

**Estimation of Terrestrial Surface Heat Flux Using
a modified Two-layer Model in the Heihe River Basin, Northwestern China.**

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A modified version of an operational two-layer model (Zhang, et al, 2004, 2008) is described and used in this paper. Surface temperature of mixed pixel is separated into vegetation temperature and soil temperature by PCACA algorithm (Pixel Component Arranging and Comparing Algorithm). Bowen-ratio (β , the ratio of heat flux to latent heat flux) of soil and vegetation are obtained by Layered Energy-separating algorithm. The spatial expansion of the surface resistance to Evapotranspiration is obtained by a strategy of identifying the 'true dry edge' and the 'true wet edge' in surface temperature--vegetation fractional cover trapezoid space. Based on this model, soil evaporation and vegetation transpiration over the middle Heihe river basin in Northwestern China were estimated using the combination of MODIS data and meteorological data from surface meteorological stations. Terrestrial surface heat fluxes measured by Eddy Correlation systems during May, 2008 in Linze Agro-ecosystem Station are used to evaluate the surface heat flux retrieval from the modified two-layer model. For investigating the scaling difference between pixel scale and the scale of Eddy Correlation systems, we also used LAS (Large Aperture Scintillometer) data from Grassland Station of Lanzhou University. It should be pointed out that due to the absence of method for separately measuring soil heat flux, and vegetation heat flux at field, direct comparisons between retrieved soil, vegetation heat flux and ground measurements can not be performed, which is the faced challenge for all two-layer models and more works need to be done for more accurate validations.

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