

Hydrological Processes in Kherlen River Basin Revealed by Isotope Tracer Approaches

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1. Isotope Tracers

Water is the most important medium of mass transport in terrestrial ecosystem and geochemical processes. Isotope tracer is extremely useful tool to investigate the water and mass cycle system, because the tracer behaves with the water and mass in the terrestrial environmental system.

We make clear the hydrological cycle and mass transport processes in the soil-plant-atmosphere system using the isotopes of ²H and ¹⁸O.

2. Water Use Strategies of Trees

Water source of absorption by the tree was evaluated using oxygen-18. The tree used the soil water from the surface to 10 cm depth.

Also, the transpiration and evaporation rate was estimated using Keeling-plot analysis. The ratio of transpiration to the evapotranspiration was estimated to be 61 to 73 % at forest site and 35 to 59 % at grassland site (KBU).

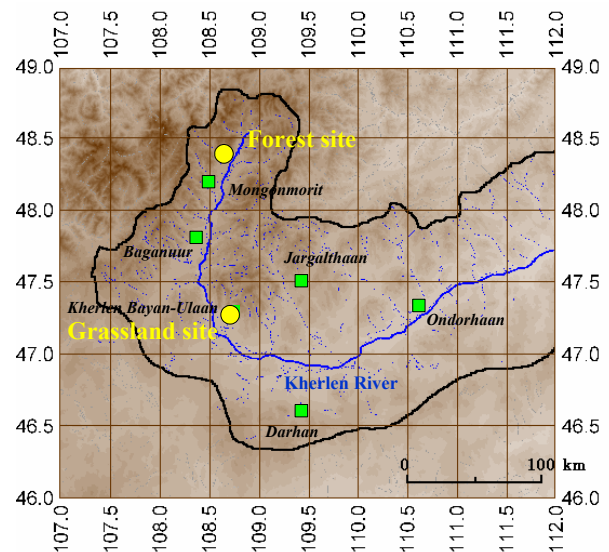


Fig. 1 Location of the study site in Kherlen River Basin.

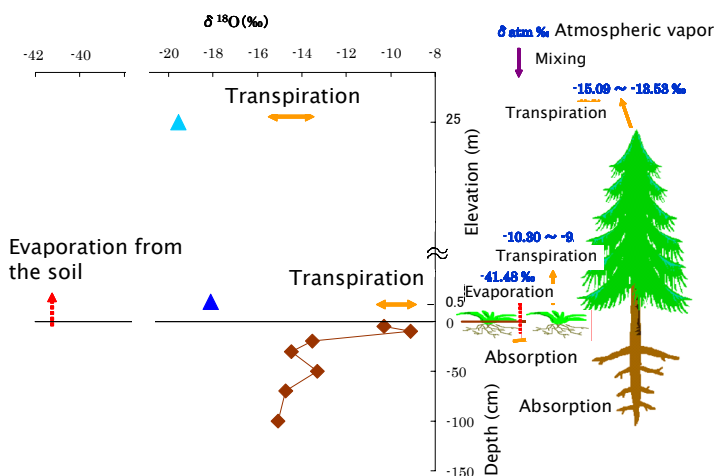


Fig. 2 Oxygen-18 signals in Soil-Plant-Atmosphere system at forest site.

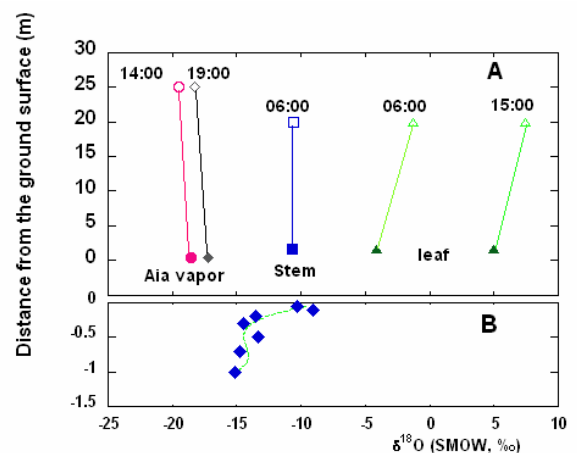


Fig. 3 Oxygen-18 profiles in the atmosphere, leaf, stem and soil water. The oxygen-18 values agree with that of the soil water taken from the depth of 5 to 10 cm.

