

3.025 Methane emission from the stems of *Alnus japonica* in riparian wetlands within a temperate forest catchment.

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Abstract:

Methane (CH₄) is a strong greenhouse gas with more than 20 times the global warming potential compared to carbon dioxide. Understanding the sources and emissions of CH₄ is crucially important for climate change predictions; however, there are significant discrepancies between CH₄ source estimates derived via so-called bottom-up and top-down methods. Anoxic wetland ecosystems are considered to be the largest contributor to natural CH₄ emissions, accounting for more than 20% of the global CH₄ source. Recently, wetland-adapted trees have attracted a considerable attention because of its potential significance as a new emission source of atmospheric CH₄, in which CH₄ produced by methanogens in soil are believed to be transported upward inside the stem and diffused to the atmosphere through woody stem surfaces, yet the magnitude and controls of tree-mediated emission processes remain unknown. In our study, we have conducted measurements of CH₄ emission rates from the stem surfaces of *Alnus japonica* (*Alnus japonica* (Thunb.) Steud.) in riparian wetlands within a temperate forest catchment. A near-infrared laser spectroscopy instrument and closed chamber systems enables us in-situ continuous measurements of CH₄ emission rates, revealing that meteorological conditions and soil environment are associated with the spatio-temporal variations in the CH₄ emission rates.