

A NEW CASE OF RESERVOIR TRIGGERED SEISMICITY: AZAD DAM WEST OF IRAN

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Increases in the frequency of occurrence of earthquakes due to man's engineering activities in dam construction have resulted from the reservoir impoundment. In this article, the correlation between the times of high water levels in the reservoir and occurrence of earthquakes has been analyzed. The effect of the reservoir on the nearby earthquake causative faults to verify that these earthquakes were triggered by the reservoir, have been investigated by using concept of fault stability. The correlation between water level change and V_p/V_s ratio, attenuation of coda waves, similarity of waveforms before and after the impounding the reservoir have been investigated. For these purpose, the data recorded in Azad network has been analyzed from August 2010 to August 2014. Figure 1 shows the location of stations, reservoir and located earthquakes.

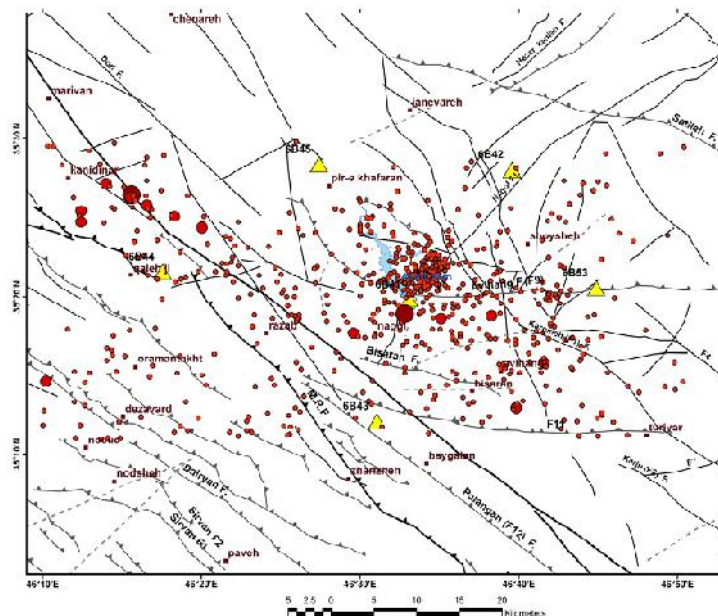


Figure 1. Location of Azad reservoir, stations, and located earthquakes

Following Hamzehloo et al., (1997) and Chander and Kalpna (2000), the Azad reservoir load was simulated by a 82 pyramids load. The maximum water depth was considered as 125 m at the dam. The formulas based on 3d Boussineq solutions (Jaeger and Cook, 1969) have been used to compute cumulative values of six stress tensors. These stress tensors were used to calculate change in normal () and shear () stress on Nogol fault plane, which were then used to calculate change in stability. The negative stability contours below the dam for Nogol fault indicates that the reservoir assists the occurrence of earthquakes (Figure 2). The 2011 earthquake with magnitude 3.5, which occurred after the impounding the reservoir is the largest induced earthquake (Figure 2).

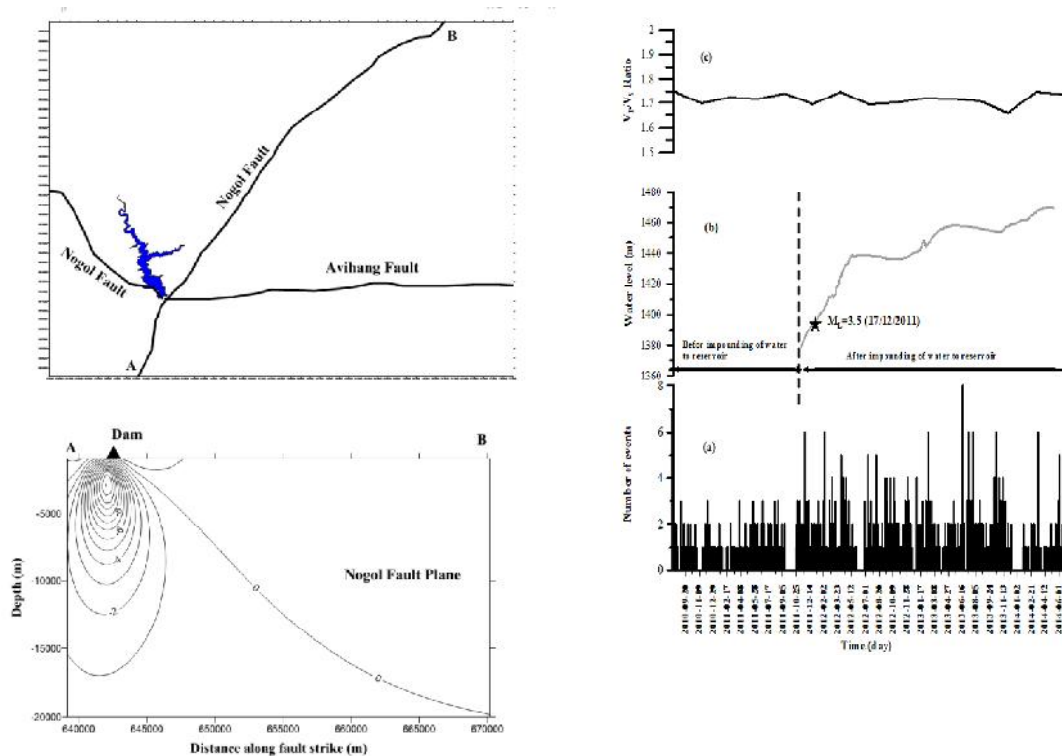


Figure 2. Stability contours due to reservoir load on Nogol fault (left), variation of V_p/V_s , water level and number of earthquakes (right)

REFERENCES

- Chander R and Kalpna (2000) On categorising induced and natural tectonic earthquakes near new reservoirs, Eng. Geol. 46, 81–92
- Hamzehloo H, Chander R and Sarkar I (1997) Probable role of Sefidrud reservoir in the occurrence of the Rudbar earthquake of 1990, Bull. Ind. Soc. Earth. Tech., Paper No. 363, 34(1): 17–25
- Jaeger JC and Cook NGW (1969) Fundamentals of Rock Mechanics, Methuen, London, p. 515

