Fluid inclusion study of ore-forming fluids and its bearing on the hydrothermal mineralization of the Datuanshan copper deposit of skarn type in the Tongling area, Anhui Province

G. WU, J. DENG, C. WEN, C. ZHAO, Y. DU

Department of Earth Sciences, China University of Geosciences, Beijing 100083, P. R. China (ysdu@cugb.edu.cn)

Fluid inclusion analyses have been carried out in order to understand the characteristics and evolution of ore-forming fluids of different metallogenic periods and constrain the hydrothermal mineralization in the Datuanshan skarn-type copper deposit, Tongling, Anhui Province. It is shown that in the formation process of the deposit, the temperature and pressure of the metallogenic system decreased gradually, and a regular variation in composition, salinity, density and mineralization degree of the ore fluid took place with transition of the metallogenic process from postmagmatic hydrothermal period through skarn period to quartz-sulfide period. Correspondingly, there occurred enrichment, transportation and precipitation of metallogenic elements in the metallogenic system, the process of which was evidently influenced by pH, Eh and gas fugacity of the ore fluid. In addition, the ore fluid of the principal metallogenic period in the deposit is rich in heavy metal metallogenic elements such as Cu, Fe, Ag and Zn, which is consistent with the fact that the deposit is a copper one rich in Au and Ag. Evidently, the content of the heavy metal metallogenic elements in primary ore fluid may be taken as an indicator of mineralization.

Volatile elements in pillow lava glasses from the Kermadec Arc – Havre Trough and offshore Taupo Volcanic Zone, southwest Pacific

R.J. WYSOCZANSKI[1], E.H. HAURI[2], J.A. GAMBLE[3], J.F. LUHR[1], S. EGGINS[4] AND I.C. WRIGHT[5]

[1] Department of Mineral Sciences, Smithsonian Institution, Washington, DC, USA (richardw@volcano.si.edu)

[2] Department of Terrestrial Magnetism, Carnegie Institution of Washington, DC, USA

[3] School of Earth Sciences, Victoria University of Wellington, Wellington, New Zealand

[4] Research School of Earth Sciences, Australian National University, Canberra, Australia

[5] National Institute for Water and Atmospheric Research, Wellington, New Zealand

The Kermadec Arc (KA) - Havre Trough (HT) and Taupo Volcanic Zone (TVZ) are a result of westward subduction of the Pacific Ocean Plate under the Australian Plate, with KA-HT marking the oceanic part and TVZ the continental margin segment. Here we present new FTIR and Ion Probe measurements of H_2O, CO_2, S, Cl and F from glassy pillow rinds of lavas dredged from depths up to 3000 m. Major element and trace element contents of the glasses were measured by EPMA and LA-ICPMS. For all techniques, analyses were on the exact same spots to provide data on small-scale heterogeneities, and trends among elements.

The KAHT glasses are basaltic to basaltic andesite, (e.g. 50-55 wt.% SiO_2, 4-7 wt.% MgO), with major element trends that are consistent with fractionation of olivine+plagioclase, which occur as microphenocrysts. Water contents across the oceanic sector of the arc range from 1.2 to 1.8 wt.%, and show no trend with other elements. The glasses are water-saturated for basalts erupted at these depths, indicating that they may have lost some of their primary water. A melt inclusion in an olivine crystal has 2.52 wt.% H_2O, which could be closer to the initial concentration. Water contents for the continental sector are significantly lower (0.08-0.37 wt. %). By contrast, CO_2 contents of oceanic glasses (4-16 ppm) are extremely low yet show good trends with other chemical parameters, particularly Ti, Mg#, and alkalis, consistent with an increase in CO_2 with fractionation, and indicating that the low CO_2 contents are primary, and are not due to degassing on eruption. S contents range from 300-700 ppm in the HT, but are substantially less (c. 120 ppm) in the KA. The inverse is true for F and Cl (275-475 and 600-1100 ppm F and Cl in the HT, and 490-530 and 2750-2950 ppm F and Cl in the KA). There are strong positive correlations between all volatile phases, except for water. The variability of volatile contents in samples analysed multiple times was < 10 %, and there is no relationship between vesicularity or water depth and volatile content.