Rifting movements of lower Paleozoic in the most northern edge of Gondwanaland within Iranian geological framework

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The basaltic volcanic rocks of northeast Iran pose an important problem regarding interpretation of tectonics, magmatism, and geodynamics of rifting in geotectonics setting of northern-most parts of Gondwanaland and its position within geological framework of the region. These rocks outcrop in four region of Shahroud-South Gorgan, Robate Gharabil, south of Bojnourd, and northeast of Neyshabour. They are generally accompanied by sandstone and shales clastics which have been formed in upper Cambrian-Silurian time.

Volcanic rocks of the region reveals several episodes of eruptions which occurred during three stages; stage 1, with alkaline nature in upper Cambrian, consisting of volcanic ash, pumice, lapilli, tuff, and agglomerate; stage 2, in middle Ordovician with lava origin rocks, tuff, and agglomerate; stage 3, in upper Ordovician-Silurian mainly of pillow lavas, dolorites and, basaltic lava flows. Rocks of stage 2 has olivine tholeitic character, while the 3rd stage being completely tholeitic. The sedimentary sequence accompanying the 3 stages were mainly of conglomerate, sandstone, and evaporites; sandstone and quartzite; and sandstone and shale clastics respectively. Field relationship of basalts, volcanic-sediments, change in chemical nature of basaltic rocks to transitional and tholeitic type were investigated. The gathered data from regional geology, structural setting, and their comparison with major structural trends in adjacent areas, i.e, Afghanistan and Turkey. Conclusion is drawn to relate the above volcanic activity to rifting process of continental margins in the most northeastern parts of Gondwanaland in early Paleozoic time in Iran.