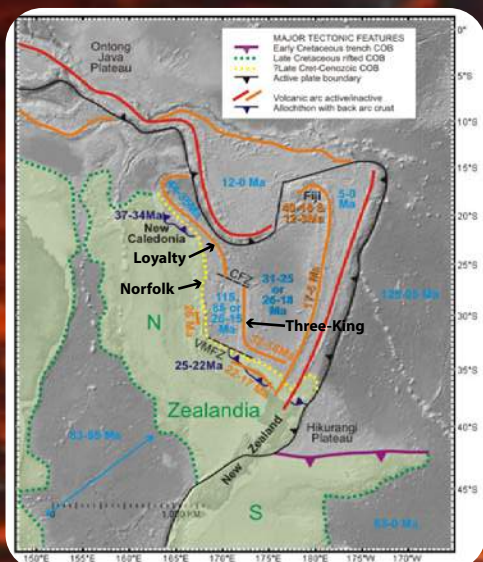




VESPA : Volcanic Evolution of South Pacific Area

22 may - 17 june 2015

N/O l'Atalante



Map of SW Pacific area, after Martin Patriat. VMFZ: Vening Meinesz Fracture Zone, CFZ : Cook Fracture Zone.

To study this former subduction zone, the VESPA cruise has taken advantage that the Cook Fracture Zone, an early Miocene transform fault, cuts across the Loyalty and Three-King ridges. This allowed us to dredge deep parts of a structure which is usually overlaying by a thick sediment layer.

Boninites, andesites and shoshonites are of great use to determine the arc polarity of these ridges and both with geophysic methods we will be able to :

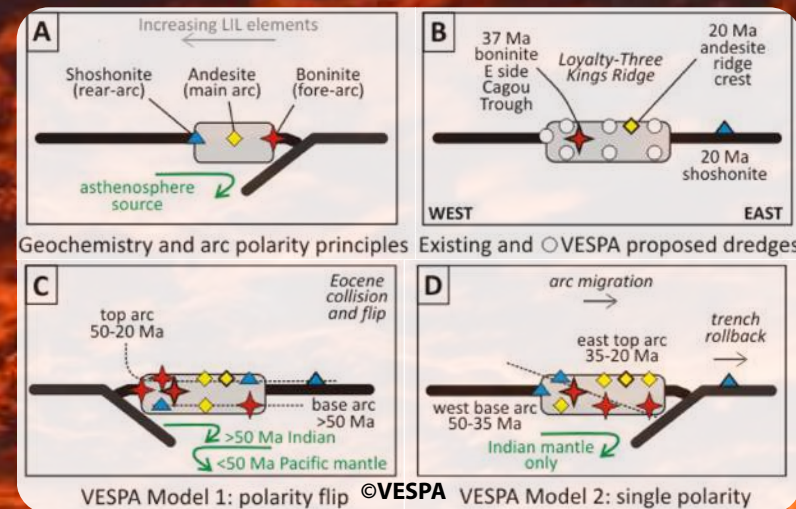
- 1) Establish the age of subduction initiation
- 2) Resolve conflicting model of South Pacific volcanic arc evolution, especially between a Cenozoic subduction flip and arc collision model versus a simple Pacific trench roll-back.



Route map of the ship between New-Calédonia and New-Zealand.

Geochemical investigations on rock dredged:

- Geochemical data using Ar/Ar and U/Pb techniques and micropaleontological data in order to date the formation of the ridge and to know if several volcanic arcs exist.
- Sr, Nd, Pb and Hf isotopic data on volcanic rocks to characterize the mantle source beneath ridges.



VESPA Model 1: polarity flip ©VESPA VESPA Model 2: single polarity

Geochemical tests of arc polarity and subduction flip :

- A) Theoretical case. B) Previous dredge sampling. C) Case with a pre-50-Ma history. D) Case with an arc entirely younger than 50Ma.

During the cruise the scientific team has aquired :

3.5 tonnes of rocks from 43 dredge sites,

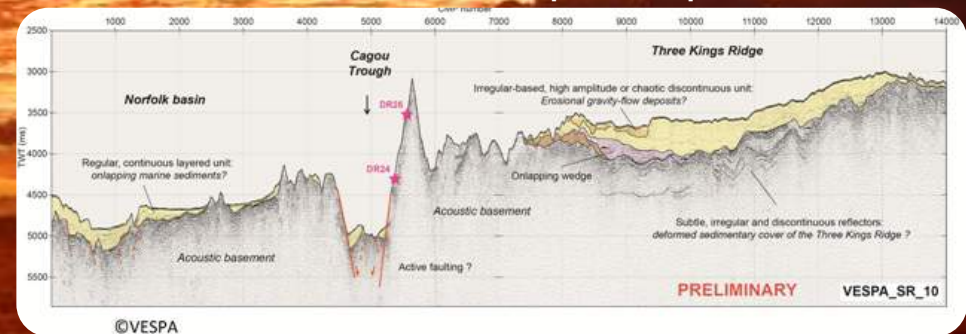
A huge quantity of maps using multibeam echosounders, Seismic reflexion profiles using a Sub-bottom profiler (CHIRP) and a rapid seismic profiler (SISRAP).



VESPA team on the deck of l'Atalante

Many thanks to InterRidge for providing this opportunity to participate in this cruise, and to Martin Patriat and Nick Mortimer (chief and co-chief) for this successful scientific mission.

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Example of a volcanic polymictic breccia dredged at around 3000m below seafloor, DR026.



Hornblende crystals will be used in order to date rocks.