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Study of reservoir triggered seismicity at Koyna, India using a borehole seismic network.

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Reservoir triggered seismicity started at Koyna soon after the impoundment of the Shivaji Sagar Lake created by the Koyna Dam. The activity has continued till now including the largest triggered earthquake of M 6.3 in 1967; 22 earthquakes of M $\geq$ 5 and several thousands smaller earthquakes. The latest significant earthquake of ML 3.8 occurred on November 9, 2017. A network of 23 broad-band 3-component seismic stations has been operating in the vicinity of Koyna seismic zone. The absolute locations errors of earthquakes were $\sim$ 800 m. The main reason was the presence of $\sim$ 1 km thick very heterogeneous Deccan Traps cover that introduced noise and locations could not be improved. To improve the accuracy of location of earthquakes, a unique network of eight borehole seismic stations surrounding the seismicity was designed. Six of these have been installed at depths varying from 981 m to 1522 m during 2015 and 2016, well below the Deccan Traps cover. During 2017 a total of $\sim$1700 earthquakes were located. There has been a significant improvement in the location of earthquakes and the absolute errors of location have come down to $\pm$ 300 m. All earthquakes of ML $\geq$ 0.5 are now located, compared to ML $\geq$1.0 earlier. Based on seismicity and logistics, the location of the Pilot Borehole was provided. The Pilot Borehole was started in December 2016 and completed in June 2017. The borehole seismic network recorded 8 earthquakes of M$\geq$ 2.0 and 68 earthquakes of M 1.0 to 1.9 during 2016-2017 in the immediate vicinity of the Pilot Borehole.