Gold content of fluids and quartz in the Hishikari epithermal deposit

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Gold content in fluid inclusions and quartz grains obtained from the Hishikari low-sulfidation epithermal gold deposits, SW Kyushu, Japan was preliminaly investigated by Laser Ablation ICP-MS.

The most marginal bands of two different veins were collected from the underground mining area; high-grade (>40g/t Au) vein within the bonanza zone and low-grade (<4g/t Au) vein at the lowermost part of the deposit. The marginal band of the high- and low-grade veins is composed mainly of euhedral adularia and fine-grained quartz which grow on host rocks towards the center of the veins as the earliest stage of ore formation. In the high-grade vein, euhedral quartz cuts the early marginal band and is defined as later stage quartz in this study. Fluid inclusions in the early stage adularia and later stage quartz were measured.

Some fluid inclusions in the early adularia from the high-grade vein contain gold with a miximum concentration of several tens μg/g Au, similar to ore grade. However, in fluid inclusions of the early adularia in low-grade vein no gold could be detected. Fluids in the later quartz were lower gold content (less than 0.8 μg/g Au) than the ore grades. The later stage quartz grains in high-grade vein contain trace amount of gold with an average 0.04 μg/g Au. The center of the quartz grain has a higher gold content and shows the brightest CL image. No gold particles were observable by SEM in the areas.

These results suggest that gold contents in the early fluids were high and controlled the ore grade of the veins. However, gold content of fluid in adularia could not accurately quantified because 1) high concentration of Na_2O (0.2 ± 0.05 wt%) in adularia prevents from identification of signal from low salinity fluid (<1.0 equiv. wt% NaCl), 2) the fluids may potentially escape through their clevages at the first laser attack, resulting in no signal when the laser reached at the surface of inclusions. In the later stage, gold precipitated at the early stage dissolved and re-distributed in the later quartz which contains invisible gold distributed on the nano-scale.

The accurate quantification of gold and other elements in fluid inclusions in the early quartz by LA-ICP-MS will be investigated and discussed; it may provide constraints for further understanding the source of the mineralizing fluid.

Occurrence of iodine rich brines and hot spring waters in Japan

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Nearly 70% of iodine in the Earth's crust is estimated to exist in marine sediments (Muramatsu and Wedepohl 1998). Since sediments should largely be transported into the mantle, it is important to understand the behavior of iodine and other halogens during subduction processes. In this study we present results for brines and hot spring water samples from different locations in Japan (e.g. Pacific side, volcanic front areas and Japan Sea side) where we determined the concentrations of iodine, bromine, chlorine and some other elements by ICP-MS (inductively coupled plasma mass spectrometry) and $^{129}I/^{127}I$ ratios by AMS (accelerator mass spectrometry) in a subset of the samples. The iodine levels varied very widely from <0.01 to 140ppm. Samples collected from Kazusa Formation (ca. 2000m depth) at Chiba Prefecture (the pacific coast of Japan) showed the highest iodine concentrations and low $^{129}I/^{127}I$ ratios of around $170x10^{-15}$. The results indicate that iodine was released from the subducting marine sediments into the shallow areas the brines are located in. High concentrations of iodine (more than 50ppm) were also found in the samples collected from Miyazaki, Niigata, Akita and Hokkaido.

Although most of the hot spring waters were low in iodine (generally less than 0.05ppm), samples collected from Kusatu-Shirane volcano showed relatively high iodine concentrations up to 9ppm, with chlorine concentrations of about 3000ppm. Relationships between the increase of halogen concentrations and the volcanic activity (e.g. frequency of earthquakes) were observed in the Crater Lake Yugama, in which iodine showed the highest increase among the three halogens. The $^{129}I/^{127}I$ ratios in hot springs of Kusatsu Shirane areas were about $180 x10^{-15}$ which is compatible with the estimated ratio for iodine derived from subducted marine sediments in this region. Our results for the Kusatsu-Shirane and similar hydrothermal systems demonstrate that recycling of subducted sediments is the dominant source of iodine in volcanic systems at active margins.