Formation process of different types of manganese nodules collected on seamounts in the Northeast Pacific

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Manganese nodules are a low-grade large-scale deposit that are situated on the seabed, and future development is expected. However, the etiology is not well understood. The purpose of this study was to elucidate the formation process of three different types of manganese nodules collected from seamounts in the northeast Pacific, where there are few reported cases, based on the internal structure, element concentration, and age of formation. A sample with a thin coating on the surface of the seafloor, a sample buried in sediment, and a diameter of 8 cm, collected during the KH-17-03 cruise, Hakuho-Maru. The three types of samples were analyzed. Observation of the internal microstructure using μ-focus X-ray CT, elemental concentration distribution using an X-ray analysis microscope, and 10Be ages were obtained from accelerator mass spectrometry.
As a result, (1) In the sample with thin coating produced from the surface of the seafloor, the part formed in seawater from the buried surface of the sediment is thicker and layered, and the part formed in the sediment is thinner than seawater and sponge. And the layer thickness ratio was about 2: 1. (2) Correlation of element concentration was clear in the part formed in seawater, and that in sediment was unclear. (3) The growth rate was almost constant in seawater and not constant in sediments. From the above results, it was found that there is a difference between the element concentration distribution and the growth rate in seawater, which is an oxidative environment, and in sediment, which is a reductive environment. It was suggested that it affected the collection.

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