

Power spectral structure of Pc3 geomagnetic pulsations excited by earthquakes

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Some strong inland earthquakes that occur on the dayside excite Pc3s. The Lamb waves generated by the January 2022 Tongan undersea volcanic eruption are also believed to have excited large amplitude and short period compressional Pc3 geomagnetic pulsations in the dayside plasmasphere (Iyemori et al., 2025). Increases in power spectral density (PSD) in the Pc3 frequency band were observed statistically 10-30 minutes after the origin time of large inland earthquakes ($M > 6.5$) during the daytime (10-14 LT). The PSD of Pc3s caused by earthquakes or by Lamb waves shows many spectral peaks having an interval of 3-5 mHz, and this is similar with the characteristic reported by, for example, Samson et al. (1995) for normal, i.e., solar wind origin Pc3s. The compressional Pc3s observed by the Swarm satellites also show similar spectral structure. In this paper, we examine statistically the PSD structure of the Pc3s possibly excited by earthquakes and compare it with the spectral structure of normal Pc3s. We also examine its dependence on the size and plasma density distribution of the model plasmasphere estimated with the parameters corresponding to each Pc3 occurrence time.

Keywords: acoustic wave, earthquake, Pc3 magnetic pulsation, plasmasphere