

Influence of grazing on vegetation, surface energy and water balance over the Mongolian steppe

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Mongolia in the eastern Eurasia locates in arid to semi-arid area. Since 1990, the social system in Mongolia has changed radically, and resulted in transformation of lifestyle and the way of grazing. The serious influence of such a change is anticipated because Mongolian grassland is a sensible area to the changes of external conditions. In addition to the condition in Mongolian steppe, the interannual variation in precipitation influenced aboveground biomass and increase of air temperature and decrease of precipitation in recent year were reported. Therefore the long-term research is necessary. The object of this study is to assess influence of grazing on vegetation, surface energy balance and water balance over the Mongolian grassland through a three-year research.

The study site is in a steppe grassland at Kherlen Bayaan-Ulaan (KBU), Mongolia. Grazing has been carried on all the year round. In this area, a protected area (200 m by 170 m) was constructed in autumn 2002 in order to study the possible grazing impact. Two measurement stations which employ on eddy correlation method, one in a protected area and the other in a pastoral area, have been installed and operated since March 2003.

The difference of the green biomass values of the two areas appears significantly after July and the values of both areas in 2004 are higher than in 2003 in spite of no significant difference of precipitation in growing season between the two years. The value of dead vegetation biomass in the protected area is constantly bigger than that in the pastoral area. Therefore the grazing activity appears to have controlled biomass. After July in 2004, the net radiation values of the protected area are higher than those of the pastoral one, which corresponds with changes of biomass and albedo. The increase of the net radiation values in protected area caused the higher values of soil heat flux and sensible heat flux in this area. For the enhanced sensible heat flux values in protected area, the bigger values of roughness length, because of the bigger values of biomass, also contribute to the higher fluxes. There is no significant difference of the annual integrated values of evapotranspiration between the two areas. The result agrees with the simulated one by a previous study which indicates that the reduction of transpiration by grazing in pastoral area is largely compensated by the increase of evaporation.