Compare Orientation of drainages and faults in Nehbandan, East Iran

[1]Saeedeh Hosini, [2]Maliheh Ghoorchi

1- Quchan Payam-e noor university

2-Research center for ore deposite of eastern Iran, Ferdowsi university of Mashhad

Abstract

Nehbandan area is situated in East Iran in South Khorasan province. The study area is located in high risk situation in South Khorasan. Recognizing of hidden quaternary fault, is one the most important objects in such area. Various kinds of geological evidence have recently been used to show the presence of a fault. On the other hand channel orientation is one of the geomorphic observables for fingerprinting modes of tectonic in active environment. This paper reviews data on the orientation of drainages in Nehbandan area to test the occurrence of fault river system. GIS computational methodologies and associated programs have been used for this purpose. Rose diagrams are used to compare drainage orientation with main structures like faults. To extract drainages, data are collected from Nehbandan sheet by1:100000 scale and completed by a field work. The methodology is supported by drainage orientation. Study area divided in 3 regions. Zone A include North east part, B for South east part and other as zone C from North to south. In A Orientation of river and faults have no correlation. Comparison of drainage directions with faults directions show that In B, both show main direction as 300 to 315°. Faults in C part are developed in two principle directions, 315-330° and 355-360°. The principle drainage directions are 300 to 315°. Our findings highlight a connection between drainage evolution and underlying structural factors in B and C part. There may besome genetic relationship between the drainage and the trending faults. Our study has demonstrated a link between easily identifiable geomorphic features with tectonic structures.

Keywords: *Nehbandan, fault, GIS.*

Introduction

Nehbandan area is located in the south eastern part of khorassan province and is limited by the 31 30 to 32 of north latitude and 60 to 60 30 degrees east longitude. The best access to this area is possible by Mashhad-Zahedan high-way which passes through Birjand and Nehbandan cities.

Structually, study area belongs to the East Iranian flysch zone. This area is centered at the intersection of two important strike-slip faults ;The sinestral Bandan fault and dextral East Neh fault. There are also a few major faults in west of the East Neh fault that some of them are probably splays of the Neh fault.

Faults are most important factors to change morphology of the solid earth crust; therefore analysis types and investigation their relation with other agents is necessary.

Drinage network as one of the most basic external dynamics processes in deformation of the earth directly involved. Therefore the morphology investigation of drainage network is essential to access its relation to the geological structures.

Geology

In Nehbandan area three mélange complexes are recognized include: (1) TamamDeh complex in the northeast (2) Bandan complex in the south east (3) zone adjacent to the EastNeh fault. The mélange components represent older than complete ophiolite series which have been subsequently dismembered by strike slip faulting [2]. The oldest sediments stratigraphically overlye the mélange zone, are Maastrichtian and observed in Tamamdeh and Bandan mélange [2].

Late cretaceous flysch have exposed as bounded by the East Neh and Bandan fault. The flysch zone is composed of a great thickness of argillaceous, siliceous, fine clastic and sub ordinate calcareous sediments associated with sub marine diabasic rocks and tuffs**.**

This sequence is intensity folded and slightly metamorphosed in part. It passes into the chaotic rock jumble in many place and was known as colored mélange. It contains also numerous large and small bodies of serpantinized ultrabasic rocks. The flysch and mélange formations have been overlay with marked unconformity by Paleocene-Eocene limestones and Tertiary-Quaternary volcanic and continental deposits. Most of the vallys in the area cover of Quaternary alluvial fans and gravel plains.

Data and methods

Filed investigation and remote sensing processing showed the orientation of some drinages in Nehbandan area. Graphical and statistic presentation of these data indicates a reasonable coincidence between the network drainage and fault distribution. Since the most of the valleys in region is covered by alloviall fans therefore drinages in accordance with lithology is regardless and extension of drainage is related with resistance of rocks.

Drainages data are collected from Nehbandan sheet by 1/100000 scale and completed by a field work. Rose diagrams are constructed to display data orientation with in different interval zone.

Satellite images were processed for extracting faults (fig 1). Faults from geology map and satellite image were digitized by GIS software .

Rose diagrams were constructed to display data orientation in different interval zone. In this study for achieve more useful results, the area divided in three region . Zone A include North east part, zone B is located in South east part and other as zone C from North to South.

A, B and c area have been shown in figure 2.

Drainages digitize also, they have been drown by first and end points. Distribuiton of drianages has been shoawn in figure 3.

Conclusion

Comparison of drainage direction with faults direction in each zone show that in zone B drainages and faults both preferentially located towards the West- North west (300-315 degree); But in A zone orientation of rivers and faults have no correlation (fig 4 and 5).

In C zone faults tend to be located in two principle directions 315-330 degree and 355-360 degree (west–northwest) and these orientations correspond to major orientation of drinages (300-315 degree).

It is proposed that there are some genetic relationship between drainages and faults and also network drainage.In B and C zones, It is controlled primarily by the trending faults.

