Goldschmidt 2024 Abstract
https://doi.org/10.46247/gold2024.24351

Hydroclimate at ~400ppm in Northern South America: A Modern and Pliocene study.

LINA C PEREZ-ANGEL AND JAMES M. RUSSELL

Brown University

Presenting Author: lina_perez_angel@brown.edu

The Pliocene, from ~5.3 to 2.6 million years ago (Ma), is the last epoch when Earth's mean temperature was ~2.5-4°C warmer than today, CO2 concentrations were higher than pre-industrial levels (~400ppm) and the northern hemisphere was largely deglaciated. The Pliocene offers a valuable opportunity to explore the impacts and feedback mechanisms governing the hydrological cycle in a warmer climate. However, Pliocene precipitation reconstructions from proxy data are scarce, limiting our ability to assess the mechanisms governing rainfall regimes under these boundary conditions. The Sabana de Bogotá in the northern tropical Andes of Colombia (~4ºN) offers a unique sedimentary archive from the South American tropics, including sediment from an extinct lake preserved in the Funza-II core that dates to the late Pliocene (~3.8 Ma). To evaluate the responses of hydroclimate in the northern tropical Andes to thermodynamic processes (i.e., wet-gets-wetter) relative to feedbacks and dynamic mechanisms (e.g., El Niño-like processes), we measured the carbon and hydrogen stable isotopic composition of sedimentary plant waxes (C29 and C31 *n*-alkanes) (δ13Cwax and δDwax) in the late Pliocene to mid Pleistocene section of the Funza-II core. Additionally, given the complexity in atmospheric circulation and topography in the region, we measure modern stable isotope composition of precipitation to better interpret our isotope-based paleoclimate record (Pérez-Angel et al. 2022). Our δDwax results from *n*-alkanes indicate that late Pliocene precipitation was more D-enriched than the early-mid Pleistocene (~25‰), suggesting drier conditions during a warm climate. The δ13Cwax results show no drastic changes in vegetation that could alter the isotopic fractionation, reducing the uncertainty in our climatic inferences. This Pliocene-Pleistocene hydrology reconstruction in northern South America illustrates the importance of dynamical responses of the tropical Pacific Ocean to the climatology of the western Americas, as seen in regions influenced by the North American monsoon (Bhattacharya et al., 2022).