Assessment of vegetation shifts and hydrological change though biomarkers and compound specific δD-δ^{13}C analyses in a subtropical wetland

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The hydrology of the Everglades wetland system has been significantly modified over the past decades, resulting in changes in water quantity, quality and timing in this complex hydrologically linked system. As a result, the Everglades is undergoing a massive restoration to re-establish hydrological conditions that existed prior to anthropogenic stress. Therefore, paleoenvironmental information is needed to assess past and present conditions in order to model future changes in local ecology, such as vegetation successions associated with water delivery variations, in relation to modifications to the hydrological regime.

Here we report on the application of biomarker analysis in an effort to assess past hydrological changes in this wetland ecosystem and to reconstruct past vegetation as well as hydroperiod conditions. In particular, compound-specific carbon and hydrogen isotopic ratios of n-alkanes and their distributions in important local biomass, surface soil transects (ridge to slough) and soil cores in Southern Everglades were determined. Our data show that n-alkane distribution and their δD and δ^{13}C values differ significantly among the studied plants, along soil transects and down core. Changes of compound specific H and C isotopes coincide with the plant type change from historically slough-type vegetation (longer hydroperiod) to present ridge-type vegetation (shorter hydroperiod). These δ^{13}C and δD changes may relate to both changes in plant primary productivity and vegetation shifts due to the hydrology change.