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Structure of the Atmospheric Boundary Layer over the Coastal Region

B. H. KWON[1], I. H. YOON[2], H. J. KIM[3], Y. G. LEE[4], J. W. LEE[4]
[1]*Dept. Of Environmental Atmospheric Sciences, Pukyong National University, Busan, Korea*
[2]*Dept. of Earth Science Education, Kyungpook National University, Daegu, Korea*
[3]*Dept. of Astronomy and Atmospheric Sciences, Kyungpook National Univ., Daegu, Korea*
[4]*Airship Department, Korea Aerospace Research Institute, Daejeon, Korea*

Indirect methods of estimating surface fluxes from more easily measured mean winds and temperatures are most widely used to describe turbulent exchanges in the surface layer. The gradient method and the profile method can be readily used since fluxes in the atmospheric surface layer are calculated without the surface roughness and the surface temperature. However, because wind profiles are quite sensitive to terrain inhomogeneity over fairly long fetches, and wind speed observations have limited accuracy, the profile method is a shaky foundation for getting representative surface roughness length and friction velocity in the field. It was difficult to describe, in detail, vertical variations of the turbulent fluxes using the gradient method in the inland surface layer (Kwon and Júnior, 2004). In order to estimate fluxes obtained from the gradient method and profile method by the balloon and to compare those with the turbulent parameters by the scintillometer, we conducted the experiment in the reclaimed land from the sea, and the structure of the coastal atmospheric boundary layer was analyzed with the data from the GPS rawinsonde. The Ekman layer was developed up to 500 m where the wind was directed about 45˚ in a clockwise sense from the wind direction near the surface. The wind blew from the sea oriented to the west in the afternoon and from the north in the morning. While this sea-breeze-like wind was observed in summer, any diurnal variation of wind direction was not detected in winter. The seasonal different phenomena might be due to the surface heat imbalance between warm and cold periods. An organized measurement of the atmospheric turbulences, which play an important role in the surface, will help to understand the structure of ABL over the coastal.

Keywords: Sensible Heat Flux, Coastal Atmospheric Boundary Layer

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References

[1] Kwon, B. H. and J. F. O. Júnior, 2004, Variations of turbulent fluxes in the Atmospheric Surface layer according to the presence of cloud, Journal of the Korean Earth Science Society, in print.