Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.36078

Orbital-scale Middle Miocene climate and carbon cycle coupling

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The Middle Miocene time interval is characterized by a tight coupling between climate changes and carbon cycle reorganizations, specially during the Miocene Climatic Optimum (MCO), which recorded the youngest hyperthermal climate variability mode of Earth's history. The warm MCO was followed by global cooling during the Middle Miocene Climate Transition (MMCT), culminating with East Antarctic ice sheet expansion at 13.8 Ma, and the termination of the "Monterey" positive carbon isotope excursion. Here we present high-resolution proxy records at Ocean Drilling Program (ODP) Sites 926 and 927, located in the tropical Atlantic Ocean (Ceara Rise), across two intervals of major climate change: (I) the MCO thermal maximum centered at 15.6 Ma; and (II) the major cooling step of the MMCT at 13.8 Ma. Our new datasets comprise foraminiferal stable carbon ($\delta^{13}C$), oxygen ($\delta^{18}O$) and boron ($\delta^{11}B$) isotope and trace elements, as well as sedimentary elemental ratios records. Differently from deep eastern equatorial Pacific MCO records, tropical Atlantic records depict improved carbonate preservation during the warmest phase of the MCO thermal maximum, which was likely characterized by drier hydroclimate conditions over tropical South America. Ongoing precession-resolution foraminiferal $\delta^{11}B$ and trace elements measurements will help constraining oceanic carbonate chemistry, and Antarctic ice sheet hysteresis across two phases of major climate reorganizations during the Middle Miocene.