Geophysical Research Abstracts
Vol. 14, EGU2012-9926, 2012
EGU General Assembly 2012

Deciphering natural to anthropogenic control on sedimentation: the Late Holocene Magdala (Kinneret Lake, Israel) harbour hystory

G. Sarti (1), V. Rossi (2), A. Amorosi (2), D. Bertoni (1), A. Ribolini (1), I. Sammartino (2), and G. Zanchetta (1)

(1) University of Pisa, Science, Earth Department, Pisa, Italy (sarti@dst.unipi.it, +39 050 2215800), (2) Dipartimento di Scienze della Terra e Geologico-Ambientali Università di Bologna

Using a multidisciplinary approach involving geologists, geomorphologists and archeologists, the late Holocene sedimentary succession buried beneath the ancient Magdala harbour area (Kinneret Lake, Israel) was studied, in order to highlight the strict relationships among harbour evolutive phases (e.g. foundation, siltation, abandonment), natural events (e.g. sea-level variations, climatic changes and earthquakes among the most important) and, obviously, archaeological history. Recent excavations performed within the "Magdala Project" have discovered a harbour structure with late Hellenistic-Roman mooring stones at altitudes of 208.100 m and 208.320 m bsl respectively, suggestive of a higher lake-level (about 212 m bsl) than previously hypothesized. Along the most representative sections of trenches, integrated sedimentological, micropalaeontological (benthic meiofauna and pollen) and geochemical analyses were carried out on sedimentary deposits underlying and overlying the harbour structures, to define the main depositional facies and evolution phases that took place during the last millennia. Spatial variability of coeval palaeoenvironments across the archaeological site allowed to reconstruct a comprehensive picture of the harbour complex, evidencing the occurrence of three main evolution phases, similar to those reported from several Mediterranean Sea harbour systems: 1) a pre–harbor foundation phase; 2) a sin-harbor activity phase and 3) an harbor-abandonment phase. The first phase corresponds to the development of a natural lacustrine sandy beach barren in archaeological remains and containing an ostracod fauna very similar to the one observed within the present-day lake basin at ca. 5 m water depth. The second phase was characterized by the formation of an early Hellenistic sheltered lacustrine basin, recording the first anthropogenic control exerted on coastal sedimentation by the construction of harbour structures ("anthropogenically forced sheltered basin"). Dark, fine-grained deposits formed during the sin-harbour activity phase are rich in osteological remains (sheep, cattles) and archaeological artifacts (coins, pottery etc.). Moreover, the very high proportion of noded forms of Cyprideis torosa with respect to the smooth ones reflects stressed conditions, possibly connected to high pollution levels induced by harbor activities or, more generally, to a dense human frequentation. According to this interpretation, a sharp increase in concentration of trace metals Zn, Pb and Cu, along with P2O5, is recorded at the very base of the sin-harbour sequence on which Late Hellenistic and early Roman harbour structures rest on.
The third phase, dated to the middle Roman period onwards, marks the siltation of the harbour basin and the end of Magdala harbour activities. The harbour-abandonment sequence is constituted by shoreface sands sharply overlain by foreshore-backshore well-sorted pebble conglomerates bearing middle Roman age remains. Another very similar conglomerate layer crops out in the sequence and covers Byzantine anthropogenic structures. From a sedimentological point of view the abrupt transition from sands to conglomerates indicates that major changes in sediment supply occurred after the late Roman age. We tentatively correlate this lithofacies change to climatic fluctuations (from a rainy to an arid phase) or to tectonic events, such as the destructive earthquakes occurred in the 349 AD and in 749 AD.