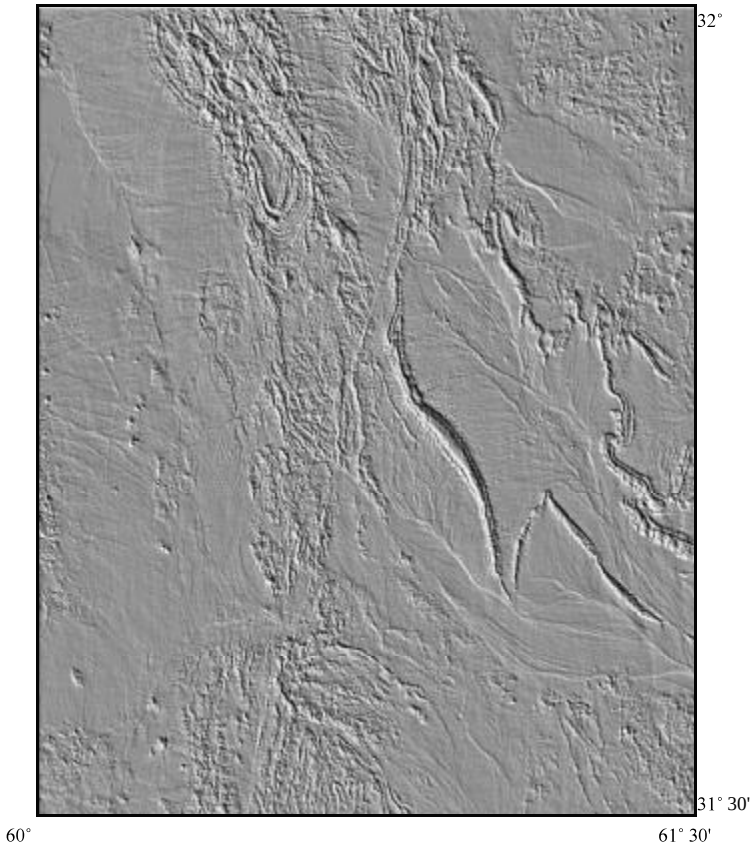

Fig1. Filtered Landsat Image for faults in study area.

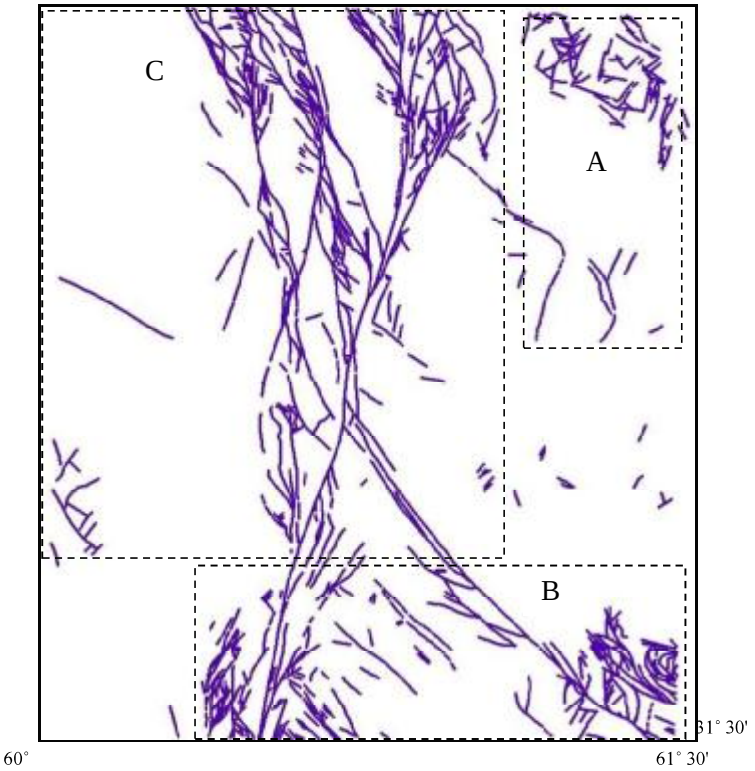

Fig2. Distribution of faults in study area.

Fig3. Distribution of rivers in study area (rivers drown by first and end points).

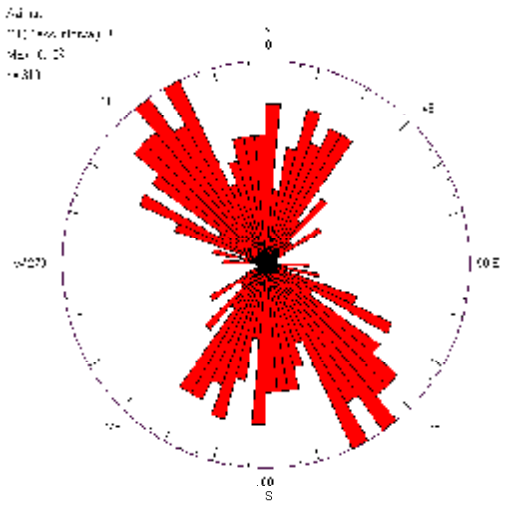

Fig4. Roz diagram for faults in study area.

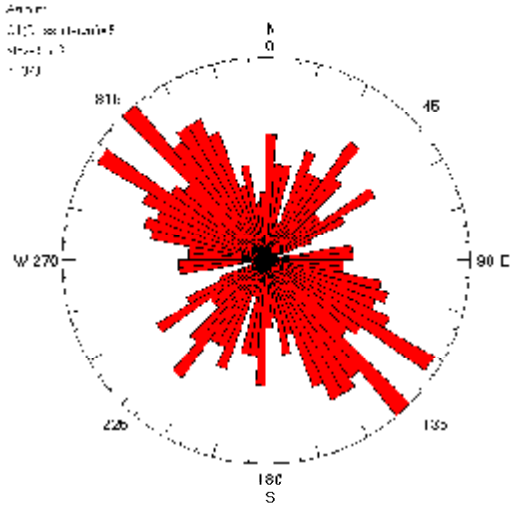

Fig5. Roz diagram for river in study area.

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