

Recent observations of low-latitude E region quasi-periodic echoes from Gadanki radar

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New observations on low latitude quasi-periodic (QP) echoes made using the Gadanki MST radar are presented. These observations have been gathered through systematic observations made on a few days per month spread over two years. Although QP echoes have been observed both during the day and night, they are predominantly observed during night. Both local time preference and seasonal dependence have been observed over Gadanki. The most important observation is the quasi-sinusoidal altitude variations of the echoing layers with periods 2-15 minutes. These observations are continuous in time and hence unlike the quasi-periodic striation often observed both at low- and mid-latitudes. Majority of observations, however, can be categorized as quasi-periodic striated structures. We have also noted signature on the possible role of electric field mapping between thin layers separated by a couple of kilometers in the nighttime E region. The velocity data suggest that the irregularity velocities are predominantly controlled by layer dynamics, not so much in terms of temporal structures.

The wide variety of data gathered suggests that the structures and dynamics cannot be accounted for by any one of the mechanisms suggested in relation to mid-latitude QP echoes. In this paper, we attempt to find out the most likely mechanism that may be at work for most of the time, given the condition of the magnetic field line geometry over Gadanki and background ionospheric parameters