

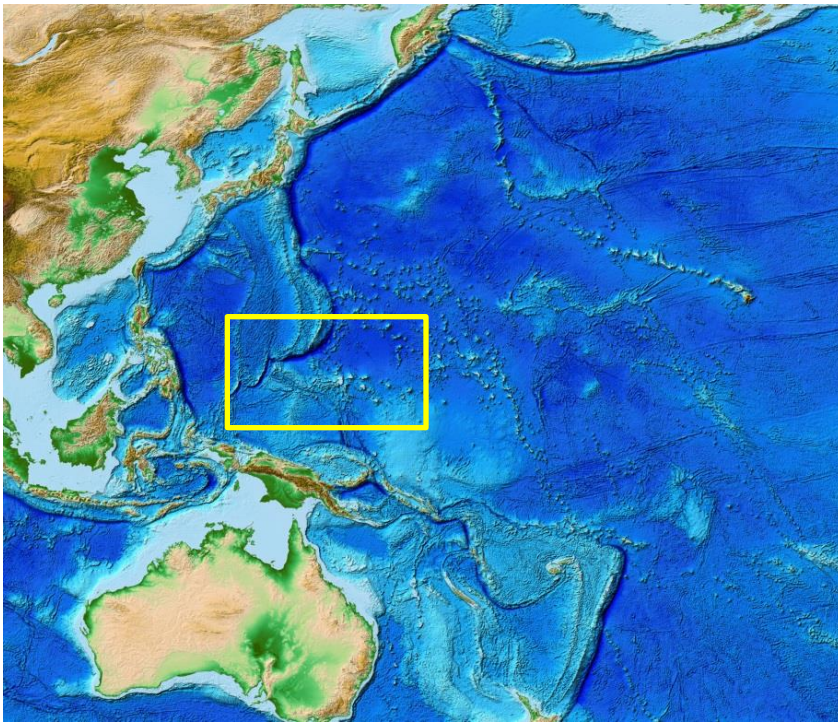


Origin of the Caroline mantle plume and its interaction with the Caroline basin

Guoliang Zhang

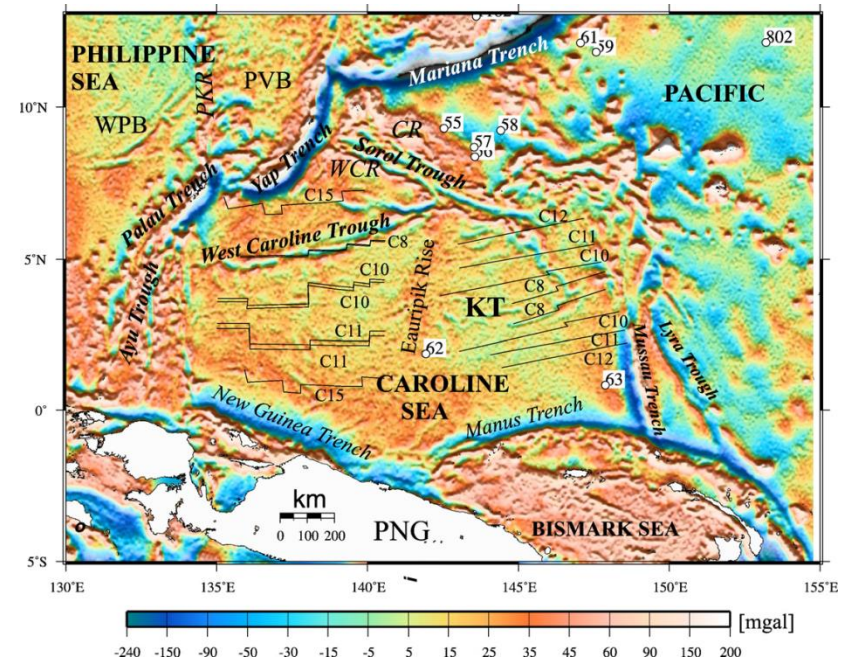
