

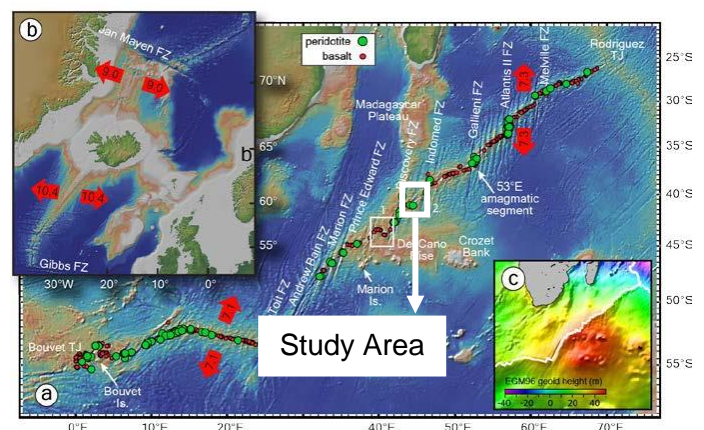
Interridge Cruise Bursary Report

Participation on a collaborative research cruise to the Marion Rise, SW Indian Ridge: The Plume-Ridge Interaction with the Marion Hotspot

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Background: This document is a written report of the participation of Gabriella Alodia, 3rd year Postgraduate Student in Marine Geophysics at the School of Earth and Environment, University of Leeds, as on-board geophysicist of the **TN365** Scientific Cruise to the **Marion Rise, SW Indian Ridge**. The participation is supported by **Interridge Cruise Bursary**. The cruise was carried out aboard the **R/V Thomas G. Thompson** of the University of Washington with 25 science days in total. Gabriella is specifically responsible in gravity data processing as well as assisting the geophysical watch-standing.

Objective: The main objective of this cruise is to test the hypothesis that the Marion Rise is isostatically supported by ancient residues of a prior mantle-melting event. It is underlain by the dredge compilation of Zhou and Dick (2013), which indicate that the Marion Rise has a largely **thin, discontinuous, and missing igneous crust**.



Study Area: **Marion Rise, South West Indian Ridge**. Due to rough weather, we only managed to survey one of the two planned study areas, i.e. the most-eastern part of the area. Picture taken from Cruise Proposal to the NSF.

Duration: At sea from 21 February to 28 March 2019. Sailing from Durban to Cape Town, South Africa.

Key Results: Gabriella, along with the other geophysical watch-standers, has processed daily **multi-beam bathymetry** data. She also specifically processed the **gravity data** from time stamping with the positioning system(s), corrections, and calculated the Free-Air Anomaly (FAA), Bouguer Anomaly (BA), and Mantle Bouguer Anomaly (MBA). Modelling of the cooling of the lithosphere was also attempted to compute the Residual Mantle Bouguer Anomaly (RMBA), which was followed by inversion to obtain the Residual Crustal Thickness (RCT). These analyses aided feature interpretation along with the magnetic anomalies data. The geophysical data processing was supervised by Maurice Tivey of WHOI. The results will be published in several papers and posters with different co-authors, as reviewed by the Chief and Co-Chief Scientists.

Outreach Involvement: Gabriella has supported the **sea-to-shore broadcasts** by making contacts to three **Indonesian schools** with varying levels of education. We carried out a 1-hour broadcast to:

- PENABUR Kota Wisata **Junior High School**, on 13 March 2019, with 160 participants;
- Tirta Marta Cinere **Elementary School**, on 22 March 2019, with 50 participants, and;

- IPEKA Tomang **High School**, on 27 March 2019, with 108 participants.

The broadcasts were made possible by Mike Cheadle of the University of Wyoming and Theresa Williams, a teacher-at-sea participant.

Partners: The main partners of this cruise are Woods Hole Oceanographic Institution (WHOI), State Key Laboratory for Marine Geology of Tongji University, China, and Leibniz University Hannover, Germany.

Initiators: The Chief Scientist of this cruise is **Henry Dick** of WHOI (hdick@whoi.edu), with Huaiyang Zhou of Tongji University and Juergen Koepke of Leibniz University Hannover as Co-Chief Scientists.

Reference: Zhou, H., & Dick, H. J. (2013). Thin crust as evidence for depleted mantle supporting the Marion Rise. *Nature*, 494(7436), 195. DOI: 10.1038/nature11842

Documentation: In order of appearance, the photos in this report are taken/provided by Joanna Hoyt (Ship Crew), Theresa Williams (Teacher-at-Sea), Dominik Mock (PhD Student, Leibniz University Hannover), and Ellen Roosen (WHOI Staff).

