

## The origin of atmospheric water vapor in Eastern Siberian taiga

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Eastern Siberia where covered with permafrost is located inland of eastern Eurasia, where climate is severely dry with 200 to 300 mm of annual precipitation amount. Larch trees dominate taiga forest in this area. Recycling process of water vapor through transpiration of vegetation is a presumable process for maintaining the forest. To examine the importance of the ecosystem (taiga forest) as the origin of water vapor and precipitation of East Siberian taiga, isotopic compositions of atmospheric water vapor, precipitation, sap water and soil water in taiga forest near Yakutsk, eastern Siberia were observed during late summer in 2006, 2007, and 2008.

The value of  $\delta^{18}\text{O}$  and d-excess of atmospheric water vapor in taiga forest through whole sampling period of three years varied from -30 to -18 permil and from 3 to 24 permil, respectively. On the diurnal timescale, delta value of atmospheric water vapor increased in the morning, whereas it decreased in the afternoon. The fluctuation in the morning is inferred to be due to increase of transpiration by plants, while the decrease in delta value in the afternoon may be caused by entrainment of the water vapor with low delta values in free atmosphere when the mixing layer become thick with temperature increase.

In terms of fluctuation with a time scale of 10 to 20 days, delta value of atmospheric water vapor in taiga forest varied with precipitable water and mixing ratio, and delta value increased when mixing ratio increased, whereas d-excess value decreased. It seems to be caused by larger contribution of transpired water with high delta values. On the other hand, delta value decreased and d-excess value increased after precipitation events. This may be caused by decrease of delta value of atmospheric water vapor due to removal of water with high delta value through Rayleigh distillation process and also due to evaporation of precipitation and isotopic exchange between raindrop and surrounding water vapor.

These results indicate that transpiration of taiga forest plays an important role as the origin of atmospheric water vapor.