

# Spatial extent of recent vertical tectonic motions measured in NE Sicily coastal area. Insights from marine geology and coastal geomorphology studies.

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Vertical position of sea-level, pointed out by related deposits and morphologies, provide useful markers to estimate tectonic uplift rates. For the Holocene very high uplift rates are measured in the northeast Sicily coast (Antonioli et al., 2009). This study compares vertical tectonic movements and marine geology data in the coastal sector between Capo d'Orlando and Brolo (NE Sicily); tectonic lineaments show different trends both onland (Nigro & Sulli, 1995) and offshore (Nicolich et al., 1982) and also the morphological response follows closely this difference. The geomorphologic survey provided data on Holocene uplift rates. We studied an archaeological ancient quarry of grinding wheels for oil that has been found in the Capo d'Orlando inshore (Scicchitano et al., 2011). They present semi-submerged circular holes in Stilo-Capo d'Orlando deposits (Carbone et al., 1998). The tectonic uplift was evaluated as the difference between the observed local paleo-sea level position and the predicted sea-level curve for the same locality (Lambeck et al., 2011). The resulting uplift rate is 0.36 mm/yr (Scicchitano et al., 2011). In this area we studied also the Brolo stack. It is a metamorphic rock emerging at 450 m from the coastline. The study led to the discovery of a fossil-bearing conglomerate in protected trays at 3.5 m a.s.l.. Radiocarbon analysis on a gastropod gave us an age of 4965 years  $\pm$  70 cal BP. If we compare this data with the predicted local sea level curves (Lambeck et al., 2011), we obtain an uplift rate about 1.5 mm/yr (Lo Presti et al., 2010), which is higher than that calculated in the study of archaeological rest. A detailed study of the Brolo sector shows us different morphological coastline positions of the Brolo plain. A picture of the year 1847 shows the coastline about 200 m landward. In the Brolo coastal plain we have also found a *Spondylus* at -6 m b.s.l. We wait for the radiocarbon dating which allows us to have a new uplift rate data.

The analysis of marine geology data (Multibeam) evidenced structures connected to different fault systems, such as the submarine canyons that are the continuation of river beds. Multibeam data evidenced also tilted NE-ward submerged surfaces, indicating existing structural movements, interesting only in restricted areas. So, very different uplift rates in the Holocene in very close areas distant only about 10 kilometers: both 0.36 mm/yr (Scicchitano et al. 2011) and 1.5 mm/yr (Lo Presti et al. 2010), and morphobathymetric data (tilted surfaces), evidence the important role of active tectonic lineaments. Seismic reflection profiles support this assumption, showing the metamorphic basement strongly dissected by high-angle faults, which at place determine the occurrence of emergent rock bodies (e.g. the Brolo stack). All this suggests the occurrence of "restricted regions" in the coastal-marine sector with different geological behavior as response to prominent tectonic releasing bands, determining their horizontal and vertical movements.

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