



Magnetospheric Line Radiation: Survey results using 6.5 years of DEMETER spacecraft data

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Frequency-time spectrograms of electromagnetic emissions observed in the Earth's inner magnetosphere at frequencies between about 1 and 8 kHz sometimes consist of several nearly horizontal and almost equidistant intense lines. The emissions of this type were observed both by ground-based instruments and by satellites, and they are usually called Magnetospheric Line Radiation (MLR). We compiled a list of all MLR events observed by the low-altitude DEMETER spacecraft during the duration of the mission (2004–2010). Altogether, 1230 MLR events were identified, which likely represents the largest database available to date. We analyze a possible connection between the MLR occurrence and solar wind parameters using the superposed epoch analysis. We show that the MLR occurrence is enhanced during specific solar wind parameters, being larger in relation to the interplanetary shocks. We further show that there is a connection between the MLR occurrence and the season of the year, with the events being more frequent during the northern winter than during the northern summer. As for the spatial distribution of the event occurrence, the events are less frequent at geomagnetic longitudes of the South Atlantic Anomaly. We also analyze the energy spectra of electrons precipitating at the times of MLR events, and we derive energy-latitude plot of electron flux enhancements related to the MLR occurrence. Finally, we perform a detailed wave analysis of two MLR events for which high resolution multicomponent data are available. It is found that the events are right-handed nearly circularly polarized, propagating at oblique wave normal angles from larger radial distances and lower geomagnetic latitudes.