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Results obtained through the geomagnetic method for short-term prediction of Vrancea (Romania) earthquakes. A ten year experience

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The paper is based on geomagnetic records made at Muntele Rosu Observatory (Romania), during 10 years time interval from December 1997 to April 2007. The results of the data processing are illustrated in diagrams of the magnetic impedance Bz(t)/Bx(t), where Bz is the vertical component of the geomagnetic flux density and Bx its horizontal component. Knowing the way electric resistivity varies ahead of an earthquake, we can assert that the earthquake-precursory growth in geomagnetic impedance is matched by an earthquake-precursory decrease of electric resistivity.

The time variation of Bz(t)/Bx(t) and Bz(t)/By(t) is closely examined in correlation with Vrancea seismic activity.

The theoretical reasons for using ratios Bz(t)/Bx(t)=$\zeta(t)$ and Bz(t)/By(t)=gηgt) of the geomagnetic flux density components as earthquake prediction tools are first of all provided. We calculated the daily average of the ratio ζ(t) and ηgt) and plotted them for each studied year. Every calculated value of the ζ(t) and ηgt) ratio on the diagram refers to midday time.The earthquake marks are accompanied by values of the moment magnitude MW. The working data are represented by geomagnetic data as recorded at Muntele Rosu Observatory in the period December 1997 – April 2007 and by the data of Vrancea seismic acivity in the same period. Seismic data were taken from the seismic bulletins of the National Institute for Earth Physics.

The correlation between the time variation of Bz(t)/Bx(t) and Bz(t)/By(t) and Vrancea seismic activity prove that 85% of all earthquakes of magnitudes M>Mo (Mo=3.6-4.0, usually Mo=3.9, in the case of subcrustal earthquakes, while in crustal earthquakes

Mo=2.8-3.0), were preceded by significant perturbations of the magnetic impedance Bz/Bx. The largest earthquake occurred in this time interval has the moment magnitude Mw=6.3.

Right now, it seems that neither the precursor time nor the amplitude of the precursory geomagnetic anomaly can be linked reliably with the magnitude of the anticipated earthquake.