IODP[3] Expedition 504S – The Volcanic Ash Record from the Ontong Java Plateau

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Abstract

The Ontong Java Plateau (OJP) is the largest oceanic plateau in the world. Collision of the OJP with a trench north of the Solomon Islands arc resulted in congested subduction, and the initiation of new subduction on the southern flank of the arc. This process is regarded as the prototypical example of subduction reversal. Plateau collision also resulted in the emplacement of basaltic and sedimentary rocks of the Malaita Terrane (Solomon Islands).

Three hypotheses for the collision have been advocated. Hypothesis 1 holds that collision occurred at ~25 Ma, shutting down subduction and accreting the Malaita Terrane. However, with no local stratigraphic signal for collision at 25 Ma, this event was described as "soft docking". Initiation of new subduction south of the arc was delayed until the late Miocene. Soft docking has since been invoked in other collisional settings, and the 25 Ma event cited as the cause of a change in Australian plate motion. Hypothesis 2 dismisses the soft docking concept and considers a latest Miocene collision. Soft docking is also dismissed by Hypothesis 3, which posits a two-stage collision involving an earlier (late Eocene) collision of a fragment rifted from OJP and a later (late Miocene) collision of the main body of OJP.

ODP drilling of the OJP carbonate sequence has recovered multiple volcanic ash layers. Ashes spanning the late Eocene to late Oligocene have been interpreted as evidence of the close approach of the OJP to the arc, supporting Hypothesis 1. No analysis of these ashes has been reported in the literature. It is unknown whether the ashes are products of arc volcanism or are derived from the Samoan hotspot. Sedimentary rocks from the Malaita Terrane contain volcaniclastic components, but these have had only limited analysis. The SPARC proposal will isotopically fingerprint the OJP ashes. These will be geochemically and geochronologically compared with volcaniclastic rocks from the Malaita Terrane (to be analysed in a parallel study) and with existing analyses from the Samoan chain.

Identifying the source of the OJP ashes will also provide data on wind directions responsible for ash transport and paleoclimatic implications. By combining this information with a broader analysis of dispersed ash and other aeolian sediments in the carbonate sequence, we will reconstruct the Eocene to Miocene history of aeolian transport to the western equatorial Pacific. The results will allow us to track the emergence and amplification of the East Asian Monsoon.

To help the IODP[3] Science Office provide the best possible support to scientists interested in joining this expedition, we invite potential applicants to complete our **Expression of Interest (EoI)** form.

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