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Possible Basement Transverse Faults in the Western Alborz, Northern Iran

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Abstract

Transverse basement (TB) faults are important structures in the mountain belts or sedimentary basins influencing various aspects of them. The origin of these faults is diverse, but their effect on the shape and configuration of continental margins is characteristics. The Western Alborz range that borders the South Caspian basin to southwest is a complex range with principal faults and known earthquakes such as 1990 Rudbar (Mw 7.3). However, TB faults are less known in this range. This paper attempts to compile available data from aeromagnetic survey, local geology maps, tectonic maps, remote sensing and earthquake data to introduce several important TB faults or lineament in the Western Alborz. Qezel Owzan-West Talesh, Lahijan-Sepidrud, Takestan-Polrud and Valian-Hezar are large TB faults or lineaments across the Western Alborz. Some of introduced TB faults and lineaments are possibly continuing within the South Caspian basin. The TB faults introduced or assessed in this paper are more or less correlating with irregularities of the northern margin of the Alborz Range. This correlation is clearer for the Lahijan-Sepidrud TB fault, F-1lineament and to a lesser degree for Amlash, Polrud-Takestan and Valian-Hezar lineaments. Detail geometry, origin, effect on sedimentation along the continental margin and their relationship with huge regional magmatism in the Cretaceous and Eocene in the Western Alborz suggested subjects for further investigations on these faults and lineament.

Keywords: Basement; Transverse fault; Alborz; Talesh; Iran.

Introduction

Transverse basement fault (TB fault) or cross-trending basement fault is a relatively high dip basement structure oblique to perpendicular to the main strike of a geologic domain such as a mountain range or sedimentary basin. The origin of TB faults is diverse, but many of them are the result of old rifting processes [1, 2]. Transfer zones [1, 3], rift-margin faults [2], large continental strike-slip faults [4], and tear faults that accommodate differential shortening during collision [5, 6] are examples for the origin of TB faults. The TB faults can influence on many aspects of mountains ranges, sedimentary basin and inverted terrains [6-10]. They also play an important role in salt tectonic [11], hydrocarbon potential and seismicity [7, 12].

The Alborz Range in the northern Iran is a complicated mountain belt that borders the Caspian Sea

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from south (Fig. 1). The Range is bounded from south by Central Iran block. Despite the large number of published studies on the geology and tectonics of the Alborz Range, there is a gap of study on the basement structures, especially the TB faults, probably due to lack of good subsurface information. The Mosha [10, 13], Kandevan [14], Khazar [15-17] and North Alborz [18] faults are some of known basement-involved faults in the Alborz Range. This paper attempts to compile available geologic, airborne magnetic and seismic data with other forms of evidence to introduce some certain and potential TB faults in the Alborz Range from Talesh Mountain to west Central Alborz between 48° and 51° eastern longitudes.

Materials and Methods

Geological Setting

The Alborz Range is a polyorogenic folded belt that evolved during Cimmerian and Alpine orogenies [19]. It was suggested that the Alborz block was separated from Gondwanaland in the Ordovician and Silurian and then collided with the Eurasia plate in the Late Triassic during Early Cimmerian Orogeny [20]. The Early Cimmerian Orogeny caused inversion of originally normal faults such as the Mosha and Hasanakdar faults in the Central Alborz [21]. The Shemshak Group, composed of a thick succession of fluvial, deltaic to marine sedimentary rocks was deposited in the Late Triassic – Middle Jurassic [22]. In the Middle Jurassic, the Middle Cimmerian event initiated a rift basin [23, 24] in the region. The marine condition continued in the Cretaceous until the Late Cretaceous – early Paleocene, when there was a pulse of exhumation and cooling accompanied by folding in the Central Alborz [21, 25] that closed the limited Cretaceous basins in the area and causing the inversion of Middle Cimmerian related normal faults [21]. Deposition of Paleocene Fajan conglomerates [16, 19] was terminated by the development of a marine condition in a Neo-Tethys

