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# Multi-instrument overview of the 1-hour pulsations in Saturn's magnetosphere and auroral emissions (invited)

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The in-situ exploration of the magnetospheres of Jupiter and Saturn has revealed different periodic processes which differ from the rotation period. In particular, in the Saturnian magnetosphere, several studies have reported pulsations in the outer magnetosphere with a periodicity of about 1 hour in the measurements of charged particle fluxes, plasma wave, magnetic field strength and auroral emission brightness. We made a 10-year survey of the quasi-periodic 1-hour energetic electron injections observed in the Saturn's outer magnetosphere by the Low-Energy Magnetospheric Imaging Instrument (MIMI/LEMMS) on board Cassini. The signature of these injections is pulsations in the electron fluxes at energies between a hundred keV up to several MeV. We investigated the topology and the morphology of these pulsations, as well as the signatures of the electron injections in the radio emissions and the magnetic field, respectively, measured by the Radio and Plasma Wave Science (RPWS) instrument and the magnetometer (MAG) on board Cassini. The morphology of the pulsations (interpulse period, number of pulsations per event, growth and decay time) shows a weak local time dependence, which suggests a high-latitude source for the pulsed energetic electrons. This suggestion is reinforced by the observation of strong radio bursts in the auroral hiss coincident with the electron pulsations and by the higher growth rate and decay rate magnitudes at high latitudes. Moreover, since the morphological properties of the pulsations are similar at the various locations where the electron injections are observed, the acceleration mechanism of the electrons is likely common for all the events and may be directly or indirectly involving magnetic reconnection. The auroral emissions, which display the ionospheric response to magnetospheric dynamics, exhibit some quasi-periodic 1-hour pulsations as well. Some pulsed auroral brightenings are observed while Cassini detects several electron injections. Moreover, pulsations in some auroral features are thought to be triggered by reconnection at the magnetopause or at high-latitudes. Hence, the concomitance of 1-hour pulsations in different magnetospheric measurements and in the auroral emissions set constraints on the origin and the significance of the pulsed events in Saturn's magnetosphere.