Geo-INQUIRE installation: BingClaw - Model for simulating dynamics of cohesive Landslides - Norwegian Geotechnical Institute (NGI), Norway.

Project title: Source-to-coast model for landslide-generated tsunamis in the SW Iberia Margin

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Project short report:

Gorringe Bank is the largest tectonic seamount on the European offshore margin, rising to nearly 5 km from the seafloor and shaped by long-lived Miocene–Quaternary thrusting, uplift, and ongoing seismicity (Gamboa et al., 2021). Its most prominent failure, the North Gorringe Avalanche (NGA), exhibits a major scar clearly visible in modern bathymetry (Figure 1, top panel). The deposit extends over 43 km, reaching ~100 m in thickness, and contains numerous large coherent blocks, indicative of a rapid, high-energy collapse likely triggered by an earthquake in this seismically active region. Previous research shows that the NGA was capable of generating a significant tsunami that reached the south Portuguese coast (Lo Iacono et al., 2012). However, accurately quantifying the Gorringe Bank NGA tsunamigenesis and hazard extent requires revisiting the landslide size estimate, the pre-failure reconstruction, and the numerical models for the landslide dynamics, tsunami generation and propagation.

This project investigates the tsunamigenic potential of the NGA, which has an estimated volume of ~100 km^3. Preliminary results, based on the initial pre-failure bathymetry of the NGA, are shown in Figures 1 and 2. However, continued thrust-front deformation has buried earlier scars, producing a deceptively smooth present-day seafloor; therefore, a detailed analysis of seafloor morphology combined with interpretation of seismic profiles are necessary to improve the pre-failure model. Once completed, this updated morphological model will be used with the BingClaw model to simulate the landslide dynamics and the resulting wave generation. The final simulations and morphological reconstructions will refine our understanding of deepwater slope-failure dynamics and associated tsunamigenesis and support a

scientific publication assessing tsunami hazards from non-seismic mass-wasting events in the NE Atlantic.

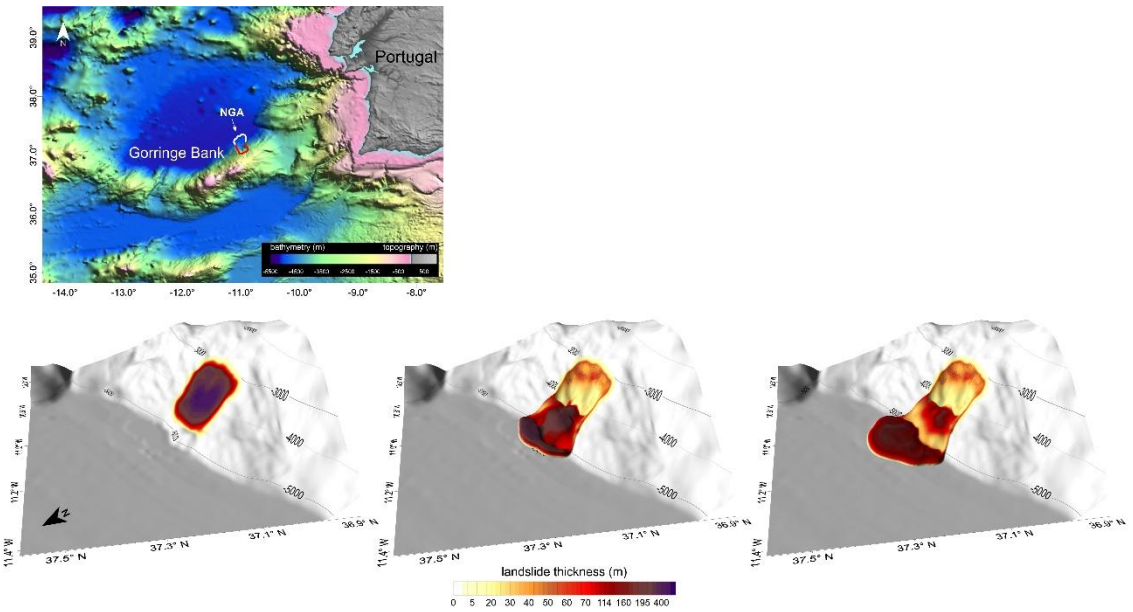

Figure 1: Top) Regional overview of the southwest Iberian margin. The North Gorringe Avalanche (NGA) scar and the corresponding deposit areas are indicated by the red and white lines, respectively. Bottom) Snapshots of the NGA covering a total duration of 20 minutes.

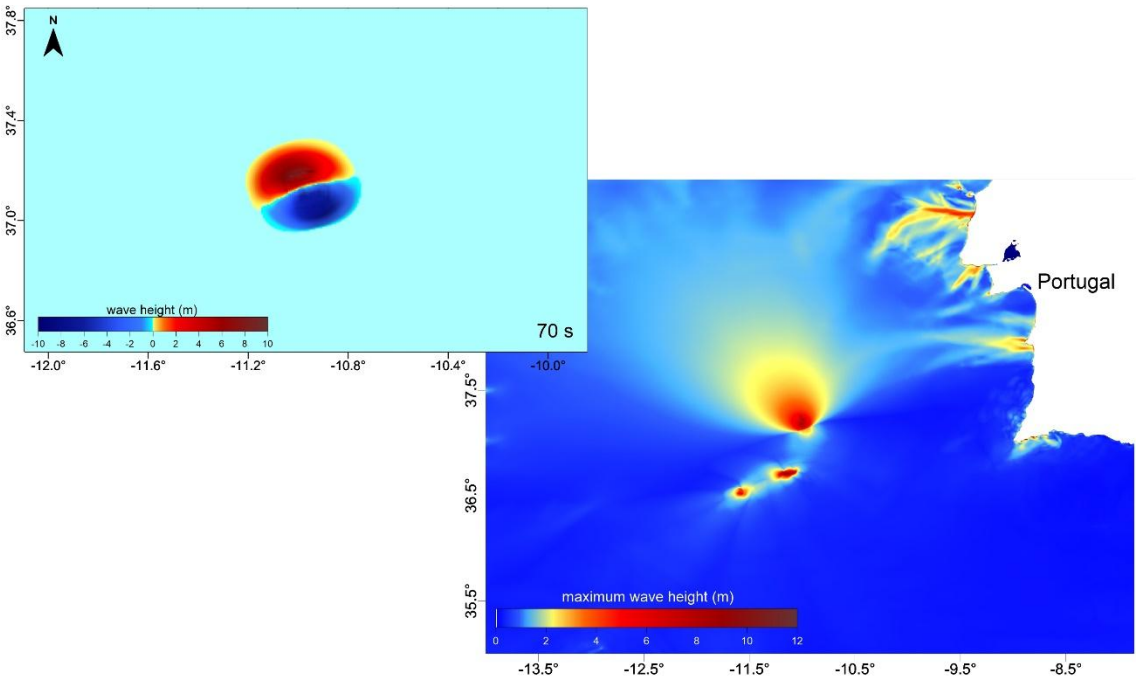

Figure 2: Simulated tsunami wave induced by the NGA at 70 s, and the maximum tsunami wave height simulated for the NGA.

References

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