

MAGNETIC FIELD OBSERVATIONS FOR THE 8 DECEMBER 2016 MW=6.0 CHINE EARTHQUAKE

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A precursor is a parameter of change that acts prior to the occurrence of a possible earthquake and thereby alerts a series of changes through which one can predict the seismic incidents. Instantaneous anomalies within the geomagnetic data are perfect example of a precursor. The current study aims to investigate the fluctuations of the magnetic field before and after a seismic event. This study uses the assessed geomagnetic data extracted from three stations located near Shihezi, China which underwent a 6 Mw earthquake at a depth of 17.6 kms on December 8, 2016 at 05:15:04 (UTC). Characteristic curves have been depicted for each station by continual mapping out of elicited 24-hour data, two weeks before and a week after the Shihezi earthquake. The results indicate an anomaly occurred less than 10 days prior to the earthquake through the fluctuations in the amplitude of magnetic field. Using this method, it can be pointed out that such anomalies are directly associated with an earthquake.

In this study, we examined the magnetic field data, provided by the global network of observatories, monitoring the Earth's magnetic field namely INTERMAGNET from three stations around epicenter of this earthquake. Three operating proton precession magnetometers were installed at distances of 808 km, 1692 km and 2984 km from the epicenter of the earthquake, and were sampling every one minute. We used characteristic curve method for geomagnetic data processing (Pourbeyranvand and Dehghani, 2015). The characteristic curve is formed for different components of the magnetic field in various magnetic stations by over-plotting the magnetic data in a 24-hour time period from 2016/07/08 to 2017/01/08.

In Figure 1 the raw geomagnetic data for X component at one of the stations is plotted (left). The characteristic curve can be extracted from this figure (right), which is obtained throw over-plotting of the geomagnetic records in a 24-hour time frame.

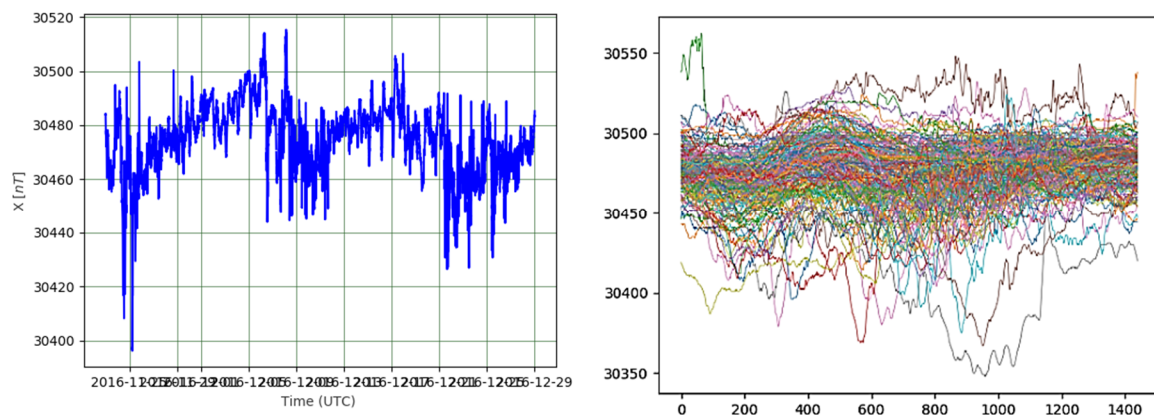


Figure 1. (left): geomagnetic record, (right): characteristic curve composing from over plotting of several geomagnetic records.

In Figure 2 the geomagnetic data, before and after implementing the method are compared. In both figures a relatively sharp geomagnetic anomaly can be observed prior to the seismic event.

