

What can the carbon isotope composition of plant tissue tell us?

A. HOPE JAHREN^{1*}

¹University of Hawaii at Manoa, School of Ocean and Earth Science and Technology, Honolulu, HI 96822

(*correspondence: jahren@hawaii.edu)

The geologic record contains hundreds of millions of years' worth of accumulation of plant tissues. The organic carbon of the terrestrial rock record (TOC) is a reservoir of partially decomposed land-plant tissues, the carbon having been fixed *via* photosynthesis. During the last decade, carbon isotope analysis of TOC in sediments has become a standard technique for identifying periods of potential environmental instability throughout Geologic time. Conspicuous carbon isotope excursions (CIE) have been documented within terrestrial sediments throughout the Phanerozoic, but what is the best way to interpret a terrestrial CIE after it has been documented? Most of the interpretations in use are ultimately based upon observations in modern plants; specifically, from studies designed to measure changes in the $\delta^{13}\text{C}$ of plant tissue upon exposure to environmental variables. Within my talk, I'll review the history of various approaches, along with our new observations of the dependence of C_3 isotope fractionation on $p\text{CO}_2$. I will also discuss the potential for carbon isotopes in TOM to yield much-needed insight into key periods of the Paleozoic that are hypothesized to carry large disruptions in carbon cycling, but are poorly served by existing proxies.