A Novel 205 MHz Stratosphere Troposphere Wind Profiler Radar at Cochin (10^o N, 77^o E), India

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The Cochin University of Science and Technology hosts the World's first 205 MHz Stratosphere-Troposphere (ST) wind profiler radar situated in the southern peninsular India, the gateway of Indian summer monsoon. This profiler constitutes 619, three element Yagi-Uda antennae with an effective aperture area of $1.6x10^8$ Wm^2 and is capable of providing accurate 3-dimensional wind profiles for an altitude range of 315 m to 20 km. The system description and first time validation along with results from some of the radar's potential applications are being presented. The radar wind profiles have been validated against collocated GPS-radiosonde measurements. The radar and radiosonde profiles show very good correlation with coefficients of 0.99 and 0.93 for zonal and meridional winds, respectively. The standard deviation of the radar measurements with respect to radiosonde measurements is found to be 1.85 ms^{-1} for zonal wind and 1.66 ms^{-1} for meridional wind. Some of the scientific applications are discussed in brief with results, such as the dynamics of the tropical easterly jet and monsoon low level jet observed during the summer monsoon, the possibility of inferring the tropical tropopause layer, rain signature on radar signals, the study of turbulence etc. Moreover, the radar also detects echoes from ionosphere. The ST radar at Cochin is an ideal instrument for understanding process studies of monsoon at the region of its onset, which is expected to enhance our understanding of monsoon dynamics.