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THE NECESSITY OF REVIEWING THE MAP OF ACTIVE FAULTS OF TEHRAN

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INTRODUCTION

The curved ~ E-W trending Alborz active orogenic belt in the north of Iran, is a part of Alpine-Himalayan orogenic belt caused by the collision of Gondwana and Eurasia plates in the late Triassic (Allen et al., 2004). Tehran and Alborz provinces with highest population in Iran about 16 million people is located in central part of this active belt. The existence of active faults with high seismic potential based on some significant seismic records in this area, can be caused to the increase of the risk of the devastating earthquakes. The occurrence of historical earthquakes and the Malard s recent earthquake (located in the Alborz province) with the magnitude of 5.2 in 2017, can be warning for future earthquakes in the area. Therefore, the study of neotectonics and identification of faults in Tehran and Alborz provinces, is very important. In this study, the faults of the west of Tehran including North Tehran fault have been investigated.

SATELLITE IMAGES PROCESSING

Remote sensing data (ETM^+, SAS.Planet, Air photos & DEM-Aster) were used to determine the location of faults in the area and to better identify different lithological and structural units. For identification of structural units such as faults, high pass filters and edges filters were used (Nash, 1992). In this study, the visual method is used to determine the fault lineaments (Figure 1). In this research, the pan data related to data obtained from the SAS.Planet has been used as high-resolution data. These data have been combined with ETM^+ sensor data as RGBI form.

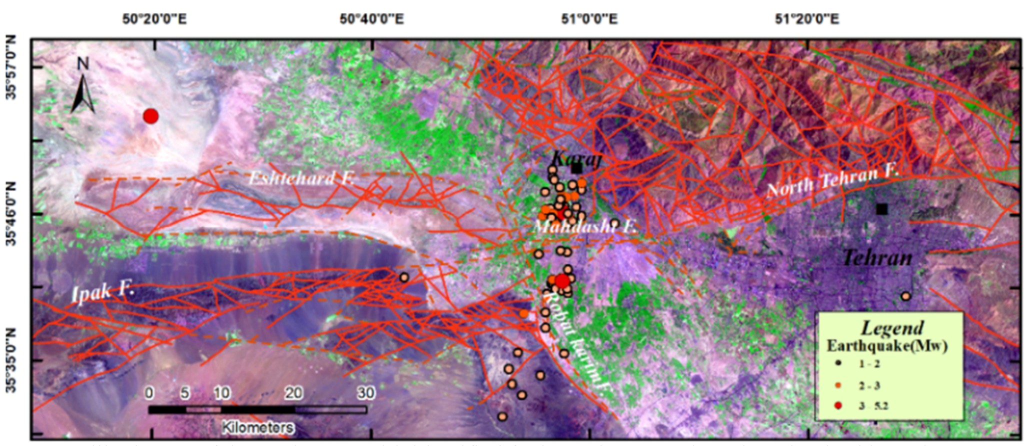

Figure 1. Satellite image of the study area with identified faults and occurred earthquakes in this region at 2017.

AEROMAGNETIC SURVEY & PROCESSING

In this study, qualitative & quantitative analyses of aeromagnetic data to investigate the effect of many identified lineaments on magnetic basement and delineate the major faults, basement faults and buried faults of the region were used. In the first step, we applied Geosoft Oasis Montaj 6.4.2.HJ software package to get the total magnetic field intensity map. Then the processed total-field magnetic flight line data were girded using a minimum curvature routine approximately one-fourth of the line spacing of the survey. The data are displayed as a color shaded-relief image (Figure 2). Also, in this study, special filters and methods (Upward Continuation, Derivative in Z & X direction, and Reduce to Magnetic Pole) were used to get a clear view from the aeromagnetic condition of the area, aeromagnetic lineaments and the identified shallow faults.

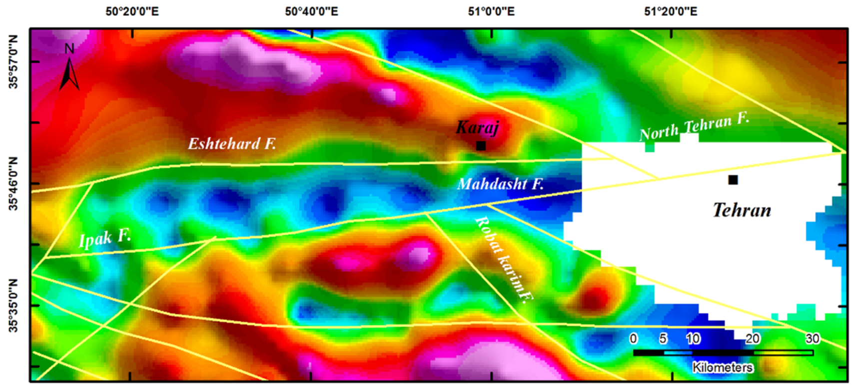

Figure 2. Total magnetic field intensity map with aeromagnetic lineaments.

CONCLUSIONS

Although, due to the urbanization on the alluviums, some surface structures of the active faults do not have any outcrop, but the field data can be confirm the results of remote-sensing, aerial photos and aeromagnetic studies.

A number of major faults have been introduced for the first time in this study. Also, the situations of some previously known faults are change. For example, other researches have been showed that the western part of North Tehran fault is connecting to the Mahdasht fault and Ipak fault zone. Although, the results of remote-sensing and geophysical studies show that Mosha-Fasham Fault (Abyek-Firuzkuh) in the north Tehran has two separate segments with different strikes. The location of Malard earthquake 2017, and its foreshocks and aftershocks indicate the activation of several crossed-faults. The results of this study confirm the application of new techniques for identifying and correcting the position of active faults in the Iranian crust, especially in the provinces of Tehran and Alborz.

REFERENCES

Allen, M., Jackson J., and Walker, R. (2004). Late Cenozoic reorganization of the Arabia- Eurasia collision and the comparison of short-term and long term deformation rates. *Tectonics, 23*,153-165.

Nash, C.R. (1992). Factors affecting the acquisition of structural data from remotely-sensed images of eastern Australia. *Basement Tectonics, 9*, 109-121.