



Winter nitrous oxide and methane emissions from drained peatlands

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Global climate warming induces changes in winter weather conditions, including snow cover, which significantly influences winter period emissions of greenhouse gases (GHG) carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Although it is known that greenhouse gas emissions during winter contribute to annual balances, their quantification is still not well-known in snow-covered ecosystems.

CH₄ and N₂O fluxes were measured from 2 drained peatlands (former peat extraction areas (Laiuse site and Ess-soo site)) and 2 drained forests (spruce and birch forest, Järvelja) in Estonia using the closed chamber method during the winters 2016/2017–2017/2018. At each study site measurements in two experimental plots were conducted. Mean N₂O winter fluxes in spruce and birch forest varied from -1.3 to 216 and from 0.4 to 240 μg N m⁻² h⁻¹ respectively, whereas CH₄ fluxes varied from -16.93 to 0.25 and from -37.49 to 86.66 μg C m⁻² h⁻¹, correspondingly. N₂O fluxes were especially high during freeze/thaw events.

Mean winter fluxes in Laiuse and Ess-soo peatlands were -1.88 to 3.89 and -2.46 to 4.93 μg N m⁻² h⁻¹, and 3.66 to 390 and -1.24 to 437 μg C m⁻² h⁻¹, respectively.

The fluxes of CH₄ were mainly correlated with the depth of water level and soil temperature. N₂O fluxes were mainly correlated with soil temperature and soil moisture.