

[EJ] Evening Poster | S (Solid Earth Sciences) | S-RD Resources, Mineral Deposit & Resource Exploration

## [S-RD33]Resource Geology

convener:Tsubasa Otake(Division of Sustainable Resources Engineering, Faculty of Engineering, Hokkaido University), Daisuke Araoka(Geological Survey of Japan, National Institute of Advanced Industrial Science and Technology), Ryohei Takahashi(秋田大学大学院国際資源学研究科, 共同), Tatsuo Nozaki(Research and Development Center for Submarine Resources, Japan Agency for Marine-Earth Science and Technology)  
Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Ore deposits consisting of supracrustal concentrated valuable elements and minerals result from the Earth's dynamics including magmatism, hydrothermal activity, metamorphism, and weathering. The formation of ore deposits is also closely associated with global environmental changes and biological evolution in the Earth's history. Involvement of different academic fields in Earth Science including Geology, Petrology, Mineralogy, and Microbiology is required to understand the genesis of ore deposits. The field of Resource Geology is essential not only for efficient exploration and development of ore deposits but also for better understanding and assessment of hazardous elements that may be caused by resources development. This session widely covers various topics of field investigation and observation, laboratory experiments, theoretical calculation, development of analytical methods and others related to the supracrustal migration and concentration of elements.

### [SRD33-P10]Ore formation processes in a submarine hydrothermal ore deposit in Izena Hole, Okinawa Trough: comparison with Kuroko deposits

\*Tsubasa Otake<sup>1</sup>, Takuro Ikeshima<sup>1</sup>, Tsutomu Sato<sup>1</sup>, Jun-ichiro Ishibashi<sup>2</sup>, Tatsuo Nozaki<sup>3</sup>, Hidenori Kumagai<sup>3</sup>, Lena Maeda<sup>3</sup>, CK16-05 Onboard members (1.Hokkaido University, 2.Kyushu University, 3.JAMSTEC)

Keywords:submarine hydrothermal ore deposit, SIP, Kuroko deposit, replacement reaction

Construction of an appropriate ore deposit model is prerequisite for exploration and development of any type of ore deposit, including the submarine hydrothermal ore deposits found in Japanese economic exclusive zones. However, their internal structures beneath the seafloor and evolution of ore mineralogy throughout hydrothermal activities have not been well understood. The CK16-05 cruise, operated from November to December, 2016 under SIP program, drilled through submarine hydrothermal ore deposits in the central part of Izena Hole, Okinawa Trough to investigate mineralogical, geochemical, and geophysical characteristics of both mound and lower sulfide deposits at the site. In this study, we are focused on C9027A and B cores, which drilled through a mound sulfide deposit to investigate mineralogical and geochemical changes in the sulfide ores with increasing depth from the seafloor and to compare the ore distribution and formation processes with Kuroko volcanogenic massive sulfide deposits, which were formed by ancient submarine hydrothermal ore deposits.

Results of microscopic observations with a reflecting light and SEM-EDS demonstrated that, samples at shallow depths are dominated by sphalerite and galena. In contrast, sample from the middle to deeper depths are more abundant in pyrite and chalcopyrite, and pyrite, respectively. The mineralogical change in the submarine hydrothermal ore deposit was comparable to that of some Kuroko deposits, such as Matsumine deposit in the Hokuroku district. Our previous study using Fe isotope suggests that such a distinct ore zonation in Matsumine deposit is governed by replacement of sphalerite- and galena-rich ores by chalcopyrite- and pyrite- rich ores during long-term hydrothermal circulation. Based on the similarity in the ore distribution with depth, the mound sulfide deposit was also likely to be formed by the same processes. On the other hand, pyrrhotite and anglesite, which are rarely found in Kuroko deposits, are present in

samples from the shallow part in the submarine hydrothermal ore deposit. Textural evidence indicates dissolution of pyrrhotite and replacement by pyrite or marcasite with increasing depth. Decrease in Fe content in sphalerite with increasing depth suggests that sulfur and oxygen fugacity in the hydrothermal fluid was higher in the depth. The formation of pyrrhotite and the subsequent transformation to pyrite or marcasite in the submarine hydrothermal ore deposit was likely caused by such change in the fluid chemistry.