

## Chemical characterization of dissolved organic matter in an alpine stream from thawing and collapsing permafrost to Qinghai Lake

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The Tibetan Plateau is the world's largest and highest plateau, approximately two thirds of which is covered by permafrost. Due to recent climate warming, large organic carbon stored in the permafrost is thawing and becomes available for transport to aquatic ecosystems (i.e., stream and lake) as dissolved organic matter (DOM) and fine particulate organic matter (POM). These DOM and POM are not only important food sources for the aquatic food web, but also a significant feedback if remineralized during transport. In this work, we collected water samples along a stream from the headwater in the Permafrost region to the downstream in the Qinghai Lake. The concentration and composition of DOM were determined using high temperature combustion analysis, UV-Vis absorption spectroscopy and fluorescence spectroscopy. The concentration of dissolved organic carbon decreased sharply from 13.87 mg/L to 4.32 mg/L from collapsing permafrost area (3850 m a.s.l.) to the foot of the mountain (3200 m a.s.l.), and then fluctuated in a narrow range between 3.00 mg/L and 4.50 mg/L. The DOM with high humic-like fluorescence, specific UV absorbance ( $SUVA_{254}$ ), and low spectral slope ratio ( $S_{275-295}$ ) and fluorescence index (FI) was observed in the headwater, which was distinct difference from that at the middle and downstream area where the DOM are less aromatic and low molecular weight. Meanwhile, the freshness index ( $\beta/\alpha$ ) increased slightly in mid and downstream. This increasing trend for FI and  $\beta/\alpha$  indicated a contribution of recently in situ produced DOM by aquatic bacteria and algae in the stream. We speculate that the biological process is an important way to cause the chemical change of DOM composition and concentration, and therefore the thawing and transport of permafrost carbon may play a key role in sustaining the alpine stream ecosystem.