# Ionospheric Conductivity Modulation in Pc5 Pulsations

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A modulation of ionospheric conductivities by a factor of two was detected during a magnetic Pc5 pulsation event. The variations seem to be due to oscillating flux and energy of precipitating electrons. A ring current instability causes time-varying diffusion of electrons into the loss cone. We discuss several aspects of the complicated ionosphere-magnetosphere coupling associated with this event.

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.