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SCG64-01 Room:A05 Time:May 27 12:00-12:15

A kick-off drilling expedition at Iheya-North Knoll in Ore Genesis study of Ocean Resources in SIP

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A R&D project, led by Prof. Emer. Tetsuro Urabe of Univ. Tokyo, "Next-generation Technology for Ocean Resources Survey" started in FY2014, as a part of the Cross-ministerial Strategic Innovation Promotion Program (SIP). In the project, three types of ocean resources are targeted: seafloor hydrothermal deposit, Co-rich Mn-Fe Crust, and REY mud. The study on Genesis of Ocean Resources in this project aims to develop a screening technique for area having high potential of ocean resources as well as air-borne and/or satellite remote sensing technique for on-land resource exploration. Especially in the study on hydrothermal ore-deposits, higher level of achievement is required than those for other two types of ocean resources as the SIP program because of the recent advancement of the knowledge on this type of resource. The project goals not only include the establishment of a genetic model but also aim to propose an exploration technique for concealed ore bodies.

In July 2014, a non-riser drilling expedition was conducted at and around an active hydrothermal field on the Iheya-North Knoll by D/V Chikyu. Three active hydrothermal sites are known so far at this location. One has been known since late 1990s and is referred as the Iheya-North "Original" site to distinguish it from other two. At this site, more than 20 holes were drilled in IODP Exp.331, successfully obtaining a wide-range of lithology including polymetallic massive sulfide ores (Takai et al., 2011). Some of the holes showed apparent fluid discharge at the pulling out of the drill pipe. Numerous biological and geological observations have also been performed by the manned submersibles (Shinkai 2000 and 6500) and ROVs. Contrastingly, other two sites were recently located in early 2014, called the (Iheya-North) Natsu and Aki sites.

In Exp. 907 (CK14-04 Cruise), systematic LWD observations of six holes down to 340 mbsf were conducted to constrain the area of the fluid reservoir beneath seafloor followed by three coring holes down to 150 mbsf. Detailed results of LWD and coring were reported in this meeting (Saito et al. and Nozaki et al.). To protect the sensors from the anticipated high temperature of hydrothermal fluids, exceeding 300^{o}C, a back-up pumping system was attached to maintain fluid-flow as coolant continuously even during pipe connection. The back-up circulation system, i.e. Non-Stop Driller (NSD), supplied the drill-fluid of approx. 500GPM (1.9kL/min) during the operation. This flow rate was determined to protect the sensors of logging tool under a range of reasonable flow-rate into borehole; however, the rate was overestimated. Recorded maximum temperature throughout the expedition was 84^{o}C. In addition, no apparent discharges of the fluid forming black smoker was observed. Regardless of these observations, profiles of annular temperature and comparison between structural cross-section of seismic reflection survey, provides us the area of fluid reservoir beneath the Iheya-North Knoll was tabulated (Figure).

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Figure; Estiamted area of sub-seafloor Hydrothermal reservoir (Red-colored area). Open star: LWD site. Red-color-filled star: LWD and coring site. Broken circles indicated the areas of hydrothermal sites.

Keywords: SIP, Iheya-North Knoll, Hydrothermal fluid reservoir, LWD

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