Active Tectonic in Binalud Mountain with Respect to Morphotectonic

Extended Abstract

Introduction
Tectonic of Binaloud mountain ranges is controled by thrust faults system and folds related to these faults. Parts of this mountain ranges and Neyshabour plain is as study area in north eastern Iran and between latitudes 36° 11' 00 to 36° 30' 00 and longitudes 58° 35' 00 to 59° 00' 00. In this paper we first study morphometric indices in this area then analyze drainages and alluvial fans to identify activity of Binaloud mountain.

Materials and Methods
In order to identify activities in Binaloud mountain, studying morphometric indices and analysis of drainage network together be done. The first step for calculating morphometric analysis in the region is to digitize topographical maps with the scale 1:50000 by ArcGIS software to extract required data and then morphometrical data is formulized and calculated exactly and the results is interpreted.

Results and Discussion
A: Morphometry
Some morphometric indices that calculated in this paper are:

1&2: Mountain-front Sinuosity(smf), Relic Mountain Fronts (Facet %)

To determine relative activity in mountain front of the area has been divided in to three parts along Bozhan, Miraabad and Damanjan rivers and elevation 1500 m is assumed as mountain front.

In part 1, Smf index is obtained 1.51, in part 2, 2.6 and in part 3, 1.69. Also in part 1,2,3

* E-mail:elahehsht@yahoo.com.au Cell: 0951037414

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Facet% index is equal with 85%, 64% and 79% respectively, and reveal that relatively activities is not the same in Binaloud and part 1 is more active than the other parts (Figure 2).

3: Drainage Basin Asymmetry ($A_F$)
To this aim, we consider three drainage-basins (Figure 3). Values of $A_F$ are calculated for basins 1, 2 and 3 are 29%, 66% and 20% respectively that basin 3 shows more asymmetry than other basins.

4: Topographic Symmetry Factor ($T$)
Values of $T$ for basins 1, 2 and 3 are 46%, 40% and 58% respectively that basin 3 represents more asymmetry than other basins.

5: Ratio of Valley-floor Width to Valley Height ($V_f$)
For calculating this index, 25 stations in this area are considered, that stations numbers 25, 24, 23, 22, 21, 2, 17, 16 and 15 indicate less uplift than other stations (Table 1). $V_f$ index analysis indicates that the gradual forwarding towards the north and interior parts of Binaloud mountains, we encounter reduction in the relative uplift and tectonic activities (Figure 4).

B. Analysis of Drainage Network

1: Quantitative Analysis Relationship between Drainage Pattern and Trend of Faults
Fractures which are occurred in the area have been suffering erosion gradually and have created parallel and perpendicular valleys to faults.

In order to study this research carefully, lineament map was prepared based on the drainage patterns (Figure 5). To comparison and interpretation of changing the direction drainage, according to drainage basins, study area has been divided into 8 parts and then for each part is drawing a Rose diagram (Fig. 6).

the dominant trend of streams in all the area under study is perpendicular to the thrust fronts that is both due to the topographical slop caused by thrust movements and topographical uplifts and crossed structures with faults from NW-SE.

2: Analysis of the Iso-ase Lines
The iso-base lines analysis generally consists of two consecutive stages:
1 - determin order of river - 2 The iso-base lines mapping (Iso-base map) interception between order 1 that is the youngest category of an erosional category system with topography lines, provide a map that indicates erosion surface (Iso-base map). analysis of iso-base lines may be a useful method to discover young tectonic processes. Because abnormalities in these surfaces in study area are approximately coincided to structural lineament.

The study of iso base maps indicates that even the youngest streams (quaternary) are influenced by tectonic movements and not erosion! It means that tectonic movements and uplifts of the area prevail over erosion.

3: Alluvial Fans
In a great part of the area, the young alluvial fans have been created at the nose of the older alluvial fans and in some points being more advanced and have covered the older alluvial fans that is an evidence to the severe uplifts along with the young faults adjacent the valley indicating the continuation of recent tectonic activities in the area (Figure 8).
Conclusion
Morphometric indices that are calculated, analysis of drainage network and alluvial fans indicate active tectonic in the area and important role of faults in development of drainage.

The study alluvial fans, Confirm active uplifting in the region affected by young faults between mountains and plain.

Keywords: Neyshabour, Binalud mountain, Morphotectonic, Rose diagram, Iso-base line, Drainage, Alluvial fans.