Discovery of hydrothermal ventsistem and iron-oxide precipitation in the Satsuma Iwo-jima Island, Kagoshima, Japan

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The Nagahama Bay of the Satsuma Iwo-Jima island is characteristically brownish-red in color, due to suspended fine particles of Fe-oxides that formed upon mixing of Fe-rich hydrothermal fluids with oxygenated seawater. Such coloring is also supported by the shape of the bay, where direct input of open ocean water is rather restricted. Thick sediments of Fe-oxides develop at the bottom of the bay. Mechanism of such sedimentation of Fe-oxides is potentially similar to that for Precambrian Banded Iron Formations (BIFs). In order to obtain insight into the precipitation mechanism of Fe-oxides in marine environments influenced by submarine hydrothermal activity, we started strategic research project utilizing newly developed *in situ* monitoring system combined with conventional geochemical methods.

We discovered Fe-oxide chimneys and mounds that develops at 3˜5m depth in the E site of the bay. The mounds is 1m-high and box-shaped, and has many small Fe-oxide chimneys (1-3cm in diameter) at its surface. The chimney and mounds consists of soft Fe-oxides and sands with plant leaves. Under the SEM-EDS observation, the Fe-oxides contain numerous micrometer-sized fibrous materials that could be plant fibers and/or bacteria.

The W site is covered by 1˜1.5m-thick Fe-oxide-rich muddy sediments. Observations by diving and long-term records by submersed camera suggest that sedimentation occurs during low-tide and quiescent periods. Surface mud (10˜20cm thick) is easily resuspended by strong waves.

The 85.5cm-long core at the W site, recovered by diving, contains reddish Fe-oxide mud and white-gray volcanic tuffs. Several cm-thick banding within the reddish Fe-oxide mud is related to the volcanic activity (of the Satsuma-Iwo Dake) and/or mudflows by strong storm activity in this area. The reddish Fe-oxide mud unit contains narrow banding of organic-rich layers.

These results may put some constraints on the mechanisms of Fe-oxide precipitation for BIFs, although there are many distinct differences between siliceous clastics (clays) and Fe-oxides dominated Nagahama Bay sediments and chemical sediments (pure SiO2-Fe2O3-Fe3O4 system) dominated Precambrian BIFs.