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## 青藏高原中强地震前的地电场变异及构成解析

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The variation of waveform and analysis of composition for the geoelectrical field before moderate or strong earthquakes in Qinghai-Tibetan plateau regions

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摘要

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**摘要** 青藏高原及邻区的地电场常态波形存在场地的选择性现象,场地的岩石结构、裂隙及裂隙水、构造活动等因素影响地电场的常态波形,较大湖泊有助于附近出现TGF-A波形,在第四纪沉积层较厚、岩石含水量高和透水性强的地区多出现TGF-B波形,而构造活动剧烈的基岩山区易出现无日变形态的地电场.该地区中强地震前,地电场的短临异常存在时间上或同步或有十余天差的丛集现象,而在空间上可分布于该区多个断层附近,表现出离散现象,这种时间上丛集、空间上离散的现象是该区域地电场短临前兆特征.引入 $\Sigma-\Delta$ 求和方法从地电场观测数据中解析出自然电场通常的稳定性,说明了中强地震之前部分地电场的背景值跃变是一种自然电场变化现象;建立潮汐谐波振幅比 $T_A$ 值的概念及计算方法,从定量角度说明了青藏高原地区TGF-A、TGF-B和无日变波形的潮汐影响在逐次降低;使用一阶差分 $\Delta E$ 方法,解析出地电场分钟数量级的高频电磁成分,通常这种高频突跳表现出一定程度的随机性、有限性.三种不同的分析方法,从地电场的构成中解析出自然电场、大地电场和高频电磁成分的特征,为地电场的物理解析提供了理论和方法上的基础.

**关键词:** 青藏高原 中强地震 地电场 变异 物理解析

**Abstract:** Site-selective phenomenon exists in the normal waveforms of the geoelectrical fields of Qinghai-Tibet Plateau and its adjacent areas: rock structure of the sites, cracks and fissure water, tectonic activity and other factors affect the normal waveforms of the geoelectrical field, a large lake will contribute to the occurrence of TGF-A waveforms nearby, TGF-B waveforms will mostly occur in the areas where there are thick Quaternary sediments, high water content, and good water permeability of rocks, while the geoelectrical fields with no diurnal variation are prone to appear in the bedrock mountains where there are intense tectonic activities. Before moderate or strong earthquakes in the region, short-term and impending anomaly of the geoelectrical field has a cluster phenomenon, in which there is a temporal synchronization or a few days' difference, while spatially it can be distributed near several faults in the region, manifested as a discrete phenomenon. This phenomenon of temporal clustering and spatial scattering is the short-term and impending precursor characteristics of the geoelectrical field in the region. The  $\Sigma-\Delta$  summation method is introduced to analyze the usual stability of spontaneous field through the observational data of the geoelectrical field, which indicate that before a moderate or strong earthquake, background value jumps of part of geoelectrical fields are a transformation phenomenon of spontaneous field; the concept and calculation method, in which the  $T_A$  value is the sum of the first 10 order tidal harmonic amplitude divided by the sum of the first 100 order harmonic amplitude, are established to show from a quantitative point of view that the tidal effect of waveforms of TGF-A, TGF-B and non-diurnal variation are successively reduced; the first order difference method of  $\Delta E$  is adopted to analyze the higher frequency electromagnetic components in the minute order geoelectrical field monitoring data, usually the high-frequency jumps show a certain degree of randomness and limitedness. By using three different methods of analysis, the

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features of spontaneous field, the telluric field and high-frequency electromagnetic components are analyzed from the composition of the geoelectrical field, which provides a theoretical and methodological basis for the physical analysis of the geoelectrical field.

Keywords: [Qinghai-Tibetan plateau](#) [Moderate or strong earthquake](#) [Geoelectrical field](#) [Variation](#) [Physical analysis](#)

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