

SEM031-06

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Crustal dynamo as a cause of seismo-magnetic phenomena

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Magnetic variations observed at around earthquakes may be precursors to events or signals that carry information independent of seismic waves, and thus have been the subject of various observations and theoretical calculations. As observational facts, the simultaneity of the occurrence of earthquakes and magnetic variations around them have been the main evidence of an association between them. Here, using data from a high-resolution magnetometer and a broadband seismometer obtained in southern of China during the 2004 Great Sumatra earthquake, we show clear evidence that the crustal dynamo mechanism generated magnetic variation. Magnetic variation with amplitude of about 0.1-0.2 nT was observed during the passage of the Rayleigh wave and showed the same frequency dispersion as that of the seismic wave. Subtracting the apparent magnetic variation caused by the inclination of the ground calculated from the observed seismic wave, we show that the magnetic variation (i.e., polarization characteristics and the relative phase relation with the seismic wave) is consistent with the results of the crustal dynamo estimation based on the seismic wave data. Although co-seismic magnetic variations have been reported many times, this is the first report to show a quantitatively clear example of the crustal dynamo mechanism causing such variations.

Keywords: geomagnetic pulsation, earthquake, crustal dynamo, seismic wave