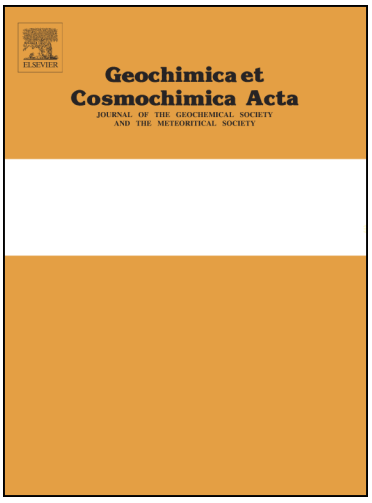

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New high pressure experiments on sulfide saturation of high-FeO* basalts with variable TiO_2 contents – Implications for the sulfur inventory of the lunar interior

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ABSTRACT

In order to constrain sulfur concentration in intermediate to high-Ti mare basalts at sulfide saturation (SCSS), we experimentally equilibrated FeS melt and basaltic melt using a piston cylinder at 1.0-2.5 GPa and 1400-1600 °C, with two silicate compositions similar to high-Ti (Apollo 11: A11, ~11.1 wt.% TiO_2, 19.1 wt.% FeO*, and 39.6 wt.% SiO_2) and intermediate-Ti (Luna 16, ~5 wt.% TiO_2, 18.7 wt.% FeO*, and 43.8 wt.% SiO_2) mare basalts. Our experimental results show that SCSS increases with increasing temperature, and decreases with increasing pressure, which are similar to the results from previous experimental studies. SCSS in the A11 melt is systematically higher than that in the Luna 16 melt, which is likely due to higher FeO*, and lower SiO_2 and Al_2O_3 concentration in the former. Compared to the previously constructed SCSS models, including those designed for high-FeO* basalts, the SCSS values determined in this study are generally lower than the predicted values, with overprediction increasing with increasing melt TiO_2 content. We attribute this to the lower SiO_2 and Al_2O_3 concentration

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