



PP42D-1141 - Faunal Stable Isotopes Describe Eastern African Hydroclimate Across the Afro-Eurasian Collision



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09:00 - 12:30



McCormick Place - Poster Hall, Hall A (South, Level 3)

Abstract

The Oligocene collision of the African and Eurasian plates transformed African faunal diversity and composition, but the mediating role of hydroclimate in this process is not fully understood. We analyzed stable carbon ($\delta^{13}\text{C}$) and oxygen ($\delta^{18}\text{O}$) enamel isotope values from the newly discovered Oligocene-aged Topernawi Formation in Turkana, northern Kenya ($n = 45$), and compared these data to other new ($n = 154$) and published faunal isotope measurements ($n = 92$) from the Eocene, Oligocene, and Miocene in northeast Africa. At Topernawi and nearby Chilga in Ethiopia, low $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ enamel values suggest warm and wet tropical ecosystems that were likely forested immediately prior to the exchange (29 Ma). This is consistent with plant macrobotanical records, despite a global cooling period related to the onset of southern hemisphere glaciations. Within Topernawi, enamel $\delta^{18}\text{O}$ measurements from taxonomically diverse hyraxes of the clade Paenungulata suggest size-based differential water use. While Eocene and Oligocene $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ data are tightly correlated and indicate alternating dry and wet conditions with high inter-site variability, after the plate collision faunal $\delta^{18}\text{O}$ values rose, and $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ variation became decoupled, perhaps in response to adaptations in the vegetative community to water stress related to reorganization of regional hydroclimate as the Tethys closed. Overall, paenungulate taxonomic diversity and $\delta^{18}\text{O}$ breadth declined after the collision of the African and Eurasian plates, replaced by Eurasian immigrant fauna with relatively broader $\delta^{18}\text{O}$ ranges. Faunal $\delta^{18}\text{O}$ values remained consistently high after the collision and into the Middle Miocene Climatic Optimum, suggesting drier conditions and relatively stable hydroclimate that may mark a shift in mean climate state in eastern Africa after the closure of the Tethys.