Modelling landslides along the Malta Escarpment (Northwestern Ionian Sea) by sub-bottom profiling: implications for tsunamigenic potential.

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We present evidence of sub-marine slumps in Chirp sonar and Sparker profiles, at the shelf edge facing the Malta Escarpment, offshore southeastern Sicily (fig 1a).
An open debate exists about the location of the seismogenic sources of eastern Sicily responsible for large earthquakes (e.g. 1169 and 1693) followed by disastrous tsunamis. According to some authors, they are located offshore and related to the Malta Escarpment Fault System (e.g. Argnani and Bonazzi, 2005), for others they are on land (Visini et al. 2009) and tsunamis are due to large submarine slides (e.g. Billi et al. 2010).
Pirrotta et al. (2013) recognized two, seismically induced, over-imposed slumps made of Holocene deposits, in the Augusta Basin (fig 1b) occupied by the northern part of the Malta Escarpment. Although the grid of chirp profiles is not large enough to investigate the slumps entirely, the data show that the overlying body has a minimum volume of ~ 1 km^3, thus its tsunamigenic potential could only be responsible for minor tsunamis, such as the 1542 one.

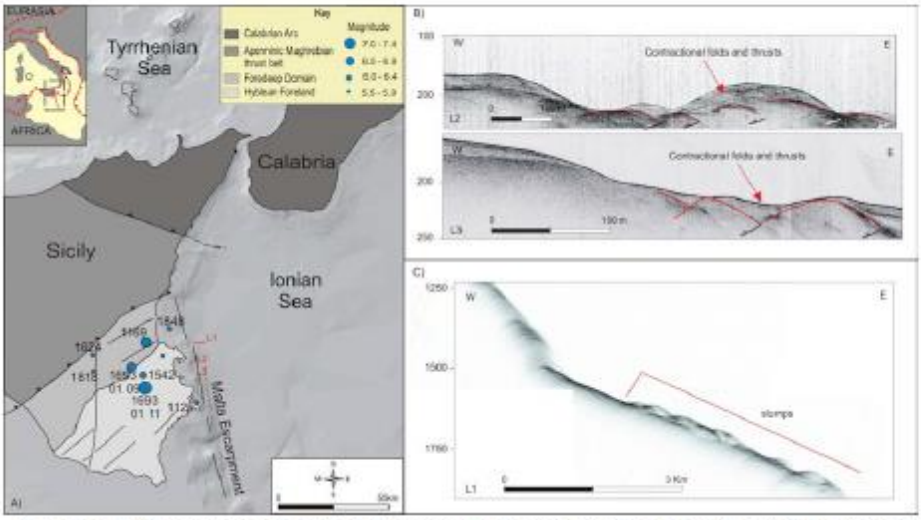

Fig. 1 – a) eastern Sicily seismotectonic setting, L1, L2 and L3 are the Chirp profiles of figures b) and c)in the Augusta Basin and at north, respectively.

During November 2013, in the frame of the scientific project SATOME (Slides and Tsunamis on the Malta Escarpment), we acquired new seismo-acoustic profiles in the Ionian offshore from Catania to Malta. The analysis of the Chirp and Sparker profiles showed additional landslides with typical slump geometry, limited slip and relatively low deformation, similar to those previously observed in the Augusta Basin.

In particular, a slump located north of the Augusta Basin (fig 1c), suggests that the landslide system can be larger than that originally defined by Pirrotta et al. (2013) and thus it may have a significant tsunamigenic potential and contribute to the trigger of big tsunamis, along with the slip on the seismogenic faults.

Data analysis is still in progress. Chirp and Sparker profiles will be further analysed to define the size of the slide system and to determine its tsunamigenic potential. This work has implications for the definition of the tsunamigenic sources and the assessment of tsunami hazard in southeastern Sicily.

References

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