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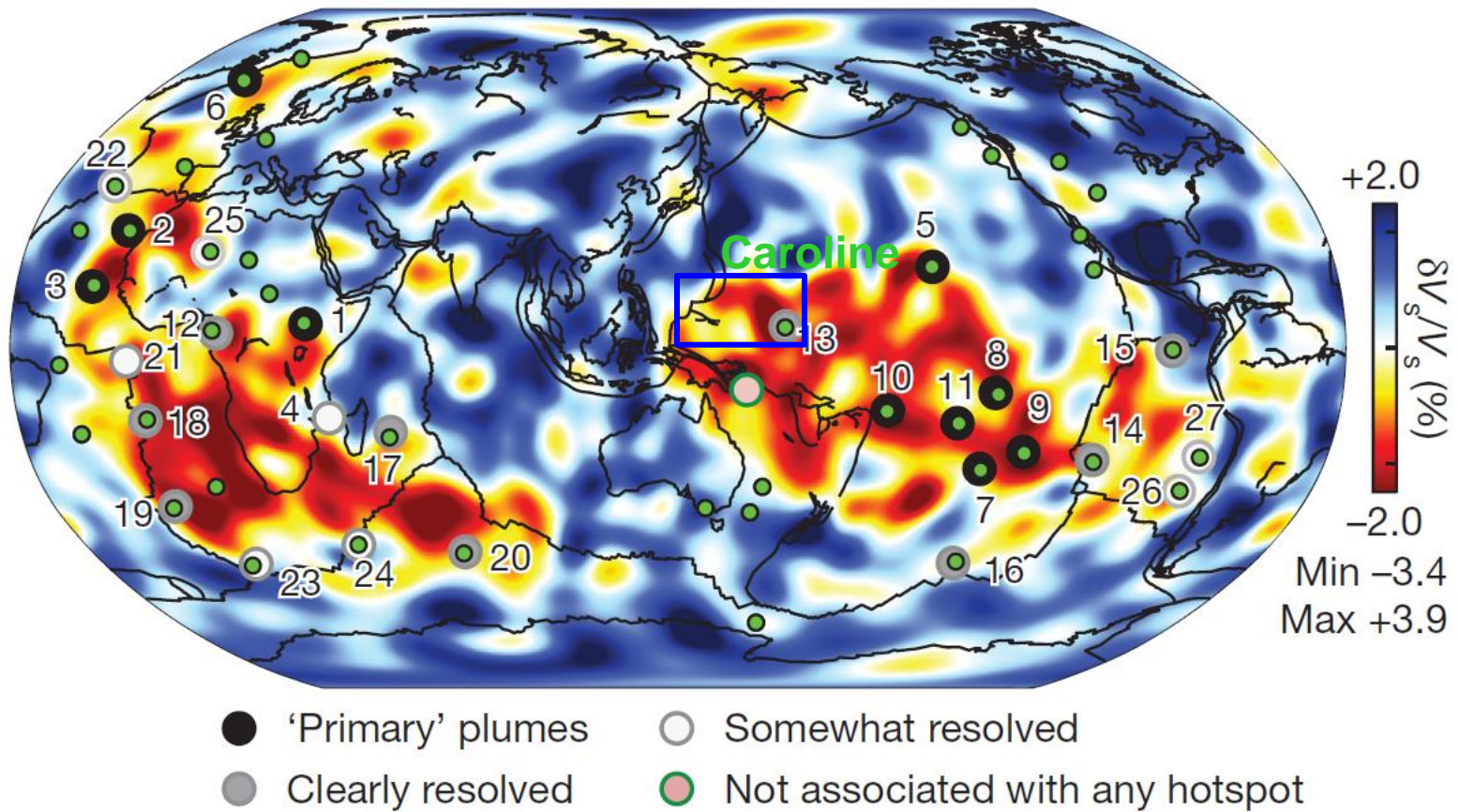
The Caroline basin was formed between 35-25 Ma.

