Strontium isotopes provide evidence for non-catastrophic reconnection of the Black Sea to World Ocean during the last deglaciation

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The Black Sea is the world's largest anoxic basin, and its recent bottom sediments are rich in organic matter because of little seafloor degradation. This restricted setting is a potential analogue for the semi-enclosed Kimmeridgian basin in the North Atlantic region. The onset of restricted conditions in the Jurassic might be similar to what occurred during the early Holocene in the Black Sea. The Holocene history of the Black Sea has been highly debated for the last 20 years. There is general agreement that the almost fresh Black Sea 'lake' and the Mediterranean Sea were reconnected in a short interval of time after the last glacial period, but the timing and mode of this reconnection as well as the level of the Black Sea at the time remain open questions. Since reconnection, the Black Sea has been a stratified water body with poor ventilation of its deep waters, promoting organic-matter accumulation.

Most published geochemical data used to underpin interpretations of the Holocene history come from short cores collected along the northwestern Black Sea shelf where the sedimentation rates in the Holocene were slow, so thicknesses of Holocene sediment are ~70 cm. In contrast, MUN core MAR02-45 has more than 10 times higher resolution thanks to a much greater thickness of Holocene sediments. This core is 9.5 m long with a continuous high-resolution sedimentary record in its lower 6.8 m, spanning 10.3–5.5 cal ka. Sr isotopic studies performed on molluscs from this core indicate that the $^{87}Sr/^{86}Sr$ values change from 0.708874 to 0.709147 during time interval between 9431 and 6948 calendar years before present. This supports an idea of non-catastrophic although rapid reconnection of the Black Sea to the world ocean. Oxygen and carbon isotopic ratios and trace elements in ostracods across the same interval can provide constraints on environmental conditions during the onset of the modern conditions of anoxia in the deep basins of the Black Sea, and will be evaluated during ongoing research.

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