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Industrial Accidents Triggered by Natural Hazards: an Emerging Risk Issue

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Natural disasters such as earthquakes, tsunamis, flooding or hurricanes have recently and dramatically hit several countries worldwide. Both direct and indirect consequences involved the population, causing on the one hand a high number of fatalities and on the other hand so relevant economical losses that the national gross product may be affected for many years. Loss of critical industrial infrastructures (electricity generation and distribution, gas pipelines, oil refineries, etc.) also occurred, causing further indirect damage to the population.
In several cases, accident scenarios with large releases of hazardous materials were triggered by these natural events, causing so-called "Natech events", in which the overall damage resulted from the simultaneous consequences of the natural event and of the release of hazardous substances. Toxic releases, large fires and explosions, as well as possible long-term environmental pollution, economical losses, and overloading of emergency systems were recognised by post-event studies as the main issues of these Natech scenarios.
In recent years the increasing frequency and severity of some natural hazards due to climate change has slowly increased the awareness of Natech risk as an emerging risk among the stakeholders. Indeed, the iNTeg-Risk project, co-funded by the European Commission within the 7th Framework Program specifically addresses these scenarios among new technological issues on public safety.
The present study, in part carried out within the iNTeg-Risk project, was aimed at the analysis and further development of methods and tools for the assessment and mitigation of Natech accidents. Available tools and knowledge gaps in the assessment of Natech scenarios were highlighted. The analysis mainly addressed the potential impact of flood, lightning and earthquake events on industrial installations where hazardous substances are present. Preliminary screening methodologies and more detailed methods based on quantitative risk analysis were developed. Strategies based on the use of multiple information layers aiming at the identification of mitigation and early warning systems were also explored. A case-study in the Emilia-Romagna region is presented.