Geophysical Research Abstracts,
Vol. 10, EGU2008-A-11574, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-11574
EGU General Assembly 2008

Sources of fluid and rare metals at magmatic degassing on Kudriavy volcano, Kuriles, Russia.

I.V. Chaplygin (1), M.A. Yudovskaya (1), E.O. Dubinina (1), S.V. Tessalina (2)
(1) IGEM RAS, Moscow, Russia; (2) IPGP, Paris, France

Kudriavy volcano on Kurile islands is a unique example of long-lasting emission of magmatic gases which are forming ore mineralization on fumarolic fields. Monitoring of compositions of volcanic condensates during last 15 years show that the fluid is anomalous rich both in polymetallic (Pb, Cu, Zn and Fe), rare (Re, In, Cd, Ge) and noble (Au, Pd, Os) metals. Here we show that this enrichment in geochemically diverse elements is not a result of primary enrichment or specialization of magmatic source, but may be specified by transport and concentrating abilities of high-temperature gas.

New data on stable isotopes of oxygen and hydrogen of volcanic condensates show that high-temperature ($>700^{\circ}$C) fumarolic gas do not demonstrate mixing with meteoric water and isotopic composition of oxygen changes due to interaction with wall-rocks. High δ^{18}O values (up to 11.6 permil) imply a contribution of additional (subduction) component. This let us propose that gases are released from zone of melting of subduction magmas, not from shallow magmatic camera.

This conclusion was supported by analytical data of Re-Os isotopic system in volcanic rocks, acid condensates and sublimates from fumarolic fields. Low radiogenic ^{187}Os/^{188}Os isotopic ratios of condensates (from 0.122 to 0.152) and Pb sulfides shows that most of Os was remobilized from the source with isotopic characteristics close to that of mantle. Data on volcanic rocks shows considerable variations in ^{187}Os/^{188}Os ratios: from 0.205 for young basaltic andesites to 0.588 for ancient rhyodacites. Radiogenic compositions of acid rocks could be formed due to contamination with crust material. In any case additional source should be able to account for elevated concentrations not only of Re but of In and other metals. Recent mineralogical study

reveals developed In mineralization, which is usually characteristic for Sn-W granite-related deposits, not for mineralization related with basaltic magmas. Gas transport reactions under high thermal gradient are considered to be the key factors controlling precipitation of metallic sublimates in fumarolic environment.

The study is supported by RFBR, grant 07-05-00042.