



Spatial variability of Boundary Layer over Kochi using two Wind Profiler Radars

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There is a good understanding of homogeneous marine and land boundary layers. However the inherent heterogeneity observed in the coastal atmosphere produces variation in the boundary layer. The coastal environments are influenced by the adjacent ocean, the topography and the thermal contrast between land and sea. The thermal contrast between the land and sea due to the differential heating/cooling causes land-sea breeze. The vertical mixing in this turbulent layer and its depth are critical parameters in determining air pollution concentrations near the ground. The depth of the vertical mixing depends on the vertical profiles of the temperature, humidity, turbulence or the atmospheric composition. The variations of air temperature, humidity and pressure due to small-scale turbulence lead to variations in the refractive index of the air derived from the refractive structure parameter, which is proportional to the SNR of the wind profiler backscattered signal. Consequently, the range-corrected SNR can be used as an effective estimate the PBL height. Thus the wind profiler measurement can be used to estimate the height of the PBL.

Data collected by two nearby wind profiler radars separated by a distance of approximately 12 kms is used to study the spatial variability in the planetary boundary layer (PBL) height. The two radars, one is VHF operating at 205 MHz and other is UHF radar operating at 449 MHz make observations with very good vertical resolutions. The 205 MHz Stratosphere Troposphere (ST) Radar is situated at Cochin University of Science and Technology, Kochi (which is away from the sea by about 13 km) provides accurate three-dimensional wind profiles for an altitude range from 315m. The 449 MHz radar is situated at the Naval Base, Wellington Island, Kochi (which is away from the sea by about 4 km) makes three dimensional wind measurements from 300 meters. Corresponding signal-noise ratio and the spectral width are also available. We used the Radar data for the estimation of the PBL height over Kochi during a period of six months from January 2018 to study the spatial variability. The diurnal variation of the PBL height is also studied for few periods of continuous operation. The results of this analysis will be presented.