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# Accumulation processes of organic carbon in peat deposit in a tropical mangrove forest on Pohnpei Island, FSM.

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To quantitatively evaluate organic carbon accumulation processes in peat deposits on a tropical mangrove ecosystems, solid-state $^{13}$C cross-polarization and magic angle spinning nuclear magnetic resonance (CPMAS NMR) signals were monitored to determine the organic carbon composition of humified leaf and root, which account for a large majority of mangrove-produced litters and mangrove peat in a coral reef-type *Rhizophora* forest on Pohnpei Island, Federated States of Micronesia. Radiocarbon dating was also used to estimate the average turnover times of peat deposits at each depth. The mass loss rate of mangrove leaves during humification was much higher than that of roots. Mass loss rates of mangrove leaves and roots are expected to be affected by their varying chemical characteristics and the different aerobic/hydrological conditions present in the two litter types during humification processes. The decomposability of individual organic carbon components also varied markedly between leaf and root litters. Significant increases in aryl-C/*O*-alkyl-C and aliphatic-C/*O*-alkyl-C ratios and minor increases in aryl-C/aliphatic-C ratio during the humification of leaves implied that only the *O*-alkyl-C component was relatively labile compared with aryl- and aliphatic-C, and that the decomposability of aliphatic-C was also slightly higher than that of aryl-C, while the difference was not significant in leaf litters on the forest floor. Regarding roots, a stable aryl-C/*O*-alkyl-C ratio during humification suggests that the decomposability of aryl- and *O*-alkyl-C components did not differ greatly in the peat deposit, while the concomitant minor increase in the aliphatic-/*O*-alkyl-C ratio and the substantial decrease in the aryl-/aliphatic-C ratio with humification imply that aliphatic-C was more recalcitrant than aryl- and *O*-alkyl-C in the peat. Conversely, the compositional properties of organic carbon and the ages of $^{14}$C of the peat deposit were quite homogenous and relatively modern throughout the peat profile, suggesting that large amount of mangrove roots penetrate up to at least 80-cm depth. These findings provide quantitative and qualitative insights into the potential importance of very high production of mangrove fine roots for organic carbon accumulation in peat in tropical mangrove ecosystems.

Keywords: peat deposit, organic carbon, 14C dating, coral reef-type mangrove forest, solid-state 13C CPMAS NMR