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Using GoogleEarthEngine for historical- and modelled scenario based ocean hazard analysis and visualization in the Mediterranean Sea

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Remote sensing is an essential tool to analyze, model and evaluate natural disasters. Whereas terrestrial remote sensing is championed by air- or space-borne techniques, subaqueous remote sensing is based on hydro-acoustic measurements. A combined analysis of subaqueous and terrestrial remote sensing data is necessary in order to understand, how ocean hazards, like tsunamis, affect coastal societies and infrastructure.
By evaluating large-scale natural disasters since the beginning of the 2000s, it is obvious that the largest and most devastating disasters, in terms of casualties and economic losses, have affected coastal areas. With $\sim$40 % of humankind living within a small corridor of only 100 km from the coast, the need for dedicated and interdisciplinary disaster risk reduction strategies are paramount for keeping up with coastal development. During the last decades, sophisticated techniques of seafloor and sub-seafloor surveying enabled the scientific community to obtain a precise picture of the seafloor's physical state and to identify zones of historical and future deformation. This approach allows the reconstruction of a variety of historical events and modelling of realistic and probabilistic future scenarios. These findings, however, are commonly only communicated within the scientific community and do only rarely make their way to decision makers or coastal stakeholders.
To overcome this hurdle, we started to design a web-based, cross-platform application to visualize and analyze the effects of ocean hazards like tsunamis and sea-level rise by using GoogleEarthEngine. We use space-borne Landsat 8 data to perform a decision-tree based 30x30 m grid landuse classification, which is a key parameter to evaluate vulnerability. Hazard scenarios are implemented by importing ESRI ArcGIS shape files. The number of potentially affected humans is calculated by combining the flooded areas from the scenarios with the landuse and census data of the regions. Furthermore, the easy-to-use graphical user interface allows to evaluate flooded areas by a GoogleMaps overlay.
Here, we present the first version of the cross-platform, web-based application MORA (Mediterranean Ocean Risk App) by using the 1908 Messina Tsunami as an exemplary scenario. Once more scenarios are implemented, the easy-to-use interface of MORA can serve science, decision making and education to assess the potential impact of historical- and modelled scenarios on modern society.