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The transition from Pc1 to IPDP under the conditions of enhanced magnetospheric convection

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In the present study, we analysed the magnetospheric processes accompanied by midnight, postmidnight and morning geomagnetic pulsations of rising frequency (IPDP). The pulsations were recorded in the Mondy observatory (L=2) on 6-7 April 2000 and on 17 April 2002. The dynamic spectra of IPDP are similar to noisy dynamic spectra of classical IPDP that appear in the evening sector after the substorm injections. It makes them different from the well-known morning IPDP wave events with the dynamic spectrum consisting of discrete irregular elements.

The pulsations under study are not obviously related to an individual substorm injection and are generated under the different magnetospheric conditions. The oscillations registered during 3 hours on 07.04.00 were generated at the time of the intensification of magnetospheric convection. On 06.04.00, two-hour-lasting IPDP were recorded on the background of prolonged substorms activity. On 17.04.02, short IPDP occurred to the east of the region of initial aurora intensification 40 min after the start. All these cases share the common property: the waves were emitted in the MLT sector, where the inner plasma sheet boundary was moving towards the Earth.

A “convective” mechanism of the IPDP generation was used for the interpretation of obtained results. In this model, oscillations with frequency $f \sim \mathrm{L}_{ps}^{-4}$are caused by Cherenkov instability of energetic ions in the inner edge of the ion plasma sheet and the increase in the midfrequency of pulsation results from the radial drift of the source region. Here L_{ps} is the McIlwain parameter, corresponding to the inner edge of ion plasma sheet. We conclude that in some cases the IPDP geomagnetic pulsations can be generated during the progress of Pc1 sources toward the Earth. This study is supported by the INTAS grant 03-51-5359.