Geophysical Research Abstracts
Vol. 15, EGU2013-6813, 2013
EGU General Assembly 2013

Evidence of clastic evaporites in the canyons of the Levant basin (Israel): implications for the Messinian salinity crisis

Stefano Lugli (1), B. Charlotte Schreiber (2), Zohar Gvirtzman (3), Vinicio Manzi (4), and Marco Roveri (4)

(1) Dipartimento di Scienze Chimiche e Geologiche, Università di Modena e Reggio Emilia, Modena, Italy (stefano.lugli@unimore.it), (2) Department of Earth and Space Sciences, University of Washington, Seattle, U.S.A., (3) Geological Survey of Israel, Jerusalem,
Israel, (4) Dipartimento di Fisica e Scienze della Terra, Università di Parma, Italy

The recognition of widespread and thick evaporite deposits below the floor of the Mediterranean Sea has boosted a long standing controversy concerning their depositional setting (shallow versus deep) and their correlation with the onshore sequences. Until a new scientific campaign might be launched to cross those deposits, the discussion is still open to speculation.
Many Messinian evaporitic deposits have been interpreted as primary precipitates in very shallow-water or coastal environments, thus favouring the idea of a desiccated Mediterranean basin (Hsu et al., 1973).
Recent studies have questioned this interpretation (Hardie and Lowenstein, 2004) and widespread, thick, clastic evaporite facies have been identified in the Mediterranean (Manzi et al., 2005). These clastic deposits are not compatible with a desiccation model as they were clearly emplaced by fully subaqueous, deep-water processes, ranging from submarine slides, to high- and low-density gravity flows.
One of the most relevant areas for the understanding of the salinity crisis is the Levant basin where the Messinian evaporites partially fill some of the erosional features (canyons) considered to have formed as a consequence of significant drawdown related to the desiccation of the Mediterranean Sea (up to – 850 m, Druckman et al., 1995).
Our complete revisitation of the available cores from onshore Israel cutting through the sedimentary filling of the Messinian canyons (Afiq 1, Ashdod 2, Be'eri Sh1, Be'eri Sh4, Jaffa 1 and Talme-Yaffe 3) revealed exclusively clastic sulfate facies. This is the first direct evidence that the Lower Evaporite Unit offshore Israel may actually consist of deep-water resedimented evaporites that were originally deposited on the margin of the Levant Basin.

References

Druckman Y., Buchbinder B., Martinotti G.M., Tov R.S., Aharon P., 1995. The buried Afiq Canyon (eastern Mediterranean, Israel): a case study of a Tertiary submarine canyon exposed in Late Messinian times. Marine Geology, 123, 167-185.

Hardie L.A. & Lowenstein T.K., 2004. Did the Mediterranean Sea dry out during the Miocene? A reassessment of the evaporite evidence from DSDP Legs 13 and 42A cores. JSR, 74, 453-461.

Hsu, K.J., Cita, M.B., and Ryan, W.B.F, 1973. The origin of the Mediterranean evaporites, in Ryan, W.B.F., et al. eds., Initial Reports of the Deep Sea Drilling Project, v. 13, Washington, 1203–1231.

Manzi V., Lugli S., Ricci Lucchi F., Roveri M., 2005. Deep-water clastic evaporites deposition in the Messinian Adriatic foredeep (northern Apennines, Italy): did the Mediterranean ever dry out? Sedimentology, 52, 875-902.