Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02992, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02992
EGU General Assembly 2008

The efficacy of the magnetic total force measurement as a tool to monitor temporal changes of interplate couplings

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It is widely recognized that stress changes in the Earth's crust generate magnetic changes on the ground surface via the mechanism of the piezomagnetic effect. However, quantitative natures of the piezomagnetic effect have not been sufficiently understood, so that whether or not they are large enough to be observed is not clear. To solve the problem, in-situ stress sensitivity should be estimated by a comparison between theoretically expected magnetic changes and actually observed ones. We have conducted a precise examination of magnetic records in Tokai district, central Japan, and have executed simulations for the estimation of piezomagnetic field intensities. Magnetic data have been corrected in such a way that effects due to the EarthâEURŹs external field and the internal core field are to be removed. Significant changes in the magnetic field correlated to the temporal change of the interplate coupling can be seen only at the site near a magnetization boundary in the crust. On the other hand, results of simulations show that not stress concentrations on a plate boundary but magnetic anomalies in the Crust play important roles in generation of piezomagnetic field in the region. These facts imply that detectable signals of the piezomagnetic field actually appear near magnetic boundaries in the Tokai Area. Some earlier studies have been pointed out that huge earthquakes in this area accompany pre-seismic slip on the plate boundary. The result of the present study implies that we will be able to detect pre-seismic signals by magnetic measurements if the pre-seismic slip does exist.