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Atmospheric CO_2 and sea surface temperature across the late Eocene and early Oligocene from South Pacific: Site U1553, IODP 378 Expedition

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The late Eocene to the early Oligocene (32-39 Myr ago), is an intriguing period where climate transitioned from the "Greenhouse" state of the Eocene to the "Icehouse" state of the Oligocene (Westerhold, T. et al., 2020). This is also a time with potentially dynamic ice sheets on Antarctica and variable atmospheric CO_2 concentrations (CO_2). The relationship between CO_2 and ice sheet growth-and-retreat (i.e. through sea level reconstructions) is largely unknown for this time period, but important for constraining thresholds of CO_2 for ice sheet stability at different climate states. Here, we use the high latitude site U1553 in the South Pacific that allows for orbital scale reconstructions from planktonic foraminifera. We analyze multi-species foraminifera for stable isotopes, trace elements and boron isotopes. Through these we explore foraminiferal "vital-effects" and changes in seawater boron composition, providing a robust base for generating long term, continuous CO_2 and seawater temperature records through the late Eocene-early Oligocene. We will present our first reconstructions for this period and explore our evolving understanding of the link between temperature, carbon cycle, and sea level (i.e. salinity).

Westerhold, T. et al. (2020) An astronomically dated record of Earth's climate and its predictability over the last 66 million years. *Science* 369, 1383.