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CO_2 and CH_4 supersaturation of headwater streams across forested Sweden

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Lateral export of carbon (C) from soils to running waters is a persistent pathway for C with terrestrial origin. This "aquatic conduit" might be especially important in boreal regions where a significant part of the global C stock is stored in the soil. Even though the awareness of the fate of terrestrially derived C is increasing in regional and global C budgets, the scarcity of data on the contribution of streams is widely acknowledged. In particular, the evasion (degassing) of gaseous C (i.e. CO_2 and CH_4) from the water surface of streams requires better characterization.

In this study we present CO_2 and CH_4 data from $\sim$200 randomly selected headwater streams in forested catchments along the west coast and in the central part of Sweden. The streams were sampled by headspace technique at four occasions during different seasons to cover seasonal dynamics. All streams, independent of season, were supersaturated in CO_2 (median pCO_2=2763 μatm) and a majority ($\sim$60%) in CH_4. There were however large seasonal variability and with indications that the main source of dissolved inorganic carbon (DIC) (geogenic vs. biogenic) varies both with space and time. To determine the source of the DIC is important when including aquatic C fluxes into the terrestrial C balance. Without this information the source strength of evasion from headwater streams will remain uncertain