Examining Temperature Proxies Based on Branched Tetraether Membrane Lipid Abundances Derived from Lacustrine Surface Sediments and Modern Lake Temperatures in Central Chile

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The modern climate of central Chile is dominated by the Southern Hemisphere Westerly Wind (SWW) belt. The SWW is the strongest time-averaged oceanic wind on Earth, and the latitudinal location and intensity of the SWW belt is strongly correlated to precipitation amount and ambient air temperature along the western side of South America. The SWW belt is also hypothesized to exert significant influence on the global carbon cycle by enhancing upwelling in the Southern Ocean, which results in increased marine to atmosphere CO_2 exchange and provides a large proportion of the nutrients required for primary production. However, this region lacks high resolution climate data that is necessary to closely examine the relationship between the fluctuations in the location and intensity of the SWW belt and changes in regional temperature. In this study, we investigate the relationship between the abundances of branched tetraether membrane lipids (brGDGTs) extracted from more than 50 lacustrine surface sediments spanning >10° of latitude and recorded modern lake and mean average air temperatures in central Chile. Many studies have shown that brGDGTs abundance is related to growth temperature, making them robust biomarkers for use in paleotemperature reconstruction. We compared our regional calibration with previously developed brGDGT temperature calibrations from soils, African Lakes, and tropical lakes with the goal of embarking on down-core paleotemperature reconstructions. Such future study will allow us to gain understanding of the long-term characteristics of the SWW belt and implications for regional and global climate dynamics.