Geophysical Research Abstracts
Vol. 18, EGU2016-7722-1, 2016
EGU General Assembly 2016

Approaches for assessment of vulnerability of critical infrastructures to weather-related hazards

Unni Eidsvig, Marco Uzielli, and Bjørn Vidar Vangelsten
NGI, Natural Hazards, OSLO, Norway (unni.eidsvig@ngi.no)

Critical infrastructures are essential components for the modern society to maintain its function, and malfunctioning of one of the critical infrastructure systems may have far-reaching consequences. Climate changes may lead to increase in frequency and intensity of weather-related hazards, creating challenges for the infrastructures.
This paper outlines approaches to assess vulnerability posed by weather-related hazards to infrastructures. The approaches assess factors that affect the probability of a malfunctioning of the infrastructure should a weather-related threat occur, as well factors that affect the societal consequences of the infrastructure malfunctioning. Even if vulnerability factors are normally very infrastructure specific and hazard dependent, generic factors could be defined and analyzed. For the vulnerability and resilience of the infrastructure, such factors include e.g. robustness, buffer capacity, protection, quality, age, adaptability and transparency. For the vulnerability of the society in relation to the infrastructure, such factors include e.g. redundancy, substitutes and cascading effects. A semi-quantitative, indicator-based approach is proposed, providing schemes for ranking of the most important vulnerability indicators relevant for weather-related hazards on a relative scale. The application of the indicators in a semi-quantitative risk assessment is also demonstrated.

In addition, a quantitative vulnerability model is proposed in terms of vulnerability (representing degree of loss) as a function of intensity, which is adaptable to different types of degree of loss (e.g. fraction of infrastructure users that lose their service, fraction of repair costs to full reconstruction costs). The vulnerability model can be calibrated with empirical data using deterministic calibration or a variety of probabilistic calibration approaches to account for the uncertainties within the model.

The research leading to these results has received funding from the European Community's Seventh Framework Programme under Grant agreement No 606799 Impact of extreme weather on critical infrastructure (INTACT)