

44° GNGTS Conference | Udine, 10-13 February 2026



Towards a Unified PFDHA Platform: OpenQuake Engine Implementation

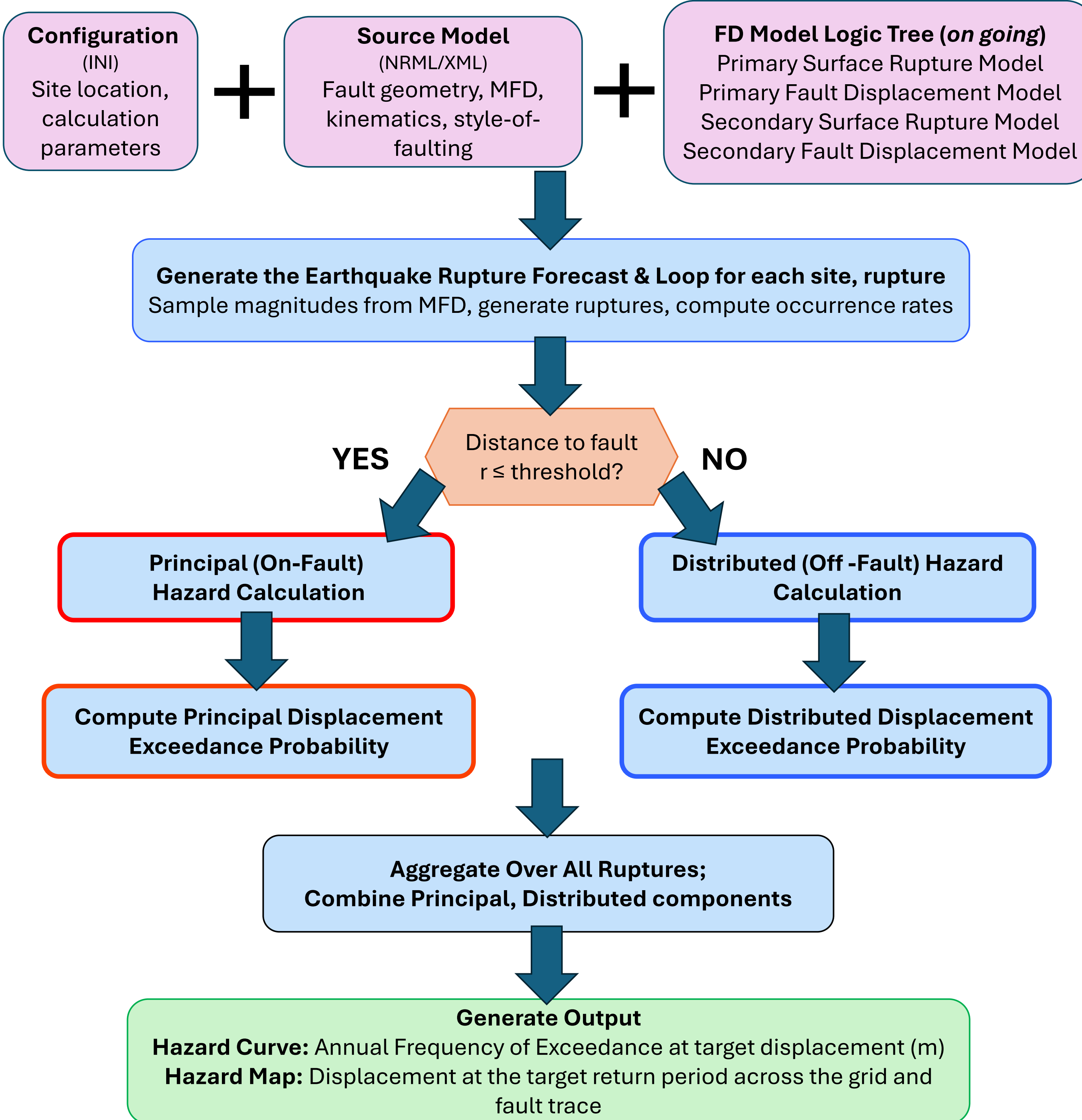
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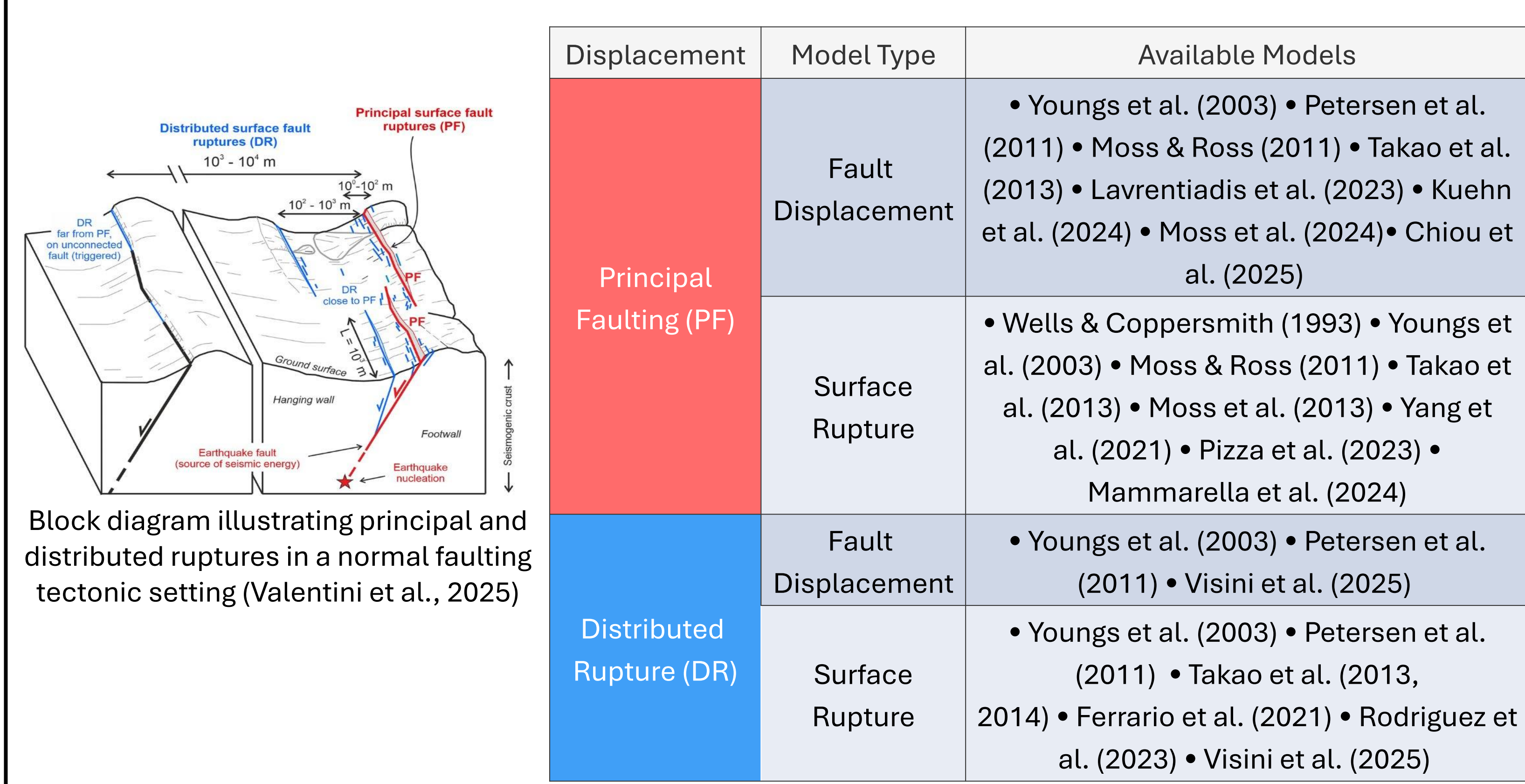
Scope of the work

