



New imaging of the salinity crisis: Dual Messinian lowstand megasequences recorded in the deep basin of both the eastern and western Mediterranean

Christian Gorini (1,2), Lucien Montadert (3), and Marina Rabineau (4)

(1) Sorbonne Universités, UPMC Univ Paris 06, UMR 7193, ITeP, F-75005, Paris, France, (2) CNRS, UMR 7193, ITeP, F-75005, Paris, France, (3) Beicip-Franlab, 232 Avenue Napoléon Bonaparte, 92500 Rueil-Malmaison, France, (4) CNRS, UMR 6538, Domaines Océaniques, IUEM, UBO, 29280 Plouzané, France

Through several examples we show that following sea-level fall and marginal erosion during the Messinian salinity crisis (MSC), clastic inputs into the eastern and western Mediterranean Sea are not distributed evenly in space and time but are mainly limited to the lower section of the Messinian salinity crisis depositional megasequence. Significant similarities around the basin allow us to propose a Mediterranean Messinian salinity crisis depositional episode that can be divided into two seismic megasequences: the Messinian lower megasequence (MLM) and the Messinian upper megasequence (MUM). Their distinctive seismic facies correspond to systems tracts deposited during three main stages that represent a complete sea level cycle. (1) A falling stage systems tract including mass transport deposits and forced regressive clinoforms deposited in the early part of the falling stage, and related to the increasing rate of relative sea level fall. This stage is characterized by a marked shift in the depocenter towards the deep basins. (2) An early lowstand characterized by massive clastic inputs from major Messinian rivers (the Rhone, Nile, and Antalya Gulf rivers) or smaller river systems (offshore south Lebanon). These clastics were deposited in an oversaturated basin, as evidenced by the interfingering chaotic and transparent seismic facies of the Messinian lower megasequence (MLM). (3) A late lowstand, starting with rapid deposition of massive halite, with no detrital inputs into the deep basin. The upper part of the evaporites clearly onlaps the Messinian erosional surface at the margins and is evidence for a transition between a late lowstand stage and an early transgressive stage. These deposits belong to the Messinian upper megasequence (MUM). We interpret the transition between the two megasequences as the peak of the “salinity” crisis, the end of the relative sea level fall, and the maximum dispersal of sands into the deep Mediterranean basins.