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Measurements of water vapor and carbon dioxide fluxes over Erhai Lake using eddy covariance technique

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Abstract
An eddy covariance measurement site was built to measure long-term turbulent fluxes of water vapor and CO_2 over Erhai Lake (area 250 km2, maximum depth 21.5 m) in the Southwest part of China. The observation also included radiation, wind speed, direction, and water temperature profile measurements. Using a whole year data in 2011, the diurnal variation patterns of sensible heat, latent heat and CO_2 fluxes were investigated. The sensible heat flux peaked in early morning (about 25 W m-2) and reached its minimum in the afternoon (about -15 W m-2), and was strongly controlled by the air-water temperature difference. The latent had an opposite diurnal course with a maximum in the afternoon (about 150 W m-2) and minimum in the morning (about 5 W m-2), which was correlated with water pressure deficit. In order to analyze energy balance, heat storage of water was estimated using water temperature profile data. The result showed that the average energy balance closure was about 80% in the summer, and about 70% in the other time of the year. The aerodynamic roughness length (z0) and bulk transfer coefficients (Cd and Ch) were also estimated using eddy covariance data. The average value of z0 was 0.043 m in the summer and 0.050 m in other periods of the year. The average value of Cd, Ch was 2.1 x 10-3 and 1.3 x 10-3 respectively for the whole year.
Keywords: water vapor and carbon dioxide fluxes, eddy covariance, Erhai Lake