- Develop a transparent and reproducible framework for PFDHA (Probabilistic Fault Displacement Hazard Assessment) within the OpenQuake Engine
- Provide a case study application in Southern Italy (Calabria Region).

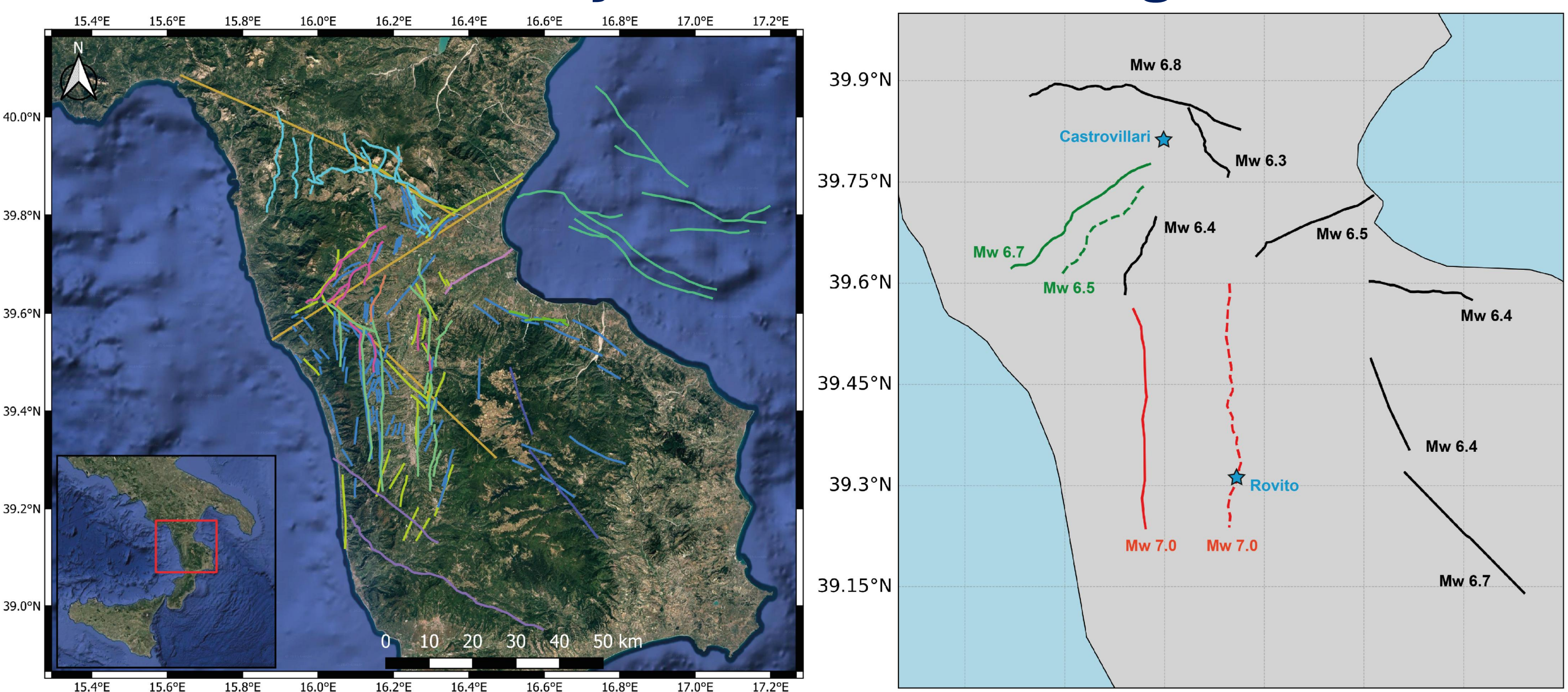
PFDHA Workflow implemented in the OpenQuake Engine



