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DEMETER卫星观测到的与汶川地震有关的LF电场异常

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LF electric field anomalies related to Wenchuan earthquake observed by DEMETER satellite

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摘要

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摘要 本文利用法国DEMETER卫星观测的电场数据, 获得了汶川地震前后约一个半月以16天为周期的LF频段(在本文定义为10~18 kHz)的平均功率谱密度准动态分布图像. 发现昼侧10~14 kHz、夜侧10~18 kHz的电场平均功率谱密度的幅度在2008年5月12日发生的汶川地震前后存在明显变化: 震前先明显增大, 随后减小, 在发震时段几乎达到最小, 震后逐渐恢复并较震前增大. 同时, 分析了2006、2007年和2009年的LF频段的电场平均功率谱密度分布图像, 发现无论是昼侧还是夜侧, 它们的变化特征比较相似, 但与2008年对应时段, 特别是发震时段的电场平均功率谱密度幅度明显减小的变化有明显差异. 这表明2008年5月12日前后出现的电场平均功率谱密度的明显变化可能与汶川地震有关.

关键词: 汶川地震 LF频段 DEMETER 电场 平均功率谱密度

Abstract: We obtained the quasi-dynamic images of average power spectrum density (APSD) with 16-day period of LF (In this paper defined as 10~18 kHz) electric field in about 1.5 months before and after Wenchuan earthquake using the data from French DEMETER satellite. It was found that there were marked changes of the amplitudes of dayside APSD in 10~14 kHz and nightside one in 10~18 kHz before and after Wenchuan earthquake occurred on May 12, 2008. At first, the amplitudes increased greatly before the earthquake. Then they decreased and almost reached the minimum in the period of earthquake occurrence. And after the earthquake they increased gradually and were higher than those before the earthquake. After analyzing the images of APSD of LF electric field in 2006, 2007 and 2009, we found that both dayside and nightside APSD had similar variation characteristics. However, their variation characteristics differed obviously from those in the corresponding period, especially their marked decrease in the period of Wenchuan earthquake occurrence in 2008, which indicated that the remarkable changes of the amplitudes of APSD of LF electric field before and after May 12, 2008 may be caused by Wenchuan earthquake.

Keywords: Wenchuan earthquake LF frequency band DEMETER Electric field Average power spectrum density

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