RECENT RESEARCH ACTIVITIES

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].

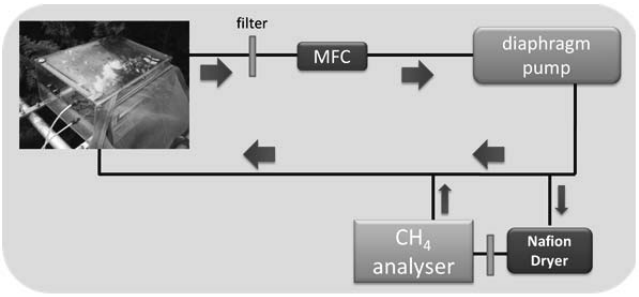

Figure 1. An automated closed chamber system for measureing the CH_4 exchange flux between plant leaves and the atmosphere.

References

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[3] Sakabe, A., Hamotani, K., Kosugi, Y., Ueyama, M., Takahashi, K., Kanazawa, A. and Ito, M., "Measurement of methane flux over an evergreen coniferous forest canopy using a relaxed eddy accumulation system with tuneable diode laser spectroscopy detection", *Theor. Appl. Climatol*, *109*, 39-49, **2012**.

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