

Evapotranspiration Measurements over Different Surfaces in the Heihe River Basin

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How energy and mass are partitioned at the earth's surface is concerned by more and more people. Four sites with eddy covariance (EC) system observation are chosen to measure evapotranspiration in the Heihe River Basin, namely, Arou, Guantan, Yingke and Linze sites, which underlying surface is alpine meadow, forest, cropland and wetland with saline soil. In addition to EC flux systems, two large aperture scintillometer (LAS) flux systems were observation at Arou and Linze sites.

Besides careful instrument maintenance and periodic calibration, higher quality data are obtained through rigorous post processing. EC data processing contains spike detection, lag times correction, converting sonic temperature into actual temperature, coordinating rotation using planar fit method, correction for density fluctuations (WPL-correction), etc. An EdiRe (University of Edinburgh) program was used for this purpose. LAS data were processed from the structure parameter of the refractive index of air C_n^2 , after saturation judgment, determination of atmospheric stability and the universal stability function, the sensible heat flux is calculated combined the meteorological data.

Evapotranspiration (ET) plays an important role in studying energy and water exchange among soil, vegetation and atmosphere and at a given site ET depends largely on the availability of water and energy, and thus is site-specific. The four sites in this study located in different area and there is a strong heterogeneity because of the inherent physical diversity of the land and vegetation properties. First, diurnal and seasonal variation of evapotranspiration measured by EC is analyzed over different land cover types. The energy 'imbalance' and the Bowen ratio on different surfaces are also discussed in this section. Second, the influencing factors of ET are studied on different surfaces. These influencing variables contain the net radiation flux, vapor pressure deficit (VPD), surface temperature, soil moisture and leaf area index. Finally, the differences between sensible heat fluxes measured from LAS and EC are discussed using a footprint model combined with a landuse/landcover map as well as the energy closure ratio of EC.

Key words: eddy covariance system; large aperture scintillometer; evapotranspiration

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