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How to Reconstruct the landscape of Lombok Island (Indonesia) during the Kingdom of Pamatan Buried by the AD 1257 PDC Deposits of Samalas Volcano?

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The AD 1257 eruption of Samalas volcano (Lombok Island, Indonesia) is considered as one of the most powerful of the Holocene. It ejected more than 40 km3 of pyroclastic material, including a DRE volume of inland PDCs up to 16 km3. Most of these PDCs were deposited on the North, SW, and SE flanks of the Rinjani Volcanic Complex. However, the local damages of the eruption are still to be studied. There is no clue about how many people perished, but the void in the island's history during this period may be telling. Local legends ("babad") indicate that there were survivors, but the kingdom and its capital Pamatan were erased. We speculate that this ancient city and other settlements still lie buried beneath tephra deposits in several places of the island.

The objectives of our study are threefold: (i) to draw the pre-eruption shape of Lombok, including the former coastline, former valleys, and the offshore topography; (ii) to model the post-eruption landscape evolution; and (iii) to reconstruct the pre-eruptive settlements on the island.

Our methods encompass two kinds of field investigations. Inland investigations will be carried out, combining: (i) geomorphological surveys of natural outcrops along the shore and the main rivers, and on man-made outcrops from the carries; (ii) geophysical investigations will be held using geophysical sounding tools (GPR, SUPERSTING resistivimeter). Nearshore geophysical investigations will be carried out with purposive sampling method, in order to take several samples for sedimentation analysis.

Preliminary results underline that a huge volume of PDC deposits has been well-preserved from natural erosion for centuries. However, extensive mining activities since the 80's have progressively transformed the natural volcanic landscape into a man-made landscape. The drawing of the pre-eruptive paleoshore allows us to suggest suitable locations for former coastal villages and harbours.