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Transient auroral emissions at Jupiter and Saturn associated with magnetic reconnection (Arne Richter Award for Outstanding Young Scientists Lecture)

A. Radioti
University of Liege, Laboratory of Planetary and Atmospheric Physics, Liege, Belgium (a.radioti@ulg.ac.be)

The auroral activity is the visible signature of a long chain of interactions and provides a picture of the magnetospheric processes. Ionospheric and magnetospheric coupling at Jupiter and Saturn associated with magnetospheric processes such as magnetic reconnection gives rise to precipitating energetic particles and auroral emissions. This lecture discusses the auroral dynamics with emphasis on the auroral counterpart of magnetic reconnection at Jupiter and Saturn, based on combined studies of remote auroral, in-situ magnetospheric data and simulations. In particular it is shown that periodic ejected plasma flow during magnetic reconnection in Jupiter's tail couples with the ionosphere and creates periodic auroral features. At Saturn, plasma flow produced by consecutive reconnection events in the flank of the magnetopause creates transient auroral emissions at the end of the ionospheric footprint of the newly open field lines. Finally, injected plasma populations in the magnetosphere, possibly associated with magnetic reconnection, trigger auroral features located equatorward of the main auroral ring of emission at Saturn.