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Estimation of atmospheric turbulent fluxes determined by the bulk transfer method

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The momentum flux and the sensible heat flux were measured with Scintillometers at 6 site of which surface characteristics like roughness length and zero-displacement are different each other. We estimated the momentum flux and the sensible heat flux based on the bulk transfer method with the drag coefficient and the heat transfer coefficient calculated from the temperature and wind speed that observed at two heights. The variation of bulk transfer coefficients showed a marked differences depending on the atmospheric stability which is less influenced by the zero-displacement than the roughness length. The sensible heat flux overestimated in nighttime and underestimated in daytime regardless of the stability, showed 19 Wm-2 of the root mean square error that is less than 8% of its maximum. Since the momentum flux is not only effected by drag coefficient but also by wind speed square, the choice of wind speed in the bulk transfer method is critical. When the similarity theory does not work, it is required to calibrate the wind speed for the bulk transfer method to that measured at the reference height.

Key-Words: Drag coefficient, Heat transfer coefficient, Bulk transfer method, Turbulent fluxes, Scintillometers