

RESOLVED  $\delta^{13}\text{C}$  SIGNATURES IN *METROSIDEROS POLYMORPHA* AS AN  
INDICATOR OF HYDROCLIMATE VARIABILITY ON MAUNA KEA

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## ABSTRACT

High-resolution  $\delta^{13}\text{C}$  data in perennial plants can be associated with changes in annual to inter-annual hydroclimate variability. Analysis of  $\delta^{13}\text{C}$  in native evergreen *Sophora chrysophylla* (māmane) from Mauna Kea, Hawai‘i demonstrated that variations in the  $\delta^{13}\text{C}$  signature correlated with changes in July precipitation, illustrating the strong relationship between photosynthetic carbon isotope discrimination and hydroclimate. Using similar methodology, this study analyzes the  $\delta^{13}\text{C}$  signature of high elevation *Metrosideros polymorpha* (‘ōhi‘a) from Hakalau, Mauna Kea, Hawai‘i. A wedge of ‘ōhi‘a was processed and cut into thin slices with an industrial razor and combusted in an EA-CRDS Stable Isotope Analyzer, producing a full resolution of  $\delta^{13}\text{C}$  values across the wedge. The measured  $\delta^{13}\text{C}$  values were then compared to the visible ring structure and to independent  $\delta^{13}\text{C}$  values measured from māmane on Mauna Kea, in order to evaluate potential trends and annual to inter-annual signals of hydroclimate variability. This study shows that variability in the  $\delta^{13}\text{C}$  signature of ‘ōhi‘a is most likely driven by regional changes in climate, suggesting that ‘ōhi‘a may act as a proxy for past climate conditions on Mauna Kea.