Comparing Last Interglacial with late Holocene vertical movements along Mediterranean sea. A zoom on Sardinia

Fabrizio Antonioli (*), Luigi Ferranti (**), Marco Anzidei (***) & Egidio Trainito

Riassunto

Comparazione tra movimenti verticali costieri Tirreniani e quelli Olocenici, nel Mediterraneo ed in Sardegna

La comparazione tra movimenti verticali costieri nel mare Mediterraneo occorsi a partire da 125 ka BP o negli ultimi 3-4 ka BP è resa possibile in base alla presenza di molti indicatori di grande precisione come i solchi di battente o reperti archeologici oggi sommersi ben correlati al paleo livello del mare. In questa nota si fa il punto nel Mditerraneo con un approfondimento in una delle regioni più stabili del Mediterraneo: La Sardegna.

Key words: *Relative sea level rise,Last Interglacial, Holocene*

The Mediterranean basin is subjected to a complex pattern of crustal deformation distributed along tectonically active belts, developed in the framework of the convergence between of the African and Eurasian plates. So far, the interpretation of sea level variations along the coasts in this region must be accompanied by the evaluation of vertical land movements. Markers attributed to the last interglacial are represented by notches, marine terraces, beach deposits, speleothem concretions, boreholes of molluscs living in the spray zone of rocky cliffs and cores in subsiding Plains. In terms of timing, they have been identified with variable degree of accuracy. In the western and central Mediterranean area, in Spain and Algeria and further east in Tunisia, the high stand is represented by marine terraces and raised beaches, which, apart from the Gibraltar area, commonly lay close to the predicted eustatic elevation . Less is known about the French coast, where limited unpublished evidence suggests tectonic stability. In contrast, in the eastern Mediterranean the high stand markers are tectonically displaced, but the database is small as distribution and elevation of the high stand markers are known from a few sites only Greece: Lebanon, Israel, As regard coastline of Italy during last Interglacial. Ferranti et al., 2006 and Antonioli et al., in print 2008, provided a detailed compilation of hundreds of sites.

Late Holocene relative sea level change was carried out through measures based on the study of maritime archaeological structures pertaining the last 3 ka. Predictive models was used for sites located in tectonically stable areas or where the magnitude of tectonic uplift or subsidence is known from geological or archaeological indicators. A comparison between observed deformations and predictions of glacio and hydro-isostatic signals provided constraints on the earth rheological profiles and ice sheets chronologies. Recent results indicated for the Mediterranean significant variations of relative sea level in the last ~2000 years, suggesting that the observed signal can be accounted for eustatism and isostatic adjustment as well as by land movements in active seismic and volcanic zones, which can produce relative changes up to several meters. A revue of the Holocene rslc was provided for Italian coastline by Antonioli et al., in print, where These data (105 sites), compared with predictions allowed the calculation of the tectonic ratea. They are based on precise measures of geomorphological and archaeological markers aged between 0.4 and 12.6 ka cal BP, sampled at elevation between +7 and -51 metres.

Fig 1 - Measuring the MIS 5.5 tidal notch at Capo Figari (Olbia).

The Sardinia-Corsica block is a detached and rotated sector of the Alpine foreland including a small fragment of the western Alps in Northern Corsica (Alvarez; 1972; Montigny *et alii*, 1981; Vigliotti & Langenheim, 1995). Rotation and drift of the block accompanied to uplift of the islands to their gross regional elevation as a consequence of rifting in the Liguro-Provencal basin behind (Doglioni et al., 2004). Collision of the block with the western Adriatic margin occurred in the mid-Miocene (Patacca *et alii*, 1990). Since then, Sardinia and Corsica have been effected by extensional tectonics related to Tyrrhenian Sea rifting mostrly during late Miocene-Pliocene p.p. (Assorgia *etalii*, 1997; Casula *et alii*, 2001), and at present are thought to be stable. Opposite to the other segments of the peri-Tyrrhenian area, Sardinia lacks historical and instrumental seismicity (Boschi *et alii*, 2000). GPS geodetic motion of the IGS site Cagliari shows a small to statistically insignificant east velocities with respect to stable Europe, supporting the notion that Sardinia is part of the stable European margin (Serpelloni et al., 2005; Ferranti et al. 2008). However, campaign GPS sites of the PTGA network in southern Sardinia (Ferranti et al., 2008) exhibit differential velocities of up to 4 mm/a relative to the IGS site CAGL, suggesting internal deformation which is not recorded by seismicity. Anyway, the motion of GPS sites located around the Campidano basin are parallel to the faults bounding the basin, and thus only strike-slip (horizontal) motion is permitted in this part of Sardinia. We show new data for Last Interglacial (rispetto a Ferranti et al. 2006 and) for northern coast of Sardinia: tidal notches at Tavolara island (between 6.8 and 7.3 m) and capo Figari (about 5.0-5.10, Fig. 1). As regard the Holocene relative sea level change on the Sardinian coast, in addition to data by Antonioli et al. 2007, we report the measure of a Punic age harbour on the Sant'Antioco island and the relative sea level of 1.6 ka BP using a post Roman age wreck, recently discovered and studied into the Olbia harbour.

All this data confirm a strong stability of the whole Sardinian coast during Holocene, while little vertical displacements are found using Last Interglacial markers (3-4 meters in 125 ka).

(*)Enea, Dipartimento Ambiente, Roma
(**) Dipartimento Di Scienze Della Terra Di Roma
(***) Ingv, Istituto Nazionale Di Geofisica, Roma

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