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Reservoir triggering seismicity in Greece: An evidence based review

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First filling and water fluctuation in artificial lakes and reservoirs are known causes of local seismicity. In Greece, 117 dams were built over the past 60 years, of which, however, only 22 have a capacity greater than 20x206cm3 and could thus affect seismicity in a meaningful way. Most of these larger dams have been constructed and operated by the Greek Public Power Corporation (PPC). The paper aims at a comprehensive review of all relevant studies, undertaken so far, and critically examines the evidence of reservoir triggering seismicity and possible accelerated earthquake occurrence provided. The main reservoirs examined include the Marathon, Kremasta, Pournari, Ilarion and Polyphyto artificial lakes, all of which have recorded seismic events associated with their filling and/or operation for the time period up to 2010. Seismic activity that correlates with maximum or minimum water level fluctuations leads to conclusions about a possible triggering seismicity due to a pore pressure diffusion (drained or un-drained response). In each case we review the cross-correlation coefficients between the reservoir levels and triggered events, and discuss the reasons for their association from an engineering geological (mechanical properties of rocks and formations) and seismological (triggered events) perspective. Our work suggests that, whilst in these cases PCC performs very well the task of hydrological and energy management of the reservoirs, it is crucially important to monitor and validate the daily seismicity at and around the artificial lakes for a better understanding of the upmost limit of triggered seismicity, and possible triggered landslides in the areas surrounding its main reservoirs.