Characterization of Ionospheric Nighttime F region irregularities using 205 MHZ RADAR during Equinox

Alkha. P. George[1], Rakesh V [1]*, Dr. S Abhilash[1]*

[1] Post Graduate student from Department of physics Bharata Mata college, Thrikakkara, Ernakulam

[1*] Scientist, Advanced centre for Atmospheric RADAR Research, CUSAT, Kochi

Abstract

The VHF radar, operating at a frequency of 205 MHz, has been installed at Cochin University of Science and Technology (CUSAT) with the purpose of measuring wind components of the lower atmosphere. It is successfully configured for probing nighttime ionospheric irregularities over the near-equatorial region of Cochin, India. This study was conducted during the months of Equinox. The primary focus of this work was on the characteristics study of irregularities occurring in the F region of the ionosphere, also aiming to investigate the sources of plasma irregularities within this region during the Equinox period of 2023. During the months of Equinox, both quiet and disturbed ionospheric conditions were observed, and these were distinguished based on the value of solar indices, particularly the Ap index. In March, the data indicated a disturbed ionospheric storm of 12 % and a quiet storm of 63.5%. Analysing the data collected during these disturbed storms provides valuable insights into the properties of the ionosphere, shedding light on the F region and the underlying sources of irregularities and plasma drift. This research can further contribute to our understanding of various solar phenomena, especially during this solar maximum period of the 11^{th} solar cycle, as well as other factors such as atmospheric phenomena like westerlies, plasma bubble events, and cosmic events like gravity waves generated by phenomena such as supernovas and black holes.