



## **The mysterious Lusi eruption: the origin of water and future challenges**

Adriano Mazzini (1), Florian Scholz (2), Christian Hensen (2), Henrik Svensen (1), Sverre Planke (2,3)

(1) University of Oslo, Oslo, Norway (adriano.mazzini@fys.uio.no), (2) Geomar, Kiel, Germany, (3) VBPR, Oslo, Norway

The spectacular Lusi eruption started in northeast Java the 29 of May 2006 following to a 6.3 M earthquake striking the island. Initially, several gas and mud eruption sites suddenly appeared along a reactivated fault system and within weeks several villages were submerged by boiling mud. The most prominent eruption site was named Lusi. To date Lusi is still active and erupting gas, water, mud and clasts.

Recent gas analyses highlighted that the root of the feeder channel are as deep as 4.5 km. The results are consistent with deep sited magmatic intrusions and hydrothermal fluids, from the neighbouring Arjuno volcanic complex, responsible for the enhanced heat that altered source rocks and/or gas reservoirs.

The origin of the erupted water remained so far elusive. Here we report the results of water geochemical analyses collected during six years monitoring of Lusi site. The data are compared with samples from neighbouring mud volcanoes and hydrothermal vents; ultimately they are integrated in a regional geological and stratigraphic framework.

There are six water sources that are part of the Lusi system. These can be summarized as 1) Shallow meteoric fluids (~300 m); 2) Fluids originating from the illitization of the bluish grey clays of the upper Kaliberg Fm (up to 1.8 km); 3) Sea water fluids (the ultimate precursor to all clay dehydration fluids) entrapped during the fast burial of the upper Kaliberg Fm; 4) Fluids released from the carbonates of the Kujung-Propuh-Tuban Fm; 5) Fluids from the illitization of deeper sited (~4.5 km) Ngimbang mudstones; 6. Hydrothermal fluids related with the neighbouring Arjuno –Welirang volcanic complex.

Despite the new discoveries the Lusi eruption still hides numerous mysteries regarding the mechanisms that keep on feeding its activity and the origin of the erupted fluids. Lusi Lab is a recently fund ERC project that to perform a multidisciplinary study using Lusi as a unique natural laboratory. The project will complete regional monitoring and innovative sampling at the erupting crater to evaluate the impact that seismicity, local faulting and the neighbouring Arjuno-Welirang volcanic complex have on the long-lasting Lusi activity.