

# The investigation on the factors which govern evapotranspiration of Kherlen river basin in Mongolia

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## 1. Background and purpose

Mongolia locates dry to semi-dry area and the vegetation is in the eco-tone where forest-grassland-desert change takes place. This type of area is easily disturbed by the changes of external conditions. One of the key factors in such environments is evaporation, and there is a report that 90% of the annual precipitation evaporates. In this research, intensive observations were carried out to investigate evaporation and its relation with the environments.

More specifically two flux stations, one in a grassland and one at a forest, and 4 automatic weather stations (AWSs) in grasslands were installed and operated for the period of March- October, 2003 in addition to special observations of LAI, flux and soil moisture at the 4 AWS sites once per month. The following results were obtained from the analysis of these data sets.

## 2. Method

An automatic observation system and AWS are installed in a total of 7 points of 6 grassy places and 1 forest in Mongolia Kherlen river valley upstream part. And, each point observing heat fluxes when the special feature and vegetation situation between the points of the heat fluxes characteristic have been grasped, then Analysis and consideration were performed paying attention to the latent heat transportation which is the parameter which determines evapotranspiration for the relation between vegetation conditions, soil moisture conditions, and heat fluxes. Here, correspondence with the example for which same research was done except clarifying the correlation of each external condition and Mongolia was tried.

## 3. Conclusion

### (1) Relationship between vegetation and precipitation and grazing

Precipitation is not a dominant factor which determines the quantity of grassland vegetation; rather grazing activity appears to control more strongly the biomass. Similarly, the relations between the soil moisture and vegetation differed in the forest and in the grassland. In the forest, when soil moisture became high, Leaf Area Index (LAI) also increased. On the other hand, there was no clear relation between the soil moisture and LAI.

This is probably another indication that grazing is more important factor in the grassland.

### (2) Relationship between vegetation and soil volumetric water content

The relations differed greatly in the forest and the prairie. In the forest, when soil moisture became high, LAI reacted keenly and showed the upward tendency. On the other hand, almost regardless of soil moisture, LAI was fluctuating in the prairie. In a prairie, soil moisture did not control vegetation and it turns out that it is a factor with strong influence as opposed to vegetation in pasturage.

### (3) Relationship between evapotranspiration and soil volumetric water content

When soil moisture increased, it was shown that evapotranspiration also increases together. When the present data set which covers the soil moisture (SM) of 5-20% approximately with that observed in prairie area in the U.S. for SM range of 15-50%, a single functional curve was obtained, which gives relation between SM and evaporation ratio for grassland.

### (4) Relationship between evapotranspiration and vegetation

For forest, evapotranspiration increases with the increase in LAI. However, for grassland this relation is less clear.