It has long been unclear on the nature of the western Caroline Ridge and the East Caroline Ridge.



Gaina and Muller, 2007

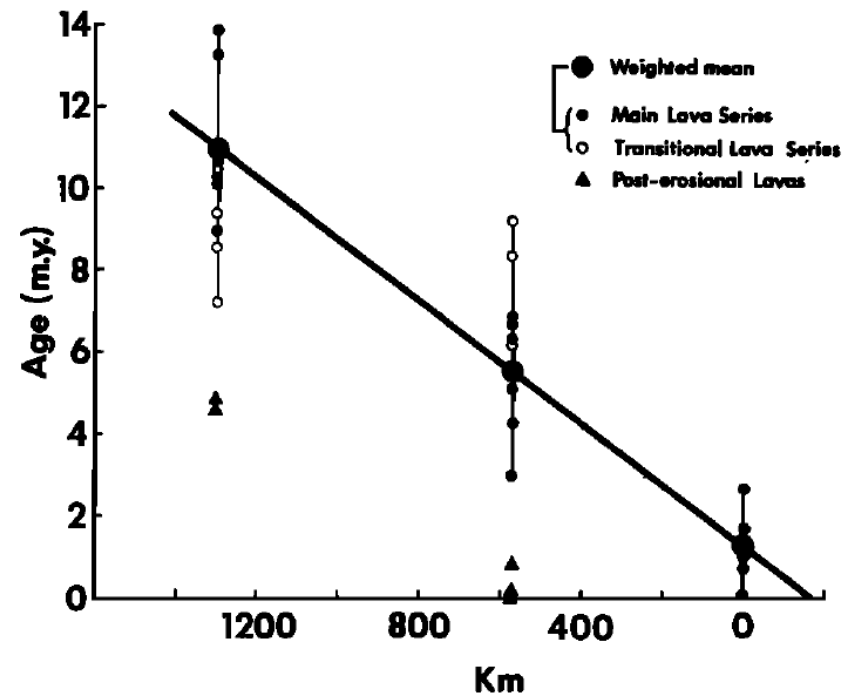
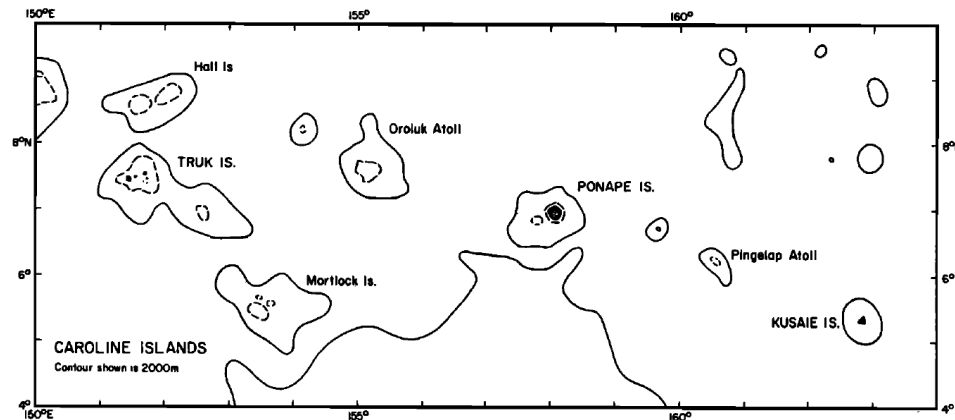
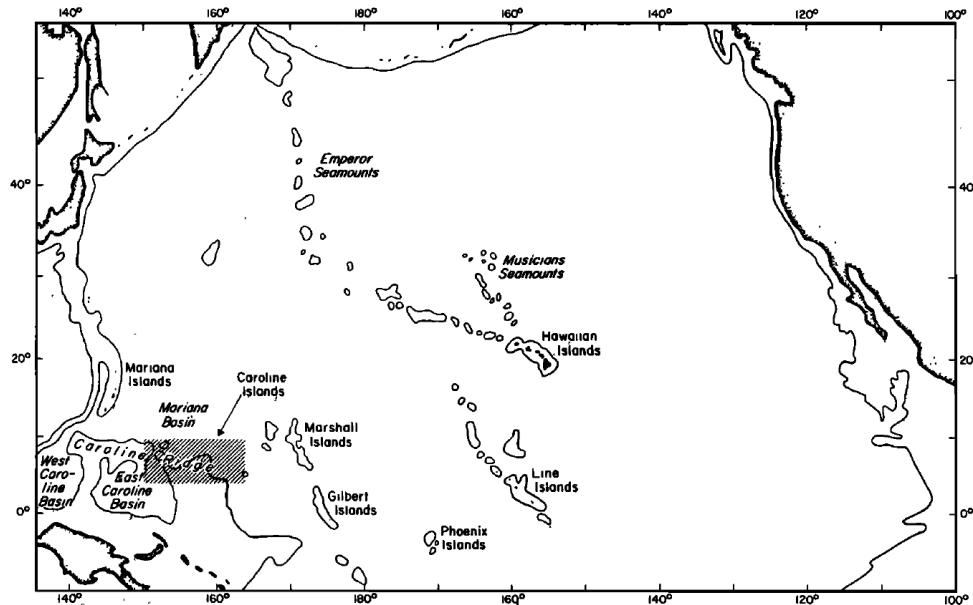
SEMUCB-WM1 at 2,800-km depth



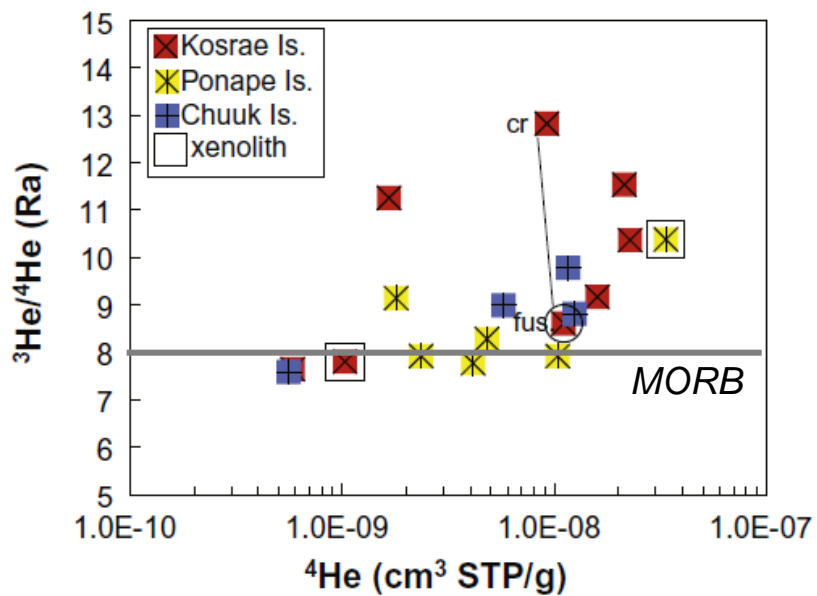
French and Romanowicz, 2015 (Nature)

