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

[S-RD33]Resource Geology

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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 filed 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-P02]Changes in Ag/Au Ratio due to Mineralization Types and Locations in the Epithermal Sirawai Au–Ag Deposit in Mindanao, Philippines

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Both Au and Ag have been mined from numerous deposits in Japan. However, the changes in the Ag/Au ratio (Ag/Au) in a deposit have not been comprehensively investigated. Recently, a low-sulfidation epithermal vein-type Sirawai Au–Ag deposit was discovered in Mindanao, Philippines. So far, the upper part of the deposit has been explored. In this study, the changes in Ag/Au in the Sirawai deposit due to the mineralization types and locations are clarified. In total, 19 pits (depth; 7–10 m) were dug and 182 samples were taken at depth intervals of 1 m. The total length of 50 drill holes (length: 20–70 m) was 2,292 m. The drill core samples were prepared using a sampling interval of 1 m. In total, 2,474 samples were assayed for Au, Ag, Cu, Pb, and Zn. Additionally, ten polished sections were observed via microscopy and four sections were examined via electron probe microanalysis. In total, 30 drill core samples were analyzed via X-ray diffraction. The pits and drill holes passed through Au–Ag veins at a total of 45 points. Pyrite, chalcopyrite, galena, sphalerite, tellurium minerals, and electrum were the ore minerals that were identified. Hydrothermal quartz, adularia, illite, and smectite were generated around the veins. Mineralization can be divided into three types based on the texture and mineral paragenetic features of the veins. Type-1 mineralization was found at all 45 points. The Au grade of this type ranged from 0.4 to 2.5 g/t. Au/Ag widely varied from 4 to 77, and it increased with an increase in the elevation (Fig. 1A). Cu was predominant at a low elevation, while Pb was predominant at a high elevation (Fig. 1B). Type-2 mineralization was recognized at 9 of the 45 intersection points. Ore band showed a banded texture (Ginguro, also referred to as “silver black”). The Au grade of this type ranged from 12.3 to 183.3 g/t. Although Ag/Au varied from 1 to 43, in most cases is it was less than 10. Type-3 mineralization was found at 5 of the 45 intersection

points, and these points were distributed within a narrow range of elevations. The ore minerals were generated in the void spaces of breccias (diameter: 2–5 cm). The Au grade of this type was moderate (1.8–6.2 g/t), and Ag/Au ranged from 16 to 30. The deposit formation process is summarized as follows: a neutral hydrothermal fluid ascended through the veins and passed through a shallow aquifer containing cold groundwater. Type-1 mineralization occurred because of the cooling of the fluid. Ag/Au increased moving upward as the temperature of the fluid in the veins decreased. The migration of fluid from the veins formed an alteration halo, which eventually became an impermeable alteration cap rock (ACR). The fluid in the veins wrapped by the ACR began to boil because of the heat retention effect, thus resulting in type-2 mineralization. As air tightness increased because of the ACR, the pressure in the veins also increased. When overpressure conditions were reached, hydrothermal eruption occurred, thereby resulting in type-3 mineralization. This study demonstrates that the changes in Ag/Au reflect the different type of mineralization. Thus, the interpretation of zoning and the fluctuation in Ag/Au are useful for understanding the ore precipitation environment. Furthermore, Ag/Au can be considered an effective tool for gold exploration.