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Estimating land surface energy fluxes over Mt.Everest area of the Tibetan Plateau by using the ASTER and in situ data

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Determination of land surface energy fluxes is a difficult and crucial work over heterogeneous landscape especially over mountainous regions. In this study, based on 9 scenes of ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) images from 2006 to 2011 and in situ data around Mt.Everest area of the Tibetan Plateau, land surface characteristic variables (albedo, land surface temperature, NDVI and vegetation fraction) and energy fluxes (net radiation flux, soil heat flux, sensible heat flux and latent heat flux) was estimated by using SEBS (Surface Energy Balance System) model. During calculating net radiation, the effect of topography was taken into account by DEM data. The total incoming solar radiation at the ground surface was separated into three parts, the solar direct radiation, the diffuse sky radiation and the adjacent terrain reflected radiation. The results of estimation were validated by land surface observations in the Qomolangma (Mt. Everest) Station for Atmospheric and Environmental Observation and Research, Chinese Academy of Sciences (QOMS/CAS). It is shown that the derived land surface characteristic variables and energy fluxes are in good accordance with the land surface and their thermodynamic status. The mean absolute percentage difference of albedo, land surface temperature and net radiation flux is less than 10%.