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USING THE AIRBORNE GEOMAGNETIC DATA FOR RECOGNIZING THE CAUSATIVE FAULT OF THE 2013 GOHARAN EARTHQUAKE

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One of the important methods of geophysics is magnetometry. This method by measuring the magnetic field of the earth helps us to recognize the underground structure. Low cast and availability of relative comprehensive software for analysing and interpretation of data made the airborne geomagnetic method one of the cheapest and most practical geophysical methods in the world. This old method with precise instruments is widely uses to explore mineral ores, oil and recognize the holes and karsts. Furthermore, the airborne geomagnetic is also used in seismology in order to recognize the hidden faults and structures in the bedrock. When an earthquake occurs with no apparent causative fault and surface rupture, analysing of airborne geomagnetic data can easily reveal the strike of the causative fault (Peters, 1949; Telford et al., 1990; Reeves, 2005).

In the morning (6:38 local time) of 11 May 2013 an earthquake with moment magnitude of 6.1 occurred in a sparsely populated desert to the east of the Strait of Hormuz, in SE Iran called Goharan. This event occurred in the western part of the Makran subduction zone close to the Minab-Zendan fault zone (Figure 1). Based on the early reported focal mechanism and closeness of this event to the right lateral strike-slip Manujan fault, the focal mechanism of this earthquake was reported to be mostly strike-slip and NW-SE striking Manujan fault was considered as causative fault. On the other hand, later study revealed that this event with left lateral mechanism triggered on an about W-E trending unrecognized fault (Penney et al., 2015).

We used airborne geomagnetic data to recognize the causative fault of the Goharan earthquake. For this purpose we considered processing of geomagnetic data. Among the processing the filters such as turning to pole, vertical derivation and tilt filters and total magnetic field intensity map has been applied. For the geomagnetic analysis we used the GeoSoft Oasis Montaj 6.4.2 Software, and the trends of the structures are identified in the study area. Our result for the Goharan area revealed an about W-E striking bedrock fault that correlate well with the identified fault for the Goharan event, and based on the seismicity data this recognized fault is the causative fault of the Goharan earthquake. In summary, we show that the achieved result is very promising and there a very good correlation between the magnetic lineament location and the causative fault of the earthquake and seismicity distribution (Figure 1).

REFERENCES

Hessami, K., Jamali, F., and Tabasi, H. (2003). *Major Active Faults map of Iran, Scale 1: 2500000*, International Institute of Earthquake Engineering and Seismology.

Penney, C., Copley, A., and Oveisi, B. (2015). Subduction tractions and vertical axis rotations in the Zagros–Makran transition zone, SE Iran: the 2013 May 11 Mw 6.1 Minab earthquake. *Geophysical Journal International*, *202*(2), 1122-1136.

Peters, L.J. (1949). The direct approach to magnetic interpretation and its practical application. Geophysics, 14(3), 290-320.

Reeves, C. (2005). Aeromagnetic surveys: principles, practice and interpretation (Vol. 155). *Geosoft*.

Telford, W.M., Telford, W.M., Geldart, L.P., Sheriff, R.E., and Sheriff, R.E. (1990). *Applied Geophysics* (Vol. 1). Cambridge university press.

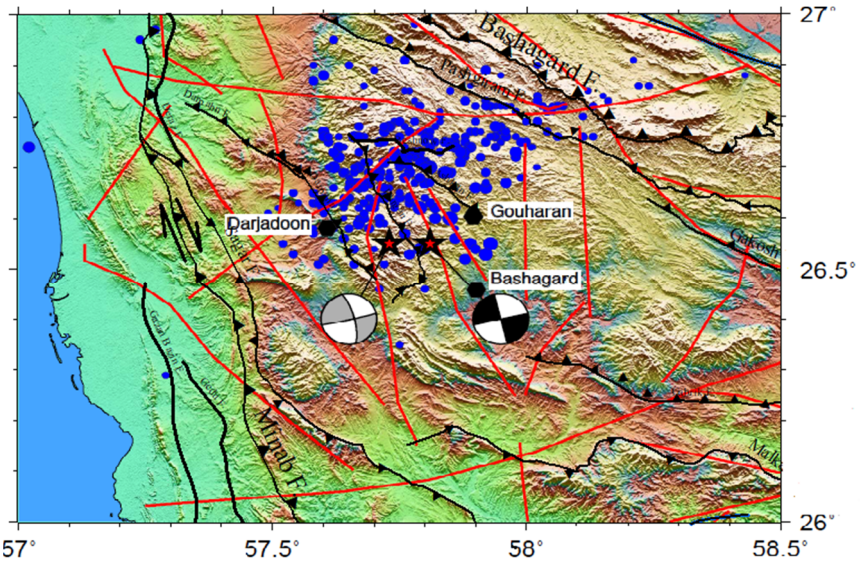

Figure 1. Location of the Goharan earthquake and its aftershocks. The black beach ball with its star show the focal mechanism and epicentre of this event based on Iranian seismological centre (IRSC) and grey beach ball with its star show the focal mechanism and epicentre of this event based on CMT solution. Blue circles show the seismicity of the area after the Ghoharan event until the end of 2013. Black lines show the active fault of the study area based on Hessami et al. (2003) and red lines show the recognized fractures and faults by using airborne geomagnetic data in this study.