Do Japanese cypress trees emit methane significantly into the atmosphere?
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Recent experiments conducted by Keppler et al. [1] suggested that CH$_4$ emissions from terrestrial plants under aerobic conditions could be a significant source of atmospheric CH$_4$. However, since the mechanisms underlying CH$_4$ emission are still largely unknown, any extrapolations to the global scale are highly speculative. In Japan, artificial plantations of Japanese cypress (Chamaecyparis obtusa Sieb. et Zucc) cover up to 10% of the total Japanese forest area. Investigating whether C. obtusa emits CH$_4$ significantly is thus important to develop an emission inventory of CH$_4$ in Japan and to understand its impact on the atmospheric CH$_4$ budget.

In this study, we for the first time made an attempt to estimate CH$_4$ fluxes from intact leaves and trunk, which are rather than detached tissues, of C. obtusa over the whole season using an automated, closed-chamber system coupled to a laser-based instrument that allowed in situ real-time detection of CH$_4$ [2]. Continuous in situ measurements of methane (CH$_4$) fluxes were conducted in the Kiryu Experimental Watershed in Shiga Prefecture, from August 2009 to August 2010. The closed-chamber system, which was used to evaluate CO$_2$ exchange between the atmosphere and forest ecosystems, was coupled to a laser-based instrument to monitor CH$_4$ concentrations. Temporal changes in CH$_4$ concentrations from the foliage and trunk were measured at one-second intervals during chamber closure to determine CH$_4$ fluxes between the leaf and trunk surfaces and the atmosphere. While recent studies have suggested that some plants emit CH$_4$ under aerobic conditions (References are cited in [2]), emission or uptake of CH$_4$ in detectable amounts with our experimental system, by intact leaves or the trunk of C. obtusa, was not significantly observed throughout the measurement period. We note that at KEW CH$_4$ exchange between the atmosphere and forest has also been measuring based on a relaxed eddy accumulation technique coupled to the laser spectroscopy instrument, indicating that CH$_4$ emission from leaves and trunk are insignificant, as consistent with the results of the closed chamber study [3].

References


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