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Statistical analysis of the ULF magnetic field data linked to Izu Island earthquake swarm.

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There have been many reports on ULF magnetic anomalies in relation with local powerful seismic activities. Most previous works have been dealt with seismo-ULF signatures based on the physical principle such as fractal and polarization analyses, whilst there are only few works based on the statistical analysis. In this paper, we aim at extracting the properties of seismo-ULF signatures and to address their physical mechanisms by using the statistical analysis. The statistical properties (i.e. cumulative probability distribution function) are calculated by using each half-hour period in a number of frequency band ranging from 1mHz to 2Hz for the time period of about three years around Izu Island earthquake swarm (the year of the quake, one year before and after the quake). As a result, the remarkable change in the shape of cumulative probability distribution starts about one month before the swarm particularly at the frequency band of 6.7mHz to 0.01Hz. After the swarm, the distribution returns to the original distribution, For other two years (before and after the swarm), the cumulative probability distribution does not show systematic dependence as is seen for the year of the swarm, which indicates that the observed changes of the distribution is due to the swarm.

Keywords: ULF, earthquake, statistical analysis, seismo electromagnetics