Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.16120

Western Black Sea suboxic layer biogeochemical structure during the December 2022 R/V Bilim Expedition

MUSTAFA YUCEL[1], HASAN ÖREK[1], NIMET ALIMLI[1], **HILAL CURA**[1], NAIM YAĞIZ NAIM DEMIR, MSC[2], VOLODYMYR MYROSHNYCHENKO[1], BETTINA FACH[1], SINAN ARKIN[1], SÜLEYMAN TUĞRUL[1] AND BARIS SALIHOGLU[1]

[1]Middle East Technical University, Institute of Marine Sciences
[2]Middle East Technical University

Presenting Author: cura.hilal@metu.edu.tr

The Black Sea is a unique semi-enclosed basin with ten sizable rivers flowing into a highly connected coastal-deep sea system, adding anthropogenically generated nutrients and pollutants, fueling the biggest anoxic-sulfidic water body on Earth. The ecosystem of the Black Sea is particularly distinct in that it is vulnerable to the increasingly harmful effects of a number of human-caused stresses, including eutrophication and hypoxia, overfishing, and the introduction of alien species. The impacts of climate change on the ecosystem are superimposed on top of these. The marine environment of the Black Sea has seen significant changes since the early 1970s, and it is believed that combinations of these stressors are the primary cause of its decline. The Black Sea's redox interface, which can stretch to a meters-long suboxic (no sulfide and no oxygen) zone and separates the thin upper layer from the largest sulfidic water body on Earth, is a crucial factor in regulating the health of the productive upper layer. Here, we present the most recent findings from the Black Sea's redox interface, which was studied as part of a basin-wide research mission by R/V Bilim-2 in December 2022. We focus on the western central basin in this contribution and present high-resolution vertical distributions of oxygen, nutrients (nitrate, silicate, and phosphate), and hydrogen sulfide. Throughout this month, the water was transitioning to winter conditions while maintaining above-average seasonal sea surface temperatures. Although the average sigma-thetas at the lower end of the oxycline was at 16.0 to 16.2, at the lower end of the historical datasets including the last decades, we still found evidence of winter mixing and oxygen injection across density layers. Hydrogen sulfide's onset density was also observed to be between 16.2 and 16.4, which is consistent with earlier datasets from the winter. Our research hints at how Black Sea microbial communities taking part in sulfur, nutrients and oxygen cycles react to anthropogenic stressors and climate change. It also suggests that the biogeochemical regime exhibits a certain degree of resilience, which is revealed by the suboxic zone oxygen and sulfide gradients.