Nontronite formation in rhyolitic ignimbrite

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The voluminous (>300 km^3) rhyolitic Ongatiti Ignimbrite (OI, 1.25 + 0.12 Ma) in the Taupo Volcanic Zone of New Zealand (Wilson et al., 1995; Black et al, 1996) contains sporadic occurrences of <10 to 100 mm-wide nontronite seams. Nontronite was initially deposited in OI fissures as a colloidal gel, and developed into larger and more ordered crystals with time. However, before precipitation of nontronite in fissures, solutions reacted with the OI. This resulted in leached selvedges and replacement by nontronite of OI components, <10 mm thick, along the sides of fissures. The rest of the OI remains fresh. From Fe contents in the OI (2.4 wt.%) and nontronite (16.2 wt.%) about 300 m^3 of fresh rhyolite needs to be dissolved to produce 50 m^3 of nontronite, using the equation below (Reyes and Vickridge, 1996):

$\log (C_A/C_F) = \log M_F - \log M_A$
(C= concentration, M= mass, A= altered rock, F= fresh rock;
_(OI) = 2.5 g/cm^3, _(nontronite)= 2.25 g/cm^3)

Leaching and dissolution of ignimbrite can occur around rootless fumaroles (e.g., Keith, 1991), where interaction of volatiles from cooling ash flows with groundwater result to acid waters. Nontronite only started to deposit (Fig. 1) once the OI has partly cooled while still having the capacity to release volatiles.

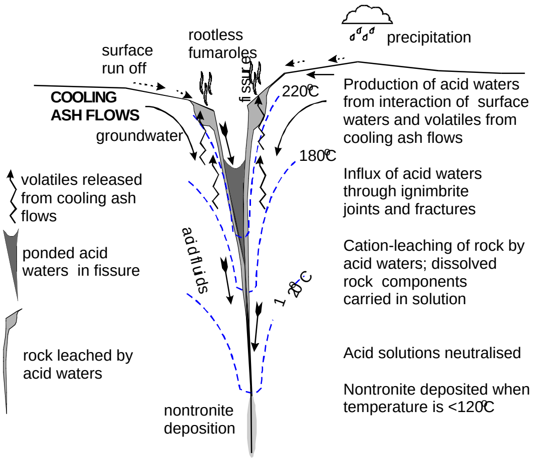

Fig.1. Nontronite formation in the Ongatiti Ignimbrite.

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Selective mobilization of metals from granitic melt into exsolved fluid and their separate deposition during formation of the F-Be deposit

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An aegirine granite intrusion associated with the Yermakovka F-Be deposit (Transbaikalia, Russia) hosts pegmatites which, to a first approximation, are considered as a geochemical model of a deep-seated reservoir of rest magma, possible source of ore-forming fluids (Reyf & Ishkov, 2001). Melt (MI) and fluid (FI) inclusions in magmatic quartz and fluorite have been studied using micro-thermometry, EPMA, and AES of laser-opened FI (Reyf, 1997). The data obtained suggest that initial granitic melt was enriched in F (2.6 wt%) and H_2O (4.5wt%) and had became fluid-saturated at ~700ºC, prior to segregation of the intergranular residual melt into cracks within crystalline carapace. Exsolved fluid is found to be a mixture of immiscible alkaline-fluoride-sulphate brine (L1) and a low-salinity CO_2-bearing solution (L2). This is evident from the confinement of the L1 and L2 inclusions to the same growth-zones of host minerals. The immiscible phases have different salinity, density (1.7-2.1 and 0.75-0.85 g/ml), and metal content (see Table).

	Concentration, wt%					Max. concentr., g/kg				
	$(Na,K)_2O$	SO_3	F	NaCl	CO_2	Be	Mo	Mn	Fe	Ce
L1	20-23	12-15	8-9	+	-	0.3	17.8	9.6	4.3	+
L2		-	+	2-6	8-14	0.7	<0.7	<1	0.6	-

The evidence for both joint and separate migration of the immiscible fluid phases are revealed, and the activity of autonomous brine flows is studied more carefully since it is enriched in many metals. Zones of albitization within granite intrusion are found to be formed by the fluid mixture at *T*=650-580ºC. Only pyrite and minor molybdenite were deposited in the course of albitization. More abundant molybdenite along with monazite precipitated from autonomous brine flow during formation of quartz veinlets in endocontact part of the intrusion at *T*=650-600ºC, and molybdenite-rich dolomite-garnet-oligoclase veinlets in biotite schists were formed by the brine flow at 600-550ºC. At the level studied, no berylliym minerals were precipitated from the Be-bearing brine at T>500ºC, however, they could precipitate within cooler area. The high-grade phenakite-fluorite ores precipitated at 400-150ºC, predominantly from autonomous flow of L2.

The separation of Mo and Be is likely to result from different stability of the complexes $NaHMoO_4^0$ and $BeFCO_3^-$ in the immiscible magmatic fluids and from different dependence of their solubilities under subsolidus conditions

This work was supported by RFBR grant 00-05-64323.

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