Manganese Crusts with Super Smooth Surface (3S Manganese Crusts) observed at Takuyo No.3 Seamount, Northwest Pacific

*Masaki Saito[1], Takashi Ito[2]

1. Graduate School of Education,Ibaraki University, 2. Department of Education,Ibaraki University

During the research cruises, JAMSTEC KR17-07C and KR 18-11C, the detailed observations based on ROV "Kaiko" revealed that the manganese crusts with several cm order of Mn oxide layer in thickness spread over in the northern ridge of Takuyo No.3 Seamount. In addition, the crusts having super smooth surfaces (3S crusts) were also observed. In general, the surface structure of marine manganese oxide has been classified into two types, s (smooth) and r (rough). However, the smooth surface observed this time is obviously different from the common s type surface structure, and there is a possibility that a new classification in the manganese oxide surface is required.

In this study, the characteristics of the distribution of the 3S manganese crusts and the surface structure were examined preliminary. For examining the characteristics of the distribution, the image data taken with a digital still camera mounted on ROV "Kaiko" Mk - IV was used. These images were taken randomly by onboard operators during each dive. We checked the images one by one and counted the images showing the 3S crusts. Also, the distribution frequency (shots/min.) of the 3S crusts was measured.

As a result of the image analysis, it is clear that the distribution of the 3S crusts at Takuyo No.3 seamount has water depth dependence. The main distribution area of the 3S crusts is between 1400 - 1600m in water depth. The super smooth surface did not spread over the entire surface of each crust but was found on the edges of the side surface of the crusts mainly.

SEM observation of the samples showed a clear difference between the 3S crusts and common s type surfaces. The surface of the super smooth surface was literally extremely smooth even at the level of SEM observation, but it was also confirmed that there were many scratches of several tens of microns in length. This scratches appeared not only in one direction but also in random distribution. We have the plan to clarify the formation process of super smooth surface based on mineral and chemical compositions and micro CT observations in addition to further SEM observations.

Keywords: manganese crusts, Takuyo No.3 Seamount, Super Smooth Surface, 3S Manganese Crusts

