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## **Photogrammetry surveys and mosaic: a useful tool to monitor active zones. Applications to the Indonesian Lusi eruption site.**

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Unmanned and remotely operated aircraft showed to be an efficient and cost effective way to explore remote or extreme environments. Comparative photogrammetry studies are an efficient way to study and monitor the evolution of geologically active areas and ongoing events and are able to highlight details that are typically lost during traditional field campaigns.

The Lusi mud eruption in eastern Java (Indonesia) represents one of the most spectacular geological phenomena that is ongoing since May 2006. In the framework of the Lusi Lab project (ERC grant n° 308126) we designed and constructed a multipurpose drone to survey the eruption site. Among the numerous other payloads, the Lusi drone is equipped with Olympus EPM-2 and Go-Pro Hero3 cameras that allow the operator to collect video stills, high quality pictures and to complete photogrammetry surveys. Targeted areas have been selected for detailed studies in the 7 km<sup>2</sup> region inside the embankment that was prevent the mud burial of the settlements in the Sidoarjo Regency.

The region is characterized by the presence of the Watukosek fault zone. This strike slip system originates from the Arjuno-Welirang volcanic complex and extends to the north east of the Java Island intersecting the Lusi crater. Therefore of particular interest are the faulted surveyed areas present around the Lusi crater inside the embankment. Results reveal a surprising accuracy for the collected mosaic. Multiple surveys are able to reveal the changes and the evolution of the fault through time and to indicate more active zones. In particular this type of survey can highlight the weakness zones and is thus useful to prevent potential geohazards in the area. The poster shows the aerial survey results, including a 3d-printed slice of LuSi, obtained combining 2500 16 Mp photographs. A 3d zoomed detail is also shown, evidencing the resolution that this technique can offer.