Precipitation environment of iron hydroxide in Nagahama Bay in Satsuma Iwo-jima

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Satsuma Iwo-jima is located about 38 km south of the southern end of the Satsuma Peninsula and at the northwest edge of the Kikai caldera. The weakly acidic hot spring containing rich mineral gush out in Ngahama Bay in this island. Because of mixing this hot spring water and seawater, it around this island discolors reddish brown to white (Shikaura and Tazaki 2001). Iron hydroxide precipitation in Nagahama Bay is influenced by wind direction, wind velocity and tide. And precipitation speed and deposition rate are very fast because this Bay is semi-closed environment (Ninomiya and Kiyokawa 2009, Ueshiba and Kiyokawa 2012, Kiyokawa et al,.2015). In this study, we estimated the sedimentation rate from sediment trap which was put in Nagahama Bay before 2009. And differences in seasonal of iron hydroxide precipitation environment were investigated from the sea water quality measurement. For that purpose, the following observations and measurements were conducted.
Trap analysis: Since 2009, an acrylic pipe with a length of 1 m as a sediment trap was put on the seafloor of Nagahama Bay. There are 36 traps (13 traps were cut, 23 traps were not cut) that raised from Nagahama Bay until 2017. And CT scan, stratigraphic description, particle size analysis and electron microscope observation were conducted. Sea surface observation (Riku-view), Sea floor observation (Oguri-view): To observe color change of the sea surface in the Nagahama Bay, we were taken photo at three places: Misaki Bridge, Koibito Misaki, and Heikejo. To observe the color change in the sea floor of the Nagahama Bay, we were put on under water camera there. And we observed hydrothermal activity, the precipitation of iron hydroxide and the sea surface of the sea seafloor from these data. These photos were taken five minutes intervals. Sea Water Quality Survey: To investigate changes in seawater environment, we measured sea water quality at two locations on the E-site from December 9th to 14th in 2017. It was three times a day when tidal changes.

Result
Observation of traps, we divided into four parts from the appearance of color and sediment. First, red brown part. Second, black part. Third, ocher color part. Fourth, Mixed part of black and ocher color. In the CT image observed striped layers of several mm to several cm. And the color density of the CT image was changed by the difference in color of trap. The mixed part of black and ocher color of trap was observed a structure with a hole in the CT image. Turbidity changed within the range of 30 to 100UTN. The pH decreased from the seafloor to the sea surface in the range of 7.0 to 8.0. The temperature increased from the seafloor to the sea surface in the range of 21 to 23 degrees. We observed two changes. First, the pH suddenly changes the sea surface about 0.1 to 0.5. Second, the pH gradually decreases from the sea floor to the sea surface, the pH rises sharply as much as 0.2 at 3 m depth. It was also observed the temperature rose about 0.5 degrees. Sea surface could observe long-term from several weeks to several months. We were able to confirm reddish brown color flowing out to the open ocean and staying in the bay. Seafloor could be taken for several days between May and September.

Conclusion
There is a difference between trap photos and CT images. Mixed part of black and ocher color in trap photos are observed few holes in CT images. It may be organisms such as bacteria. Comparing the traps, it

found that there was about 193 cm of sediment about seven years. As a result, the precipitation speed is about 29 cm / year that speed is a fast deposition rate. Water quality measurements sometimes showed irregular behaviors about water temperature and pH. because of gust of wind, these changes occurred.

Keywords: Satuma Iwo-Jima Island, Deposition of iron hydroxide

