

TECTONIC INVESTIGATION OF EARTHQUAKE REGIONAL ACCUMULATIONS IN AFGHANISTAN

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Afghanistan is the most stable part of the Eurasian plate. The Arabian plate subducts northward under Eurasia in the west of Afghanistan and the Indian plate does the same in the east (Figure 1). Structural geology of Afghanistan shows that the region is affected by three main faults and their deformational zones. The Hari Rod fault zone oriented W-E with right lateral strike slip movement in the middle of Afghanistan and the Chaman and Badakhsan fault zones oriented NNE-SSW with left lateral strike-slip movement in the eastern boundary of Afghanistan (Wheeler et al., 2005).

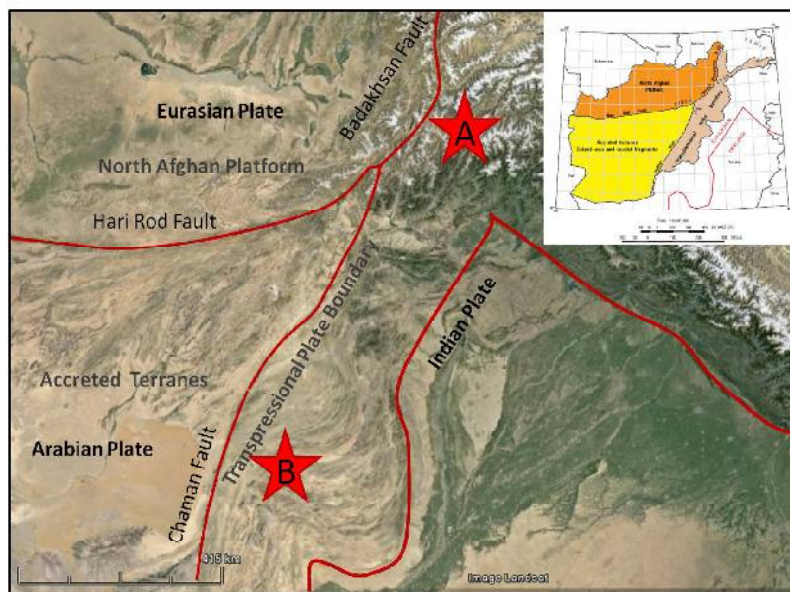


Figure 1. Tectonic map of Afghanistan on satellite image that tectonic regions and main faults are mapped. In the index map: Pink, transpressional plate boundary; yellow, accreted to the platform and orange, North Afghan platform (Wheeler et al., 2005)

In this paper, for the recent tectonic analysis of earthquakes distribution, subsurface and surface structural analyses are done. For this purpose, trend of the faults and fold axes are mapped in the study area then the changes in the magnitude, depth and focal mechanism of the earthquakes in different longitude and latitudes are investigated and based on the evidence, the results are presented.

Davoodi (2013) and this article are believed that the seismotectonic map of Afghanistan shows two main accumulation of earthquakes in Afghan region (Figure 2), one of them located in Hindu Kush area, where the triangular edge of Indian plate is collision with Eurasia plate (“A” in the Figures 1 and 2), another one is located in the Southern part of Transpressional Plate Boundary, where the Indian plate boundary shows Z shaped curvature (“B” in the Figures 1 and 2). Distribution of the earthquakes indicates that the “A” region is wider than “B”. Due to the previous studies (Wheeler et al., 2005), the crustal earthquakes are located in the both regions while the mantle earthquakes are located in the “A” region.

The focal mechanism of earthquakes indicates two different mechanisms that are match with “A” and “B” regions. The “A” dominated by dip-slip mechanism especially reverse and the “B” dominated by left-lateral strike-slip mechanism (Figure 2 shows focal mechanism of earthquakes from 1976-1980 for example).

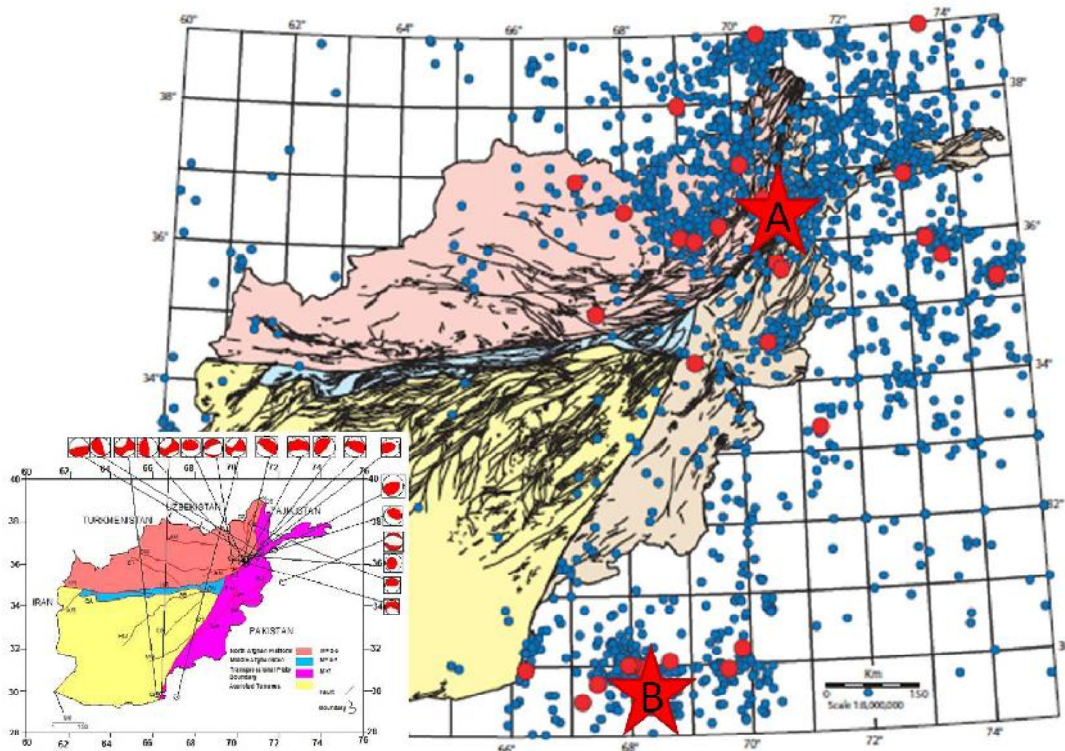


Figure 2. Seismotectonic map of Afghanistan (Wheeler et al., 2005) and focal mechanism of 1976-1980 earthquakes on the index map

The “A” region is clash zone of three plates, where the Arabian and Indian plates subduct beneath the Eurasian plate, and also one of the largest triangular edges of Indian plate boundary is located in the south of this region. Therefore, the “A” region is a place for accumulation of stress due to the subduction, so earthquakes with dip-slip focal mechanism and mantle seismicity at depths occurs. The “B” region is located in the boundary between the Arabian and Indian plates that both of them are moved northward with different rate. Arabia moves with respect to a fixed Eurasia at 33mm/yr, and India dose the same at 39 mm/yr (Wheeler et al., 2005). The Z shape curvature of Indian plate boundary in the “B” region causes to accumulation of stress, so earthquakes with strike-slip focal mechanism and crustal seismicity at depths occurs.

REFERENCES

Davoodi Z (2013) Distribution of the recent deformations of Afghanistan region along the Chaman active fault zone, *International Van Earthquake Symposium*, 23-27 October, Van, Turkey

Wheeler RL, Bufe CG, Johnson ML and Dart RL (2005) Seismotectonic map of Afghanistan, with annotated bibliography, *USGS open file report*, 011: 1-31

