

Spatial dependence of day-time vertical polarisation of Pc 3-5 magnetic pulsations in Sri Lanka

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Abstract

The rate of change of the horizontal and vertical components of magnetic pulsations in the period range 20-600 s have been recorded at four stations in Sri Lanka, namely, Vavuniya, Maradankadawela, Maho and Colombo. An analysis of the records shows that the horizontal polarisation of the pulsations is predominantly along the magnetic meridian at all four stations. The vertical polarisation as measured by the ratio $\Delta Z/\Delta H$ increases with increase in period and for signals in a given periodic band, except for those recorded at Maho ; there is also an increase of vertical polarisation with distance of the recording station from the magnetic equator. At Maho, there is a local decrease of the vertical polarisation at all periods probably due to anomalous electrical conductivity in this region. Although the spatial and period dependence of the vertical polarisation of the pulsations recorded at the other three stations can be explained in terms of an oscillating ionospheric current band of half-width about 105 km flowing east-west in the neighbourhood of the magnetic equator, and its image current in a uniform conducting earth, such a model may not be realistic in that it neglects possible effects due to induced currents in the ocean deflected round the coasts of Sri Lanka. It is suggested that the observed day-time polarisation may represent the effect of a wider equatorial ionospheric current system, such as the equatorial electrojet and additional effects due to induced currents in the ocean.