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Variation of Geomagnetic Transfer Function Associate with 2000 Izu Islands Earthquake Swarm in Japan

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It is known that an empirical linear relation among the three components of short-period geomagnetic variation.

$$\Delta Z(\omega) = A(\omega) \cdot \Delta X(\omega) + B(\omega) \cdot \Delta Y(\omega)$$

where ΔX , ΔY and ΔZ are geographic north, east and vertical components of geomagnetic field variations, respectively, and these are complex Fourier components. The A and B , which are coefficients of ΔX and ΔY , respectively, are called as the transfer functions (TFs), which are specific to a given station and are frequency-dependent complex functions. Transfer functions have been usually used to map conductivity anomaly. The above equation is well satisfied in the case of strong external source fields, which is generally related to the intense solar activity. In this paper, we would like to investigate the variation of the TFs associated with the earthquake activity.

In this paper, we calculate TFs using data from 2000 to 2002 at Mochikoshi, Seikoshi and Kamo in Izu Peninsula and Kiyosumi, Uchiura, Fudago and Unobe in Boso Peninsula. In this period, Izu islands earthquake swarm started on June 26, 2000 and lasted about three months. This swarm activity was concerned with the volcanic activity at Miyakejima Island. There are 6 large earthquakes with magnitude greater than 6 in this swarm activity.

TFs are computed with the use of the FFT approach and the wavelet transform approach. The multiple coherency concept between ΔX , ΔY and ΔZ in time series data is applied for the wavelet transform approach and data which show only high multiple coherency (>0.9) are selected for estimation of TFs. The results of FFT approach on A and B values indicates anomalous behavior before and during seismic active period. For example, B values decrease and the direction of induction arrow are scattered in the period < 100 s during the earthquake swarm. It suggests the relation between swarm activity and TFs. The detailed results on association between anomalous changes of TFs and seismic activity will be discussed on the poster.