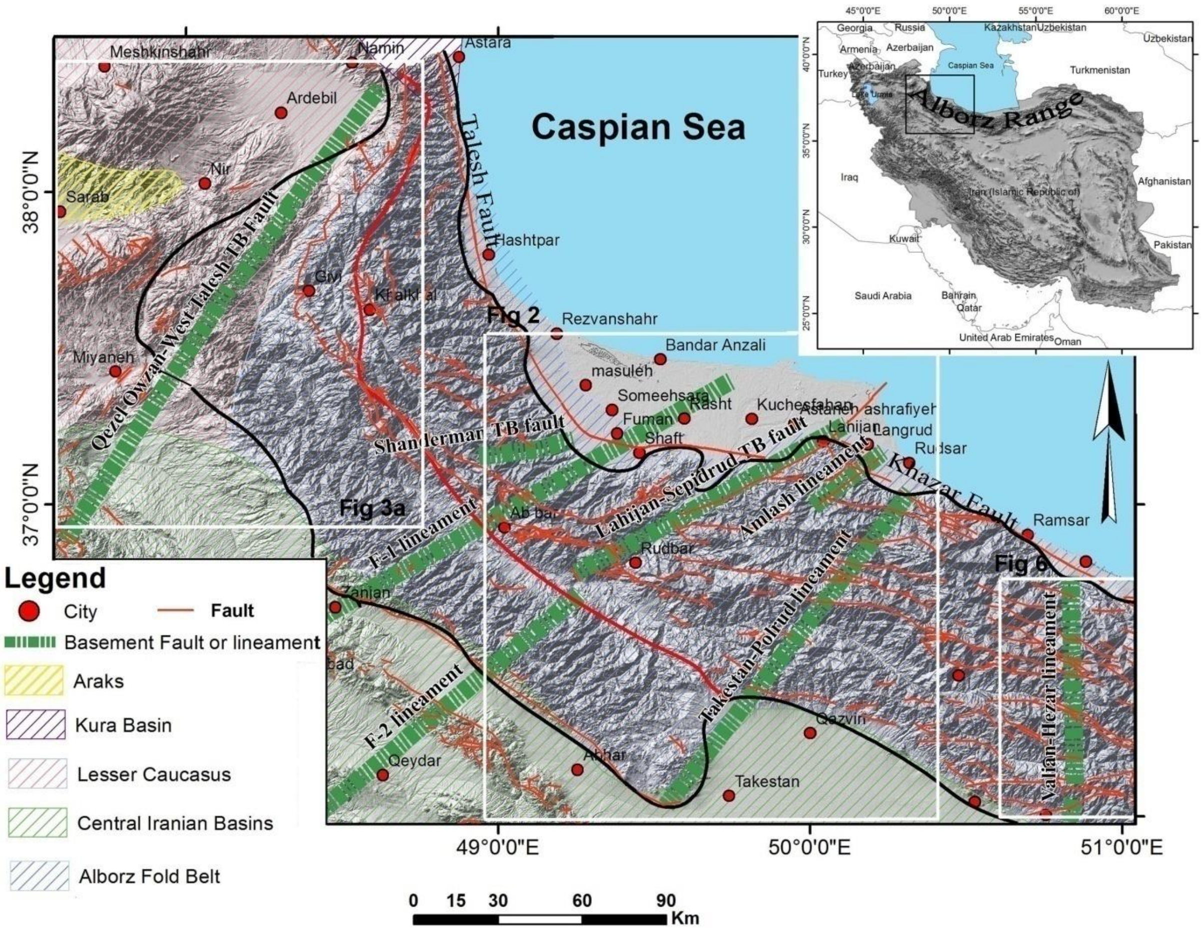

Figure 1. shaded relief map (SRTM) of the Western Alborz showing the TB faults and lineaments and structural zones of the region. Black hard-line shows the boundary of the Alborz Range to north and south. The red hard-line separate the Paleozoic-Mesozoic zone from the Eocene Tertiary magmatic zone in the Western Alborz.

related back-arc basin in the West and Central Alborz, in which the Eocene Ziarat carbonates and Karaj tuffs, shales, and volcanics were deposited [16]. During the Oligo-Miocene, right-lateral transpressional tectonic regime [16, 25], or oblique inversion [9] deformed the range.

The rigid basement of the South Caspian Basin is one of the thickest basins in the world with ~20 km of Cenozoic sediments [15]. The crystalline rigid basement of the basin is slightly subducts below the Eurasian Plate along the Apsheron–Balkhan sill [16, 26]. There is a small component of underthrusting of this lithosphere beneath the continental crust of the Talesh Mountains [26]. The Western Alborz has a curved geometry especially at Talesh Mountains that wraps around the western side of the South Caspian Basin (Fig. 1). Present day NE directed oblique convergence between the Arabia and Eurasia plates is accommodated through a combination of strike-slip (~5 mm/yr in the central part of the Talesh Mountains) and thrust faulting (~2 mm/yr–6 mm/yr in the northern and southern parts of the mountains) respectively [27] that indicate deformation partitioning during continuous convergence. The Western Alborz composed of early Paleocene to early Oligocene volcanic and volcaniclastic rocks [28]. The stratigraphy of the region indicates early to middle Eocene extensional tectonics (back-arc) dominated in the region associated with the Neotethys subduction zone [22, 29]. The transition from extension to Neogene compression occurred sometime during the late Eocene to early Oligocene in the case which the comparison between cooling ages from the Talesh Mountains and elsewhere across the Iranian Plateau indicates widespread plateau formation in the Oligocene, earlier than previously suggested for the northwestern plateau margin [30].

The Alborz basement

There is no reported outcrop of the Alborz basement [16, 26, 31]. The oldest known rock unit in the range is the Kahar formation including 1000 m of siliciclastic sedimentary strata (sub-green schist), with minor carbonate and igneous rocks, which were deposited along the peri-Gondwanan margin of Iran [32] or a rift-basin affecting the whole region. The base of the formation is about 560 ma old, based on detrital zircon U–Pb ages [32]. Other known old rocks in the Alborz include, for example, the Lahijan granite that measured ion probe 206Pb/238U indicates a possible late Neoproterozoic to Cambrian crystallization age for it [33]. Since 1974, the continental blocks forming Alborz and central Iran have been considered to be of Gondwanian affinity [20]. However, recent works shows the existence of some remnants or fragments of Eurasia continental crust in the Alborz Range such as Shanderman complex [34] and allochthonous Anarak metamorphic complex in the Central Iran that belongs to Variscan belt [35]. For a long time, the Alborz Range was considered as a rootless mountain belt a crustal thickness of only 35–40 km which is unusually thin [36, 37]; however recently published works show that the lower crystalline crust is ∼34 km thick and the total crustal thickness beneath the Central Alborz is 58 ± 2 km [38]. Another study concluded that the crustal root with thicknesses 55–60 km occurs underneath the Zagros and Alborz mountains [39]. Additionally, there is a thickening of the crust from ∼48 km beneath the northern part of the Central Iranian Plateau to 55–58 km below the central part of the Alborz Mountains, then a thinning of the crust to ∼46 km north of the Alborz Mountains beneath the coastal region of the South Caspian Sea [40].

Basement Faulting in the Alborz Range

First attempts to map the basement faults of Iran on the base of subsurface data come back to the Geological Survey of Iran's series of aeromagnetic maps of Iran (1:250000) processed by Yousefi and Friedberg at 1977. In 1994, Yousefi did a further work to produce a 1:2500000 magnetic lineament map of Iran [41]. Several other major sources of information for regional basement faults of Iran include the Tectonic map of Iran (1:1000000) [42]; Tectonic map of Iran by Huber [43]; Seismotectonic map of Iran [44]; Geology map of Iran (1:2500000) [45], Active Faults of Iran [46], Earthquake Epicenters and Tectonic Lineament Map of Iran by [47]. I use above-mentioned maps with 1:250000 geological Quadrangles and 1:100000 geology maps published by Geological Survey of Iran and other sources to introduce the certain and potential TB faults of the Western Alborz in next sections.

Lahijan-Sepidrud TB fault

The Sepidrud which transects the 1990 earthquake meizoseismal area is the only river of any size to cross the Alborz Mountains from Central Iran in the south to the Caspian Sea in the north. The gorge of the river has a long record of human habitation, which flourished in the region in the Bronze and the Early Iron Age [48]. Additionally, this river is the site of a major TB fault of the Alborz Range called here as the Lahijan-Sepidrud TB fault.

