



A review of drilling reports from the Banjarpanji-1 well and Indonesian seismicity to assess hypotheses about the trigger of the Lusi eruption

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The cause of the Lusi mud eruption remains controversial. One hypothesis is that the eruption was triggered by the M6.3 Yogyakarta earthquake some 254 km away. The second is that the eruption was caused by drilling. We review drilling data and the daily drilling reports, which clearly confirm that the wellbore was not intact and that there was a subsurface blowout. Downhole pressure data from Lusi directly witness the birth of Lusi at the surface on the 29th of May 2006, indicating a direct connection between the well and the eruption. Furthermore, the daily drilling reports specifically state that Lusi activity was visibly altered on three separate occasions by attempts to kill the eruption by pumping dense fluid down the BJP-1 well, providing further evidence of a connection between the wellbore and Lusi. By comparison with other examples of newly initiated mud eruptions elsewhere by other earthquakes, the Yogyakarta earthquake was far away given its magnitude. The seismic energy density of the Yogyakarta earthquake was only 0.0043 J/m³, which is less than a quarter of the minimum 0.019 J/m³ seismic energy density that has ever been inferred to trigger new mud eruptions elsewhere. We show that the Lusi area had previously experienced other shallow earthquakes with similar frequencies and stronger ground shaking that did not trigger an eruption. Finally, the data from the BJP-1 well indicates that there was no prior hydrodynamic connection between deep overpressured hydrothermal fluids and the shallow Kalibeng clays, and that there was no evidence of any liquefaction or remobilization of the Kalibeng clays induced by the earthquake. We thus strongly favor initiation by drilling and not an earthquake.