

Tracing the sources of marine tephra layers in the Philippine marginal basins

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Piston coring in the Sibuyan and Bohol seas in the Philippines recovered several marine tephra layers that may provide an archive of explosive eruptions and magmatic activities from the nearby Bicol volcanic arc. The glass fragments in these ash layers exhibit bubble-wall-type morphology typical of co-ignimbrite ash deposits, suggesting that they are primary distal deposits of explosive eruptions on land. In-situ geochemical microanalyses of the glass fragments reveal that they have compositions that form tight clusters in major element data plots, supporting their primary depositional origin. The ash layers appear to have a bimodal distribution in terms of major element geochemistry: one group having andesitic to dacitic composition (55-64 weight percent SiO₂) and the other one having rhyolitic composition (69-78 weight percent SiO₂). Small variation in major element composition is also observed within each group, especially the high-silica one. The bimodal grouping in terms of major elements is also supported by distinct trace element compositions of glass fragments in representative ash layers.

The andesitic to dacitic ash layers have compositional resemblance to the chemistry of the scoria fragments from fall and pyroclastic flow deposits from Mayon volcano, suggesting it as a possible source. There are several candidates for the sources of the rhyolitic ash layers, although most have strong geochemical affinity with the flow and fall deposits around the Irosin volcano. Iriga and Iraya volcanoes could be the other sources of some ash layers in the Bohol Sea. The persistence of rhyolitic ash layers in the cores suggests that they could be correlatable to the newly identified widespread tephra marker in the Bicol arc (Mirabueno et al., *Quat. Intl.* 2011). However, more detailed and extensive tephrochronological work is needed to establish the chronology and frequency of explosive eruption events from these volcanoes in order to assist disaster prevention planning from explosive volcanic eruptions in the future.

Keywords: Philippine volcanoes, tephrochronology, Bicol arc, Mayon Volcano, Iriga Volcano, Irosin tephra marker