

# TRIGGERING MICROSEISMICITY AT RESERVOIR POLYPHYTO DAM AREA (GREECE)

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The Public Power Corporation (PPC) established three reservoirs on Aliakmonas River (NW Greece), downstream of each other, with Polyphyto being the largest with a dam height of 112m, maximum water level height  $h=289\text{m}$ , maximum volume  $V=1220\times 10^6\text{m}^3$  and first filling in January 1974. The area was classified as low seismicity until 1995, when a strong earthquake of  $M_s=6.6$  occurred between the cities of Kozani–Grevena, at a distance of 18km from the southern point of the reservoir.

In order to examine whether there is any correlation between the seismic activity and the water level fluctuations via the three reservoirs, we relocated the recorded data of the local seismological network of PPC for the period 1984 to 1987, whilst for the period 1988-2010 the data used were obtained from the catalogues of the National Observatory of Athens. During the initial filling of the third downstream reservoir (Asomata Dam, height 52m), which started on October 10 1984, an earthquake of magnitude  $M_L=5.2$  was recorded on October 25 1984, NW of the edge of Polyphyto lake with focal depth 18km. This focal area is close to the one of the earthquake that took place on 13 May 1995. The impoundment of the second downstream reservoir (Sfikia Dam, height 82m) commenced on 13 March, 1985 and was completed at the end of August 1985.

Detailed investigation of the recorded microseismicity is correlated to the daily rate of water level fluctuations ( $dh/dt$ ) for the period 1984-2010. Additionally, the distribution of epicenters for the period commencing 10 years prior to the impoundment of Polyphyto dam, in comparison with the distribution for the period 10 years after, a noticeable change was observed in seismic activity in the vicinity of the reservoir, up to a distance of 50km.

Exploring the focal depths of microseismicity, for the period 1987-2010, and for distances up to 10km around the lakes, it was revealed that 67% occurred at depths of 0-5km, 11% at depths 6-10km and 6% at depths 11-15km.

The identifiable seismicity of the region is controlled by the water level fluctuations of Polyphyto reservoir, without any clear systematic manner due to the mechanism of pore pressure diffusion via permeable fault zones, thus decreasing the effective stresses and the friction coefficient of ruptures, leading to a reduction of shear strength of faults.

The majority of microseismic activity is mainly located in the SW area of Polyphyto lake, where the faults are located with a strike almost E-W. Within this fault zone, the above mentioned mechanism may be responsible for an earlier occurrence of the Kozani 1995 earthquake, via a triggering procedure.