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Influence of seismogenic source geometrical accuracy on PTHA: a test case for the Calabrian subduction interface

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Exploring different degrees of complexities in the geometry of seismic tsunami sources is a key point to optimize Probabilistc Tsunami Hazard Analyis (PTHA), as fault geometry can have an impact on the generated tsunami. In this regard, one major difficulty is represented by the potentially tsunamigenic offshore faults that are generally poorly constrained and consequently the geometry is often oversimplified as a planar fault.
We present compared scenarios of PTHA for ruptures located in the Calabrian subduction interface using different source models.
The Calabrian subduction, located in the Mediterranean Sea, has occasionally be blamed to have generated some past large earthquakes and tsunamis, despite it shows no sign of significant seismic activity on the shallow portion of the interface. Significant in-slab seismicity is recorded below 40 km depth and a rate of 1-5 mm/yr characterize the convergence between the two plates involved, Africa and Europe.
A 3D model of the subduction interface was obtained from the original interpretation of a grid of ca. 60 (9000 km length) seismic reflection profiles (Spectrum – INGV collaborative framework CA-60) coupled with the detailed analysis of the seismicity, providing a highly detailed 3D surface geometry for the first 100 km depth. This model includes both the first order information on the curvature and changes in strike and an accurate reconstruction of the 3D subduction interface, and can be scaled to different levels of detail.
We compare simplified planar vs 3D models with different degrees of geometrical complexities in order to estimate the effect of the source geometry on the tsunami generation and propagation pattern.