



Magmatic or not magmatic: the 2015-2016 seismic swarm underneath the long-dormant Jailolo volcano, North Moluccas, Indonesia.

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Occurrence of seismic swarms close to volcanoes often mark the onset of volcanic unrest. Establishing whether magma movement is the driver of seismicity and the unrest can be magmatic may be challenging, as many different processes may cause a volcano-tectonic seismic swarm. The analysis of the spatio-temporal pattern of the swarm earthquake and their source mechanics and the compatibility with the volcano tectonic setting help understand the magmatic or not magmatic origin of the volcano-tectonic crisis. Here we analyse a seismic swarm that occurred in November 2015-February 2016 around Jailolo volcano, a long-dormant and poorly studied volcano located in the northern part of Halmahera island, North Moluccas, Indonesia. The swarm included four $M > 5$ events and hundreds of smaller earthquakes were felt by the population. The earthquakes clusters in a narrow strip extending 5 km E-W and migrate 20 km southward away from Jailolo volcano at a speed of around 10 km per day. The source mechanisms of the largest earthquakes show moment tensor solution with a non double-couple component as big as 50% so that the earthquakes, beside normal/oblique faulting, include a relatively large opening component. The normal faulting earthquakes do not fit with the regional strike-slip tectonic setting of the North Halmahera and the large opening component is generally associated with magmatic processes. We conclude that a dike intrusion at shallow depth is the most likely driver behind the Jailolo seismic swarm. This represents the first documented magmatic unrest in the Jailolo region and calls for a revision of the volcanic hazard at Jailolo volcano.