eastern and western med Messinian salinity crisis : comparison scenarii and propositions

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The partial sequestration of the Mediterranean Sea from adjacent oceans at the end of the Miocene caused an evaporation surfeit that increased the water salinity above the seafloor of the deep basins and peripheral basins. As a result, an up to 2-3 km-thick sequence of evaporites was deposited in the center of the deep basins. This coincided with the concomitantly intense subaerial erosion of the adjacent margins and important Mass transport deposit events all around the peri- Mediterranean slopes. The volume of evaporites deposited in the deep basins implies a periodic connection with the world oceans concomitant with a huge evaporation during all the MSC. “Deep basins” refers to their position in the deep central parts of the extant Messinian basins in the western basin, the central basins (Ionian) and the eastern basins. The configuration of these basins and the distribution and thickness of the evaporites were very different 6 Myr ago due to the Africa Europe convergence. Evaporites deposition at the edge of the evaporites basins was affected by the geodynamic nature of the margins: Tertiary or Mesozoic passive or transform margins (North Africa), strike slip margins (northern and eastern Levant), convergent margins in the North of the East Mediterranean with evaporites subducted or stacked in a fore arc position. We propose a kinematic reconstruction of the central Mediterranean sea to discuss the connections between the Atlantic waters and the eastern Mediterranean Sea. In this presentation, we show that: (1) There is no opposition between the deposition of the first deep water evaporites and a sea level fall of more than 1000 m. (2) by a threshold effect the eastern Mediterranean could have been more restricted than the western Mediterranean during the phase 1 of the MSC, which could explain the two major incisions observed in the Nile delta (3). At the end of the MSC, this threshold effect could have been maximal with an accommodation space almost filled up and a bathymetry probably not exceeding 50 m in the western Mediterranean and in the Central Mediterranean with deposition of K and Mg evaporates, and almost zero in the Eastern Mediterranean as shown by the fluvial network developed on a wide-spread erosional surface on top of the Levant basin salt. (4) The Messinian salinity crisis (MSC) ended with the rapid re-flooding of the Mediterranean sea. A two-step flooding in the western Mediterranean could find its origin in this threshold effect.