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Calibration of the Benthic Foraminiferal Oxygen Index in the Marmara Sea

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Benthic foraminifera (total assemblages) were studied from 30 sea-floor samples collected along a bathymetric transect on the southern shelf of the Marmara Sea from depths of 15–350 m. At each station, Kaiho's Benthic Foraminiferal Oxygen Index (BFOI) was calculated based on species abundances using the methods outlined by Kaiho (1994). The calculated BFOI values were converted to analogue oxygen values, and calibrated to the dissolved oxygen values measured 1 m above the sea floor at each station. In the surface waters and central part of the Marmara Shelf transect, the BFOI values reproduce the measured dissolved oxygen values with a remarkable degree of accuracy. Beneath the pycnocline at depths of 30 to 75 m, the BFOI underestimated the measured oxygen values. This discrepancy is attributed to seasonally higher summer oxygen values within the chlorophyll maximum, corresponding to the position of the Mediterranean Inflow Water (MIW) present during summer. In the deeper part of the transect (below 140m), BFOI values overestimated the measured oxygen values. This discrepancy is attributed to the presence of denser MIW that cascades down the submarine canyon beneath the Marmara ship channel during winter, ventilating the deep Marmara Sea. The BFOI accurately points out the seasonal differences in the position and depth of the MIW in the southwestern Marmara Sea. The BFOI likely reflects the longer-term oxygen values averaged over the span of many years.