Characterization of nuclei of ferromanganese nodules in the Minamitorishima EEZ using X-ray CT

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It is well known that ferromanganese nodules start to grow around nuclei. Thus, characterizing the nuclei of the nodules can provide important information on the conditions for the growth initiation of the nodules. However, detailed investigation on nuclei of ferromanganese nodules has so far been scarce. In this study, X-ray CT is used as a method to analyze nondestructively the nuclei of ferromanganese nodules. Due to the difference in the shape and the X - ray absorption rate, we classified the nuclei of the nodules into 4 types: nucleus I, nucleus II, nucleus III, and nucleus IV. Comparison with XRF mapping analysis and ICP-MS measurement of the nuclei revealed that nucleus I (showing a low X-ray absorption rate and exhibiting lumpy shape) corresponds to consolidated pelagic clay. We also identified silica, fish teeth, phosphorite, basalt and ironstone. In addition, based on the identification of nuclei by X-ray CT analysis, it is revealed that the majority of the nuclei of the nodules in the Minamitorishima EEZ is consolidated pelagic clay ("nucleus I").
In the presentation, we will discuss the origin of the nuclei of ferromanganese nodules and its relation to the growth initiation of the nodules in the Minamitorishima EEZ.

Keywords: ferromanganese nodules, X-ray CT analysis, Minamitorishima EEZ