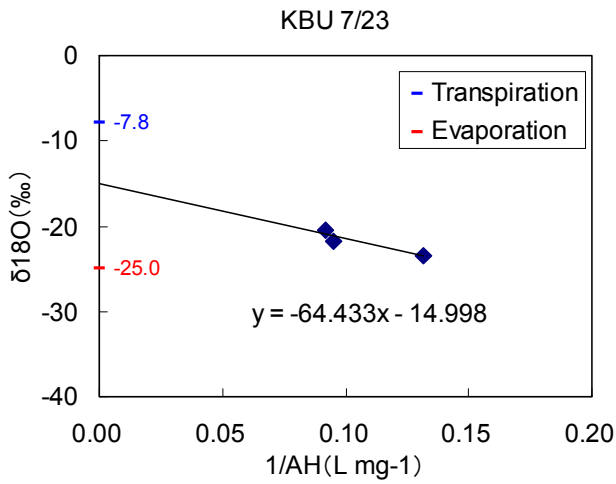


Fig. 4 Transpiration rate estimation at forest site.

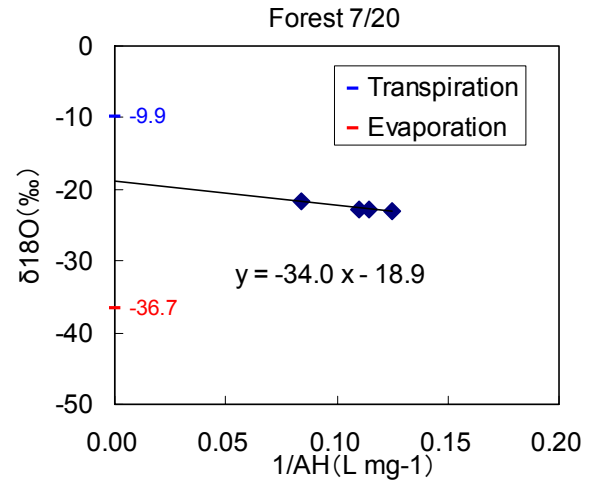


Fig. 5 Transpiration rate estimation at grassland site (KBU).

3. Vegetation Recover of the Road in the Grassland

In Mongolian Steppe, you can see the car tracks everywhere. The car tracks should cause the compaction of the soil surface and decrease of the pastures. The soil conditions were investigated at some locations along the car tracks in the grassland site (KBU).

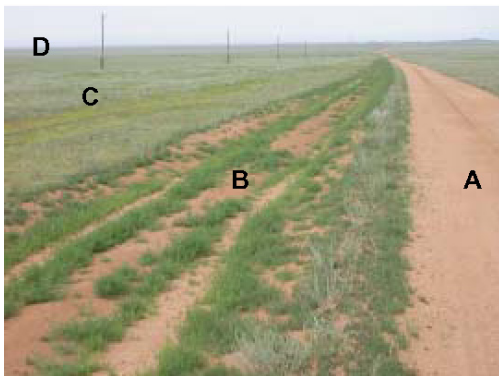


Fig. 6 The different types of the car tracks on the grass land (KBU).

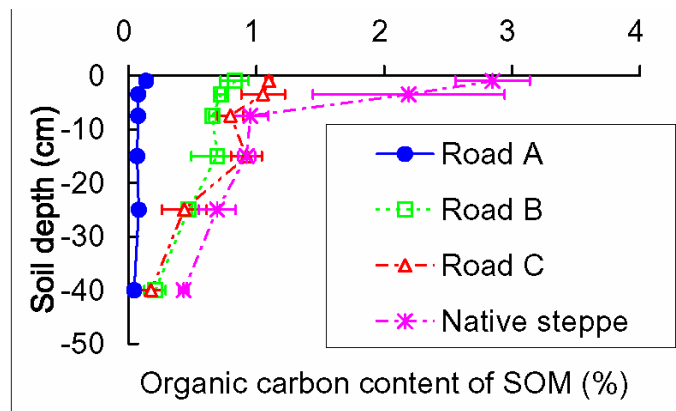


Fig. 7 The organic carbon content profiles in the soil at some locations covered by different soil surface conditions (Fig. 6) on the grassland site.