The Lahijan-Sepidrud TB fault is a recently studied TB faults in the Alborz Range [49] that extended from the Sepidrud Dam to the Caspian coast in the Lahijan City (Figs. 1 and 2). The first discovery of the fault come back to 1976 [43, 50], then better determined by several authors [16, 41]. However, the detailed local geological information about this fault zone is from [51-53]. The length of this fault is about 90 Km in the Alborz Range with an azimuth of N055 and caused a left-lateral truncation in the Western Alborz and Khazar Fault (Fig. 1) [16, 49]. In the southern portion, the superficial expression of this TB fault includes highly fractured NE-SW trending zones in the slightly metamorphosed Devonian volcanics and Permian carbonates surrounded with Triassic-Jurassic Shemshak Group [51, 54]. This basement feature has produced a ~30 Km wide deformed zone in its upper sedimentary cover by producing several trends of faults that caused a structural complexity in this portion of the Alborz Range [49]. Some of these superficial faults are major right-lateral fault valleys [54, 55]. There is no clear seismic activity for this TB fault [16]. However, based on aeromagnetic data, Yousefi (1994) continues this fault as the F-2 until the Main Zagros Reverse Fault [41] and probably it continues more toward southwest [42].

Takestan-Polrud lineament

Geometry of the southern boundary of the Alborz Range at the west of Qazvin City shows a large (~ 40 Km) southwestward displacement of mountain front from the North Qazvin Fault to the north Zanjan Fault (Fig.1) [46]. These two faults mark the boundary between northern Eocene volcanic rock and tuff of Karaj Formation and southern Neogene to Quaternary deposits (Fig. 2). There is no significant evidence for Takestan-Polrud lineament in the aeromagnetic maps of the region. However, on the base of some evidence, this lineament is proposed. At first, the geometry of southern margin of the Alborz Range in the north of Qazvin plain that show a large displacement as mentioned above. Secondly, huge amount of Cretaceous volcanic rocks between the Takestan-Polrud lineament and Lahijan-Sepidrud TB fault in comparison with surrounding regions (Fig. 2). Third, the width of domain of Eocene volcanic rocks to the east of Takestan-Polrud lineament is about half of this domain to the west of lineament; which show a major change in factors controlling the Eocene extensional basin in this area (Fig. 2).

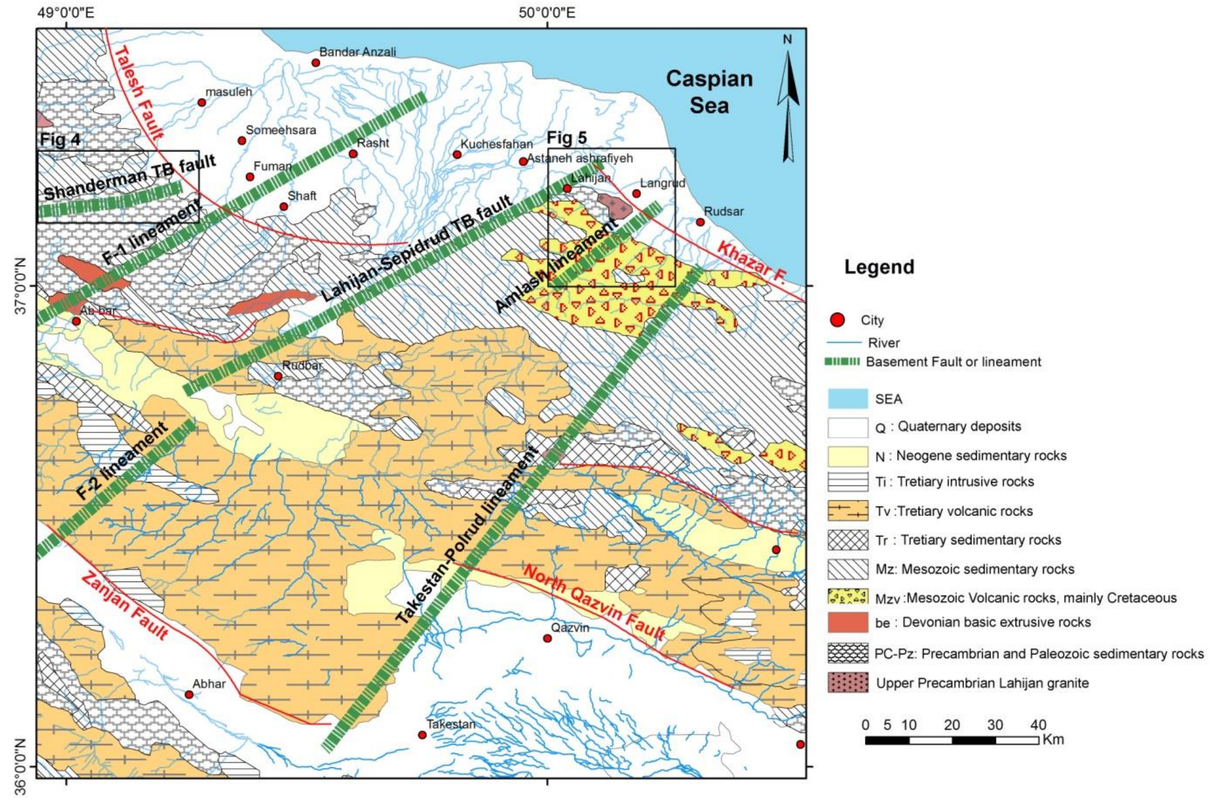

Figure 2. simplified geology map of Qazvin-Rasht region showing the location of TB faults and lineaments in the area (modified from [45], digital version provided by USGS). Note to huge amount of Cretaceous and Tertiary volcanic rocks between Takestan-Polrud lineament and Lahijan-Sepidrud TB fault. Rectangles show the location of Figs.4 and 5.