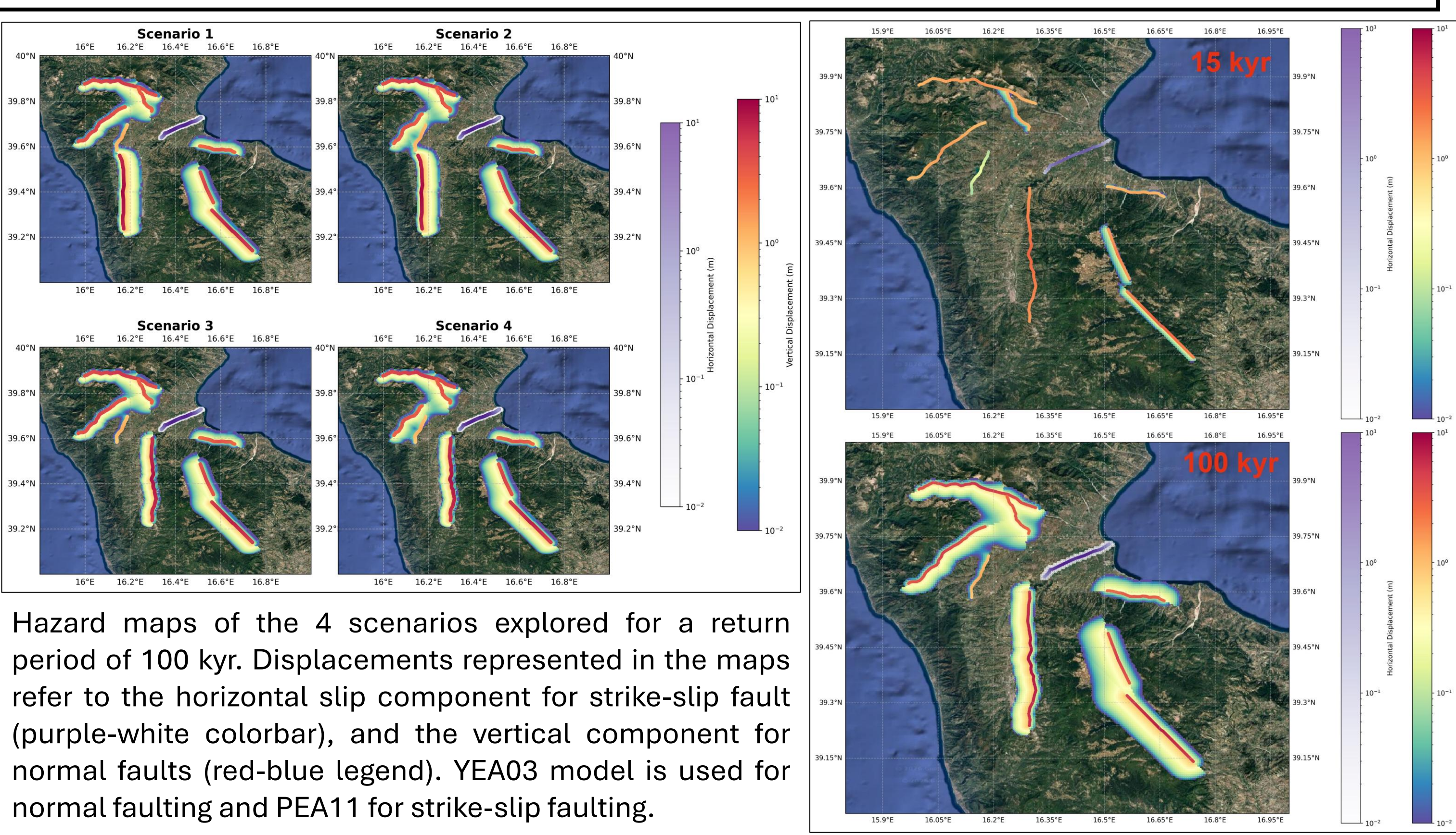
Implemented FDHA models



Case Study in the Calabria Region

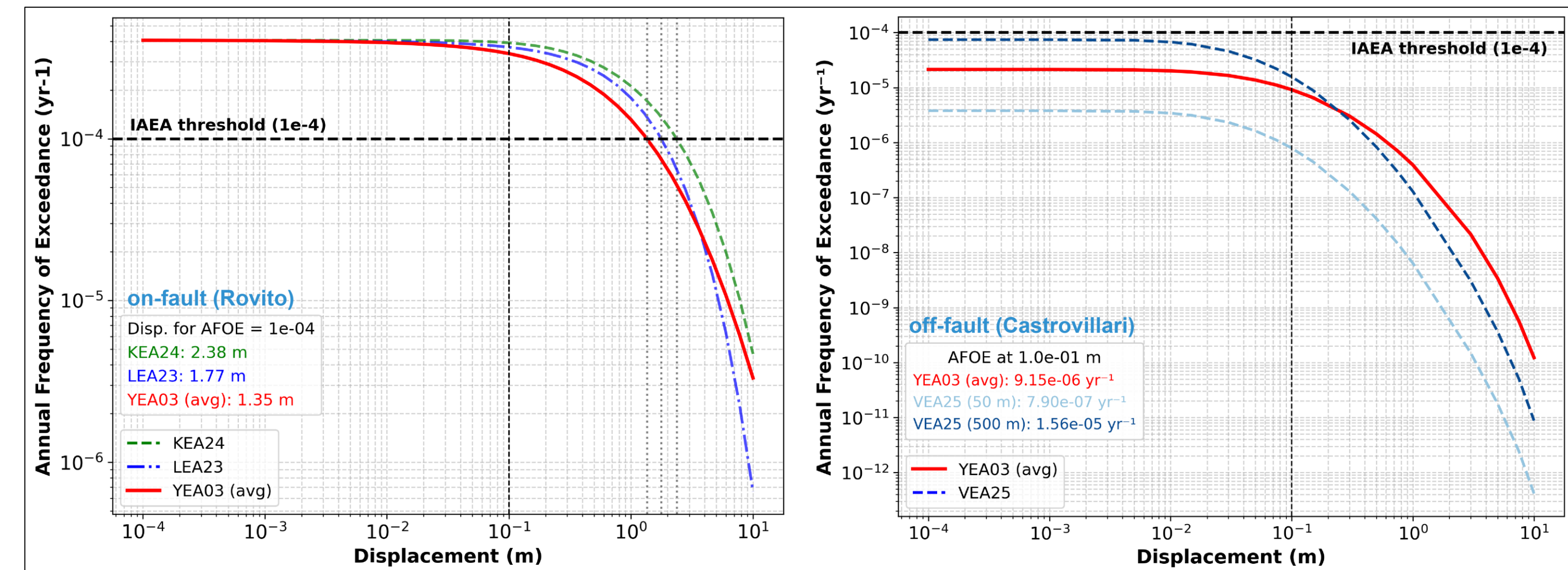


Simplified seismotectonic model of Northern Calabria, based on literature data and the ITHACA (ISPRA) and DISS (INGV) fault databases. Left panel: critically revised collection of potential fault sources. Right panel: final source model. The 11 potential fault sources are modelled by 4 alternative scenarios, representing various source configurations, with debated active faults shown in red and green solid and dashed lines.



Hazard maps of the 4 scenarios explored for a return period of 100 kyr. Displacements represented in the maps refer to the horizontal slip component for strike-slip fault (purple-white colorbar), and the vertical component for normal faults (red-blue legend). YEA03 model is used for normal faulting and PEA11 for strike-slip faulting.

On the right, the maps represent the expected displacement to be exceeded in 15 kyr (top) and 100 kyr (bottom), using the scenario 3. For 15 kyr, the displacement is mainly confined along the surface fault traces while for 100 kyr it quickly decreases when going further from the main trace.



Displacement hazard curves at two selected sites (blue stars on the map above) for the scenario 3.

Rovito: POE in 50 yr are about 1% for 10 cm.

Castrovillari: POE in 50 yr for 10 cm are very low (< 0,05%).

Take Home Message

- Successfully developed a prototypal PFDHA framework including the comprehensive model library. Demonstrated workflow capability through end-to-end calculations covering both on-fault (principal) and off-fault (distributed) displacement scenarios.
- The Calabria case study highlights the importance of logic tree approaches to capture epistemic uncertainties arising from different model formulations, parameter selections, and source configurations. It also emphasises that the tectonic model strongly drive the results and that, consequently, its definition is a crucial step in assessing the fault displacement hazard.

Need more information ?
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Research funds for a PhD grant derive from NextGeneration EU Mission 4 Component 2 PNRR Project GEOSCIENCES IR (ISPRA coord.) IR000037 - CUP153C22000800006 - OGS03 Research Unit on WP4 - Activity 4.3 Active and capable faults.
SIGMA-3 research programme (Seismic Hazard and Ground-Motion Assessment), Electricité de France (EDF) is supporting the Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS) and the Global Earthquake Model (GEM) in implementing PFDHA capabilities and integrating them into the OQ Engine.
Their contribution is gratefully acknowledged

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