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Large sea surface temperature, salinity, and productivity-preservation changes preceding the onset of the Messinian Salinity Crisis in the eastern Mediterranean Sea

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The Messinian Salinity Crisis (MSC; 5.97–5.33 Ma) is an enigmatic episode of paleoceanographic change, when kilometer-thick evaporite units were deposited in the Mediterranean basin. Here, we use geochemical (biomarker, isotope) data to reconstruct sea surface temperature, salinity, and productivity-preservation changes in the Mediterranean basin just before the MSC. The proxy data indicate that the Mediterranean Sea was significantly saltier and colder between 6.415 Ma and 6.151 Ma, than between 6.151 and 5.971 Ma. Salinity decrease at 6.151 Ma seems to be a relatively fast event just preceding the inception of a warming phase that lasted almost uninterrupted until the MSC onset. The water exchange with the Paratethys could have caused, along with the African rivers, an increased freshwater supply, resulting in normal marine Mediterranean waters between 6.151–5.971 Ma, despite the severe restriction of marine connections with the Atlantic at that time. SST changes determined a sharp drop in productivity and/or preservation of organic matter, marked by deposition of calcareous marls. Productivity and preservation were relatively high and constant until 6.01 Ma. Afterward, increased influx of terrestrial organic matter and probably enhanced water column stratification prevailed. Around 5.971 Ma, modifications in aquatic vs. terrestrially-derived biomarkers indicate changes in organic matter influx at the MSC onset.