

A comparison between energy transfer and atmospheric turbulent exchanges over alpine meadow and banana plantation

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Banana plantation and alpine meadow ecosystems in southern China and the Tibetan Plateau are unique in the underlying surfaces they exhibit. In this study, we used eddy covariance and a micrometeorological tower to examine the characteristics of land surface energy exchanges over a banana plantation in southern China and an alpine meadow in the Tibetan Plateau from May 2010 to August 2012. The results showed that the diurnal and seasonal variations in upward shortwave radiation flux and surface soil heat flux were larger over the alpine meadow than over the banana plantation surface. Dominant energy partitioning varied with season. Latent heat flux was the main consumer of net radiation flux in the growing season, whereas sensible heat flux was the main consumer during other periods. The Monin-Obukhov similarity theory was employed for comparative purposes, using sonic anemometer observations of flow over the surfaces of banana plantations in the humid southern China monsoon region and the semi-arid areas of the TP, and was found to be applicable. Over banana plantation and alpine meadow areas, the average surface albedo and surface aerodynamic roughness lengths under neutral atmospheric conditions were ~ 0.128 and 0.47m , and ~ 0.223 and 0.01m , respectively. During the measuring period, the mean annual bulk transfer coefficients for momentum and sensible heat were 1.47×10^{-2} and 7.13×10^{-3} , and 2.91×10^{-3} and 1.96×10^{-3} , for banana plantation and alpine meadow areas, respectively. This is the first time in Asia that long-term open field measurements have been taken with the specific aim of making comparisons between banana plantation and alpine meadow surfaces.