Do you believe in coincidences?

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Hypotheses and drilling data interpretation

Two main Lusi hypotheses:

a) **Man-made**: data from undisclosed sources. No field data considered.

b) **Not man made**: different interpretation of drilling data that show discrepancies with datasets used by “Man-made” camp.

* It is a duty of geologists to investigate each aspect on a small and large scale to provided unbiased judgments.
The bigger picture: regional observations and the many coincidences

Field observations and geological facts in eastern Java:

a) Numerous mud volcanoes and seeps $\rightarrow$ Lusi not the only mud eruption site

b) Lusi is aligned along a major fault zone $\rightarrow$ External trigger plausible

c) Proximity to the volcanic arc $\rightarrow$ Influence of deep volcanic system?

These facts and regional observations are often neglected by people and never considered by the “man-made” camp. How do we explain the observations on a larger scale?
Mud volcanism is common in Indonesia

Mud volcanism is a very common phenomenon in Indonesia

The geological setting of Java: text book example for mud volcano formation

Has there ever been a Lusi in the past? Likely, based on geological and historical data

Mazzini et al. 2009
Lusi is located along the Watukosek Fault

**Watukosek fault hosts other mud volcanoes on NE Java**

**Geological features clearly indicate the presence of the fault**

Mazzini et al. 2009
Watukosek Fault at surface

Photo from Lusi crater: aligned
- **LUSI**
- **Watukosek escarpment**
- **Ponanggungan Volcano**

**Watukosek escarpment**

Mazzini *et al.* 2009
Watukosek Fault at depth

Seismic profiles collected during 1980’s systematically show the presence of a faulted zone both on the SW and NE of Lusi site

Mazzini et al. 2009
May 2006: many mud and gas eruptions suddenly appeared

- Sequence of eruptions oriented along a SW-NE trend
- First eruption 1200 m from drilling site

Mazzini et al. 2007
LUSI eruption sites

Eruptions follow the Watukosek fault direction (numbers refer to previous image, listed in chronological sequence)
LUSI prograding cracks after EQ

Fractures follow the Watukosek fault direction
Faulting follows the Watukosek fault direction

Mazzini et al. 2009
Intersection fault-railway

Railway movement:
- Repaired 4 times
- Total ~ 40-50 cm

GPS monitoring:
- July ~2 cm
- August 10 cm
- September 10 cm
- June ~2 cm?
- TOT: ~25 cm

Initial shearing: 15-20 cm

Mazzini et al. 2007
Collapse/new seeps following fault trend

Subsidence monitoring October-August 2006

Istadi et al. 2009
Seismic profiles from 1980’s show presence of growing diapir at Lusi site.

Typical of geological features that will manifest to the surface as mud volcanoes

→ Lusi would have erupted sooner or later

Important detail never included in previous modelling from man-made camp

Mazzini et al. 2007
Earthquake and loss of circulation at drilling site

Coincidently **partial loss of circulation after the earthquake** and **total loss of circulation following the two after shocks**

Sawolo et al. 2009
Interestingly **Wunut, Carat, Tanggulangin** gas and oil fields and the water wells close to **Gunung Anyar** report sudden pressure loss after the 27-05-2006 earthquake.

→ **Fluids flushed away from aquifer**
Increased activity of other mud volcanoes along fault after May 2006 earthquake

Coincidentally other mud volcanoes along Watukosek fault were more active after earthquake when activity started around Lusi.

Semeru + Merapi stronger activity after earthquake

Mazzini et al. 2009
Suggested scenario that explains also regional observations

Pre-existing diapir and pre-existing Watukosek fault

Reactivation of Watukosek fault after earth quake.
Draining of fluids towards faulted zone. Aligned craters along fault zone

Prominent crater cover other eruption sites

Mazzini et al. 2009
Scenario supported by modelling

Laboratory simulations with different media reveal seepage along fault zones

Numerical model show feasibility of lateral faulting as trigger for eruptions

Mazzini et al. 2009
Do you still believe in coincidences?

Too many coincidences that cannot be ascribed to the drilled well and that are systematically neglected by “man-made” camp.

However, the drilling hypothesis cannot be excluded, and the debates are continuing.

The sole drilling hypothesis cannot explain the alterations of the plumbing system at regional scale, neither to reactivate the Watukosek fault across NE of Java or many of the other geological observations.

Possible satisfactory explanation: The 27-05-2006 earthquake reactivated the pre-existing Watukosek fault.
Open questions

Why the “man-made” camp apparently decided from day 1 that the drilling triggered Lusi – without doing any field work?

The use of the media and press releases in advertising the results of the “man-made” camp. What is hidden in the mud of Lusi?

“Man-made” camp: where do they get their data from?

Natural trigger option: what is the role of the volcanic arc in all this?