

[JJ] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-IS Intersection

[M-IS14]Biogeochemistry

convener: Keisuke Koba (Center for Ecological Research, Kyoto University), Hideaki Shibata (Field Science Center for Northern Biosphere, Hokkaido University), Naohiko Ohkouchi (海洋研究開発機構, 共同), Youhei Yamashita (Faculty of Environmental Earth Science, Hokkaido University)

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Biogeochemistry is an interdisciplinary study field including ecology, geochemistry, oceanography, limnology, hydrology, soil science and environmental sciences. Respective researches have tended to be conducted separately so far. This session aims to provide a common platform for biogeochemists of different disciplines, which facilitates the interactive discussion and information exchanges for further development of biogeochemical studies.

[MIS14-P03]Seasonal variation of O₃ flux in red pine forest

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The emission and absorption of trace gases at the biosphere affects to atmospheric chemistry, and thus it makes influence with potential indirect effects on carbon cycle and climate (Ollinger et al., 2002). We observed O₃ flux with the gradient method at a meteorological tower in red pine forest (Site Code: FJY) since 2016. We also measured CO₂ flux at the same meteorological tower for validation of the system by comparison with CO₂ flux determined by the eddy covariance method. The heights of the forest canopy and the meteorological tower were about 24 m and 32 m. Concentrations of O₃ and CO₂ were measured at two heights (26 m and 34 m) above the canopy by an ultraviolet absorption O₃ analyzer (Thermo: 49C), and an infrared absorption CO₂ analyzer (Licor: LI-820). The O₃ instrument was calibrated once a year and the CO₂ instruments were calibrated every three weeks at the observation site. The air was sampled every 300 seconds from each two vertical heights and supplied to the analytical instruments through PFA tube. Concentration of CO₂ was also measured by an infrared absorption CO₂ analyzer (Licor: LI-6262) at 26.5 m to determine CO₂ fluxes by the eddy covariance method. Wind speed and wind direction were measured at 26.5 m and they were used to obtain fluxes by the gradient and eddy covariance methods. The CO₂ fluxes in the day time (9:00-16:00) in 2017 were observed with the gradient and the eddy covariance method as $-0.14 \pm 0.12 \text{ mol m}^{-2} \text{ d}^{-1}$ and $-0.21 \pm 0.16 \text{ mol m}^{-2} \text{ d}^{-1}$, respectively. The CO₂ flux obtained by the gradient method was slightly lower and more scattered than CO₂ flux obtained by the eddy covariance method; however these values reasonably agreed. We made sure the flux observation system with gradient method worked properly. The observed O₃ concentration showed a seasonal variation and was in a maximum in May. However the primary result showed that O₃ deposition in the red pine forest in daytime had a maximum between June and July. The peak of O₃ deposition delayed to the peak of O₃ concentration. A chemiluminescence O₃ analyser was developed and optimized the measurement condition using O₃ standard gas generated by O₃ generator. The developed analyser was tested in Uenohara for 4 days and the observed O₃ concentrations agreed with the concentrations observed by an ultraviolet absorption O₃ analyzer.