Geophysical Research Abstracts
Vol. 18, EGU2016-6337, 2016
EGU General Assembly 2016

Comparison of land-atmosphere interaction at different surface types in the mid- to lower Yangzi River Valley

Weidong Guo, Xueqian Wang, Jianning Sun, Aijun Ding, and Jun Zou
Institute for Climate and Global Change Research, Nanjing University, Nanjing, China (guowd@nju.edu.cn)

The mid- to lower Yangzi River Valley is located within the typical monsoon zone. Rapid urbanization, industrialization, and development of agriculture have led to fast and complicated land use and land cover changes in this region. To investigate land-atmosphere interaction in this region where human activities and monsoon climate are highly interactive with each other, micro-meteorological elements over four different surface types, i.e. urban surface represented by the observational site at Communist Party School in Nanjing (hereafter DX), suburban surface represented by the ground site at Xianling (XL), and grassland and farmland represented by field sites at Lishui County (LS-grass and LS-crop), are analyzed and their differences are revealed. Impacts of different surface parameters applied for different surface types on the radiation budget and surface-atmosphere heat, water, and mass exchanges are investigated. Results indicate that (1) the largest differences in daily average surface air temperature (Ta), surface skin temperature (Ts), and relative humidity (RH) , which are found during the dry periods between DX and LS-crop, can be up to 3.21°C, 7.26°C, and 22.79% respectively. During the growing season, the diurnal ranges of the above three elements are the smallest at DX and the largest at LS-grass, XL and LS-crop; (2) differences in radiative fluxes are mainly reflected in upward shortwave radiation (USR) that is related to surface albedo and upward longwave radiation (ULR) that is related to Ts. USR is the smallest and ULR is the largest at DX. During the growing season, the average difference in ULR between the DX site and other sites with vegetation cover can be up to 20Wm-2. The USR variability is the largest at LS-crop, while the diurnal variation of ULR is the same as that of Ts at all the four sites; (3) the differences in daily average sensible heat (H) and latent heat (LE) between DX and LS-crop are larger than 45 and 95Wm-2, respectively. The proportion of latent heat flux in the net radiation (LE/Rn) keeps increasing with the change of season from the spring to summer. XL site demonstrates a distinct forest feature; (4) surface albedo is small while the Bowen ratio is large at DX (an urban site). The urban heat island effect results in higher Ta and Ts at DX site that is 2°C higher than that at other sites in the nighttime. It is found that surface albedo and roughness length variability both increase at LS-crop during the harvest season and straw burning periods. LE is dominant due to irrigation. Negative H is observed since evaporative cooling leads to low Ts. Daily variability of Ts and Ta is the lowest at LS-crop while RH is the largest. In the summer, the grassland albedo at XL site gradually becomes larger than that at the sites in Lishui. Since the forest-like effects becomes more distinct at XL, LE/Rn increases rapidly. Thereby, although Ts is higher at XL than that at LS-grass , there is no large difference in Ta between the two sites.