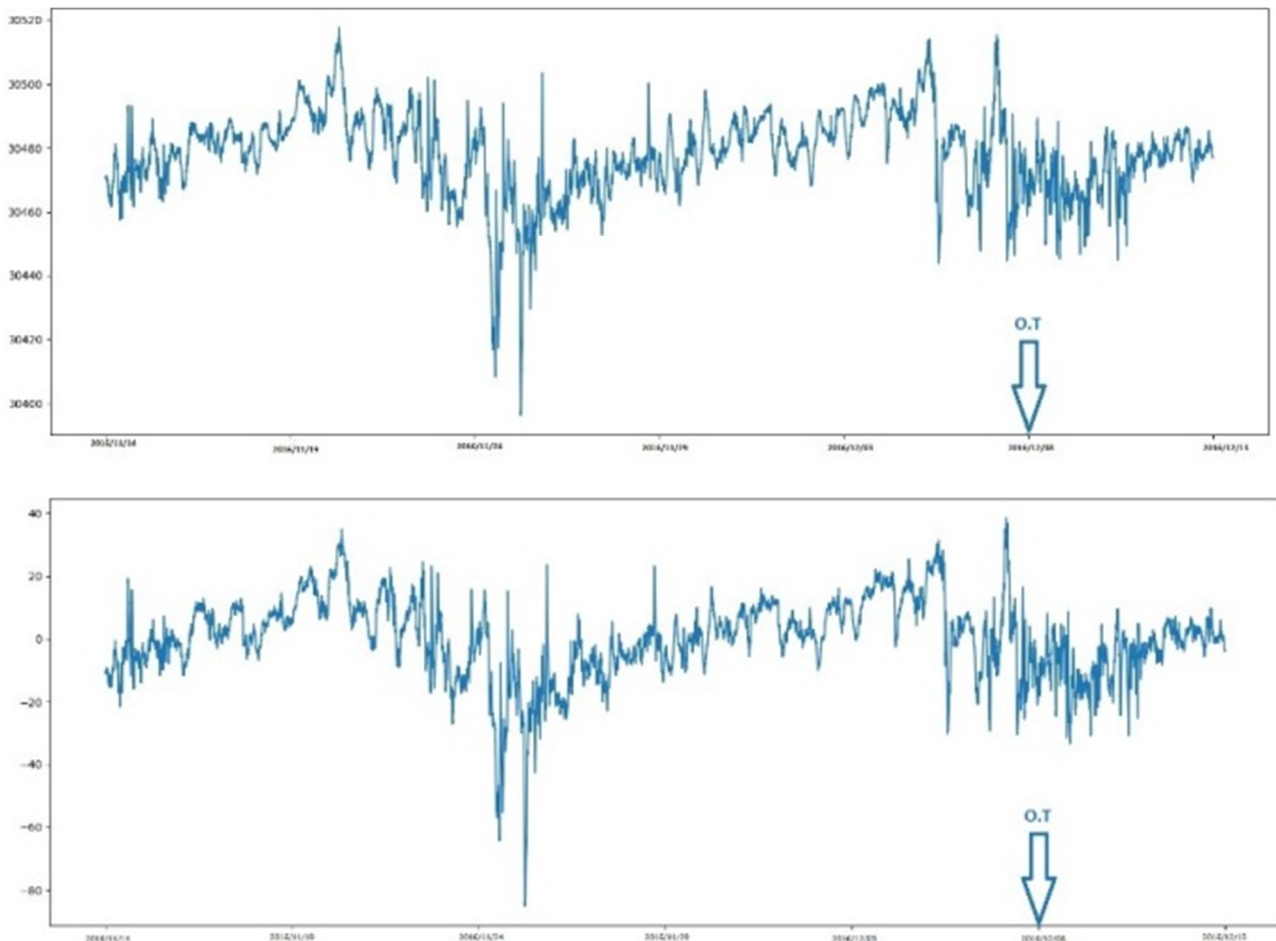


Figure 2. (up): raw geomagnetic record exhibiting an anomaly before the earthquake which its origin time is shown by the arrow, (down): the same geomagnetic data after implementing the characteristic curve method.

This figure shows that the magnetic field anomalies in the stations close to the epicenter of the December 2016 Mw=6.0 China earthquake on 28 November 2016. On the other hand, no geomagnetic storms were observed on 8 December 2016. These magnetic field anomalies are probably resulted from Piezomagnetism effects of stress-induced reversible changes. Thus, according to our findings, geomagnetic anomalies can be used as an earthquake precursor.

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