The turbulence characteristics of atmospheric surface layer on the north slope of Mt. Everest region in the spring of 2005

Maoshan LI [1], Yaoming MA [2,1] and Lei ZHONG [2]
[1]Cold and Arid Region Environmental and Engineering Research Institute,
Chinese Academy of Sciences, Lanzhou 730000
[2]Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing 100085

Eddy-correlation measurements at 3m performed on the base camp of Mt. Everest are used to study the atmospheric turbulent characteristics under conditions of katabatic and large-scale forcing in the spring of 2005. The base camp of Mt. Everest is 4 km far from the end of Rongpu glacier on the Mt. Everest. The cases where large-scale forcing results in a down-slope ambient wind are considered. Firstly the normalized standard deviations of wind speed and temperature compare favorably to the findings in the literature. Second the (co)spectral characteristics of turbulence under near neutral stratification are described. The analysis of averaged spectra and co-spectra reveals that low frequency perturbations have a large influence on the variance of all wind components, and also alter the co-spectra of momentum and sensible heat flux under near neutral stratification. The low frequency perturbations occur as brief intermittent events and result in downward entrainment of ambient air thereby producing enhanced downward sensible heat fluxes and downward as well as upward momentum fluxes with various magnitudes and timescales. When the wind direction was between 180^0 and 225^0, increased spectral power of u and v spectrum in low frequency domain and decreased spectral power of w spectrum in low frequency domain results from glacier wind on the outer layer. The spectral peak of uw co-spectra is eliminated and the co-spectral power of Tw co-spectra is decrease in the low frequency due to downward moment flux and heat flux respectively.

Corresponding author: Maoshan LI

Maoshan LI
Cold and Arid Region Environmental and Engineering Research Institute,
Chinese Academy of Sciences, Lanzhou 730000
Email: mshli@lzb.ac.cn, limaoshan@gmail.com,
Yaoming MA
Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing 100085
Cold and Arid Region Environmental and Engineering Research Institute, Chinese Academy of Sciences, Lanzhou 730000
Email: ymma@itpcas.ac.cn
Lei ZHONG
Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing 100085