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

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Lambeck K.¹, Antonioli F.², Purcell A.¹, Silenzi S.³

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Quaternary coastal morphology and sea level changes

Sea level change and shoreline migration along the Italian coast from the Last Glacial Maximum to the present

¹Research School of Earth Sciences, Australian National University, Canberra 0200, Australia, E-mail: kurt.lambeck@anu.edu.au.

²ENEA National Agency for New Technologies, Energy and Environment, Via Anguillarese 301, 00060 S.Maria di Galeria, Rome, Italy, E-mail: fabrizio.antonioli@casaccia.enea.it.

> ³ICRAM, Central Insitute for Marine Research, via Casalotti 300, 00166 Rome, Italy, E-mail: s.silenzi@icram.org

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Abstract

Relative sea-level change along the Italian coast and adjacent seas - the combined result of eustasy, glaciohydro-isostasy and vertical tectonic motion - exhibits considerable spatial and temporal variability throughout the Holocene. The tectonic contribution have been evaluated from the elevation of MIS 5.5 shoreline-markers that are well developed in many localities and the eustatic and isostatic contributions have been predicted from models of ice sheets and earth rheology. Discrepancies between observed Holocene sea levels and model predicted values provide the information for refining the model parameters, including tectonic rates of vertical movement. Holocene and MIS 5.5 information, from 30 sites in Italy has been evaluated and compared with model results to calibrate the predictive isostatic model. The resulting parameters for the earth rheology and for the eustatic (ice-volume equivalent) sea-level function are consistent with results from regions outside of the Mediterranean and reflect global values. In particular, ocean volumes continued to increase after the end of the melting of the principal northern Hemisphere ice And sea levels along the entire Italian coast sheets. continued to rise up to the present due to the combined isostatic and eustatic effects at rates that exhibit considerable spatial variability. Using the calibrated model parameters the relative sea level change due to eustasy and the concomitant isostasy is predicted across the central Mediterranean region for the period from the Last Glacial Maximun to the present. The migration of shorelines is established for the same period. Holocene tectonic rates of vertical motion are also given for the Italian coastal zone. At most sites where the MIS 5.5 shoreline occurs above or below its 'tectonically-stable' position, the inferred rates of vertical crustal displacements are consistent with the assumption that average rates for the past ~125,000 years are comparable to the average Holocene rates.



Figure 1. Palaeogeographic reconstructions at 8000 years cal BP for the central Mediterranean region. The red (negative) and orange (positive) contours refer to the sea level change. Palaeo water depths are indicated by the change in shades of blue at depths of 25,50,100, 150 and 200 m. The ice-volume-equivalent sea level (esl) values for each epoch are given in meters.

However, at some locations, notably in eastern Sicily and southern Calabria, the Holocene rates exceed the longer term average rates.

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