

Nature of the response of nighttime equatorial ionosphere to geomagnetic activity

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Past studies of the response of nighttime equatorial ionosphere to geomagnetic activity have suggested that the response may be highly variable. In order to discern any pattern in this variability, it is necessary to quantify the response, which also facilitates comparison with theoretical modeling results. Spaced receiver measurements of ionospheric scintillations on a VHF signal transmitted from a geostationary satellite and recorded at an equatorial station have yielded quantitative estimates of disturbance dynamo effects on nighttime equatorial zonal plasma drifts, and also the probable time delay for occurrence of maximum disturbance dynamo effects in the nighttime equatorial F region plasma drifts. Alteration of the ambient zonal electric field due to magnetic activity occasionally produces another effect of magnetic activity, which is of importance as far as communication and navigation systems are concerned, and that is the fresh generation of plasma bubbles in the nighttime equatorial ionosphere. A study of this requires identification of equatorial bubbles that are freshly generated as a result of magnetic activity, as opposed to bubbles that are generated up to a couple of hours earlier, and then drifted into the signal path. Decorrelation of the signals recorded by spaced receivers provides a parameter that has proved its utility in this identification. Using this, the seasonal statistics of equatorial plasma bubbles generated as a result of magnetic activity, as also suppression of the development of plasma bubbles due to magnetic activity have also been studied using spaced receiver ionospheric scintillation data.