Evidence for a Hot Spot Origin of the Caroline Islands

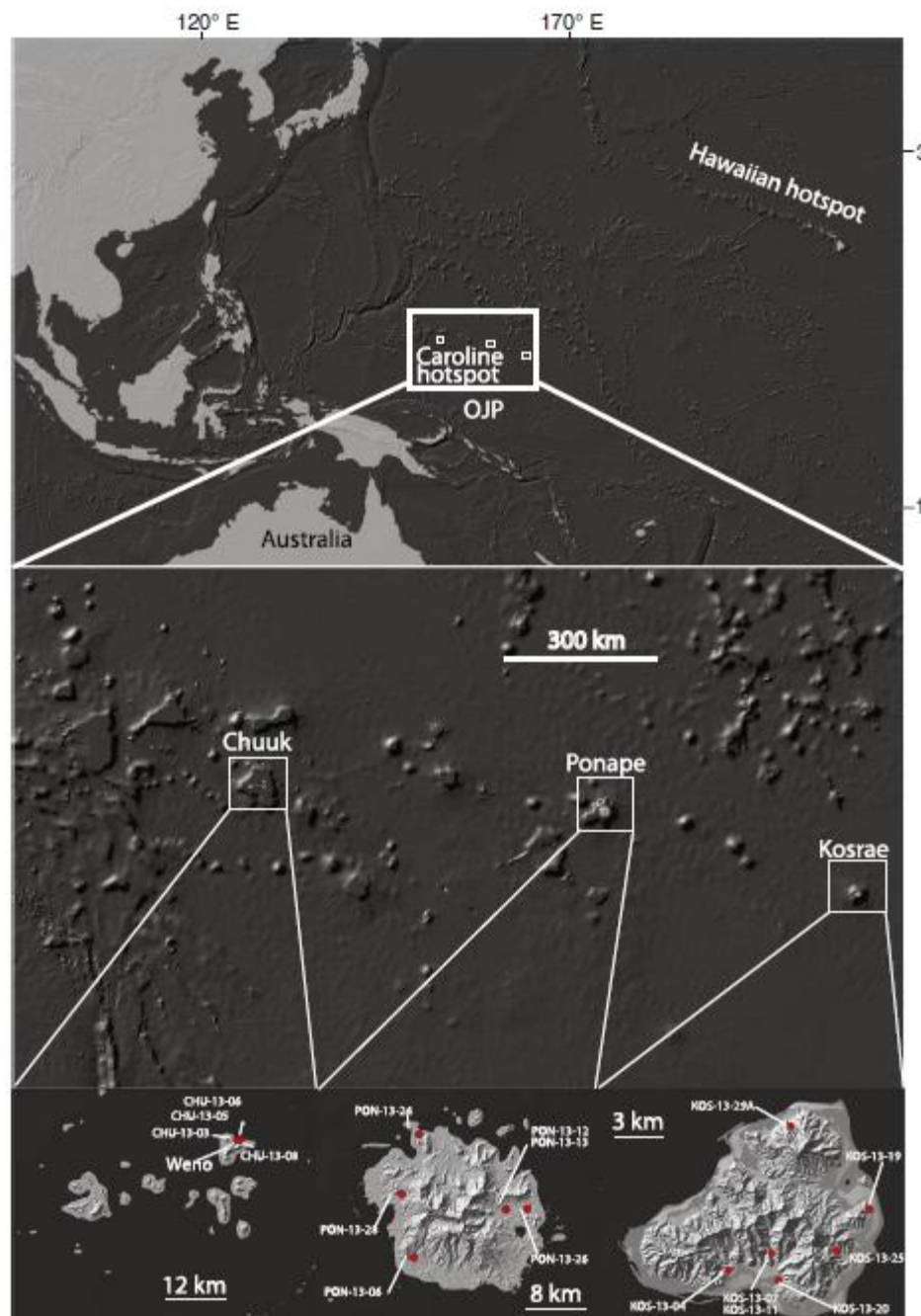
B. H. KEATING, D. P. MATTEY,¹ C. E. HELSLEY, J. J. NAUGHTON, AND