

Chemical composition of dissolved organic matter released from alpine permafrost soils in northeast Qinghai-Tibetan Plateau (QTP)

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The QTP permafrost accounts for 70% of global alpine permafrost. The fast permafrost degradation induced by global warming is happening not only in Arctic area, but also on QTP. The predicted permafrost loss on QTP is up to 49% by 2099. In addition, QTP is the water source area of Yangtze River and Yellow River. The thawing and mobilization of permafrost OC on QTP have significant impacts on C dynamics and inland ecosystem. However, the reports for QTP permafrost is limited. Here, we isolated colloidal-OC (COC) and SPE-DOC from different layer leachates of permafrost soils (0-200 cm deep) in QTP. The chemical composition of soils OC and COC was determined by solid state ¹³C NMR, and that of SPE-DOC was analyzed by FT-ICR-MS. The alkyl C proportion is substantially higher in QTP permafrost soils than Arctic permafrost soils, the latter dominated by *O*-alkyl C. Our leaching experiment revealed that carbohydrate, protein and lignin in soils is easily released as DOC during the thawing process. The aromatic carbon is dominant in leachate from active layer, but microbial carbon becomes dominant in permafrost layer leachate. Considering high solar radiation in QTP and steep slope from the permafrost area to river headwater, we speculate that photomineralization of the permafrost OC plays an important role in early stage of permafrost thawing, whereas biodegradation can not be neglected after its mobilization into freshwater system.