

Assessment and optimization of the potential earthquake precursory information in ULF magnetic data registered at Kanto, Japan during 2000 -2010

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In order to clarify the ULF seismo-magnetic phenomena, a sensitive geomagnetic network has been installed at Kanto, Japan since 2000. In previous study, we have verified the correlation between ULF magnetic anomalies and local sizeable earthquakes by both case and statistical studies. In this paper, we use the Molchan's error diagram to evaluate the potential earthquake precursory information in the magnetic data registered at Kanto, Japan during 2000 -2010. The results show that the earthquake predictions based on magnetic anomalies are clearly better than those based on random guess, which indicates the magnetic data contain potential useful prediction information. Further investigations suggest that the prediction efficiency depends on the distance (R) and the size of the target earthquake events (E_s). Finally, we introduce the probability gain (PG') and the probability difference (D') to explore the optimal prediction parameters for a given ULF magnetic station. For Seikoshi (SKS) station in Izu, optimal R and E_s are about 100 km and $10^{8.75}$, respectively; and for Kiyosumi (KYS) station in Boso, they are about 180 km and $10^{8.75}$, respectively.

Keywords: earthquake precursory information, Molchan's error diagram, statistical analysis, parameter optimization , ULF magnetic data