



## **Tsunami risk assessment in the Messina Straits, Italy, with application to the urban area of Messina**

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Since ancient times, the most important cities and urban agglomerations were built and developed very close to the seas and the oceans, because these environments have always represented a great and natural economic resource for human activities. But only in the last years people are realizing that in this way they are also exposed to the potentially very dangerous and devastating effects of a tsunami. At the moment prediction of tsunamigenic events and therefore even tsunami prediction seem very far to be realizable, but scientific community can help the local authorities to save lives and reduce economic damages with specific studies of tsunami hazard and coastal vulnerability. The regions of Calabria and Sicily are among the most tsunami-affected Italian areas and their coasts were attacked by several large events in the past that had catastrophic effects and caused thousands of victims. Here we present a tsunami risk analysis based on the overlapping of hazard maps, coming from the results of tsunami numerical simulations of the potential tsunamigenic sources of Southern Italy, and vulnerability maps, coming from a detailed analysis of the tsunami vulnerability assessment of the coastal zones of the eastern coasts of the Sicily and the western coasts of Calabria. The total vulnerability here is defined as the total human presence during the year in a selected zone (considering not only inhabitants, but including also schools and hospitals, tourism, industry and harbour activities). Numerical simulations are made by means of the UBO-TSUFDF code, that is based on a finite differences technique. It solves the non-linear shallow water approximation of the Navier-Stokes equations on a multigrid system composed of rectangular grids of different resolutions and computes the tsunami run-up in order to produce detailed inundation maps in a specific area. This technique can be also used to analyse the tsunami risk in very

detailed areas like harbours, where human presence and anthropic activities are very dense. The Messina harbour could be an interesting case of study to apply this general method of investigation.