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Stability analysis and tsunamigenic mass-failure scenarios in Palinuro volcano complex, Tyrrhenian sea

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The Palinuro volcanic chain is located nearly 80 km offshore the Campania coasts (Italy), in the southern sector of the Tyrrhenian Sea. As many as 15 distinct volcanic edifices have been recently detected that covers a 90 km long and 20 km wide belt. The associated volcanism is still poorly understood but the presence of shallow seismicity and active hydrothermal activity suggest that this large volcanic complex is still active. Specific sectors of the chain show the presence of ongoing slope instability and thus the chance of mass movements cannot be ruled out in case of seismic or volcanic activity. In this work, a stability analysis for typical seismic loads in such a volcanic area has been performed through a revised limit equilibrium approach. In the revealed weaker sections, three mass failures of different scales have been reconstructed and their motion has been calculated by means of numerical models. The tsunami produced by each slide has been simulated, and considerable waves have been found in two of the three hypothesized scenarios. For the biggest slide of 2.4 km³, waves as high as 10 m could reach portions of the Calabria coasts with consequent hazardous impact.

This study belongs to a series of works focused on the volcanoes of the Tyrrhenian Sea that are very many and still poorly investigated. Considering scenarios involving mass movements of different sizes with distinct characteristics and based on geomorphological features seems to be a viable strategy to evaluate the tsunami hazard in the region.