# Hydrological Changes in the Southern Hemisphere during the Paleocene Eocene Thermal Maximum

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Understanding changes in the hydrological cycle with warming in the Southern Hemisphere is essential for making zonal predictions of precipitation changes with anthropogenic warming. In this study, we evaluate hydrological changes associated with global warming of the Paleocene-Eocene Thermal Maximum (PETM) using carbon and hydrogen isotopic compositions of terrestrial biomarkers (*n*-alkanes) derived from leaf waxes in Tawanui, New Zealand. These records have the unique advantage of recording atmospheric $CO_2$ (modified by plant fractionation) and precipitation (modified by plant fractionation and evapotranspiration), allowing for an evaluation of the relative timing of carbon and hydrogen isotopic (i.e., climate) shifts during the PETM.

The PETM represents a period of rapid, greenhouse-gas induced global warming ~55 Ma years ago, characterized by a negative $\delta^{13}C$ excursion in $\delta^{13}C$ and a pervasive marine carbonate dissolution.Previous work at the Tawanui site have established changes in *n*-alkane $\delta^{13}C$ trends, with a peak negative $\delta^{13}C$ shift of ~2 – 3%. Our preliminary results for terrestrially derived *n*-alkane dD compositions indicate similar temporal trends among a range of chain lengths (*n*-alkanes C25, C27, C29, and C31), but with varying magnitudes of change. Differences are emerging between Northern and Southern Hemisphere sites. In general, *n*-alkane dD trends observed in the Northern Hemisphere include a “pre-event” D-enrichment followed by D-depletion during the body of the PETM. While D-enrichment is not observed prior to the PETM at Tawanui, the most positive dD values are observed before the peak of the carbon isotopic excursion. No significant D/H changes are observed during the peak excursion itself with the values returning to pre-PETM values. These records will be presented and comparisons will be made with other sites globally.