Antimony(V) sorption and mobility in calcareous soils

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Sorption and mobility of Sb(V) onto natural calcareous soils have been studied in batch and column experiments. Batch experiments were carried out with 0.5 g of soil in contact with different Sb(V) solutions at a constant ionic strength (0.01M $NaClO_4$) and temperature (25.0±0.1ºC). Results show that the sorption kinetics was similar compared to Sb(V) sorption onto other soils or onto goethite. Kinetic data were modeled considering a pseudo-second order reaction, with kinetic constants varying from 0.0338 to 0.061 $kg \cdot mol^{-1} \cdot d^{-1}$ and sorption maximum capacities between $1.67 \cdot 10^{-3}$ and $2.28 \cdot 10^{-3}$ $mol \cdot kg^{-1}$, depending on the soil sample.

Column experiments were performed in order to determine the mobility of Sb(V) in the soils. Sorption and desorption experiments were carried out and K_d values were obtained by using the CXTFIT code. The values obtained (0.97-1.55 dm^3/kg) are in agreement with the ones given by the EPA for the Sb sorption onto different soils (0.41-2.7 dm^3/kg). Antimony K-edge X-Ray absorption spectra of the sorbed soil samples were collected at the Rossendorf Beamline at the European Synchrotron Radiation Facility (ESRF), in order to determine the surface species involved in the sorption process.

On the origin of the EM-1 component in Santiago Island (Cape Verde)

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The outcropping magmatic rocks on Santiago Island have been forming for at least 10 Ma as a result of the plume activity responsible for the generation of the Cape Verde archipelago. The primitive studied lavas (<6 Ma) are highly SiO_2-undersaturated and exhibit significant REE fractionation and enrichment in incompatible elements. Previous elemental studies indicate a variable and heterogeneous residual paragenesis (garnet, amphibole and/or phlogopite) and a carbonatitic lithospheric metasomatic event, responsible for the generation of the hydrous mineralogy.

The observed [1] isotopic (Sr, Nd and Hf) variation implies a complex mantle source with a significant contribution of HIMU and an enriched mantle component. In detail the Santiago lavas display a trend in $^{143}Nd/^{144}Nd$-$^{87}Sr/^{86}Sr$ space that deviates from the hypothetical mixing line between HIMU and EM1 end-member, considering Pitcairn, Tristan da Cunha, and Gough as their proxies. The deviation towards lower $^{143}Nd/^{144}Nd$ strongly suggests that pelagic sediments do not played a significant role on the origin of the EM 1 component. This is endorsed by the lack, at Santiago lavas, of negative Nb and/or Ce anomalies. Low $^{143}Nd/^{144}Nd$ for a given $^{87}Sr/^{86}Sr$ displayed by Santiago lavas is compatible with the influence of lower crustal garnet-bearing mafic granulites, which being interpreted as melting residues, would evolve towards high $^{176}Hf/^{177}Hf$, given the high compatibility of Lu in garnet [2]. This would explain the fact that some of the studied samples plot above the Nd-Hf mantle array. However, such granulites are characterized by extreme depletion in incompatible elements leading us to favour the contribution of lamproitic subcontinental lithospheric derived melts in order to explain the EM1 component in Santiago Island.

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[1] Martins *et al.* (2007) *GCA* **71**, A630. [2] Janney *et al.* (2005) *J. Petrology* **12**, 2427-2464.