

Mid-Miocene Ocean Temperatures from paired Coccolith δ_{47} and Foraminifera Mg/Ca Ratios

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The Middle Miocene Climatic Optimum (MMCO) and Climate Transition (MMCT) were dynamic times in Earth's climate history, where high $p\text{CO}_2$ levels and warm temperatures in the MMCO gave way to global cooling and the reorganization of oceanographic currents during the MMCT. Here we use several independent methods to reconstruct changes in temperature and seawater $\delta^{18}\text{O}$ values during the middle Miocene at IODP Site 1120, southeast of New Zealand. We use δ_{47} temperatures and $\delta^{18}\text{O}$ values of coccoliths as well as Mg/Ca ratios and $\delta^{18}\text{O}$ values of foraminifera to provide two independent, complimentary records of climate. Significantly, both methods show little temperature change across the interval studied, however both methods show an increase of approximately 0.5‰ in seawater $\delta^{18}\text{O}$ values in the MMCT, presumably in response to increased Antarctic glaciation. Additionally, this work demonstrates that coccoliths can be used for δ_{47} -based temperature reconstructions, despite their known fractionation in $\delta^{18}\text{O}$ values.