

Detection of a back-scattering region at 108 km height during sunset

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Abstract

We have obtained Range Time Intensity (RTI) maps covering the equatorial electrojet heights during daytime and evening in the Brazilian sector using the RESCO 50 MHz back-scatter radar (2.33° S, 44.2° W, DIP: -0.5), at São Luís. These maps revealed the appearance of a scattering region at about 108 km of height during the sunset period. It was observed mainly during summer period under quiet magnetic activities conditions. Back-scatter coherent radars are sensitive to field aligned meter-scale plasma irregularities and the type of 3-m irregularity region we have observed, and we present here has not been reported before to our best of knowledge. The occurrence of this echo region coincides in local time with the maximum intensity of evening pre reversal eastward electric field of the F region ionosphere. Theory of the divergence of the equatorial electrojet current in the evening ionosphere has been proposed (*Haerendel and Eccles, 1992, JGR*) to explain its partial contribution to the development of the pre reversal electric field. The theory predicts enhanced zonal electric field and hence vertical electric field below 300 km as necessary as consequence of the electrojet divergence in the evening. In this paper the experimental results of the enhanced echoes from higher heights of the EEJ region do seem to provide an evidences that the divergence of the equatorial electrojet current can indeed be the driver of the scattering region observed. For the present study we have selected some days of radar observation of the E region heights during summer under quiet and disturbed magnetic condition. We also have obtained the amplitude of F-region plasma drift (pre reversal enhancement) over the same observatory, deduced from hmF2 obtained by the digisonde.

Acknowledgements

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