Mariana forearc serpentine seamounts -their morphologic comparison-

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The review of geophysical parameters, morphology, collected rocks and submersible observations of the Izu-Bonin-Mariana forearc serpentine seamounts were examined. The activity of serpentine seamount between Izu-Bonin and Mariana forearc differs so much depending on the arc activity, crustal thickness and other geophysical parameters along the arc. Four notable features at the forearc serpentine seamounts are, serpentine mud flows, huge peridotite blocks, carbonate chimneys, and chemosynthetic animal communities.

Serpentine flows

Serpentine flows are of muddy sediments composing chiefly of serpentine minerals, which are the characteristic sediments on the serpentine seamount edifice. The seamounts consist of the repeated eruption of fluidal flows at the summit area. A single serpentine mud flow forms small lobate structure and forms small bank and flows far away from the vent at the summit. However it is no more fluidal but is semi-consolidated. These sediments include many large black blocks in it. Most of the blocks are serpentinized peridotites and many exotic clasts and minerals characteristic to high pressure /low temperature type of metamorphic minerals such as glaucophane, lawsonite are commonly found from the matrix of serpentine flows. The jadeite plus quartz mineral assemblages are also found from small fragments of metabasalts in the serpentine flows. These rocks and minerals suggest the origin of serpentine flows to be deeper than 20 km in the subduction zone.

Large exotic blocks

The maximum size of the large exotic blocks is several meters in diameter and mostly composed of serpentinized peridotite. These blocks always enclosed by soft serpentine matrix suggesting density paradox. If serpentine flow was originated at the depths of 20 km and rise by diapiric uplift, the contrast of the density that is peridotite and serpentine will be 3.2 and 2.5 respectively. These two things were uplifted simultaneously by diapir dense peridotite will be left at the deeper part of the subduction zone. However these tow things flows on the surface together. This suggest the very fast rising of serpentine mud with dense blocks like diamond pipes. We suggest the important role of gases, CH4 for example.

Carbonate chimneys

At the summit of Conical, South Chamorro and Pacman seamounts many white pillar like structures are found. These are carbonate chimneys consisting of calcite, aragonite and silica minerals. Some chimneys exceed two meter high and one meter thick. The origin of these chimneys is oxidation of CH4 at the shallower part of the serpentine seamount.

Chemosynthetic animal community

Chemosynthetic animal communities were found at the southern Chamorro seamount 60 miles east off Guam Island. The community consists of two types of clams, snails, galateas and various types of bacteria. In case of Chamorro clams are fed by both CH4 and H2S which will be originated under the deeper part of the subduction zone.