

New observations of daytime 150-km echoes from Gadanki and Kototabang

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The daytime 150-km echoes were first detected using the high power 50 MHz Jicamarca radar more than five decades ago. The mystery on the origin of these echoes, however, continues to deepen. This is not only a surprise but remains possibly the most puzzling and challenging field in the ionospheric plasma physics today. For long time, presumed to be generated by interchange instability, a recent theoretical simulation suggested that the photo-electron induced enhanced plasma waves (ion waves) are the most likely source of these echoes. Using observations from the Gadanki MST radar and Equatorial Atmosphere Radar (EAR) we find that the occurrence and intensity of the 150-km echoes have a clear inverse relationship with the EUV flux, a result that is apparently inconsistent with the latest theoretical premise. We also show strong seasonal variations and dynamical features of the echoing phenomenon, providing new insight in addressing the complex interplay of atmospheric dynamics and solar photo ionization related processes. This paper is intended to present new observational results, not reported before, and discuss these in furthering our understanding on the echoing riddle.