Study of regional heat fluxes at the area with various land covers

Ayumi Kotani[1], Michiaki Sugita[2], Akira Miyata[3], Shigenori Haginoya[4], Shin-ichi Iida[5]

[1] Environmental Sci,, Univ. Tsukuba, [2] Inst. Geosci., Univ. Tsukuba, [3] Natl. Inst. Agro-Environ. Sci., [4] MRI, JMA, [5] Doctoral Program in Geoscience, Univ. Tsukuba

In an area of complex land surface usage, there are spatial variations of surface energy fluxes among adjacent patches, which are mixed to be regional scale. Around Tsukuba city, Japan, which is generally flat surface and consists of urban and agriclutural areas in patch scale of 100-1000m, surface energy fluxes and micrometeorological data of five major surface type-grass field, lawn field, forest, paddy rice field and building roof were measured for one year to compare their characteristics sand to estimate the regional surface flux of sensible and latent heat. These estimated regional fluxes are compared with fluxes evaluated at 29.5m over blending heigtht.

Under almost the same meteorological condition, variation of surface energy fluxes depends on surface condition. First, aerodynamic resistance(ra) and surface(cannopy) resistance(rs) are evaluated as parameters that represent surface properties. Each surface type had characteristic value of ra. On the other hand, rs value which indicates surface wetness or evaparative efficiency, scattered in winter, and kept small value in summer without clear differences among surface types.Secondly, sensitivity of latent heat flux to the environmental conditions is tested using Penman-Monteith equation. It appeared that contributing elements to latent heat depend on aerodynamic properties of land cover.

The contribution of upwind source area to the fluxes measured at 29.5m tower was tested by comparing with area-averaged surface fluxes evaluated for the different upwind distance. The best agreement was found for the upwind at around 5km. There is no difference between the case considering distribution of each surface types and the case considering only land cover ratio, which means that this study area has homogeneous complex surface cover. With this source area, area-averaged aerodynamic and surface resistances of each surface type was used to evaluate regional fluxes, but this method overestimated fluxes for the comparison with tower data, especially latent heat.