

A study of quasi-periodic ELF-VLF emissions at three Antarctic stations: evidence for off-equatorial generation?

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Abstract. The spatial extent and temporal behaviour of quasi-periodic (QP) intensity modulations of 0.5-2 kHz ELF-VLF signals were investigated in a comparative study of data collected at the Antarctic stations of South Pole ($L=14$), Halley ($L=4$), and Siple ($L=4$). Frequently, the waveforms of ELF-VLF signals simultaneously received at each site were identical. Although of similar frequency structure, the waveforms of the accompanying Pc3 magnetic pulsations did not show a one-to-one association. Whereas both are dayside phenomena, QP emissions occur over a smaller range of local times, and have a maximum of occurrence later in the day closer to local noon. QP emissions are identified with the periodic modulation of the electron pitch-angle distribution by the propagation of ULF compressional fast-mode waves through a region. However, contrary to previous ideas, rising-tone emissions do not represent the frequency-time signatures of such waves. In addition to generation close to the equatorial plane, we propose an additional high-latitude source of QP emissions. These emissions are associated with regions of minimum B produced by the dayside compression of the magnetosphere close to the magnetopause. Model magnetic field calculations of these minimum- B regions as a function of magnetic local time and invariant latitude are presented.

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