed and other research publications* – Public and confidential government, technical, private sector, and/or civil-society reports* – Maps and archive documents* – Student projects (e.g. dissertations and theses)* – Books* – Diaries
2. Social and other media	<ul style="list-style-type: none"> – Photographs and video clips (e.g. from print and online newspapers, blogs, websites, tweets, and citizen science)* – Newspaper articles* – Social-media posts (e.g. “tweets”)
3. Field evidence	<ul style="list-style-type: none"> – Observations from the impact on the built environment (e.g. marks on vertical services to indicate flooding occurred or the minimum extent flood water reached) – Geological mapping and any field identification of evidence of the hazard occurring (e.g. flood deposits)*
4. Stakeholder engagement	<ul style="list-style-type: none"> – Interviews with the public, hazard professionals, and civil-protection officials* – Focus groups – Workshops*
5. Miscellaneous	<ul style="list-style-type: none"> – Insurance records – Instrumental records and associated notes – Emergency call-out and incident records from emergency services – Remote-sensing images

ods, including both “Guatemala” and keywords associated with a preliminary list of 21 natural hazards (from Gill and Malamud, 2014). For example, “earthquake”, “aftershock”, “seismic”, “tremor”, and “liquefaction” were searched for alongside “Guatemala” and “Central America” to identify relevant material. We evaluated results to determine their relevance and identify other keywords. We also identified specialist books, such as an edited volume on the geology of Central America (Bundschuh and Alvarado, 2007).

We examined literature in a systematic manner, collating references, maps, and figures for 17 (of the 21) natural hazards: earthquake, tsunami, volcanic eruption, landslide, flood, drought, regional subsidence, ground collapse, soil (local) subsidence, ground heave, storm, tornado, hailstorm, lightning, extreme temperatures (heat), extreme temperatures (cold), and wildfire. Snow avalanches and snowstorms have limited spatial relevance to Guatemala, and geomagnetic storms and impact events have little country-specific (vs. generically relevant) information. For each hazard considered, we cross-referenced diverse literature to characterise it at a level of detail appropriate to this study, including information on spatial and temporal distribution, triggering relationships, and impacts. We identified and used 169 sources as evidence, with 93 (55 %) of these being peer-reviewed and 76 (45 %) of these being grey literature.

2.3 Publications and reports (locally accessible; evidence type B)

Another evidence type to inform the development of regional interaction frameworks is locally accessible reports, such as government or NGO bulletins, newspapers, and emergency call-out records. Civil-protection information bulletins and newspapers can both give a focused overview of natural-hazard occurrences (e.g. Guzzetti et al., 1994; Trimble, 2008; Raška et al., 2014; Taylor et al., 2015), providing information on hazard interactions or noting triggering relationships.

In Guatemala, we use Spanish-language civil-protection information bulletins from the CONRED. Bulletins are issued when there is a threat to lives, livelihoods, and infrastructure and include information on hazards, their spatial and temporal extent, and their impacts, including triggering other hazards. Natural hazards occurring in remote regions or having a very low impact (e.g. very small landslides) are unlikely to be included in bulletins, and therefore bulletins do not provide a complete record of events. CONRED may issue multiple bulletins per day, depending on the evolution of, for example, a weather system or a disaster event. Bulletins are distributed to a mailing list of personnel, with some on their website (CONRED, 2018b) and ReliefWeb (2016). At the time of writing, CONRED bulletins were not systemati-