EGU21-9819
https://doi.org/10.5194/egusphere-egu21-9819
EGU General Assembly 2021

Vertical velocity fields along the Eastern Mediterranean coast as revealed by late Holocene sea-level markers

Marco Liberatore[1], Domenico Cosentino[1], Elsa Gliozzi[1], Paola Cipollari[1], Nazik Öğretmen[2], and Giorgio Spada[3]
[1]Roma Tre, Geological Science, Italy (marco.liberatore@uniroma3.it)
[2]Department of Climate Geochemistry, Max Planck Institute for Chemistry, Mainz, Germany
[3]Dipartimento di Fisica e Astronomia, Università degli Studi di Bologna, Bologna, Italy

Vertical movements of the solid surface reflect crustal deformation and mantle deep related phenomena. For Holocene times, coastlines displaced from the present mean sea level are often used, combined with past relative sea levels (RSL) prediction models, to clue the vertical deformational field.
Along the coast from south-western Turkey until Israel and Cyprus, a certain amount of good quality data is already published, leaving only a gap where data are absent along the Central Anatolian Plateau (CAP) coast. Based on new field observations along with this sector, between Adalia and Adana (Mersin, southern Turkey), together with AMS 14C dating, the gap is filled, allowing to describe an overall frame made by vertical differential movements along the Eastern Mediterranean coast.
Most recent Glacial Isostatic Adjustments (GIA) models have been used to remove the glacio-hydro isostatic component of the RSL. Different solutions from ICE-6G(VM5a) and ICE-7G(VM7) models (developed by W.R. Peltier and co-workers, Toronto University), as also a solution from the GIA model progressively developed by K. Lambeck and collaborators at the Australian National University, have been applied on 201 middle-to-late Holocene markers of RSL. Both GIA models have been implemented within the numerical Sea level Equation solver SELEN4.
Tectonic velocity has been therefore calculated. Starting from southwestern Turkey, subsidence has been found within the range between -0.91 mm/yr and -2.15 mm/yr confirming values from previous works. Velocities from the new markers along the CAP coast are positive ranging between 1.01 and 1.65 mm/yr. These two first blocks are separated by a sharp velocity contact, occurring along the complex fault zone of the Isparta Angle. Such values for the CAP margin were expected as recently published papers report high vertical velocities for a Middle to Late Pleistocene uplift event. Moving to the east, velocities are also positive, within 0.3-0.6 mm/yr, along the coast between the Hatay Gulf and southern Lebanon. The spiked profile of the Lebanese sector is likely due to co-seismic deformations along the Lebanese Restraining Bend faults (LRB). To the south, the Israeli coast is instead showing stability according to some unique RSL markers named piscinae while other markers indicate slow subsidence. Hence another velocity jump of at least 0.5 mm/yr is recognizable between Israel and Lebanon: it is probably associated with already known brittle structures. In northern Cyprus, the only Holocene sea-level marker confirms the

almost zero vertical velocity values already obtained for the MIS 5e marine terrace. Therefore, a vertical velocity jump occurs between stable Cyprus and the uplifting CAP southern margin, although they are placed on the same overriding plate of the subduction system. High-angle normal faults at the northern margin of the Adana-Cilicia Basin could explain these different vertical velocity fields.

These results depict a complex frame of wide independently moving crustal blocks where kinematic separation occurs along well-known regional fault zones. Driving causes of the block movements could be related either to regional tectonics, as it probably is for the LRB coast, or to mantle dynamics, for the uplifting Turkish sector where deeper processes should be considered.