

TECTONIC INVESTIGATION OF EARTHQUAKE REGIONAL ACCUMULATIONS IN AFGHANISTAN

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ABSTRACT

Subsurface and surface studies show that the Afghan region is affected by three main faults and their deformational zones. The right lateral Hari rod fault zone oriented W-E in the middle of Afghanistan and the left lateral Chaman and Badakhsan fault zones oriented NNE-SSW in the eastern boundary of Afghanistan. The seismotectonic maps shows two main accumulation of earthquakes in Afghan region that are different at depth and focal mechanism. one of them located in Hindu Kush area (A region) and another one is located in the Southern part of Transpressional Plate Boundary (B region). The folds have Type 1 and 2 of interference patterns in B.

The A region with the mantel seismicity 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, earthquakes with dip-slip focal mechanism and mantle seismicity at depths occur in A because of stress accumulation. While the B region is located in the boundary between the Arabian and Indian plates that both of them are moves northward with different rate but the Z shape curvature of Indian plate boundary in the B causes to accumulation of stress and occurrence of earthquakes with left lateral strike-slip focal mechanism and crustal seismicity at depths.

INTRODUCTION

Afghanistan is part of the Eurasian plate and its seismicity is driven by the relative northward movements of the Arabian plate past western Afghanistan at 33 mm/yr and of the Indian plate past eastern Afghanistan at 39 mm/yr or faster as both plates subduct under Eurasia (Wheeler et al. 2005). As a seismotectonic map shows geologic, seismological and other information that is pertinent to seismic hazards but previously was scattered among many sources, so Afghanistan seismotectonic map shows active tectonics of the region.

This paper focuses on the regional accumulation of earthquakes on the seismotectonic map of Afghanistan. We sought to identify areas with the highest earthquake concentration and compare them to identify the depth, magnitude and focal mechanism. At last a discussion about tectonic cause of this distribution.

GEOTECTONIC SETTING

Afghanistan is the most stable part of a promontory that projects south from the Eurasian plate (fig. 1; Ambraseys and Bilham, 2003; DeMets et. al., 1990). West of Afghanistan, the Arabian plate subducts northward under Eurasia, and east of Afghanistan the Indian plate does the same. South of Afghanistan, the Arabian and Indian plates adjoin and both subduct northward under the Eurasian promontory. The plate