D. EPP

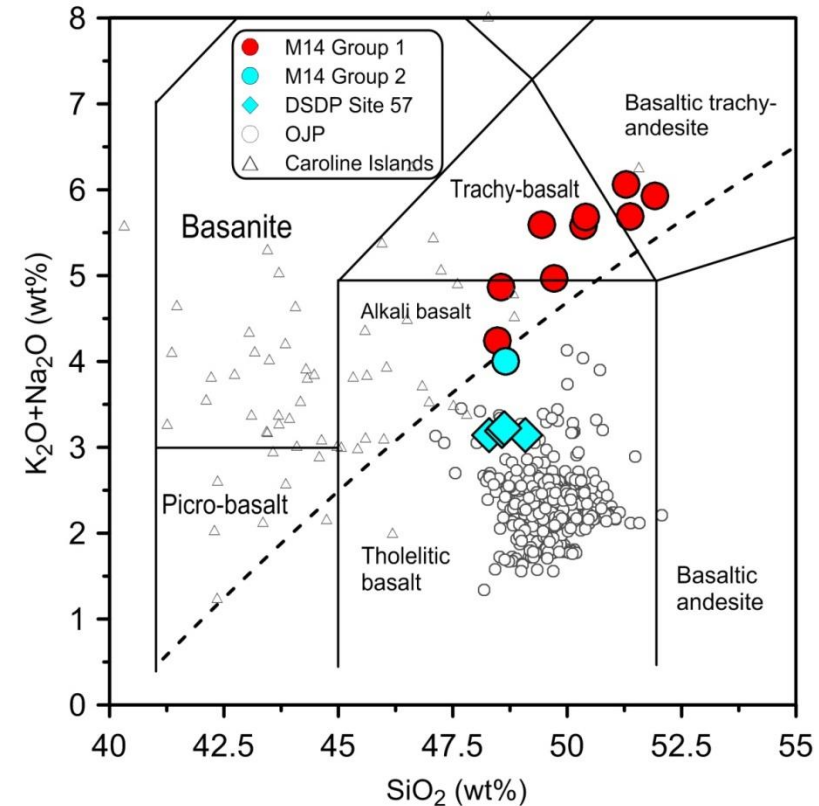
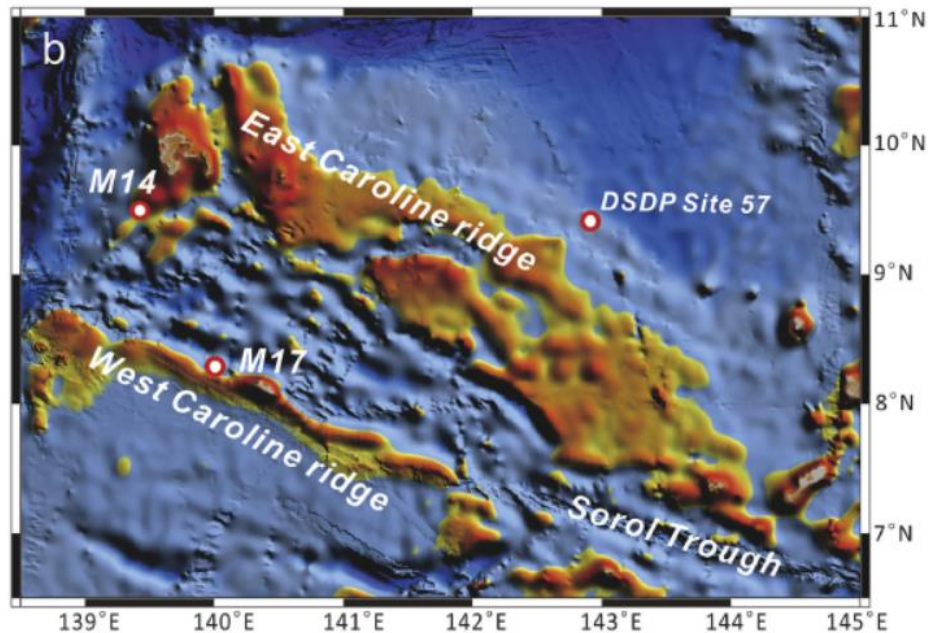
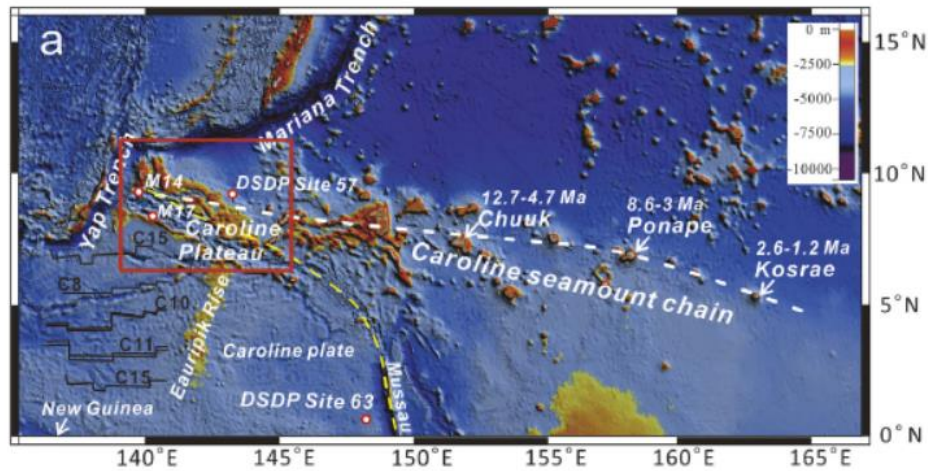


