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Preliminary studies of tsunami generation by the Ischia Debris Avalanche (IDA), Tyrrhenian Sea, Italy

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The island of Ischia is a volcanic complex located north-west of the Gulf of Naples, Italy. Its geological history is characterised by a series of effusive and explosive eruptions that continuously modified the morphology of the island itself, and by a high rate of tectonic uplift: its most elevated feature, Mt. Epomeo (787 m asl), is the result of volcanic rocks uprising that took place in the last 30,000 years. Recent submarine explorations showed the occurrence of debris avalanches and catastrophic collapses, by revealing features such as an amphitheatre scar to the south of the island and several hummocky deposits in the southern, western and northern offshore with patterns radiating from Mt. Epomeo. Debris volumes range from 0.1 km^3 from smaller events to more than 2-3 km^3 for the largest avalanche, the so called Ischia Debris Avalanche (IDA), whose run-out is probably larger than 45 km as may be deduced from large blocks visible all along the southern continental slope until 1100 m depth.

Though it is difficult to discriminate between the different episode of slope failures, nonetheless the large volumes involved are suggestive that such failures could cause tsunamis. This research is a preliminary study of the possible tsunamis associated with the major collapse. On the basis of the volume estimated and of the extent of the area covered by the possible deposits, the avalanche motion is numerically calculated by means of a Lagrangian model, and the associated tsunami is then simulated by means of a finite-element model solving the Navier-Stokes equations. Tsunami propagation around Ischia, in the Gulf of Naples and in the south Tyrrhenian sea is computed by using computational grids with appropriate resolution, and tsunami height on the coast are calculated. No direct evidence of such a tsunami is known so far. This study however poses the basis to search for possible tsunami traces, since it shows the coastal

places where the highest environmental effects are expected to have occurred and to have been preserved.