Ionospheric Conductivity Modulation in Pc5 Pulsations

Ionospheric Conductivity Modulation in Pc5 Pulsations

 # Stephan C. Buchert [1]，藤井 良一 [2]，Karl-Heinz Glassmeier [3]
Stephan C. Buchert [1], Ryouichi Fujii [2], Karl-Heinz Glassmeier [3]

[1] 名大・太陽地球環境研究所，[2] 名大・太陽研，[3] Institut fuer Geophysik, TU Braunschweig
[1] STEL., Nagoya University, [2] STEL, Nagoya Univ, [3] Institut fuer Geophysik, TU Braunschweig

Pc５パルセーションが観測されているときに電離圏伝導度は約２倍に振動していた。この変化はフラックスと降り込み電子のエネルギーの振動によるものと思われる。リングカレント不安定性はロスコーン内への電子の時間変動拡散を生じさせる。本講演ではこのイベントに関連した複雑な電離圏ー磁気圏カップリングのいくつかの様相に関して議論する。

Both, shear flow instabilities at the magnetopause and ring current instabilities have been identified as sources of Pc5 pulsations in the afternoon sector of the terrestrial magnetosphere. If the ring current is the source, the diffusion of hot electrons into the loss cone is modulated. Then electron precipitation into the ionosphere should consequently be time varying. By means of one exemplary, strong pulsation event, we show that a modulation of particle precipitation, ionospheric conductivities, and currents during magnetic Pc5 pulsations does indeed occur. The direction of the phase propagation of the disturbances is also consistent with the hypothesis of a ring current source. The height-integrated conductivities vary by a factor of about two.

Large electric field and Poynting flux variations suggest, that also strong coupling to shear Alfven modes, carrying field aligned currents, happens in the magnetosphere. The latitudinal variation of power and wave polarization shows features of a field-line resonance. Furthermore, power spectral analysis of conductivities, electric and magnetic fields reveals, that there is also a turbulent-like background in all three parameters. The power-law slope of the conductivity spectra is comparable to that of the electric field, while the ground magnetic field shows a steeper decrease with frequency due to the shielding of small scale current structures. A clear anti correlation between conductivities and the eastward electric field is interpreted as a ionospheric polarization due to Hall currents, which transmits also Alfven waves from the ionosphere upwards.

The combined effects of magnetospheric Alfven waves and time-varying ionospheric conductivities lead to rather complicated current systems an ionosphere-magnetosphere coupling.