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Investigating the Geoelectric Fluctuations Measured in Izmir-Urla-Demircili Village (Western Turkey) with Artificial Neural Networks

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Turkey is one of the countries frequently facing significant earthquakes because of its geological and tectonic position on the earth. Especially, graben systems of Western Turkey occur as a result of seismically quite active tensional tectonics. Prediction of earthquakes has been one of the important subjects taking interest of human being for a long time. Recently Artificial Neural Networks (ANN) is being used for earthquake prediction besides its successful application to broad spectrum of data-intensive applications from stock market prediction to process control. ANN was used to predict time of occurrence and the locations of the earthquakes, experienced for a specified time interval. Also ANN were analyzed the predictability of time series.

İzmir city and its surroundings are located in the strike-slip dominated zone of weakness known as the İzmir-Balıkesir Transfer Zone. The latest activity of the zone was evidenced by the Urla and Sığacık earthquakes. 10 April 2003 Urla (M=5.7) and 17-21 October 2005 (M=5.7, M=5.9 and M=5.9) Sığacık earthquakes were the important seismic activities in the region.

Recently, geoelectrical fluctuations measured in seismic areas have been attributed to stress and strain changes, associated with earthquakes. This study has been realized for the evaluation of self potential (SP) and ground temperature monitoring data, which has been collected from İzmir-Urla-Demircili Village, to investigate the relationship of the SP and the seasonal climatic changing and earthquakes.

Collected data during the eight months has been evaluated by artificial neural networks. Ground temperature and SP data has been recorded as a function of time. In addition to these two variables with each other relations, the relationship with daily average of SP data to daily rainfall and earthquakes were also investigated.

We analyzed the correlation between the sequence of extreme events in geoelectrical signals, measured by the monitoring station Urla, located in a seismic area of Western Turkey, and the series of earthquakes occurred in the same area from November, 2010 to June, 2011. The collected data were evaluated by Artificial Neural Networks.