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Geomagnetic anomalies possibly associated with the 2011 off the Pacific coast of Tohoku earthquake (Mw9.0)

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In this paper we have reported unusual changes of geomagnetic fields observed in the vicinity of the epicenter of the 2011 Tohoku earthquake (Mw9.0).

Firstly, we have investigated geomagnetic diurnal variations observed at ESA and KAK. Usually, the diurnal variations at the two stations are quite similar, because the inter station distance is not so large. In this study, the ratios of diurnal variation ranges of KAK to ESA have been monitored. The results indicate that about two month before the Mw9.0 earthquake, the ratio of Z component has increased significantly. This unique change was derived from more than one year data. After checking the original data, it is confirmed that the diurnal variations at ESA station in early January, 2011 have clearly unusual behaviors compared with other reference stations which are far from the epicenter.

And then, we have monitored underground apparent resistivity at ESA station. The mega Mw9.0 earthquake is located in the seismically active area. Actually, this place is also magnetic anomaly region. The short term variations of vertical geomagnetic fields at stations to the north and south of this region exhibit opposite phases. Preliminary results show that the energy of geomagnetic fields at short periods of ESA station is much smaller than that of KAK station, which suggests that the underground conductivity in ESA area may be different from other place. Analyzing MT data observed at ESA is now on-going.

キーワード: ULF seismo-magnetic phenomena, earthquake, geomagnetic field
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