

Coastal thermal internal boundary layer in onshore winds along the Cheju island coast and its association with synoptic wind fields

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During the prevailing onshore wind in the winter time the investigation of the thickness of thermal internal boundary layer and the variation of winds within and above internal boundary layer were carried out in the coastal region of songsan-po of the south of korea. The thickness of thermal internal boundary layer(TIBL) was formed near 10m height which was the intersected point of potential temperature profile over the ground at 100m away from the songsan-po coastline. Friction velocities have the magnitudes of 0.13m/s to 0.43m/s with the surface roughness of 0.01cm to 0.1cm within the internal boundary layer, and above the internal boundary layer they are in the range of 0.05m /s to 0.23m/s with the surface roughness of 0.0003cm and 0.0005cm. The correlation coefficients between U^* and L within the internal boundary layer are in the range of 0.96 to 0.97, and about the internal boundary layer are about 0.9. Richardson number Ri is in proportion to Z/L within TIBL, and a parabolic orbit from the relationship of Z/L to Ri is found. The drag coefficient is the range of 0.47×10^{-3} to 2.56×10^{-3} for wind speed at 10m height including temperature difference between two levels within and above internal boundary layer with good correlation. Wind variances above and within internal boundary layer have the magnitudes of $0.09m^2/s^2$ to $0.28m^2/s^2$ and $0.18m^2/s^2$ to $0.53m^2/s^2$. The comparison of observed wind speeds above the internal boundary layer associated with synoptic wind speeds gives us close relationship between them and some discrepancies between them may be partly due to no considering wind direction, and the difficulties to evaluate the strengthen of wind speed from a channel flow between the unstable internal boundary layer due to the surface heating and the upper level stable layer caused by a subsidence of air from the synoptic scale wind fields.