

Observations of Pc5 micropulsation-related electric field oscillations in the equatorial ionosphere

C. A. Reddy, Sudha Ravindran, K. S. Viswanathan, B. V. Krishna Murthy, D. R. K. Rao, T. Araki

NASA/Goddard Space Flight Center, Planetary Atmospheres Branch, Code 914, Greenbelt, Maryland 20771, U.S.A.

(2) Space Physics Laboratory, Vikram Sarabhai Space Centre, Trivandrum 695 022, India

(3) Indian Institute of Geomagnetism, Colaba, Bombay 400 005, India

(4) Geophysical Institute, Kyoto University, Kyoto, Japan 606

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Abstract. A 54.95-MHz coherent backscatter radar, an ionosonde and the magnetometer located at Trivandrum in India (8.5°N, 77°E, 0.5°N dip angle) recorded large-amplitude ionospheric fluctuations and magnetic field fluctuations associated with a Pc5 micropulsation event, which occurred during an intense magnetic storm on 24 March 1991 ($A_p=161$). Simultaneous 100-nT-level fluctuations are also observed in the H-component at Brorfelde, Denmark (55.6°N gm) and at Narsarsuaq, Greenland (70.6°N gm). Our study of the above observations shows that the E-W electric field fluctuations in the E- and F-regions and the magnetic field fluctuations at Thumba are dominated by a near-sinusoidal oscillation of 10 min during 1730-1900 IST (1200-1330 UT), the amplitude of the electric field oscillation in the equatorial electrojet (EEJ) is 0.1-0.25 mV m⁻¹ and it increases with height, while it is about 1.0 mV m⁻¹ in the F-region, the ground-level H-component oscillation can be accounted for by the ionospheric current oscillation generated by the observed electric field oscillation in the EEJ and the H-component oscillations at Trivandrum and Brorfelde are in phase with each other. The observations are interpreted in terms of a compressional cavity mode resonance in the inner magnetosphere and the associated ionospheric electric field penetrating from high latitudes to the magnetic equator.

Correspondence to: Sudha Ravindran

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