



Regional exploration of the Nusa Tenggara Islands, Indonesia, to assess their geothermal energy potential

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The Nusa Tenggara Islands is a group of small island that are situated east of Java Island. The main islands from west to east are Bali, Lombok, Sumbawa, Sumba, Flores, Timor, Alor, and Wetar. Geodynamically, the Nusa Tenggara islands lies on part of the plate margin where the Indo-Australian plate is subducted underneath the Eurasian plate. Tectonically, the Nusa Tenggara Islands are divided into four tectono-structural units, from north to south; the Back Arc unit (Bali and Flores Sea); the Inner Arc unit which consist of volcanic islands from Bali island in the west to Wetar island to the east; the Outer Arc unit which consist of non-volcanic island of Savu, Dana, Roti, and Timor; the Fore-arc unit which consists of Lombok Basin and Savu Basin. Stratigraphically, the Nusa Tenggara islands consists of volcano-sedimentary rocks as results of the subduction, where it become younger eastward. An additional interest of Nusa Tenggara Islands lies in the transition from a subduction of the Indo-Australian oceanic crust to the west to the Australian continental plateau to the east, making the continuation of Java Trench to the east, where the Australian Continental plateau collide, unclear. As a result of the transition, the volcanic arc form a linear volcanic segment with the other volcanoes from eastern Java through central part of Flores, while from central part of Flores to the east formed an echelon structures. Moreover, the volcanic rocks along the islands show different chemical characteristics. The cessation of volcanism on Wetar and Alor Island suggests is related with the collision of Australian Continental Plateau with the Eurasian plate.

This geodynamic setting of the Nusa Tenggara Islands may provide excellent opportunities for geothermal exploration. The aim of this project, therefore, is to quantitatively assess the geothermal potential of the Nusa Tenggara Islands, focusing in particular on Flores island. Here, we report the results of the first step of the analysis which focuses on obtaining a better understanding of the tectonic setting of Flores island magmatism occurrences, and lithospheric structures, and their effect and control on magmatism for geothermal energy exploration. Available geological and geophysical data suggest that Flores can be divided into several regions that have a different geothermal signature and potential. The geothermal potential on western-half of Flores island are located on the Tertiary – Quaternary volcanism, while the eastern-half of Flores are located on the Quaternary volcanism, which are associated with faults, post-volcanic features, and caldera structures.