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Sea-level change model predictions based on geomorphological data in Cyclades (Greece) and Tunisia

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The palaeo relative sea-level indicators are the most important type of data as far as the Glacial Isostatic Adjustment (GIA) related to the Last Glacial Maximum is concerned. The geomorphological and archaeological indicators have recorded the long-term sea-level variation that accompanied and followed the melting of the Late Pleistocene ice sheets. This bathymetry change stems for the combined effects of the eustatic sea-level change, the gravitational interactions between the geoid and the ice sheets and the deformation of the solid Earth. Since these three factors are fully described by the sea level equation in a self-consistent manner, the comparison of relative sea-level (rsl) data and predicted Holocene curves provides fundamental constraints on the GIA models. While the rsl data from the formerly glaciated area may provide constraints on both the extent and thickness with time of the ice sheets and the local shallow Earth structure and rheology, the palaeo sea-levels from the Mediterranean Sea may constrain the volumes of melt water that has been globally released through time and also the lower mantle rheological parameters.

In this work we combine archaeological and geomorphological rsl indicators with GIA-model predictions to investigate the Holocene sea level changes in Tunisia and Cyclades islands (Central Aegean). While the former area has been proven to be vertically stable on the long timescale, the Central Aegean could be affected by local tectonics that would result in vertical deformations. We therefore compare at first the available rsl data from Tunisia with GIA predictions based on a suite of available late Pleistocene ice chronologies and Earth rheological models. We find the best combination of ice and earth models to explain the rsl data from Tunisia and finally apply those to investigate the vertical stability at the Cyclades islands and to quantify the tectonics-related rates of vertical crustal deformation.