

**UTILITY OF LEAF WAX NORMAL ALKANES FOR LACUSTRINE
SEDIMENT CHRONOLOGY AND FOR RECONSTRUCTION OF HOLOCENE
PALEOVEGETATIVE CHANGES IN HAWAII:
AN APPLICATION OF ROBUST MOLECULAR $\Delta^{14}\text{C}$ AND $\delta^{13}\text{C}$ TECHNIQUES.**

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3.6. Conclusion

Characterization of sedimentary *n*-alkanes extracted from Ordy Pond sediments by GC and irm-GC/MS analyses confirmed their terrestrial higher plant leaf wax origin. The results of CSIA revealed considerable fluctuations in the relative abundance of C₃ and C₄ plants throughout the Holocene. With the subsequent use of a two end-member isotopic mass-balance approach, the results from this study produced the first continuous Holocene paleovegetative history (% C₄ abundance) in Hawai‘i. Comparisons with previously published pollen records from Ordy Pond sediments showed remarkable agreement with the trend of fluctuations in the relative abundance of C₄ plants. The % C₄ abundance revealed a considerable expansion of C₄ plants, mainly weedy grasses, in response to ecosystem alterations by anthropogenic activities of both the early Polynesian settlers and the European settlers in the late 18th century. Further comparisons of the % C₄ abundance constructed in this study with a few pollen records covering discrete intervals of the Holocene from O‘ahu demonstrated that the advent and/or decline of C₄ plants with time matched well with the changes in the aridity inferred from several key diagnostic pollen groups. These observations verify that the % C₄ abundance can faithfully reflect the vegetation changes and can be interpreted as an index for aridity changes during the Holocene. Based on the results from this study as well as rigorous reviews of the previous pollen records from O‘ahu, the following climatic episodes of the Holocene in Hawaii were detected; (1) wet climate before ~10,000 cal.yrBP, (2) continuous and significant aridification from ~10,000 to ~5,000 cal.yrBP, (3) an abrupt climate change toward wetter climate sometime between ~5,000 and ~4,000 cal.yrBP, (4) relatively stable but slightly wet climate from ~3,500 to ~1,500 cal.yrBP. The timing of

the dramatic change in the aridification/mitigation trend at ~4,800 cal.yrBP seems to be caused by a significant climate change that could be potentially influenced by the combination of the PDO and ENSO.