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Compositions and sources of riverine dissolved organic matter in the Bailongjiang catchment, the eastern edge of the Tibetan Plateau

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River is a crucial pathway for transporting terrigenous carbon to oceans. As a main form of terrigenous carbon, dissolved organic matter (DOM) takes place biogeochemical transformation along the river path, modifying constantly its quantity and quality. Sources and chemical compositions are key issues for riverine DOM. However, the knowledge about characteristics and variations of DOM sources and compositions in complex environments is still limited. Located on the eastern edge of the Tibetan Plateau, the Bailongjiang catchment displays large spatial variations in elevation, climate, and vegetation, making it an ideal site to investigate the organic carbon cycle pattern in the plateau. Herein, we elucidated comprehensively the spatial characteristics and sources of DOM in the Bailongjiang catchment using fluorescence spectra, molecular composition analysis and isotopic analysis (^{13}C and ^{14}C). The Bailongjiang catchment presented low dissolved organic carbon (DOC) concentration with median of 1.2 mg L^{-1}, of which poor-oxygen highly unsaturated compounds (HUCs with relative abundance 58.2-69.4%) were dominated, followed by rich-oxygen HUCs (11.0-22.2%), poor-oxygen aromatic compounds (7.6-14.7%) and poor-oxygen unsaturated compounds (2.6-9.3%). Moreover, the carbon isotopic compositions ($\delta^{13}C$ = -25.7 to -31.9‰, $\delta^{14}C$ = 51.7 to -186.9‰) showed that these DOM were mainly originated from the soil organic matter decomposed mostly from C3 plant. Due to large changes in geographical and climatic conditions (altitude and temperature), terrigenous humic-like substances decreased, and autochthonous protein-like components increased along the river path. The observed molecular patterns indicated that DOM characteristics were also significantly ($p < 0.05$) regulated by water physicochemical properties (pH, electrical conductivity, and dissolved oxygen) and land cover (forest and cultivated land cover). Our study revealed the spatial distribution of DOM molecular compositions with changing topography and climate on a catchment scale, which helps us to better understand the transformation of DOM with environment change.