



MNF Voyage Highlights and Summary

Voyage #:	IN2022_V02
Voyage title:	Sedimentation at its extreme: how powerful are submarine caldera-forming eruptions (Kermadec arc)?
Mobilisation:	Hobart, Wednesday, 9 March 2022
Depart:	Hobart, 0900 Saturday, 19 March 2022
Return:	Hobart, 1100 Tuesday, 19 April 2022
Demobilisation:	Hobart, Wednesday, 19 April 2022
Voyage Manager:	Don McKenzie, Claire Grubb
Chief Scientist:	Dr Martin Jutzeler
Affiliation:	Centre for Ore Deposit and Earth Sciences, School of Natural Sciences, University of Tasmania
Principal Investigators:	Rebecca Carey, Adam Soule, Geoffroy Lamarche, Richard Wysoczanski, Michael Manga, Steffen Kutterolf, Joanne Whittaker
Affiliation:	Centre for Ore Deposit and Earth Sciences, School of Natural Sciences, University of Tasmania

PART A – Voyage Highlights

Voyage Highlights

The Chief Scientist

Dr Martin Jutzeler is a Senior Lecturer at the Centre for Ore Deposit and Earth Sciences (CODES) at the University of Tasmania. Martin's research focusses on submarine and coastal volcanism, pumice rafts and landslides. Based on samples and data collected at sea, onland or from satellites, his research aims at reconstructing the architecture of submarine volcanoes in modern and ancient settings and improve knowledge on the dynamics of catastrophic under water events.



Title

Submarine caldera volcanism in Rangitāhua/Kermadec arc.

Purpose

This voyage was carried out in Rangitāhua/Kermadec arc, New Zealand to improve knowledge on submarine explosive volcanism. We surveyed several submarine volcanoes and their surroundings to collect data and samples that will inform on the drivers of submarine eruptions. This data will be used to study what processes are at play during transport of volcanic material on the seafloor. This scientific voyage provided exceptional data to inform on how submarine volcanoes erupt, where the produced sediments are transported, and what consequences it may have for tsunami generation.

Volcanic samples were obtained by piston coring and dredging at proximity of the target volcanoes. Further cores were collected in distant basins to reconstruct long-term volcanism in the region. We carried out seismic reflection surveys to visualise the volcanic architecture beneath the seafloor to infer on sedimentation processes. Deep-towed camera surveys provided excellent footage of deposits from the 2012 submarine eruption at Havre and informed on landslide activity in the area.

Contribution to the nation

Undersea communication cables that are essential for global trade may be ruptured by submarine volcanism. Output from this voyage will be used to model flux and maximum runout distance of submarine sediment flows.

Hard data obtained from this voyage will contribute to improve tsunami models in context where large earthquakes are not involved.

Rangitāhua/Kermadec arc will be used as a modern analogue for ore exploration in the ancient arcs that form the Australian continent. Outputs from this voyage will enhance ore recovery strategies in ancient volcanic environments that host the economic wealth of our nation.

As a result of this voyage

1. We have a better understanding of the past volcanic activity at submarine volcanoes in Rangitāhua/Kermadec arc.
2. We have found that Havre submarine volcano experienced multiple episodes of landslides, and these could be relatively recent.
3. We have mapped and sampled multiple volcanic units on the flank of submarine volcanoes and in their adjacent basins, providing an exceptional record of explosive volcanic activity in the region, including the 2012 eruption at Havre volcano.
4. We have commenced a program of research to further understand deep submarine explosive volcanism on basis of the new samples and data.

Next steps

Data from this voyage will be shared amongst our research group for facies analysis of volcanic material, chronostratigraphic reconstructions and multidisciplinary modelling of eruption, transport and tsunami dynamics. This future research will be undertaken in collaboration and consultation with Ngāti Kuri. Researchers interested in acquiring data or samples should contact Dr Martin Jutzeler directly (jutzeler@gmail.com).