Threshold of static stress triggering of earthquakes for mud-volcano

a review by Dimas Sianipar (迪馬斯)

for research paper:

Marco Bonini, Maxwell L. Rudolph, Michael Manga, **Long- and short-term triggering and modulation of mud volcano eruptions by earthquakes**, In *Tectonophysics*, Volumes 672–673, 2016, Pages 190-211, ISSN 0040-1951, https://doi.org/10.1016/j.tecto.2016.01.037.

This research mainly focuses on compiling many potential triggering and modulation of mud-volcano eruptions by earthquake's static stress transfer. The difficulty of this work is how to define the feeder dyke (strike, dip=90^{o}/vertical, and respective depth) which is received permanent stress from regional earthquakes. This research used many potential of earthquake source model (both finite fault and point source model) to define the source of permanent deformation to the mud-volcano sites. The objective of this research in particular is to define the threshold of the static stress triggering of mud-volcano in comparison with dynamic stress triggering which calculated from passage seismic waves. They compiled about many cases of mud-volcano triggering and modulation from at least nine different locations over the world i.e. eruptions in Azerbaijan, Italy, Romania, Japan, Andaman Islands, Pakistan, Taiwan, Indonesia, and California. This research contains many calculations of normal (unclamping) stresses as well as volumetric strain from variations of earthquake slip to the feeder dykes. They found potential short-term triggering (responses occur within days) of static stress changes in Romania, Taiwan and Italian sites. In Pakistan, California, Andaman Islands and Niikkappu Japan mud volcanoes, they found that the corresponding discharge may be better correlated with dynamic stress transfer. The most interested finding of this research is about the potential of delayed time triggering (or long term tringgering) acted by static stress transfer on the feeder dykes of Azerbaijan's sites. In conclusion, earthquake can trigger mud-volcano immediately (short term triggering) by unclamping stresses transfer with threshold 0.1-1 bar. Other comments for this research are about the using of global assumptions of some input parameters such us crust young modulus, shear modulus and coefficient of friction as well as the assumption of an elastic medium in an approximation of real Earth will be some issues that must be addressed in future research.

Keywords: Mud volcanoes; Earthquake-triggered eruptions; Static and dynamic stresses; Short- and long term responses; Coulomb Failure Function