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A study for the quantitative and statistical evaluation of geoelectric potential changes associated with earthquakes

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We would like to present the pre-seismic telluric current anomalies in Japan and their statistical significance. By the author's knowledge, it is only Greek-VAN group who has been successfully predicting earthquakes for more than a couple of decades. However, the reproducibility of their method has so far been barely verified elsewhere.

In Japan, VAN-like telluric current measurements were intensively conducted after the devastating 1995 Kobe earthquake. At the Koze-shima volcanic island, we observed 19 anomalies for 23 $M > 3$ earthquakes which occurred within 20 km of the station from May 14, 1997 to June 25, 2000. It has also been demonstrated that the correlation between the observed anomalous changes and the subsequent earthquakes is statistically very high. Our observations also indicate the existence of extremely high degree of heterogeneity in the subterranean electrical structure of the volcanic islands. Therefore, the high heterogeneity under Koze-shima Island has been studied, though only for the shallow depth, by a VLF-MT survey. The apparent resistivity was found to range in three orders of magnitude. Current injection into the ground was also conducted for the resistivity survey. It was verified that various features of the observed anomalous changes were different from those of changes caused by artificial sources and induction of geomagnetic disturbances.

The author considers that this thesis presents the first convincing demonstration of the existence and statistical significance of VAN-type pre-seismic telluric current anomalies in Japan (or outside Greece).

Keywords: precursor, VAN method, telluric current