



Effective estimation of Tsunami Coastal Impacts based on Tsunami Inventories, Satellite Imagery and Inundation Zoning

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Simulation models are used to calculate the tsunami wave propagation and ultimately the tsunami height at shoreline and run-up. In recent years, several researchers are working on improving the output of these simulations. Although it could be characterized as accurate, both the difficulty of collecting data and calculating sub-scenarios, the high number of factors controlling tsunami properties, and the fact that the output will only be for a very specific tsunami scenario, make this process difficult and time-consuming. Furthermore, a difficulty has been noted in disseminating the related information to the general public and its final acceptance by Civil Protection agencies for further implementation of relevant risk reduction measures as the results refer to the occurrence of a rare scenario without detailed indication of the possible impacts on individual coastal areas.

In the context of this research, a new methodology for calculating coastal impacts from tsunami is presented. It groups a large number of scenarios of tsunami generation and evolution according to the final run-up and aims to highlight the possible impacts on the coastal zone according to the tsunami intensity. It is based on the compilation of a tsunami inventory comprising historical and recent events that have affected the study area, without taking into account a single tsunami case. The proposed methodology results in the tsunami inundation zoning of the studied coastal area based on already generated events.

Subsequently, using satellite imagery, a highly detailed analysis of significant buildings and critical infrastructure located within the inundated coastal zone is carried out along with a classification of the potential impacts into 5 main categories comprising: (i) moving objects, (ii) infrastructure, (iii) buildings, (iv) natural environment and (v) population, a classification proposed within the Integrated Tsunami Intensity Scale ITIS₂₀₁₂.

This methodology can contribute to the adoption of measures to effectively mitigate tsunami impacts on the built environment, resilience and sustainability of coastal infrastructure, to the development of safer spatial and urban planning and to a precise estimation of economic losses from coastal inundation. In addition, it is an important tool for operational planning, in particular for the selection and operation of emergency sites in the coastal zone, the preparation of tsunami contingency plans, and the implementation of actions to increase the operational preparedness of Civil Protection agencies and the awareness of the general population and its special groups (students, volunteers, elderly and disabled people, etc.) about tsunamis and their impacts.