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Volcanic Activity Influenced By Tectonic Earthquakes: Static And Dynamic Stress Triggering At Mt. Merapi

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Mt. Merapi is one of the most dangerous volcanoes in Indonesia, located within the tectonically active region of south-central Java. This study investigates how Mt. Merapi affected - and was affected by - tectonic earthquakes nearby. In 2001, a Mw6.3 earthquake occurred along with an increase in fumarole temperature at Mt. Merapi. In 2006, another Mw6.3 earthquake took place, which co-occurred with an increase of magma extrusion and pyroclastic flows. Here we develop theoretical models to study the amount of stress transfer between the earthquakes and the volcano, showing that dynamic, rather than static, stress changes are likely responsible for the temporal and spatial proximity of these events. Our examination of the 2001 and 2006 events implies that volcanic activity at Mt. Merapi is influenceable by stress changes related to remote tectonic earthquakes - a finding that is important for volcano hazard assessment in this densely inhabited area.