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During Sea-Level Highstands:
A Global Synthesis with implications
for management of future coastal change

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Mid- and late-Holocene relative sea-level changes in the Mediterranean area: a review of selected sites with discussion of the possible eustatic, isostatic and tectonic contributions

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Abstract

When interpreting field data that give evidence of sea levels different from the present one, it is necessary to ascribe the vertical displacements to possible causes such as eustatic changes, tectonic uplift or subsidence, and glacio- and hydro-isostatic deformation during the period considered. For the late-Holocene, no single method exists to guide in the choice of the most likely predominant factors. In other words, one deals with one equation and at least four independent variables. A solution is possible only if appropriate numerical values can be ascribed to three unknown variables, thus obtaining a value also for the fourth unknown. This is of course a simplified approach that neglects less important - though often far from trivial - contributions, such as hydrodynamic effects, changes in water density, or other more or less local effects of climate.

This paper consists of a comparison of late-Holocene sea-level data from different Mediterranean areas for which sea-level predictions made by global isostatic models (Lambeck, 1995; Lambeck and Johnston, 1995; Peltier, 1998; Peltier et al., 2003) are also available. The areas include sites that are generally considered as relatively stable tectonically, like the southern coast of France (Laborel et al., 1994; Lambeck and Bard, 2000; Morhange et al., 2001; Peltier et al., 2003), Sardinia (Ozer et al., 1984; Peltier et al., 2003; Morhange et al., in progress), and the southern coast of Tunisia around Djerba Island (Jedoui et al., 1998; Morhange et al., in progress), where late-Holocene evidence may be either of submergence, or of emergence.

Are also considered a subsidence region in the northern Adriatic (Pirazzoli, 1998; Fouache et al., 2000), as well as actively uplifting areas in Calabria (Pirazzoli et al., 1997; F. Antonioli, pers. comm.; G. Mastronuzzi, pers. comm.), Greece (Pirazzoli et al., 1996; Pirazzoli, 1998; Stiros, 1996; Stiros et al., 2003) and the Levant (Pirazzoli et al., 1996; Morhange et al., in preparation), where the vertical displacement may be either gradual or by steps. In each case, it is explored whether the evidence available may be or not consistent with gradual isostatic or eustatic displacements. The approach is mainly empirical and based on comparisons among sites, in an attempt to decrease in each case the number of unknowns in the above mentioned equation, to bring out the most likely interpretation consistent with the data.

Finally, it is discussed whether, and how much, the global sea level may have risen, since 6000 radiocarbon years ago, due to Antarctic melting, as assumed by Nakada and Lambeck (1988), Nunn and Peltier (2001) and Lambeck (2002).

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