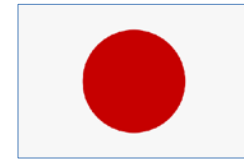


R/V SONNE CRUISE VITIAZ:

The Life Cycle of the Vitiaz-Kermadec Arc/Back Arc System: From Arc Initiation to Splitting and Back Arc Basin Formation

Proponents: K. Hoernle (PI), R. Werner (GEOMAR, Germany)



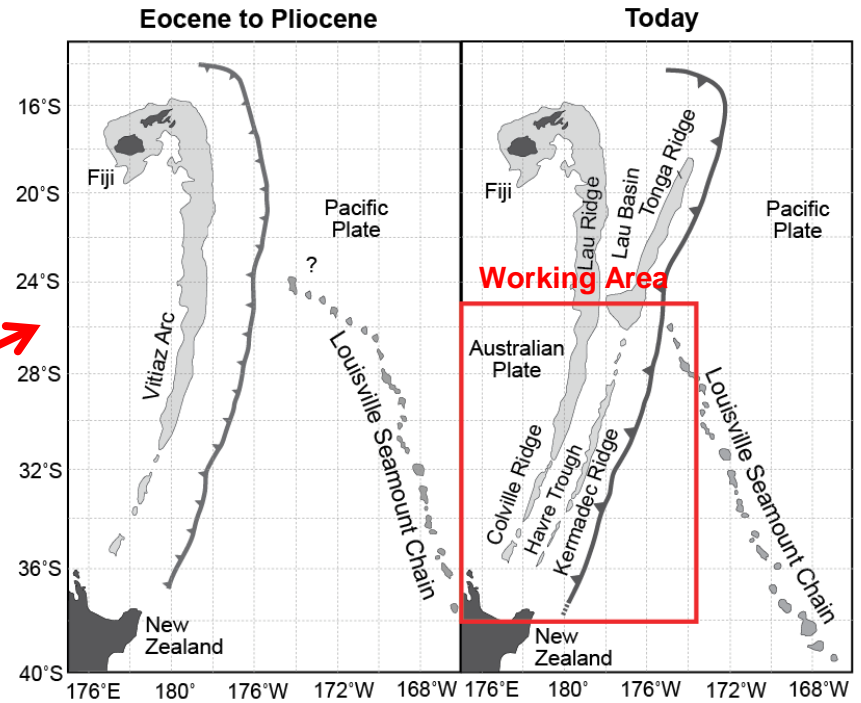
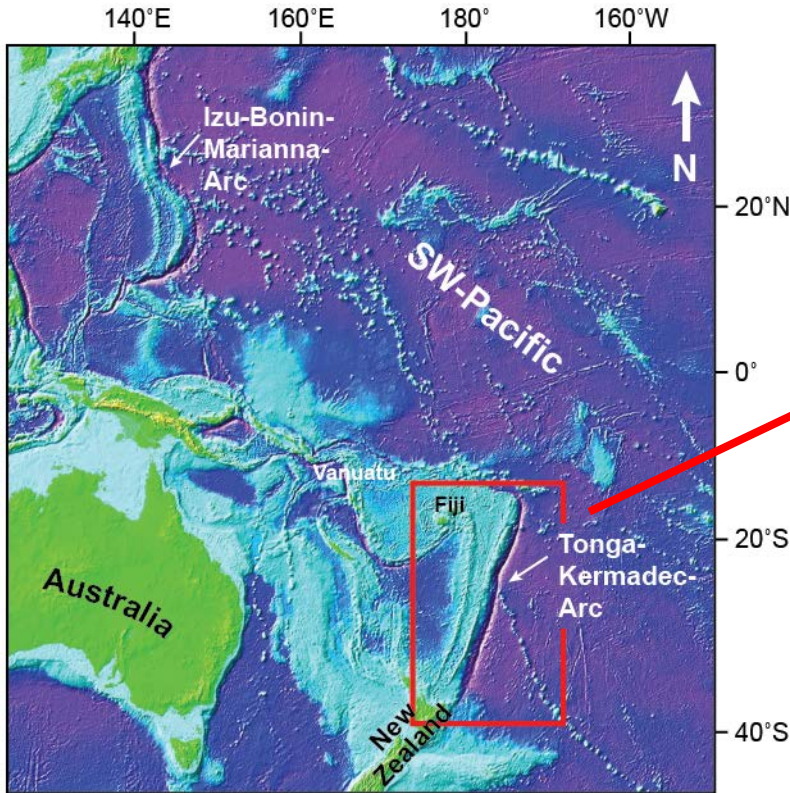
International Partner Institutes:

New Zealand: GNS; NIWA; VUW

U.S.A.: UCSC; USGS; UCSB

Japan: JAMSTEC

Project VITIAZ – Background

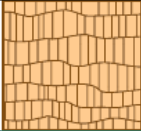

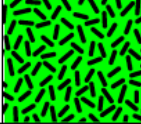
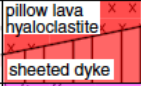





after Ruellan et al. 2003 (G3, 4), modified

Project VITIAZ – Major Goals

I. Initiation of the Vitiaz and Kermadec Arc systems:

- Did the arc initiate at c. 52-50 Ma ago during a Pacific-wide tectonic reorganization?
- Did the Vitiaz initiate through similar processes as the Izu-Bonin-Marianas system?

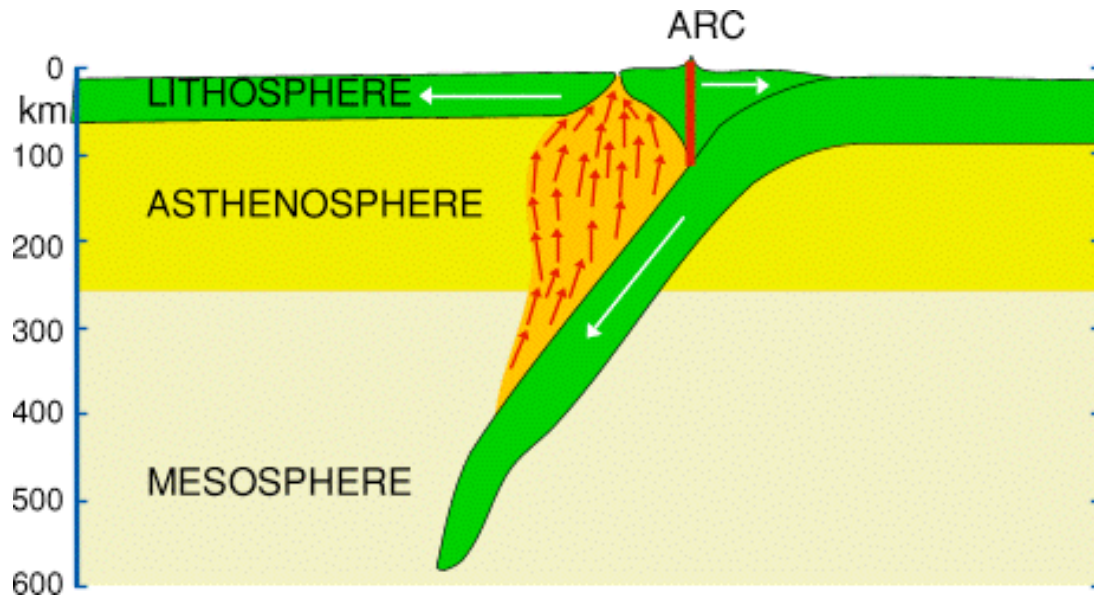
Lithology		age (Ma)	approximate depth (m)
arc tholeiites and calc-alkaline rocks		37-44	subaerially exposed
high-Mg andesite		44-45	
boninite andesite (and their differentiates)		44-48	
basalt (FAB)		50-52	5500-4760
gabbro/ Mesozoic basalt		50-52	6300
			6780
peridotite			

Bonin Ridge
fore arc sections
(Ishizuka et al., 2011)

Project VITIAZ – Major Goals

II. Temporal and geochemical evolution of the arc system:

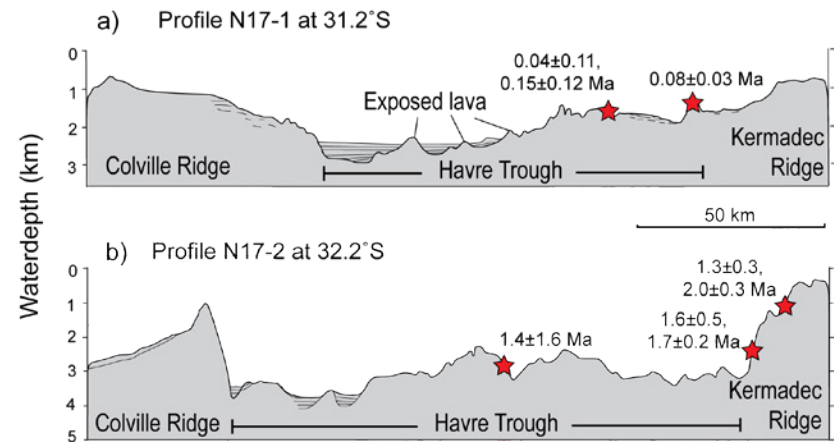
- How long did it take after arc initiation before “normal” arc-type magmas were produced?
- What are the timing and petrological and geochemical changes preceding and accompanying arc splitting?



