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Risk workflow for CASCading and COMpounding hazards in COastal urban areas: The CASCO Project

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Extreme climatic and geophysical events pose a threat to societies and have the capacity to cause significant damage and losses whenever they occur, both in their immediate aftermath and in the medium- to long-term. Their consequences can be amplified even further when more than one event affects the same geographical areas within a short time. Be it cascading hazards, in which one event triggers the next, or simply hazards that happen to occur simultaneously (“compounding” hazards), estimation of their cumulative consequences is challenging because the action of one event affects the exposure and vulnerability to the next one. While the efforts from the research community to develop multi-hazard perspectives have increased considerably in recent years, multiple remaining challenges require strongly-coordinated efforts across different disciplines and areas of expertise to tackle them with the most appropriate tools.

With a multidisciplinary team of scientists from four different Helmholtz research centres in Germany, we have started working on the CASCO project (2022-2024), in which we will develop an integrated risk workflow for CASCading and COMpounding hazards in COastal urban areas by focusing on a series of events occurring around Mount Etna (Italy). The case-scenario starts with a strong earthquake that triggers a submarine collapse at the eastern flank of Mount Etna, an area already known to be unstable, and both the earthquake and the landslide trigger a tsunami that hits the coasts of Sicily and Calabria. Almost concomitantly, a heatwave or heavy rainfall happens to affect the same regions, further stressing the population that had been affected by the combined effects of the earthquake and tsunami.

The project will be directed towards the modelling of the cascading earthquake, landslide and tsunami events, the compounding heatwave and rainfall, as well as their immediate impacts in terms of cumulative damage and casualties. Moreover, the medium- to long-term response in urban dynamics and the effect of these extreme events on the economic development of the affected populations will be explored.

By focusing on a tangible scenario, CASCO will not only tackle the challenges associated with bringing together the whole risk chain (which will be valid beyond our case-study) but also produce outcomes that help increase awareness of such extreme events and the need for societies to develop suitable strategies to strengthen their resilience and improve their disaster response.