The results of forest fire studies in Siberia

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According to U.N.O. the area reaching 650 million hectare (ha) are covered with forest fires. The amount of dust and aerosols annually brought into the atmosphere by forest fires emission can be compared with volcanic emissions. There are many researchers studying forest fires but their geochemical aspect is taken into account generally when studying aerosols. The specific of our approach is in studying of the results of fires on the Earth surface. During seven years 24 forest fire territories were studied in different region of Siberia and Kazachstan. The soil-vegetable sampling was carried out observing the lateral section “windward side–fire territory–leeward side”. The forest floor, mosses and lichens were sampled stratificatedly. Forest floors should be acknowledged to play the main role in the elements migration process during forest fires burning. First in the areas studied the forest floors are totally widespread unlike other burning materials. Second, their amount is far higher than that of the other materials. Third, the highest heavy metals (HM) and artificial radionuclides (ARN) concentration can be found in components the floors that are the highest among all the forest biocenose.

^{137}Cs, ^{90}Sr, Cd, Hg, Mn and Zn are carried out intensively from the fire territory and enrich the leeward side. This process reaches its maximum in total crown fires. The elements are redistributed around the fire territory and enrich some sections of it during quick ground fires in the wind absence. Elements emission intensity depends upon elements physicochemical properties and speciation. After the fire stops, the HM and ARN remained in ashes, redistribute around the fire-site resulting from washing out with rain and melted snow waters into lower areas of the relief. Ashes materials are brought away even with the lightest wind.

The method used lets us appreciate approximately the amount of migrating elements. For example, in Altai belt forest 140.000 hectares of forest burnt away. The forest floor amount in these forests is 10.8 t/ha, that is close to the average of the Russia forests. The average specific activity of ^{137}Cs in the forest floors is 116 Bq/kg. The average Cd and Hg concentrations are 0.38 and 0.13 ppm correspondingly. So 11.6 curie of ^{137}Cs, 160 kg of Hg and 186 kg of Cd, deposited in the forest floor, can be brought out from the fire-sites of Altai region per one year.

Geochemical flux in the mantle wedge: Insights from suprasubduction zone ophiolites

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Understanding geochemical flux in the mantle wedge during subduction is critical to our understanding of the subduction factory process and arc volcanism. It forms an important aspect of the global geochemical flux and is one of the first order problems identified by the *Geochemical Earth Reference Model (GERM)* initiative. The MARGINS program attempts to understand these processes by studying active subduction zones (crustal inputs, eruption products, seismic tomography). An alternative approach is to examine outcrops of lithospheric mantle that underlie crust formed by supra-subduction zone (SSZ) magmatism.

We have analyzed major element mineral chemistry in 50 samples of mantle peridotite from six locations in the Coast Range ophiolite of California by EMPA, and over 100 grains of pyroxene for 13 REE (La, Ce, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu) and 14 other trace elements (Li, Be, Sc, Ti,V, Rb, Sr, Y, Zr, Nb, Ba, Hf, Pb, Th) by laser ablation ICP-MS analysis. Abyssal lherzolite is found in one block; all others are *suprasubduction zone (SSZ)* harzburgite and dunite, with associated pyroxenite, websterite, and chromitite [1-2]. The abyssal lherzolites can be modeled by <5% fractional melt extraction from a fertile MORB mantle source. Melting models for the SSZ peridotites imply 15-30% fractional melting under hydrous conditions [3]. All of the peridotites have fluid-mobile element concentrations that exceed model model refractory compositions by 2-3 orders of magnitude, consistent with fluid-phase enrichment during partial melting. In addition, some of the more refractory samples have LREE concentrations that indicate enrichment by an enriched melt phase. Modeling of whole rock ICP-MS data suggests that these more refractory samples may have begun to melt initially in the garnet field before inverting to spinel facies melting.

[1] Choi, Shervais & Mukasa (2008, in press) *Geology.* [2] Choi, Shervais & Mukasa (2008, in press) *Contributions to Mineralogy & Petrolog.* [3] Jean *et al.* (2008) *Geological Society America Abstracts w/Programs* **40/1**, 34.