Keating et al., 1984



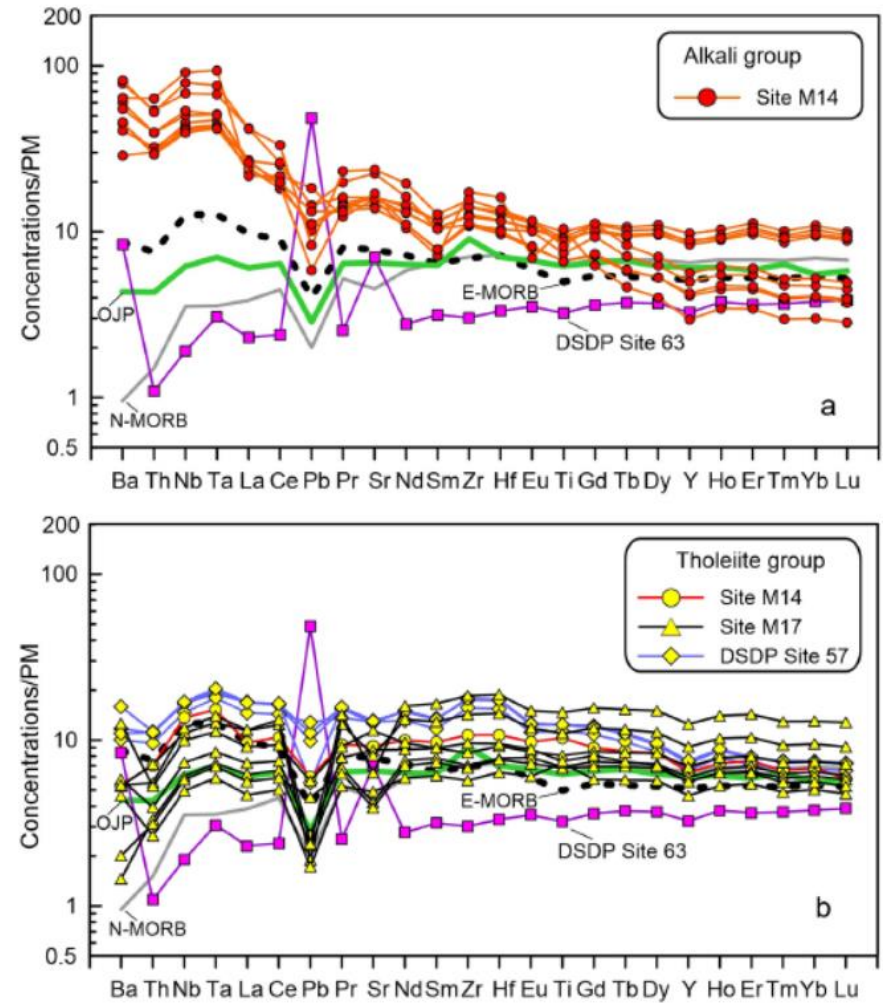
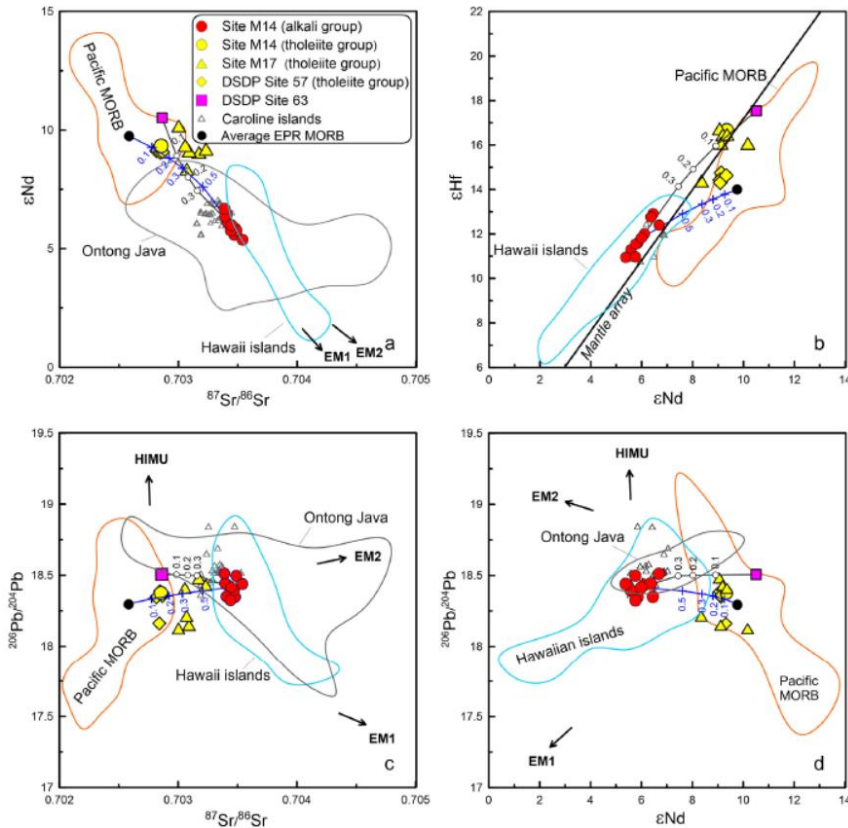
Jackson G. M. et al., 2017





