



Ground based detection and study of Saturn Electrostatic Discharges

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Radio signatures of lightning discharges have been detected by the Voyager spacecraft near Saturn up to 40 MHz (and called improperly SED for Saturn Electrostatic Discharges). Corresponding flux densities at the distance of the Earth are between a few and a few hundred Jansky (Jy), for event durations of ~ 30 to 400 msec. Cassini recently showed that SED occurrence is extremely variable on the long-term, with periods of inactivity of several months alternating with strongly emitting storm systems lasting days or weeks. Ground-based detection of SED is very interesting both for their continuous study (and from there the study of electrification processes, atmospheric dynamics, chemistry – with possible consequences on biological processes, geographical and seasonal variations, all compared to the Earth), and because they provide a good test of detectability of relatively weak transient emissions. It will be one of the topics studied by the future low frequency array LOFAR. A few Jy is a low flux density in the decameter range, polluted by intense RFI, bright sky background, and ionospheric propagation effects. Ground-based detection of SED was attempted unsuccessfully many times since 1967. In 2006, detection in a few narrow spectral channels was achieved at the UTR-2 radiotelescope in Kharkov (Ukraine). Taking advantage of a strong storm system in december 2007 and the availability of a new broadband digital multichannel receiver at UTR-2, we could for the first time detect

many SED over the whole spectral range of the instrument ($\sim 10 - 30$ MHz). SED properties measured at that occasion are compared to those from space missions. Complementarity of ground-based and space-borne observations is discussed, as well as future observations.