Qezel Owzan-West Talesh TB Fault

First time, superficial faults that highlight the boundary between Eocene volcanic zone of Talesh Mountains and the Oligocene-Miocene sedimentary rocks of the Azarbaijan were mapped by [43] and [44]. This fault is a ~170 Km long NE-trending linear disruption in magnetic anomalies exists adjacent to Neogene volcanics in the Bandar-e Anzali 1:250000 Quadrangle that [55], continuing to the southwest within the Mianeh Quadrangle along the Qezel-Owzan valley that shows evidence of deepening of magnetic basement [41, 56] (Figs.1 and 3). Toward northeast, the structure continued in the Ardebil Quadrangle. Structural expression of this magnetic lineament correlate with several mapped faults including the West Talesh – Hir, Nur, Germichay, Balikhchay and Kivi faults (Fig. 3). Yousefi continued this lineament from southeast of Ardebil to southeast of Mianeh [41]. The above-mentioned faults are situated in a ~20 Km wide zone. The west-Talesh-Hir fault is NE-SW striking left-lateral fault that dips toward southeast, marks the contact of Eocene mega-porphyry volcanic rocks with Neogene conglomerate and Quaternary alluvial terrace deposits [57, 58] (Fig.3). The fault has evident crushed zone and fault scarp [58]. The fault may be the responsible for the formation of Ardebil plain and Neogene basin in the area [58]. Kivi fault mapped by [59] and [60]. The Noor left-lateral strike slip faults was mapped by [61] as a NE-SW striking fault that gradually finds a N-S alignment parallel with the Astara Fault in the northeast (Fig. 3). The inferred position of the Noor fault was previously mapped partly by [42] and [59]. The fault dips ~80 degrees to west and has a wide crushed zone. This fault may be the boundary between Talesh upland and volcanic domain of Azarbaijan [61]. Some authors mapped the Sangvar earthquake fault approximately along the Nur Fault [46, 62]. As mentioned above, southern portions of the magnetic lineament correlates with the NE-SE trending segment of the Qezel-Owzan River that clearly is a fault valley [57, 63-65]. In another study the role of geological structures on the morphology of the Qezel-Owzan River was investigated [66]. They find that the river morphology is under influence of SE-NW, NE-SW, E-W and N-S trending structures. Then, this portion of the Qezel-Owzan River was mapped as an active fault [65, 67]. Based on local geology maps [57, 65], the axial trace folds in Miocene rocks in two sides of the Qezel-Owzan River are cut and displaced by a NE-SW trending feature parallel with Qezel Owzan-West Talesh TB Fault (Fig. 3b).

Shanderman TB fault

A small magnetic lineament mapped by [55] that correlate with NE-SW trending major strike-slip faults along the Masal and Shanderman valleys (Figs. 1 and

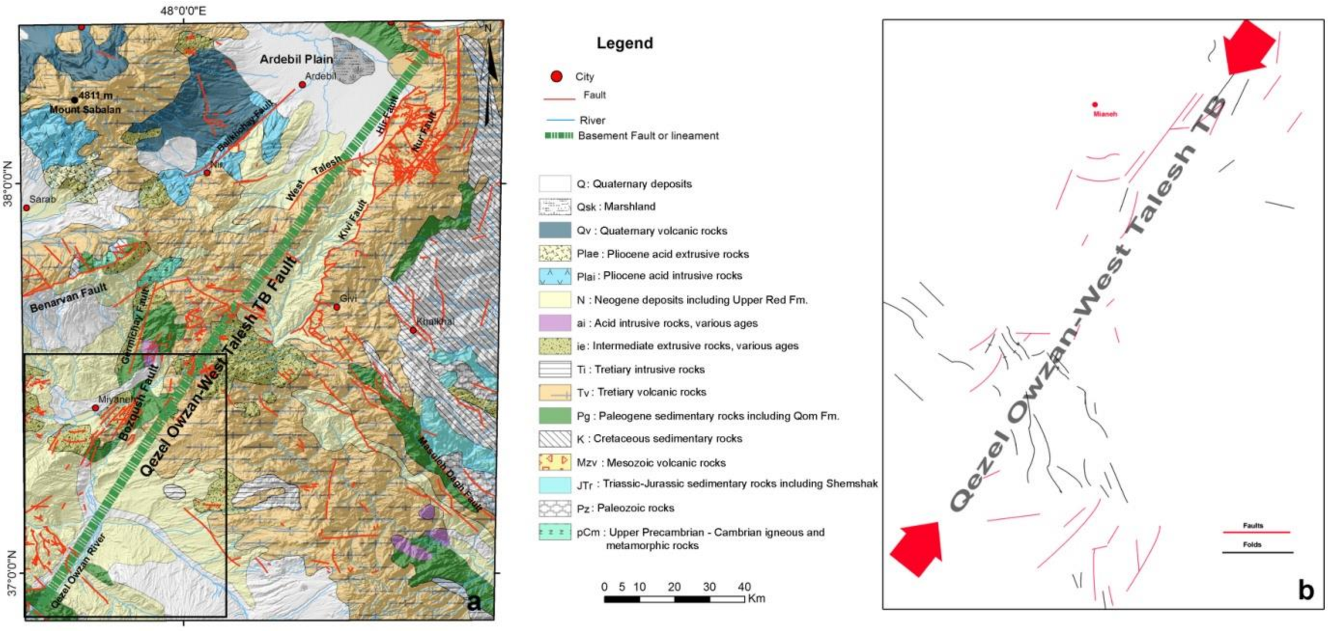

Figure 3.a- simplified geology map showing the location of Qezel Owzan-West Talesh TB fault (geology from [45]; digital version provided by USGS). Faults from [57-60]. Location of figure a is shown on Fig.1. b. it shows the axial trace of folds in the Oligocene-Miocene rocks with faults in the southern portion of Qezel Owzan-West Talesh TB fault. Note to the change in the trace of folds around the TB fault. The axial trace of folds and faults extracted from [57, 65].