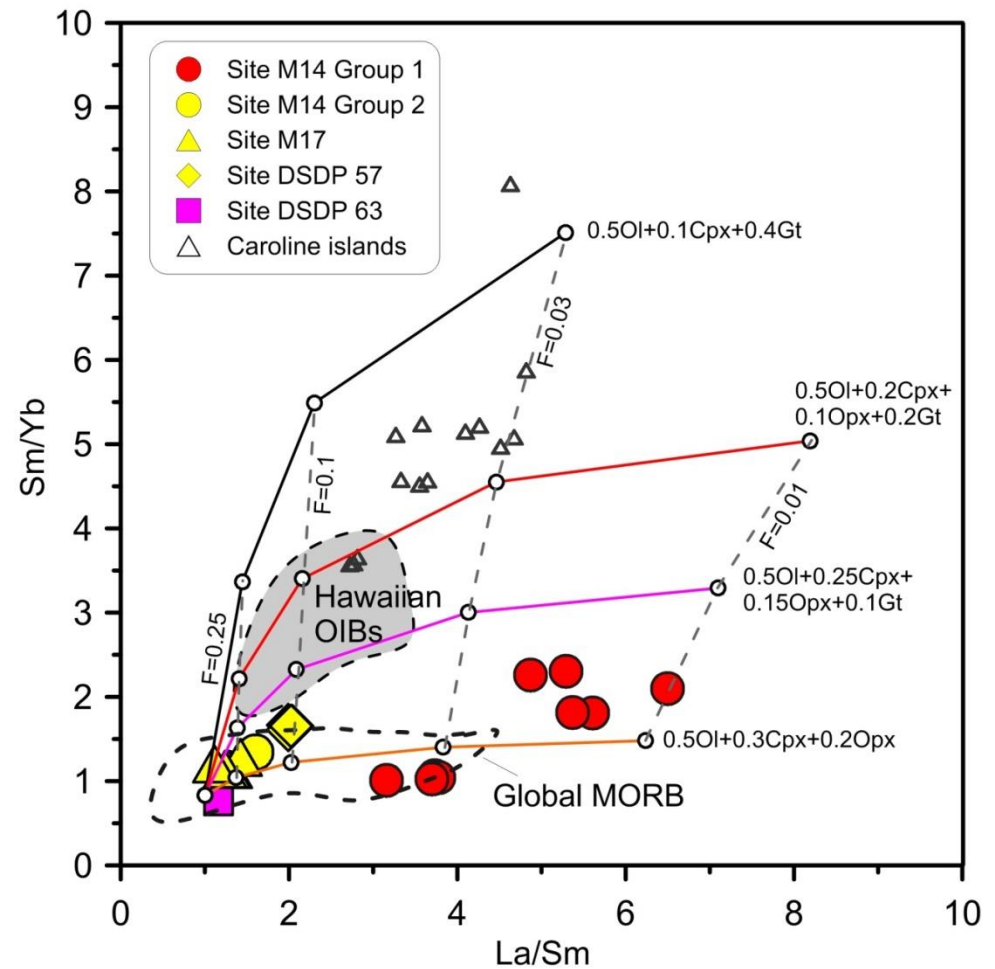
We obtained basalt samples from Sites M14 and M17, including both alkali and tholeiitic basalt rocks.

