Measuring magnitude and rate of vertical movements in the offshore Capo Vaticano (W Calabria) using lowstand coastal prisms and wave-built terraces

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The magnitude and rate of vertical movements have been measured in the offshore Capo Vaticano (western Calabria) for the Late Pleistocene - Holocene on the basis of the depth of submerged coastal prism and associated wave-built terrace formed during the sea-level lowstand of the Last Glacial Maximum (LGM). Uplifted and submerged terraces have proved to be valuable recorders of vertical motion in many locations around the world (e.g. DICKINSON, 2001; WEBSTER *et alii*, 2004) as the depth of their tops appear to be controlled by the sea-level. In the eastern Tyrrhenian margins, depending on the hydraulic energy conditions (i.e. waves and wind-induced currents), the average water depth of terraced surface of lowstand coastal prisms was probably 15-20 m (CHIOCCI & ORLANDO, 1996).

A series of LGM lowstand coastal prisms and associated wave-built terraces were identified on a new set of very high-resolution reflection seismic profiles acquired along the continental shelf and upper slope of the western Calabria continental margin. Data processing included time-depth conversion and the interpretation of the resulting seismic lines was performed using a GIS-based software package.

Seismic interpretation highlight that along the offshore Capo Vaticano the slope-breaks associated with wave-built terraced formed during the LGM deepens from ~130 m (cluster A) to ~170 m (cluster B) below sea level (bsl) as one moves from southwest to the northeast, over a distance of ~21 km (Fig. 1). Farther to the north, along the western flank of the Calabrian Arc, an average depth for the slope-breaks of ~165 m is measured.

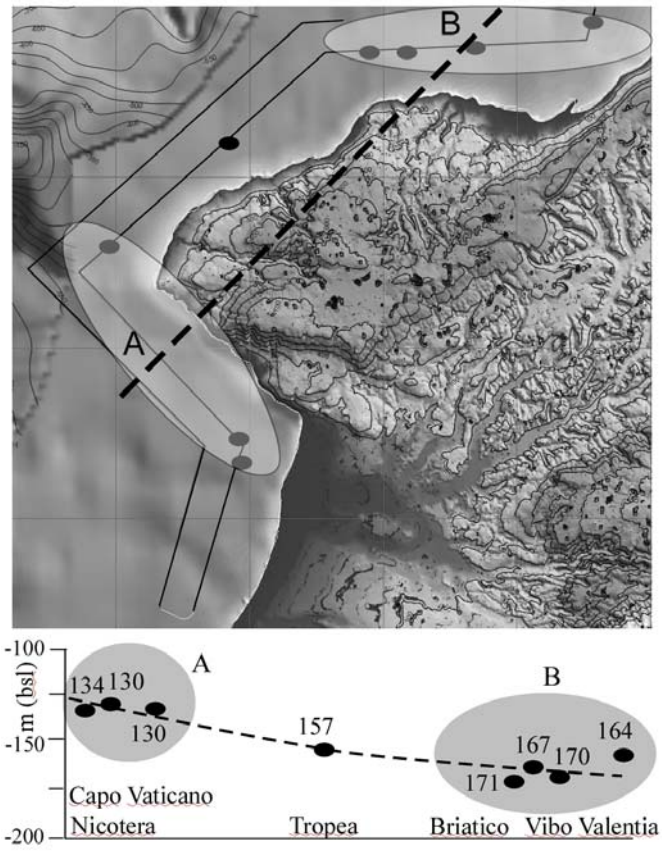

Fig. 1 – Map of the submerged coastal prism and associated wave-built terrace along the offshore Capo Vaticano and their depth profile along a NE-SW vertical section.

Removal of the non tectonic component of vertical changes using an ice-volume equivalent eustatic sea-level compilation (LAMBECK *et alii*, 2011) indicates ~15 (± 5) m of uplift and ~25 (± 5) m of subsidence during the post-LGM for the southern and northern sectors offshore Capo Vaticano, respectively. The resulting average uplift and subsidence rates (both regional and local components) for the last 20 (± 2) k.y. are 0.75 (±0.325) mm/y and 1.25 (±0.375) mm/y, respectively.

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The integration of the new data with those available in the literature (e.g. TORTORICI *et alii*, 2003; CUCCI & TERTULLIANI, 2010; FERRANTI *et alii*, 2011) may provide information on fault kinematics and constraints on slip rates of tectonic structures that are relevant for earthquake hazard analysis of western Calabrian margin.

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