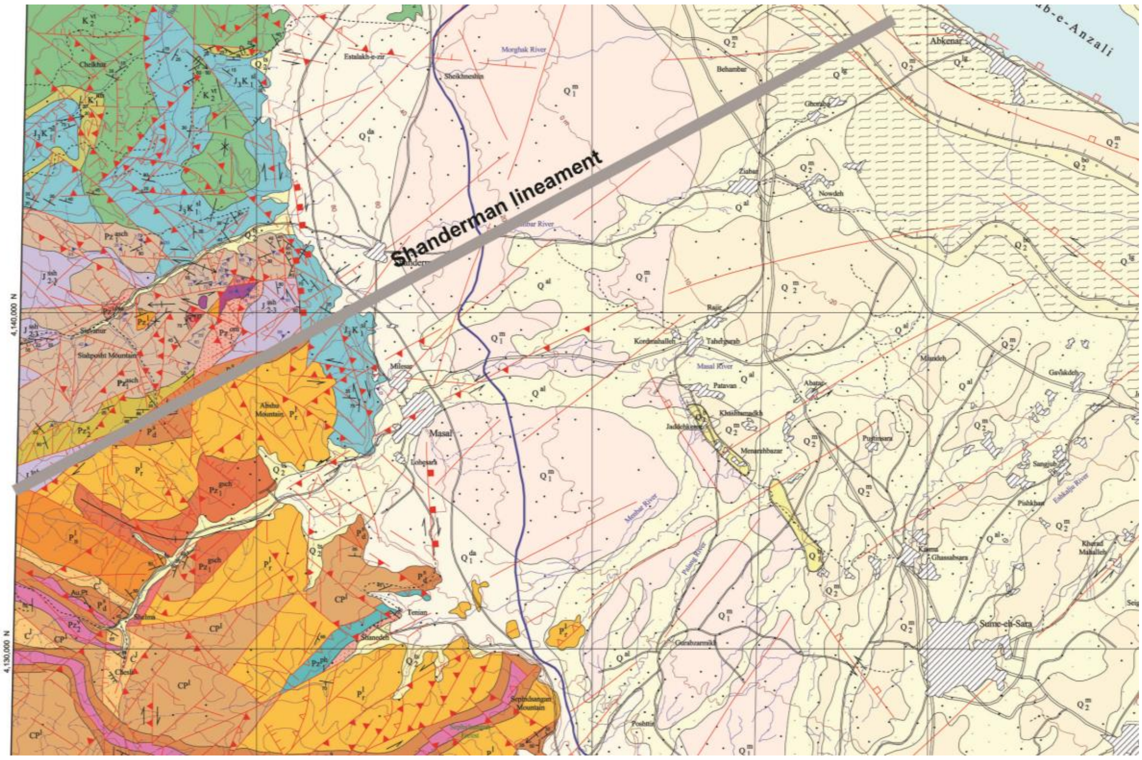

Figure 4. portion of the geology map of Bandar-e Anzali [54] showing the Shanderman lineament. For the location of figure refer to Fig.2.

4). Then, Nogol-Sadat (1992) and Nazari et al. (2004) mapped the continuation of these faults in the Caspian coastal zone [54, 68]. According to [54] these faults may be major basement faults formed in the upper Precambrian and had clear activity during Paleozoic. The Shanderman lineament superficially correlates with faults that cut the Shanderman complex from southeast [54, 59].

Amlash lineament

There is a NE-SW trending magnetic lineament in the Rasht aeromagnetic map [50] that locally correlate with a left-lateral surface fault in the Cretaceous volcanic rocks called here the "Amlash lineament" (Fig. 1 and 5). The lineament is more than 30 km long. The northeastern termination of it is hidden under the Quaternary deposits of the Caspian Coastal plain [69]. To the southwest the lineament is loosely mapped in the Javaherdeh and Jirandeh 1:100000 sheets and finally truncated within the Cretaceous volcanic rocks in the Jirandeh sheet [53, 70]. There is no direct evidence of basement characteristics of the Amlash lineament except the [50], however the it approximately bounds the upper Precambrian-Cambrian Lahijan granite [33, 71] to the east (Fig. 5).

Valian-Hezar lineament

This lineament was firstly mapped as photo-lineament [47]. This NNW-SSE trending lineament is about 90 Km long (Figs. 1 and 6). The lineament started from the Valian Valley in the southern foothills of the Taleqan Mountain and goes northward along the Gouran and Karkaboud valleys and then the Seh-Hezar River until it reaches the Caspian coastal plain in the Tonekabon City (Fig. 6). Although there is no mapped magnetic lineament along this photo lineament, but there are several lines of evidence that propose the possible existence of an important TB fault along it. Firstly, some published relocated earthquake maps of the region show an alignment of epicenters, especially in the northern portion of this lineament [72]. Another study reported the structural evidence of a basement transverse fault along the Valian Valley that caused the along-strike variation of geometry of the Mosha Fault in the southern foothills of Taleqan Mountains [8]. Additionally, several granitoid, monzonite and dolerite bodies intruded along or near this lineament (Fig. 6). Except the Mosha fault, other main faults of the Alborz Range passing from this lineament show a right-stepping geometry (s-form map pattern) and change in their attitude (Fig. 6). Examples include the Nusha, Alamutrud, Chalkrud and Kandevan faults.

