

***Evaluation of active tectonics in Jarahi - Zohreh Sub-basins based on the morpho-tectonic analysis and its impacts on the oil fields of the basin***

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**Extended Abstract**

**Introduction**

With 6.8 percent oil reservoirs, Zagros is one of the most prolific oil sedimentary basins. The greater part of its hydrocarbon reservoirs are concentrated in anticlinal traps. They are also the subsets of the structural traps. In addition to rich and vast hydrocarbon reservoirs, Zagros have been also considered in terms of its Neotectonic activities. The studies of neotectonic activities are important in control of landforms in tectonic regions, apart from its social and economic interests. The studies of active tectonics require a multi-disciplinary approach to integrate data from structural geology, geomorphology, stratigraphy, geochronology, seismology, and geodesy. The unrelenting competition between tectonic processes tends to build topography and surface processes to represent the core of tectonic geomorphology. The most effective morphometric indices have been related to erosional and depositional processes associated with fluvial systems. The rivers are highly sensitive to subtle landscape fluctuations induced by tectonic activity and can assist in differentiating active segments of geologic structures. Because drainage basins represent dynamic systems that may retain records of formation and progression since most tectono-geomorphic processes occur within its confines. Therefore, morphometric analyses of river networks, drainage basins and relief using geomorphic indices, as well as geostatistical analyses of topographical data have become useful tools for investigating landform evolution. In recent studies on morphotectonics, a mixture of geomorphologic and morphometric analyses of landforms and topographic analyses are utilized to obtain active tectonics. They have been tested in different tectonically active areas to provide insight about

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particular areas where are subject to active tectonic deformation. Therefore, since many geomorphologic effects are highly susceptible to tectonic movements and their changes are happening at the same time, we should be looking for the forms and shapes that have retained these changes over the years. With regard to the geomorphologic indices, the current study attempts to consider Neotectonic activities and its impact on the positioning of the oil fields in the Jarahi and Zohreh sub-basins.

### **Materials and methods**

In order to achieve the goals of this research, documentary information, 1:50000-1:25000 topographic maps and 1:100000-1:250000 geological map, Digital Elevation Model (DEM) related to SRTM topographic data and landsat 8 satellite images have been the important research tools. For the analysis of Neotectonic activities in the case study area, we have used such geomorphologic indices as Stream Length-Gradient index, River Sinuosity, Relief Amplitude, Hypsometric Integral, Basin Shape Factor and Drainage Basin Asymmetry Factor Index. ArcGIS software was used to digitize the topographic maps and draw river networks for calculating these indices.

### **Results and discussion**

Results of the calculation of geomorphologic indices:

The SL values in the study area are ranged from 0 to 573. The S values in the study area are ranged from 1.1 to 2.46. in the study area, the RA values are ranged from 31 to 3254, the HI values from 0.04 to 0.56, the  $B_s$  values from 0.19 to 2.49 and the  $|AF-50|$  values from -28.83 to 32.59. The classification used in this paper for each geomorphic index is calculated from El Hamdouni's method. According to Relative Tectonic Activity (lat) index, three classes of high active ( $1.6 \leq LAT < 2$ ), 12.2%, moderate active ( $2 \leq LAT < 2.5$ ) 34.5%, and low active ( $lat \geq 2.5$ ) 53.2% values were identified.

Finally, with stratum overlaying of oilfield and the obtained final layer from geomorphologic indices of the studied basin, it was found that in the Class I areas, there was no oil fields with high level of tectonic activity, but 38.3 percent of oil fields are located in Class II areas with average tectonic activity and 61.6 percent of the oil fields are located in Class III areas with their low tectonic activity.

### **Conclusion**

The obtained quantitative values from the results of the geomorphic indices in the 38 sub-basins helped to divide the studied basin into three tectonic areas with low, medium, and high tectonic activity. It was also shown that the Neotectonic activity level in different parts of the basin is not the same and the forces act with greater intensity in the eastern half. This activity was in more oil fields of Jarahi – Zohreh basin, i.e., 61.6 percent in the region with the lowest Neotectonic activity. In the areas with the highest Class of Neotectonic, there was virtually no oil field. The results indicated that Neotectonic has important role in the running or migration of oil traps and the extent of tectonic is necessary to create small fractures to oil running and finally oil production. In fact, it can be attributed to Neotectonic destructive and inhibiting roles in constructive and transferring hydrocarbons.

**Keywords:** *Geomorphologic indices, Neotectonic, Jarahi-Zohreh, Oil fields, Zagros.*