



Cause and effect relationship between simultaneously observed geomagnetic pulsations and scintillations at low latitudes

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Ionospheric scintillations of radio waves at low latitudes are associated with electron density irregularities. It has been discussed earlier (Sinha et al., 2001) that these irregularities are field aligned and can drive oscillations of local field lines. In the current studies, our observations examine the possibility if local field line oscillations can provide seeding for the development of ionospheric irregularities at low and equatorial latitudes. During local evening, low and equatorial latitudes are manifested with spread-F which causes scintillations of radio waves observed at the ground. It is during this local time that the maximum in Pc3 geomagnetic pulsations, which are associated with hydromagnetic oscillations excited on the geomagnetic field lines, is observed in the subtropical regions. The estimated eigen periods of toroidal field line oscillations by using dipolar magnetic field, and the signal strength of radio waves recorded, exhibit periodicities of the same range. The occurrence pattern of simultaneously observed scintillations and geomagnetic pulsations shows that significant number of pulsation events precede the scintillation events by more than half an hour, though in many cases either the scintillation precede the pulsation or they are triggered together. Simultaneous oscillations in the magnetic field and scintillation in the Pc3 range raises the possibility of one process driving the other. In the current study, we have made an attempt to bring out the cause and effect relationship between these two simultaneously observed phenomena.

1. A. K. Sinha, B. M. Pathan, R. Rajaram, and D. R. K. Rao, "Low frequency modulation of transionospheric radio wave amplitude at low-latitudes: possible role of field line oscillations," *Annales Geophysicae* (2002) 20: 69–80.