

能水平衡观测与模拟

黑河流域不同下垫面水热通量特征分析

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摘要:

“黑河流域遥感—地面观测同步试验”在黑河上中游地区不同下垫面上建立了多个自动气象站和涡动相关仪及大孔径闪烁仪通量观测站。选取草地、森林及农田3种下垫面的观测资料,分析了水、热和CO<sub>2</sub>通量特征。结果表明:黑河流域内不同下垫面能量收支各分量(净辐射、感热、潜热和土壤热通量等)有明显的日变化特征;各通量观测站观测结果如季节变化趋势等差异明显,反映了不同下垫面地气交换特征的不同。黑河上游阿柔冻融观测站和中游临泽草地站两套大孔径闪烁仪(LAS)的观测与涡动相关仪有关结果有较好的对应关系。结合浅层土壤热储存量的计算等分析了地表能量平衡的闭合情况。LAS观测的感热通量一般大于涡动相关仪的测量值;两者的差异主要由下垫面的非均一性、通量贡献源区大小不同以及影响大气湍流通量观测的涡旋尺度不同等原因引起。

关键词: 黑河综合试验;不同下垫面;水热通量;涡动相关;LAS

The Characteristics of Heat and Water Vapor Fluxes over Different Surfaces in the Heihe River Basin

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Abstract:

Several flux stations at difference surfaces have been established for the project “Simultaneous remote sensing and ground based experiment in the Heihe River basin”. In this paper, we selected the observation data on grasslands, forests and farmland and analyzed the characteristics of water vapor, heat and carbon dioxide (CO<sub>2</sub>) fluxes. The results showed that there are obvious diurnal and seasonal variations of energy balance components (net radiation, sensible heat, latent heat and soil heat flux, etc.) and different surface in the Heihe River basin has distinct characteristics. The Eddy Covariance (EC) flux data have been compared with Large Aperture Scintillometer (LAS) observations at Arou Station (in the upper Heihe Basin) and Linze Station (in the middle basin). Both have good correlations, however, the sensible heat fluxes observed by LAS are generally larger than that of EC. The differences are mainly from the different footprints’ or source areas of LAS and EC in the non uniform surfaces of the specific station. Besides, LAS observation of heat flux may comprise contributions from larger scale atmospheric turbulence. By considering soil heat storage in the upper soil layers, the surface energy balance closure has also been analyzed in each station.

Keywords: Heihe experiments Difference surface Water and heat flux Eddy correlation LAS.

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