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The Neogene evolution of the Corsica Basin (Northern Tyrrhenian Sea) revealed by the seismic markers of the Messinian Salinity Crisis in an intermediate-depth basin

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The Messinian Salinity Crisis (MSC), which widely affected the whole Mediterranean basin, induced rapid and spectacular palaeoenvironmental changes. It led to a major erosion of the onshore areas and the upper parts of the continental shelves and slopes, as well as important evaporitic deposits in the offshore deep basins. The Corsica Basin belongs to the so-called “intermediate-depth basin” type because of its location between the coastal plain–shelf area of East Corsica and deeper marine basins in the northern Tyrrhenian Sea. The MSC event took place in the Corsica Basin during a period of active regional tectonics, contemporaneous with the opening of the Tyrrhenian Sea, as well as during the development of the Corsica Basin and the Elba-Pianosa Ridge.

Based on the interpretation of high-resolution seismic reflection profiles and a new 1:250,000 scale synthetic geological map, we establish that the MSC is recorded in the Corsica Basin through the occurrence of two sedimentary formations bounded by three remarkable surfaces. These seismic markers suggest local and temporal variations in relative water level and associated depositional environments that differ between the north and south of the Corsica Basin. During the MSC, the northern sector (Golo Basin) was emerged, whereas the southern sector (Orbo Basin) was often flooded or submerged. In the Orbo Basin, the deposits record both an episode of intra-MSC climate change and regional tectonic events. During the MSC, the Corsica Basin was a perched lake, isolated from the deeper Tyrrhenian basins. The connection with the Tyrrhenian basins was re-established during the final stages of the MSC. Initiated by retrogressive erosion during a relative lowstand, an extensive network of incised valleys was established in the Orbo basin, allowing the drainage of the Corsica Basin southwards into the deeper Tyrrhenian basins just before the sudden Pliocene reflooding. These depositional and erosional markers record the regional tectonic context which was permanently active throughout the MSC. The Orbo basin was strongly subsident along its western rim, while its eastern rim was uplifted. In turn, the Golo basin subsided from middle Pliocene times onwards, while the northern, eastern and southern edges of the Corsica Basin were deformed and uplifted.