

Turbulence parameter estimation from concurrent measurements of radar and radiosonde

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Turbulence parameters in the lower atmosphere form an important component of the atmospheric dynamics. MST/ST radars provide us valuable data on the turbulence parameters in the lower atmospheric column above the radars. Since the number of such radars around the globe are limited, the information on the turbulence parameters in the lower atmosphere are limited. Even the estimation of turbulence parameters from the ST radars in the troposphere requires some assumptions and hypothesis and various methods are reported in the literature. The world's first 205 MHz Stratosphere – Troposphere (ST) radar located at Kochi (10.04°N, 76.33°E) provide unique high-resolution measurements in the tropical troposphere and lower stratosphere. The year round operation the radar at this location is very important since Kochi is the gateway of Indian monsoon and the turbulence information during different seasons can be obtained from this radar. Concurrent with this radar, high-resolution radiosonde measurements are also made for a number of days in 2017 and a comparative study is made with these sets of observations. Turbulence parameters such as rate of turbulent kinetic energy (ϵ) and eddy diffusivity (K) are estimated from radar measurements and radiosonde profiles. The turbulence parameters are estimated for the lower atmosphere for the pre-monsoon and monsoon seasons and the altitude profiles of both ϵ and K from radar and radiosonde measurements are studied and presented in this work.

Key words: Turbulent kinetic energy, Eddy diffusivity, ST radar