A test of sulfide solubility models using anhydrous experimental melts and natural tholeiitic glasses

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A set of 330 experimental S-saturated silicate melts ($fO_2 <$ QFM) and 53 MORB sulfide-bearing glasses from the Siqeuiros FZ, East Pacific Rise were used to test the accuracy of three SCSS models [1-3]. The models were found to adequately describe those experiments on which they were calibrated (commonly within <10% error of $\ln(X_S)$). However, when tested on natural glasses quenched at 1210-1095°C (as estimated using an Ol-melt geothermometer [4]), the models fail to reproduce the observed S content in the melts. This is particularly evident for SCSS equations proposed in [1,3] that realistically reproduce measured sulfur concentrations near 1200°C, but at lower temperatures predict systematically lower S solubility, and a negative correlation between glass FeO and S contents. Such a trend is opposite to the observed trend in sulfide-saturated MORB glasses, which display a strong positive correlation between FeO and S. The reason for this discrepancy is that both models [1, 3] over-estimate the effect of temperature over the effect of melt composition. Model [2] can reproduce the direction of the natural trend, but it significantly overestimates the amount of S dissolved in the melt. This may be explained by the positive correlation between S content and reciprocal temperature in the formulation of model [2], which is a result of applying the tabulated $\Delta G_0(T)$ values for FeS formation to developing an empiric SCSS equation calibrated on experimental data at 1400°C [2]. As a result of our testing, a new model for sulfur solubility mechanism has been proposed, which can adequately describe the effects of temperature and composition on S solubility at reducing conditions [5].

We will present the results of calculating the conditions of sulfide saturation during fractionation of high-Mg tholeiitic and calc-alkaline magmas at variable pressures.

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Comparison of soils and stream sediments geochemical data from the Santiago Island – Cape Verde

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Soils, stream sediments and rock samples were collected at Santiago Island, Cape Verde, at a low/medium density sampling, according to the recommendations of the IGCP 259-"International Geochemical Mapping", for the purpose of compiling an environmental geochemical atlas. The fine-grained fraction (<2 mm) of all samples was chemically analysed for 36 elements by ICP-MS – 9 major elements (Al, Ca, Fe, K, Mg, Mn, Na, P, Ti) and 27 trace elements (Ag, As, Au, B, Ba, Bi, Cd, Co, Cr, Cu, Hg, La, Mo, Ni, Pb, S, Sb, Sc, Se, Sr, Te, Th, Tl, U, V, W, Zn). For soils samples, pH, conductivity, organic matter colour, and texture were also determined.

Univariate and multivariate statistical techniques were applied to the concentrations of the elements of soils and stream sediments. The concentrations are higher in soils than in stream sediments, except for Ca, K, Na, Mg, P, Ni and Sr. The concentration and distribution of chemical elements is mainly controlled by the lithology and associated minerals. Soils and stream sediments collected from the Carbonatite substract (Ancient Complex) are enriched for almost all chemical elements some of them 5 times higher relatively to the soils and stream sediments of other lithologies. However, they are impoverished in Ni and Co. The anthropogenic contamination is more evident in soils than in stream sediments.