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Hidden vortices: near-equatorial low-oxygen extremes driven by high-baroclinic-mode vortices

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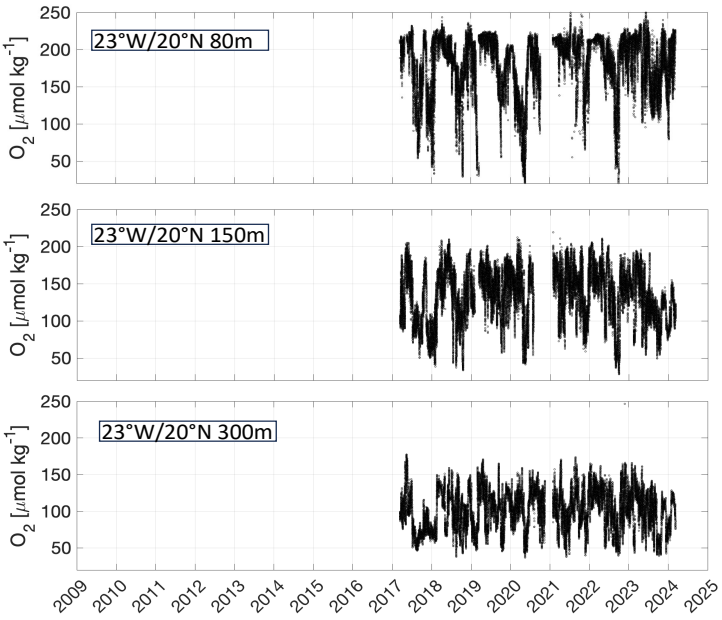
Low-oxygen events linked to subsurface eddies & also evident in long-term moorings

Low DO events below 60 µmol kg⁻¹ in the upper 200 m have been observed through repeated shipboard measurements and multi-year moored observations (Figure 1 or Table 1 in the main manuscript) in the near-equatorial (6°- 12°N) open ocean of the eastern tropical North Atlantic. Across all depths in the long-term DO time series from moored observations at 4°N, 11°N, and 20°N (all at 23°W), recurring dips in DO are observed that fall significantly below the climatological mean (see Fig. 1 or examples at 23°W/11°N at 500 m and 23°W/4°N at 80 m in Fig. 3 a,b of the main manuscript). About 60% of all low DO events (70% from shipboard, 50% from moored observations) can be directly linked to anticyclonic and cyclonic subsurface eddies. The other available long-term time series from moored oxygen sensors in the eastern tropical north Atlantic (not shown in full length the main manuscript) are as follows (Fig. S1):



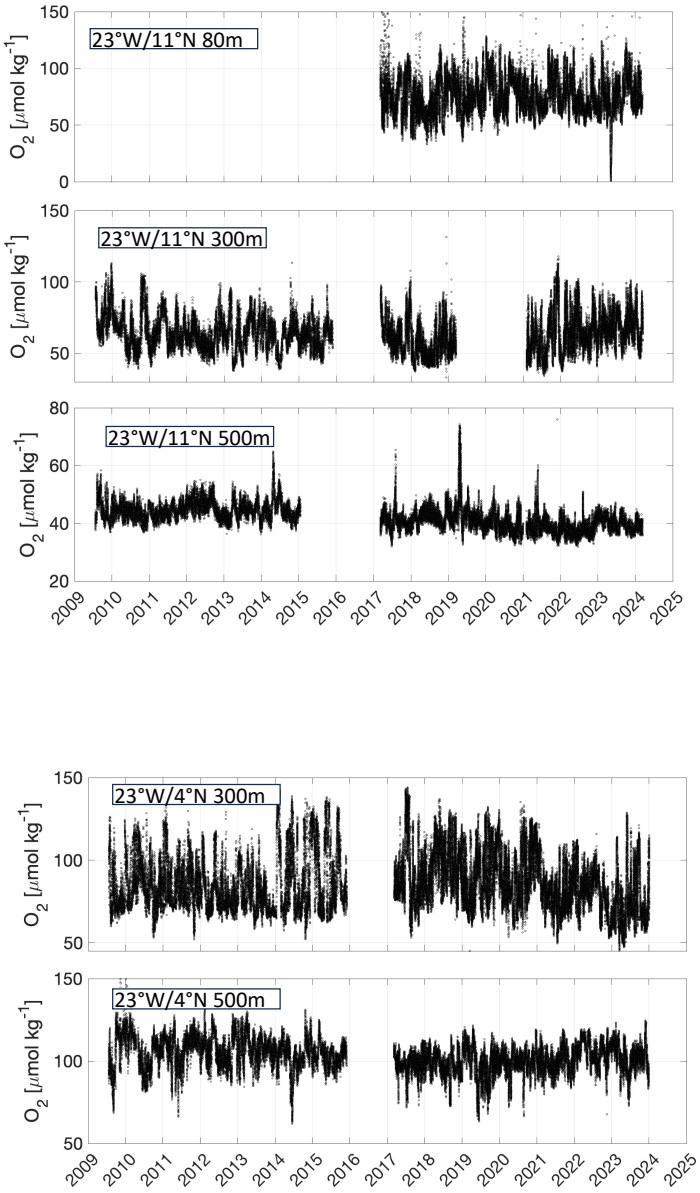


Figure S1: Oxygen time series along 23°W - at the top: 20°N (80 m, 150 m, and 300 m depth); in the middle: 11°N (80 m, 300 m, and 500 m depth); and at the bottom: 4°N (300 m and 500 m depth). Each panel shows dissolved oxygen (μmol kg^{-1}) as a function of time.