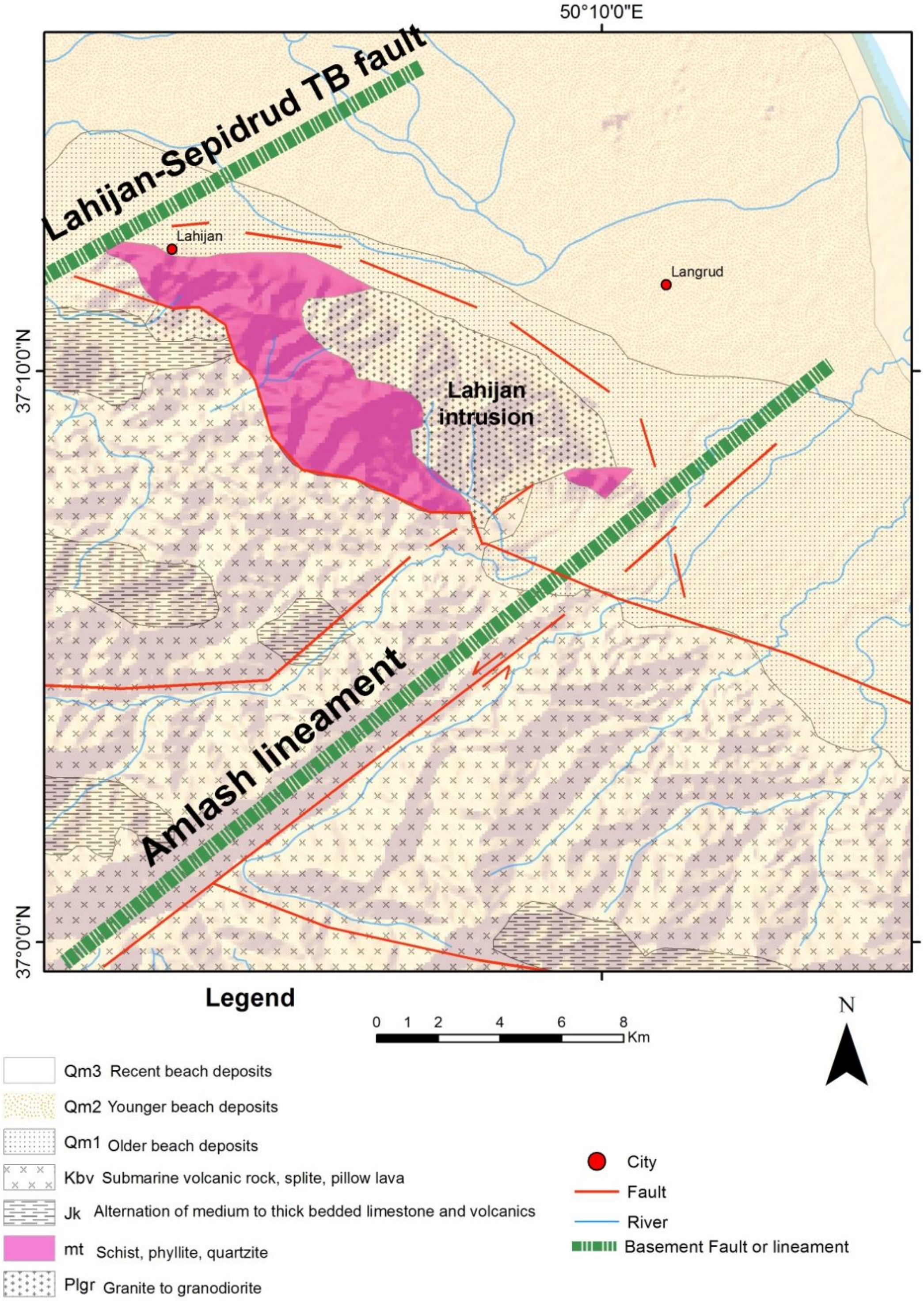

Figure 5. Local geology map showing the position of Amlash lineament with respect to the Lahijan intrusion and mapped faults. For the location of figure refer to Fig. 2. The geology map accessed from www.ngdir.ir.

F-1 lineament

This is a magnetic lineament that extends from the northeast of Rasht city to the west of Sanandaj with a length of about 450 Km (Fig. 1) [41]. It is difficult to relate this lineament with significant geological features on the local maps.

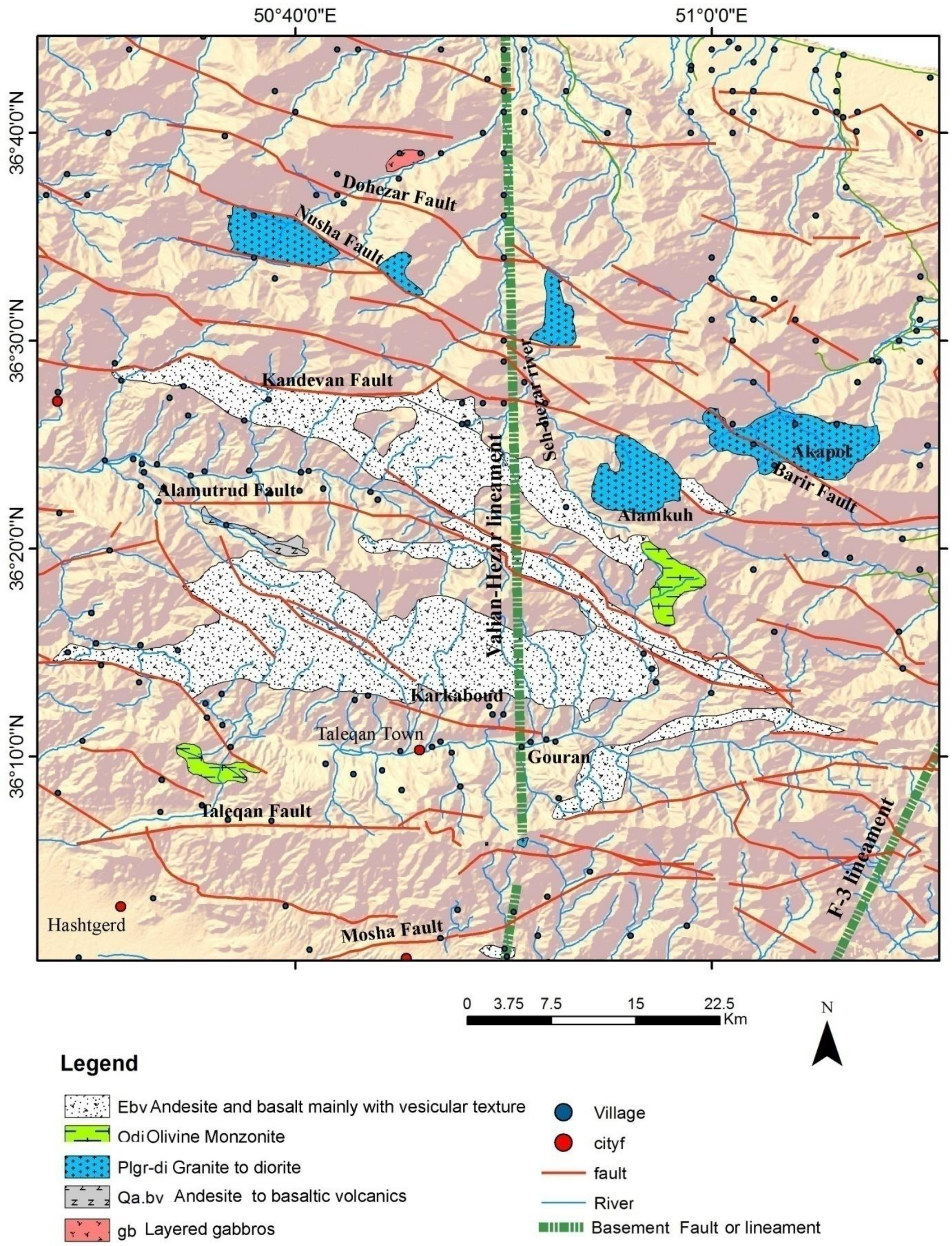

Figure 6. Distribution of volcanic and intrusive rocks around the Valian-Hezar lineament. Note to the change of trend of major fault across the lineament. Please refer to Fig.1 for the location of this figure.

