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The LUSI LAB project: a platform for multidisciplinary experimental studies

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Lusi is a spectacular mud eruption that started in northeast Java the 29 of May 2006 following a 6.3 M earthquake. Nearly eight years later Lusi is still active. The Lusi Lab is an ERC-funded project to perform multidisciplinary studies using Lusi as a natural laboratory. This represents an unprecedented opportunity to study an ongoing active high-temperature mud eruption and to evaluate the role of seismicity, local faulting and the neighbouring Arjuno-Welirang volcanic complex on the long-lasting mud eruption. A multipurpose hexacopter has been designed and constructed to access and monitor the otherwise inaccessible Lusi crater and its mud-filled outskirts. The “Lusi drone” showed to be a powerful monitoring and sampling tool duringteh fieldwork in Dec. 2013. Videos and photogrammetry were acquired with various cameras. Designed tools allow the drone to measure and log temperature and to complete remote-controlled sampling of mud, water and gas from the erupting crater. A collection of evenly spaced mud samples has been taken along a transect that extends for 1100 m outside the crater. The incubation of these will be used for geomicrobiological studies and will help to shed light on the type of the ongoing hydrocarbon generation and degradation. A network of temperature loggers deployed around the crater aims to investigate a correlation between seismic activity and temperature variation of the erupted mud. Geochemical analyses indicate that the geochemistry of the crater water represents a geochemical anomaly when comparing with both basinal brines and volcano-hosted hot springs. A combination of high temperatures in the source region and fluid-rock interactions with silicates and carbonate-rich lithologies can explain the geochemistry. This is consistent with the result of gas analyses and with a deep-seated (>4 km) source region, possibly related to the presence of hot igneous intrusions from the volcanic arc.