Project VITIAZ – Major Goals

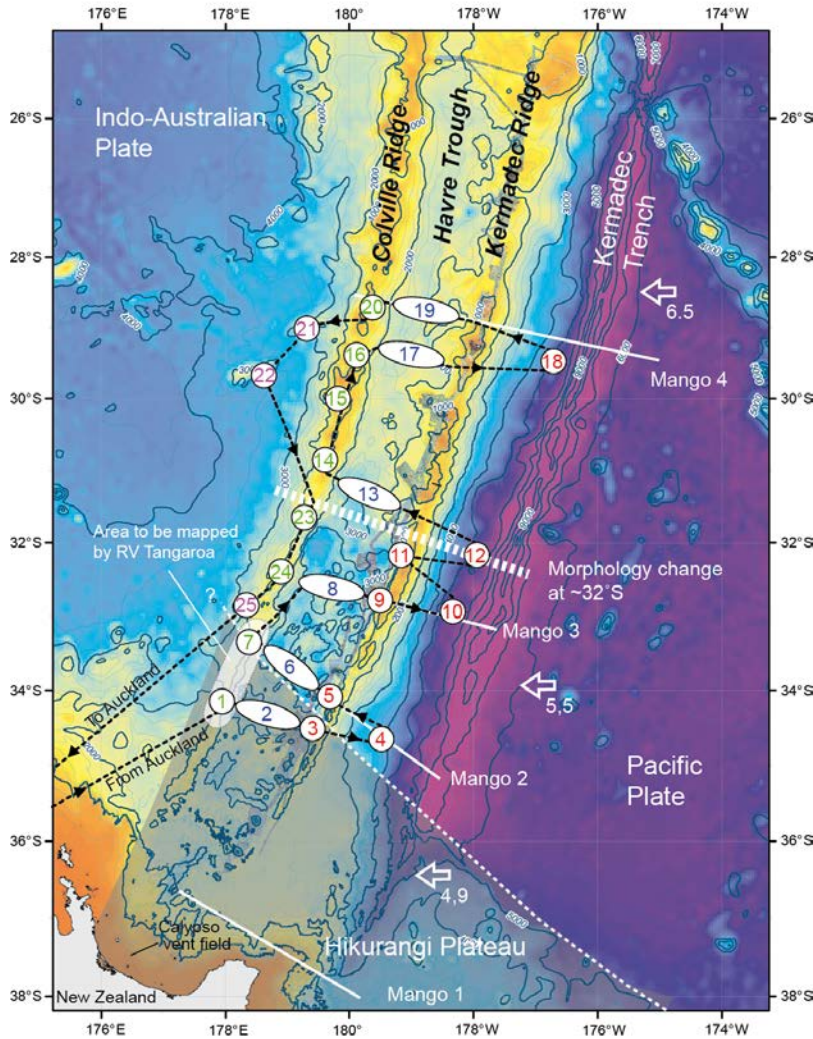
III. Transition from arc splitting to back arc basin generation :

- Ages and geochemical variability of magmatism in the Havre Trough
- What are the rifting mechanisms and how is magmatism related to rifting?
- What are the chronological and magmatic constraints on the change from corner flow (subduction) to focussed mantle flow (spreading)?
- Does the "hot fingers" model apply to volcanic structures in the Havre Trough? Slab signal in large volcanoes but absent in isolated flows.



Bathymetry and interpretation of seismic transects of R/V Aleksandr Nesmeyanov cruise (modified after Ballance et al., 1999)

Project VITIAZ – Proposed Cruise Track



Forearc and western flank of **Kermadec Ridge** (red numbers)

➤ **Arc initiation**

Colville Ridge and adjacent seamounts (green and purple numbers):

➤ **Arc evolution**

Profiles across **Havre Trough** (blue numbers):

➤ **Back arc basin formation**

Project VITIAZ – Cruise early 2016?

Methods:

To accomplish the questions we plan to use:

- Rock dredges
- Multi-beam mapping
- Sub-bottom profiling
- Magnetometer
- Gravimeter

✧ Combine new data with Mango OBS profiles and Japanese ROV dives.

Planned analyses:

- U/Pb zircon and Ar/Ar dating
- Major-trace (including volatile) element and isotope analysis (whole rock, glass, fluid inclusions)

The new "Sonne"



