



Contribution ID: 203 Contribution code: PSA-27

Type: Poster

AMS Radiocarbon Dating Analysis of Charcoal Samples from Natib Volcano: Implications for Volcanic Activity and Nuclear Power Plant Siting in the Bataan Volcanic Arc, Philippines

Monday, 21 October 2024 17:35 (20 minutes)

Located within the Bataan volcanic arc of the Philippines is the potentially active Natib Volcano, situated on the western flank of Luzon Island near a decommissioned Bataan nuclear power plant (BNPP). As the Philippine government explores nuclear power as part of its energy mix, attention has shifted towards repurposing the former BNPP. However, despite its classification as potentially active, research on the volcanic activity of Natib Volcano is limited to proving the safety of BNPP rehabilitation.

This study utilizes accelerated mass spectrometry (AMS) to obtain radiocarbon age dates of charcoal samples collected on Carabao Island, approximately 55 kilometers southeast of the flank of Natib volcano, Philippines. The lithology of the island predominantly consists of volcanoclastic and clastic rocks of dacitic and andesitic compositions. The four-centimeter (4-cm) thick charcoal layer is overlain by lapilli tuff and underlain by porphyritic andesite. Geochemical analyses, focusing on the comparison of major oxides and trace elements across volcanic data sets from various sources, revealed a strong correlation of magmatic evolution processes between the volcanoclastic deposits found in the same stratigraphy as the charcoal and the volcanic materials from the Western Bataan Lineament, particularly those from Mt. Natib and Mt. Mariveles. The radiocarbon dating of charcoal fragments from this region yielded age dates of $24,565 \pm 281$ BP, $24,885 \pm 257$ BP and $22,252 \pm 218$ BP years from three samples in the area, which are tentatively calibrated to the calendar year of 26,897 \pm 302 BC (100%), 27,113 \pm 219 BC (97.8%), and 24,675 \pm 311 BC (100%), respectively. These ages supplement the previously obtained C14 age of $27,000 \pm 630$ years.

This newly determined age enhances our understanding of Mt. Natib's volcanic history and contributes to the known age of magmatism of the Bataan Volcanic Complex. The findings have implications for the potential site of nuclear power plants in the region, further confirming the status of Mt. Natib as a potentially active volcano.

Student Submission

Yes

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Session Classification: Poster Session A

