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Volcanic tremor analysis during Merapi 2010 explosion sequences

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Merapi volcano 2010 explosions produced high amplitude seismicity and tremor for hours and destroyed several seismic stations at the summit of the volcano. We analyze seismic signals during the eruption and show that tremor frequency is related to its amplitude. Not like at Soufrières Hills volcano, Montserrat, where tremor frequency glides slowly towards higher frequencies before explosions, we observed shifting of frequencies at Merapi volcano, suggesting that the source mechanism for the tremor is different between the two volcanoes. After summit stations have been destroyed, and when amplitudes were too large, many signals were saturated during the course of the eruption. Fortunately, one station from the MIAVITA research network located at 50 km to the south of the volcano recorded nicely the largest explosions. This research station was included in the monitoring network during the large explosions on the 3rd of November, which produced pyroclastic flows up to 12 km. Amplitudes produced at the time of the 4th November explosion sequence at this station are about twice as high compared to the large amplitudes of the 3rd November explosion sequence. This observation was made first on the 4th November during the eruption on the monitoring screens, and triggered the decision to extend the evacuated zone from 15 to 20 km.