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Interception by a temperate coniferous forest and its relationship with wet canopy gas exchange

Linjie Jiao[1], Yuichi Sempuku[1,2], Ting-wei Chang[1], and Yoshiko Kosugi[1]
[1]Kyoto University, Graduate School of Agriculture, Division of Science and Technology, Kyoto, 606-8502, Japan
(jiao.linjie.66x@st.kyoto-u.ac.jp)
[2]East Nippon Expressway Company Ltd., Kanto Branch, Chiba management office, Chiba, 263-0001, Japan

Interception is an important hydrological process relating to canopy gas exchange and takes a significant part from precipitation. The real interception process by the needle leaves is worth discussing because their shape may allow interception by both surfaces and thus affects photosynthesis by blocking stomata. Therefore, the aim of this study is to figure out the distribution of interception at needle leaf and its relation with the gas exchange of wet canopy.

We measured ecosystem flux and wetness from a Japanese cypress forest by the advanced water-proof enclosed gas analyzer (LI7200, LI-COR, the USA) and handmade wetness sensors. A SVAT (soil-vegetation-atmosphere transfer) multilayer model with two rainfall interception solutions (free gas exchange with interception only by the adaxial surface and no gas exchange with interception by both surfaces) has been used to figure out the distribution of rainfall interception, snow melting water distribution and photosynthesis process of wet canopy.

The results include precipitation events from 4 years, showing that interception can happen not only on the adaxial surface but also on both surfaces. Meanwhile, when the intensity of rainfall events enhanced, the possibility of interception on both surfaces increased. Hence, such kind of needle leaf can process photosynthesis during the rainfall. Future studies should concentrate on improving the model for snow process and soil respiration. More comparison with other types of forests may also provide worthy results for learning how plants adjust photosynthesis to adapt the climate change.