Results and Discussion

Considering the available data it is difficult to assess the validity of introduced TB faults or lineaments is the previous section. However, available information from the South Caspian basin and neighboring regions such as Caucasus can help us to provide more proves for TB faults in the Alborz Range. Studies by different authors have been done on various aspects of this basin; some of which have introduced deep structure of this basin [73-75]. Deep structural or tectonic maps of the South Caspian basin include significant faults rooted in the deep crustal levels and basement [15, 23, 73-78]. These deep active faults do not seem to have a surface expression and the later displacements are structurally attenuated in the overlying sediments [77]. Several mechanisms of formation and evolution of these structures were suggested: (1) relict deep structures of the primary oceanic crust [79], (2) the origin of the structures is related to deep processes resulting in the transformation of the continental crust into the oceanic crust [73], (3) newly formed structures resulting from spreading [80]. According to various authors [15, 23, 73, 73-78] there are N-S trending deep-seated faults in the South Caspian basin that some of them correlate with introduced TB faults and lineaments in the study area (Fig. 7).

Based on aeromagnetic maps [41, 50] and works by various authors [16, 49], the Lahijan-Sepidrud TB Fault is a major transverse structure in the western Alborz that

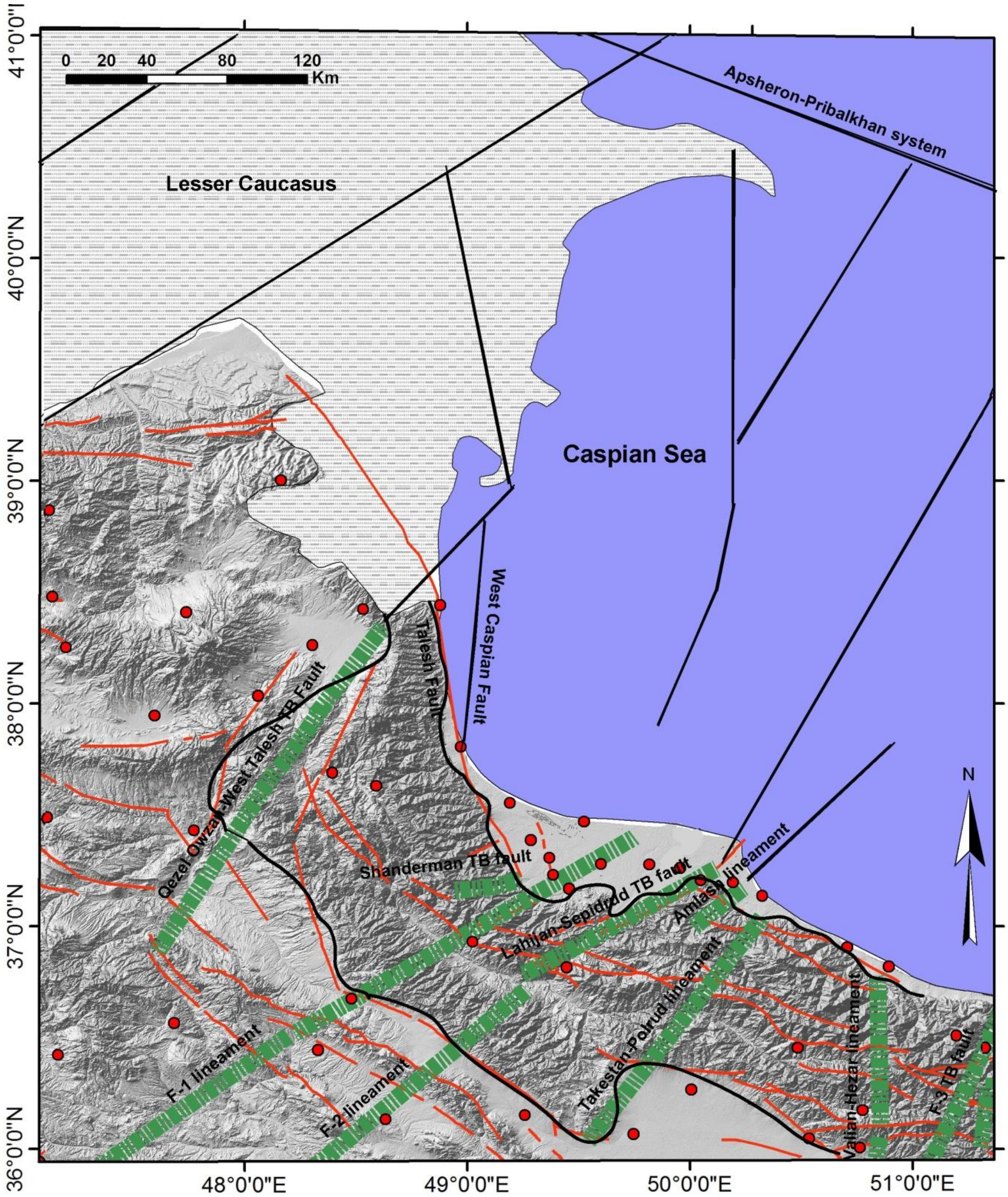

Figure 7. Regional map showing the relationship between TB faults/lineaments in the Western Alborz and basement fault in the South Caspian basin. basement faults of the South Caspian Basin from [73-78].

cut the Alborz Range for about 90 Km. This fault has caused along-strike variation of the Khazar Fault [16] and has induced complexity on the superficial structures of the area [49]. The length of the fault in the Alborz Range is about 90 Km and it is possible, not proved, that it goes more southwestward [41]. Toward north, this fault is continuing within the South Caspian basin (Fig. 7). Although older works did not link the Lahijan-Sepidrud TB fault with N-S trending fault in the south Caspian basin [15], some authors continues this fault as a N-S [23] or NE-SW [77, 78] fault that cut the entire south Caspian basin for a length of ~ 400 Km until it reaches to the Apsheron-Pribalkhan system (Fig. 7). Some authors continue the fault just for tens of kilometers in the south Caspian basin [76, 81]. Based on interpreted attitude of the Lahijan-Sepidrud TB Fault in the Alborz Range [16, 41, 49], it is preferred to consider the continuation of the fault in the Caspian Sea as a NE-SW trending structure, but the length of it is still ambiguous.