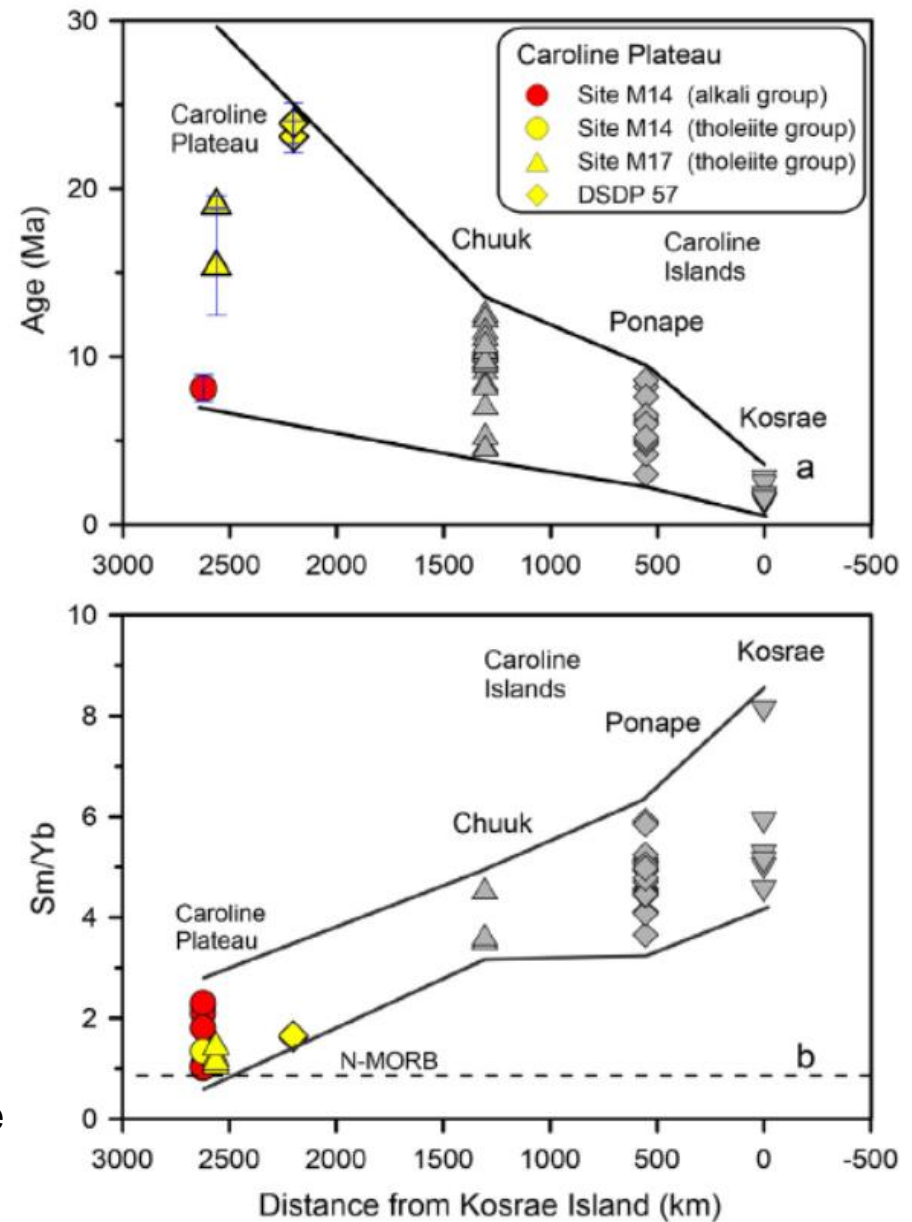
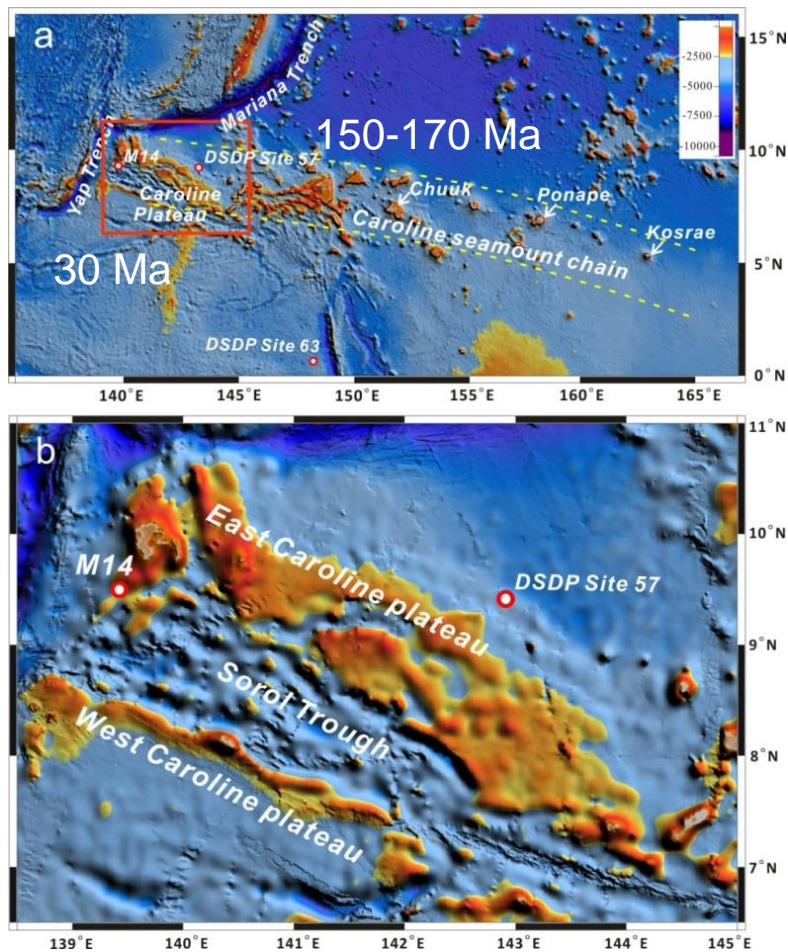
- ◆ Basalts of Site M14 are typical alkali oceanic island basalts;
- ◆ Basalts of Site M17 are similar to Ontong Java basalts with depleted isotope compositions.



Site M14 basalts are overlapped in isotopic compositions with those of the Caroline Islands, indicating a common origin.

We suggest the relatively low Sm/Yb ratios were derived from a weak effect of residual garnet in the mantle, which suggests formation of the Caroline plateau under a thin lithosphere. This is consistent with the formation of the Caroline plateau near the spreading center of the young west Caroline basin.





The tectonic reconstruction of plates, age propagation of Caroline volcanic system, and the consistent geochemistry of the Caroline volcanic rocks all suggest an origin of the Caroline plateau/seamount chain from the common Caroline hotspot.



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Geochemical and chronological constraints on the mantle plume origin of the Caroline Plateau



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Thanks!



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