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南鳥島周辺海域のプチスポット
New insights into the oceanic lithosphere from petit-spot around the Marcus Island

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Petit-spot volcanoes on the subducting NW Pacific Plate off the Japan Trench formed from melt that originated in the asthenosphere and ascended within a zone of concave flexure in the outer rise. Such tiny volcanoes are likely to be ubiquitous in such zones of plate flexure and have recently been reported from the oceanward slope of the Tonga, Chile, and Java trenches. They may also commonly occur in other settings, as similar volcanoes have been reported from the extensional Basin and Range province in North America, and from south of Greenland. It is therefore important to search for other examples of petit-spot volcanoes because they help us to address some important first-order questions about zones of lithospheric flexure.

Clusters of small conical volcanoes occur in the area southeast of Marcus Island, as inferred from precise bathymetric data acquired by the Japan Coast Guard. Most of the cones in the clusters are ∼100 m high and ⟨10 km across. Their morphologies are similar to those of petit-spot volcanoes. A search for petit-spot volcanoes around Marcus Island was conducted in May 2010 by the R/V *Yokosuka* of JAMSTEC (cruise YK10-05), carrying the submersible *Shinkai6500*. A young volcano was observed southeast of Marcus Island, contradicting the assumption that Cretaceous seamounts only occur on the Jurassic Pacific plate. The occurrence of highly vesicular alkaline lavas indicates that petit-spot volcanic activity is ubiquitous on the oldest oceanic plate as well. The morphologies of the lava flows in the area southeast of Marcus Island are different to those of flows in the NW Pacific, indicating a low-viscosity magma. The eruption setting in the area southeast of Marcus Island is unusual because the site is located far from any trench. An as-yet unknown origin of petit-spot melt ascending through the lithosphere might be identified via studies of the oldest oceanic crust in the world ′ s oceans.

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