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Characteristics of Long-term Surface Heat Source and Its Climate Influence Factors in Northern Tibetan Plateau

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Based on multi-level AWS data during 2001 to 2015 and eddy covariance data during 2011 to 2014 from Nagqu Station of Plateau Climate and Environment, the turbulent fluxes were calculated by a surface energy balance combination (CM) and eddy covariance method (EC). The CM fluxes vary greatly in the morning and evening, when the atmosphere changes from instability to stability. The EC fluxes are compared to the CM fluxes. The correlation coefficient between corrected sensible heat flux and EC sensible heat flux is as high as 0.92, while, for latent heat flux, it reaches 0.82. There is no significant difference between the EC fluxes and CM fluxes which passed the T test at 95% significant level. Therefore, a long-term heat fluxes and surface heat source were obtained. The further results are also obtained: The energy closure ratio is close to 1 in spring, summer and autumn. From 2001 to 2015, sensible heat flux shows a ascend trend, especially in summer and winter, while latent heat flux shows a descend trend, especially in summer. The annual variation of sensible heat flux and latent heat flux are obvious. Sensible heat flux reaches the maximum value of the year in April and the minimum value in July, however, latent heat flux shows the maximum value in July and the minimum value in January. The surface heat source shows a descend trend. The analysis of the surface heat source indicates that it has a significant relationship with surface temperature, soil moisture and wind speed. Particularly, the surface heat source has a significant response to surface temperature throughout the year, the great influence of soil moisture on the surface heat source in spring summer and autumn is strong, and the influence of wind speeds on surface heat source is strong in spring.

Key words: Northern Tibetan Plateau; Surface Heat Source; Climate Influence Factors

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