



Connection of lightning-related HF signatures measured by the DEMETER satellite with localized field-aligned currents

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We present an analysis of the HF pulses observed by the DEMETER satellite during its operational period between 2005 and 2010. We observe these pulses only during the local night since during the daytime the cutoff frequency is above the upper frequency limit of our measurements (3.3 MHz). A subclass of the detected HF events, typically showing a peak in the HF spectrum, predominantly occurs in the northern hemisphere during the local summer season. A reverse ray-tracing model based on the International Reference Ionosphere is not consistent with the possibility that the HF waves propagate from the lightning stroke to the altitude of the satellite. However, simultaneously recorded magnetic [U+FB01]eld perturbations often indicate the presence of the field aligned currents, together with signatures of intense O+ whistlers and associated proton whistlers. These field aligned currents, if they are associated with density depletions, can be responsible for local penetration of the observed HF pulses from the source lightning through the ionosphere.