



## **Physiographic constraints on evaporite deposition: A key-point for the interpretation of the Messinian Salinity Crisis**

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After a period of relative agreement about the model of deep basin-shallow water evaporite deposition, the debate about the interpretation of the Messinian salinity crisis (MSC) was reactivated, by the middle of the 1990's, by the proposition of several scenarios. New controversial interpretations raised which concern mostly the chronology and distribution of the major evaporite steps according to basin physiography, the importance and timing of the drawdown phases and related erosional events, and the depositional conditions of evaporites and post-evaporitic sediments. Did the main evaporite phases occur quite synchronously at the Mediterranean scale or with a complete diachronism according to the position in deep versus marginal basins? What is the real significance of the peripheral basins and the status of the central Sicilian basin: an exhumed deep basin displaying a complete sedimentary record of the MSC comparable to that of the deepest basins, or a perched shallow basin? Did the evaporites precipitate in shallow water settings related to sea level falls or in deep water conditions? Such are some of the most crucial questions that raised during the last decade.

The re-examination of the main evidences of depositional depth during the MSC along with consideration of general requirements for evaporite deposition, indicate the Mediterranean physiography was much more complex than a simple two-fold subdivision into deep and shallow perched marginal basins. The Mediterranean was segmented into a mosaic of interconnected sub-basins of various sizes inherited from a complex structural history and displaying gradual depth boundaries from deep to shallow basins. The central Sicilian basin was deep although not as deep as the deepest ones and, like other basins located in active orogenic belts, submitted to tectonically-

driven changes of the sedimentary settings. Deep water conditions are also reported before and after the evaporites in many peripheral basins. These different paleobathymetric settings governed the distribution of the evaporite deposits as well as their temporal evolution while the role of the inter-basins thresholds was crucial for hydrological evolution. In our scenario, the MSC involved two major steps which affected the whole Mediterranean even though the morphological differentiation of the domain introduced a slight diachronism of the onset of evaporite deposition. The first step started when the huge drop of base level caused the beginning of the lower evaporites deposition in shallow brine bodies and the widespread erosion of the margins. The erosion remained active throughout the crisis, but was enhanced during the second step of salt deposition and at the end of the lower evaporites, and finally during the latest Messinian dilution (lago-mare event). This last event affected the whole Mediterranean just before the abrupt restoration of the marine conditions in the earliest Zanclean.