

## Some development on predicting earthquake swarms using volumetric strain records

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Off the east coast of the Izu Peninsula in Japan, there is a submarine volcanic region where earthquake swarms occur caused by magma intrusions. We investigated the background seismicity rates of the swarm activity by removing the triggering effect of aftershocks. We found that such background rate changes coincide with the changes of exponentially weighted averages of volumetric strain increments at the Higashi-Izu station. We further found that such a relationship consistently depends on the distance between the strainmeter station and the location of the swarm onset. The quantitative relationships revealed here may be used to monitor magma intrusions that drive the stress changes. The models we adopted here are purely statistical, but we added some comparisons of their performances with those by physically reasonable models.

Keywords: Earthquake swarm, Volumetric strain, Background seismicity, ETAS model