The Qezel-Owzan-West Talesh TB fault is another major fault in the region that may be an ancient boundary between Western Alborz-Talesh Mountain and Lesser Caucasus (Fig. 1). The fault is an active system that induced deformation (mainly left-lateral) along several important faults in the cover sequence including Hir, West Talesh, Givi, Nur and other lesser important faults [58, 61] (Fig. 3). Some of these cover faults are the causative faults of major earthquakes in the past century [46]. It seems that the Qezel-Owzan-West Talesh TB fault controls the change of depth to the basement from east to west in the Ardebil plain [56]. Although the current deformation of superficial faults along this TB fault suggests a left-lateral component for it [58, 61], but a mapped fault along this TB fault shows right-lateral displacement [76]. Devlin et al. (1999) continued this fault a few tens of kilometers in to the South Caspian basin [82] (Fig. 7).

Available maps from the South Caspian Basin not shows evidence of continuation of Shanderman, Amlash, Polrud-Takestan and Valian-Hezar lineaments within it crust, but it can be due to low resolution of available data. It is likely that Shanderman lineament was a TB fault because of its Paleozoic movements [54] and also involvement of Shanderman complex that include garnet–staurolite micaschists, metabolites and ecologies with intermediate–basic intrusive bodies suggesting that the Shanderman Complex represents a fragment of the Upper Palaeozoic European continental crust that was stacked southwards on the northern edge of the Iran Plate during the Eo-Cimmerian events occurring at the end of the Triassic [34]. The Shanderman TB fault may be an important feature during the stacking and exhumation of the complex (Fig. 4). Similarly, available data for Amlash lineament is loose, and required more investigation. But, because the fault bound one of rare Upper Precambrian-Cambrian polutons of the Alborz (i.e. Lahijan granite), it is probably a TB fault with activity during Paleozoic and Mesozoic. For the other introduced lineaments, i.e. the Valian-Hezar and Polrud-Takestan, at this time it is impossible to make further synthesis.

The marginal geometry of the Alborz Range is an important factor that should be investigated more. Considering the south Caspian basin as a trapped modified oceanic crust [23, 26] means that northern margin of the Alborz Range around this basin is a continental margin. Tectonic inheritance at a range of scales has been recognized in the successive continental margins preserved within the crust of present eastern North America [83-84] and Canadian Appalachians [6]. One type of this tectonic inheritance in the continental margins is transform inheritance that is the pervasiveness of zones of crustal weakness associated with transform faults [84]. These transform faults appear to be the dominant controls on tectonic inheritance at large scales along continental margins during continent breakup and assembly, as well as on locations of differential subsidence and exceptionally thick sediment accumulations [84]. The irregular shape of the margin played a key role in its tectono-sedimentary evolution [85, 86]. The sinuous form of the some orogens is explained by the orthogonal arrangement of ancient rifts and transform faults that controlled reentrants and promontories at continental margin [83, 86, 87]. That means the inherited transverse faults can influence the shape (geometry) of the northern margin of the Alborz Range, i.e. the location of promontories and reentrants (Figs. 1 and 2). Promontory or headland is a high point of land or rock projecting into the sea. TB faults introduced or assessed in this paper are more or less correlating with irregularities of the northern margin of the Alborz Range. This correlation is clearer for Lahijan-Sepidrud TB fault, F1 and to a lesser degree for Amlash, Polrud-Takestan and Valian-Hezar lineaments. The nature and origin of these TB fault and lineaments is an important field of further investigations that should be completed with subsurface data.

The TB faults can influence on many aspects of mountains ranges, sedimentary basin and inverted terrains. These faults can influence on the history of salt tectonic, hydrocarbon potential and seismicity of tectonic zones and subzones in the continental crust. The Alborz Range is complex mountain belt that with different periods of tectonic activity especially during

Mesozoic and Cenozoic. Despite good studies on various aspects of continental deformation and tectonic evolution of the range, there very little information on the TB faults in it. An assessment of available aeromagnetic, seismic and geologic data from the western Alborz Range and south Caspian basin several TB fault or lineament were introduced. the Lahijan-Sepidrud TB Fault is a major previously known transverse structure in the western Alborz that cut the Alborz Range for about 90 Km. This fault has caused along-strike variation of the Khazar Fault and has induced complexity on the superficial structures of the area. It is possible, not proved, that it goes more southwestward. Toward north, this fault is continuing within the South Caspian basin as N-S or NE-SW - trending fault that cut the entire south Caspian basin for a possible length of ~ 400 Km until it reaches to the Apsheron-Pribalkhan system.

The Qezel-Owzan-West Talesh TB fault is another major active fault in the region that may be an ancient boundary between Western Alborz-Talesh Mountain and Lesser Caucasus. Superficial expression of the fault includes several important left-lateral faults in the cover sequence including Hir, West Talesh, Givi, Nur and other lesser important faults, some of which have documented history of seismic activity. Although the current deformation of superficial faults along this TB fault suggests a left-lateral component for it continuation of this fault in the south Caspian basin shows right-lateral displacement that may predates the active left-lateral displacement. Shanderman, Amlash, Polrud-Takestan and Valian-Hezar lineaments are four newly introduced lineaments in the western Alborz Range. It is likely that Shanderman lineament was a TB fault with Paleozoic-Mesozoic movements that facilitate the stacking and exhumation of the Shanderman Complex during the Early Cimmerian.

Considering the south Caspian basin as a trapped modified oceanic crust, inherited transverse structures such as inherited transform faults that can preserved as zones of crustal weakness in the continental margins appear to be a main control of Paleozoic and Mesozoic continental margin of the Albroz Range. The irregular shape of the margin of the Alborz Mountain played a key role in its tectono-sedimentary evolution of the region. That means that inherited transverse faults can influence the shape (geometry) of the northern margin of the Alborz Range, i.e. the location of promontories and reentrants. The TB faults introduced or assessed in this paper are more or less correlating with irregularities of the northern margin of the Alborz Range. This correlation is clearer for the Lahijan-Sepidrud TB fault, F1lineament and to a lesser degree for Amlash, Polrud-Takestan and Valian-Hezar lineaments. The real extent, nature and origin of mentioned TB fault and lineaments are important fields of further investigations that should be completed with subsurface data.

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