Dissolved organic carbon and optical properties in tropical and subtropical mangrove environments

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Among different wetland habitats, mangroves are key source of dissolved organic matter (DOM) for the estuarine and coastal waters. However, the quantity and quality of DOM from both natural and rehabilitated mangroves sustained under contrasting hydro-climatological settings of tropical and subtropical regions have not been examined comprehensively. The present study was carried out in areas of such regions in the tropics (Panay and Palawan, Philippines) and sub-tropics (Ishigaki and Iriomote, Japan). Surface water sampling was performed along the salinity gradient of mangrove dominated rivers and estuaries in 2018, aiming to investigate the distribution, mixing and fate of dissolved organic carbon (DOC), δ^{13}C-DOC and optical properties such as chromophoric dissolved organic matter (as CDOM). Preliminary results showed that mean DOC concentration was ~2-fold higher in Ishigaki and Iriomote than Panay and Palawan mangroves (225±111 μM and 103±52 μM, respectively) due to dilution effect by increased rain water flux from the typhoon event during sampling in Panay and Palawan. Strong correlation between DOC and CDOM absorption coefficient at 412 nm was only evident for the Ishigaki and Iriomote mangroves, indicative of dominance of predominantly allochthonous DOM. In the Philippines, there were no significant variations of DOM properties observed between natural (Palawan) and rehabilitated (Panay) mangroves but their mixing pattern along the salinity transect differed significantly. Property-salinity relationship revealed regions of non-linear mixing of DOC for both sites demonstrating dynamic source-sink reaction processes within the river estuaries. During the course of transport to the sea, DOC was added to the waters in Palawan in contrast to the recruited mangroves of Panay reflecting higher mangrove material input for the former site. Other optical descriptors (like spectra slope between 275 nm and 295 nm, and slope ratio in the ranges of 275-295 nm and 350-400 nm) confirmed the shift in DOM origin from terrigenous to marine sources along the salinity transects of the river estuaries. The linear decreasing trend of specific UV absorption at 254 nm ($SUVA_{254}$) further indicated the loss of DOM aromaticity downstream to the sea. Further attempt will be made to better characterize the DOM molecular compositions and fluorescence properties from the same tropical and sub-tropical mangrove sites.

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