

Estimation of regional surface heat fluxes using airborne data in semi-arid area

Ayumi Kotani[1]; Michiaki Sugita[2]

[1] Life and Environmental Sci., Univ. Tsukuba; [2] Inst. Geosci., Univ. Tsukuba

In the northeastern Asia which locates at the boundary area between arid and humid climate, the environments have been maintained on the balance of climate conditions, water cycle and human activities. Mongolia including the experimental area of Kherlen river basin is at such a climate shifting area and also has characteristics of ecotone, where latitudinal vegetation shift of boreal forest to steppe grassland is observed. To assess the structure and sensitivity of such an environment from the view point of interaction between atmosphere and land surface, surface heat flux in the regional scale is estimated using airborne data.

In the frame work of RAISE project, aircraft observation was carried out 11 times from June to October of 2003. The flight path covers the experimental area of Kherlen river basin including northern forest and southern grassland area, and several heights of 100, 200, 500 and 1000m were flown repeatedly above the ground based observation site. Measured components such as air temperature, water vapor density and surface radiometric temperature were recorded at 0.1-second interval. At the ground based observation site in the basin, hydro-meteorological elements of air temperature, humidity, radiation, soil moisture content and so on were measured.

To estimate the surface heat fluxes, the variance methods and the bulk similarity method have been tested with the turbulence data. The former approach uses the relationship between scalar variances and surface flux, while the latter uses gradient of scalar averages instead of variances. Using whole ABL data, the source area of estimated flux becomes larger, then it is possible to make comparison of different surface cover which distributed in several ten kilometers scale.