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SWARM-LIKE BEHAVIOR OF SHALLOW HYDRAULICALLY INDUCED SEISMICITY IN SE BRAZIL.

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We present a rare case of induced seismicity from ground hydraulic stimulation linked to the drilling of water wells in the district of Jurupema, located in the interior of the state of Sao Paulo, Southern Brazil. We analyze the seismicity in this region with temporary seismic station deployments during 2016 and 2017 for size, distribution both in time and space, and its links to the water well drilling in and around the district. The seismic activity in Jurupema exhibits a swarm-like behavior beginning during the summer of 2016, with epicenters initially located near deep (~100 m) water wells, and coincident with the rainy season in that particular region. During 2017, a similar seismic behavior was present around the same season, with epicenters migrating, but exhibiting similar nature. In a region where water wells are drilled to provide irrigation to farming areas, these are often drilled down to about 100 m depth, penetrating beyond the uppermost sandstone rock layer (~50 m) into a fractured basaltic rock layer, reaching the confined aquifer within it. While during the dry season wells are constantly pumped, during the course of the rainy season (when these are not being used), possible infiltration in the confined basaltic aquifer from both rainwater and the upper sandstone aquifer add changes to the pore pressure of the fractured rock, and modify the tectonic pre-stress conditions, facilitating stress release mechanisms in pre-existing faults and cracks. With our temporary seismic station deployments, we not only examine the seismicity in this region during both 2016 and 2017. Additionally, we compare its characteristics to the nearby Bebedouro case in a similar apparently induced seismic source and activity with magnitudes up to 2.9 occurring between 2005 and 2010.

KEY WORDS: ENVIRONMENTAL SEISMOLOGY, INDUCED SEISMICITY.