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Recent seasonal hypoxia on the Western Black Sea shelf recorded in adjacent slope sediments

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Bottom water hypoxia is a major environmental problem afflicting estuarine and marine environments across the globe (Diaz and Rosenberg, 2008). Hypoxia is often attributed to human-induced increased nutrient discharge from rivers and related eutrophication. The Western Black Sea shelf is a typical example of a system where such anthropogenic impacts are thought to have contributed to the development of seasonal hypoxia in the late 20th century. However, due to the lack of spatially and temporally consistent monitoring in the region, questions remain about the evolution, causes and consequences of the seasonal hypoxia on the Western Black Sea shelf and whether or not the ecological state has recently improved (Capet et al., 2013).

In this study a resin-embedded sediment core from a location below the chemocline on the Western Black Sea slope (water depth 377 m) was analyzed for its elemental composition by means of laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS), recovering a continuous geochemical record at a sub-annual resolution for the last 100 years. Relative enrichments in organic carbon, Pb, Fe, S, and Mo were observed in the depth interval corresponding to the 1970s until the 1990s, suggesting an increased carbon flux to the sediments as well as an anthropogenic pollution signal. We propose that the expansion of eutrophication on the Western Black Sea shelf was responsible for the enhanced carbon flux to our study site, while the associated hypoxia enhanced the shuttling of redox-sensitive elements to locations below the chemocline. The subsequent decrease in organic carbon and metal enrichments at the core top suggests a recent rise in oxygen concentrations and improvement of the ecological state of the Western Black Sea shelf.

References:

Capet, A., Beckers, J.-M., Grégoire, M. (2013). "Drivers, mechanisms and long-term variability of seasonal hypoxia on the Black Sea northwestern shelf–is there any recovery after eutrophication?" Biogeosciences 10(6): 3943-3962.

Diaz, R. J., and Rosenberg, R. (2008). Spreading dead zones and consequences for marine ecosystems. Science 321(5891): 926-929.