Geophysical Research Abstracts
Vol. 20, EGU2018-9672, 2018
EGU General Assembly 2018

GARI : A TOOL FOR FLOOD RISK MANAGEMENT AND ANALYSIS, Beyond mapping of flooded areas

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Floods are the most common natural hazard worldwide. Adequate flood risk management must go beyond a thorough understanding of flood processes, or the application of specific regulations within flood zones of different recurrences (i.e. 2 years, 20 years, 100 years). Above all, it also requires information that allows accurate estimation of the social and economic impacts of a flooding event and to locate the areas where these impacts are the most important. Such information enable municipalities, governmental agencies and even individuals to anticipate the impacts of a flood in a given area, to mitigate these impacts, to prepare, and to better organize and coordinate their actions during a flood. However, despite the efforts made in this area over the past ten years, it appears that the tools currently available do not generate such critical information.

GARI (French acronym for Gestion et Analyse du Risque d'inondation/Flood Risk Management and Analysis) was developed by the Environmental and Nordic Remote Sensing Group (TENOR) of INRS in Quebec City (Canada). This tool goes far beyond simple mapping of flooded areas, and allows estimation, analysis and visualization of flood risks for individuals, residential buildings, and in some cases for critical infrastructures. One of its advantages over the other currently available tools is that it accounts for the characteristics of the flood hazard (i.e. flooded areas and water levels in these areas) and for the vulnerability of the elements directly or indirectly exposed to the hazard. GARI thus generates comprehensive and relevant estimates of flood risk.

The vulnerability of the population and the human risk associated with the floods are estimated and mapped for each residential building present in an area of interest. Potential damages (annualized or related to a given flood event), as well as recovery costs, are also estimated and mapped for each residential building. These estimates can be updated regularly to account for the spatiotemporal dynamics of the flood. Finally, an estimate of the uncertainties of the potential damages associated with a flooding event of given intensity can also be generated, and allows the user to obtain information on the range of damages that can be expected.

Finally, one of the strengths of GARI is that it allows to estimate the level of risk and the potential damages associated with theoretical, anticipated or ongoing flooding events. It can therefore be used during the different phases of flood risk management.