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Seasonal trends of reservoir-triggered seismicity in Song Tranh 2 reservoir, Vietnam

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Reservoir-triggered seismicity (RTS) is the longest known anthropogenic seismicity type. It has the potential to generate seismic events of M6 and bigger. Previous studies of this phenomenon have proved that major events are triggered on preexisting major discontinuities, forced to slip by stress changes induced by water level fluctuations and/or pore-pressure changes in the rock mass in the vicinity of reservoirs. Song Tranh 2 is an artificial water reservoir located in Central Vietnam. Its main goal is back up the water for hydropower plant. High seismic activity has been observed in this area since the reservoir was first filled in 2011. The relation between water level and seismic activity in the Song Tranh area is complex, and the lack of clear correlation between water level and seismic activity has led to the conclusion that ongoing STR2 seismic activity is an example of the delayed response type of RTS. However, the first phase of the activity observed after impoundment has been deemed a rapid response type. In this work, we proved that the seismicity recorded between 2013 and 2016 manifested seasonal trends related to water level changes during wet and dry seasons. The response of activity and its delay with respect to water level changes suggest that the main triggering factor is pore pressure change due to the significant water level changes observed. A stress orientation difference between low and high water periods is also revealed. The findings indicate that water load and related pore pressure changes influence seismic activity and stress orientation in this area.

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