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The carbonate deposits underneath the geysering Lusi eruption (Java, Indonesia)

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The eruption site in East Java nicknamed Lusi is an active sedimentary hosted hydrothermal system that has been active since the 29th of May 2006. The sedimentary sequences pierced by the Lusi feeder channel are brecciated and expelled at the surface as mud breccia mixed with boiling fluids. The depth of the conduit remains so far unknown as well as the age of some of the inferred stratigraphic sequences.
Over the years we documented and collected a large set of erupted clast specimens since the initiation of the eruption. Here we describe the results of foraminifera and 87Sr/86Sr dating of selected scleractinian coral fragments and carbonate clasts rich in planktonic foraminifera collected around the eruption crater site. The clasts were collected in 2006 during the early eruptive phases of Lusi. The aim of this work is to constrain the age of the components and to improve the understanding of the, so far unknown, sequence of carbonate deposits inferred in this region of Java. Kujung and Tuban are the two formations consisting of carbonates known from this region.

Based on planktonic foraminifera biostratigraphy, one group of the samples reveal to belong to the Planktonic Foraminifera Zone M5, with an age comprised between 16.29 and 15.10 Ma (Miocene, Latest Burdighalian to Langhian). The Sr isotope-based ages of clasts analysed for 87Sr/86Sr cover a larger time window spanning from Pliocene (Zanclean and Piacenzian), Miocene (Messinian) down to Oligocene (Chatian). The Pliocene and Messinian ages are unreasonably young from what is known of the local geology and one sample provided an 87Sr/86Sr age that is $\sim$8 My younger compared to that obtained from the planktonic foraminifera assemblage occurring in that sample. This suggests that this and the young samples have been contaminated by geological sediments with higher radiogenic Sr isotope composition. Therefore these samples may be ascribed to the Miocene Tuban Formation. The minimum age of 23.77 Ma obtained by 87Sr/86Sr indicates that some of the clasts can be attributed to the Upper Kujung Formation.
This dating method is an efficient tool to investigate the geometry of the eruption system and the implications of the results are multiple including the fact that a) the two Tuban and Kujung formations are overlapping at this site; b) the Lusi feeder conduit brecciated and mobilized to the surface lithologies buried as deep as possibly 3.4 km; c) since the deeper samples erupted in 2006 belong to the typically not overpressured Kujung Formation, an additional overpressure generated from deeper units (Ngimbang Fm?) would be required to force these fragments to surface.