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Abstract

To describe element behavior due to rock weathering, Gong et al. (2013) presented a new Weathering Index of Granite (WIG) and fitted exponential equations between trace element contents and WIG values. Five new regolith profiles developed over igneous rocks and phyllite in China are investigated along with nine other reported regolith profiles formed on multiple rocks in China to investigate the quantitatively relationship between trace element contents and chemical indices of weathering. Three weathering indices of WIG, Al_2O_3/Ti, and K_2O/SiO_2 are used to quantitatively describe trace element behaviors due to rock weathering. On the basis of 13 regolith profiles developed over igneous rocks, phyllite, schist, and carbonate rocks, the equation is presented as

$$lg(c)=A*(1.2-WIG/100)+B*lg(Al_2O_3/Ti)+C*lg(K_2O/SiO_2)+D$$

where c is the content of trace element in ng/g for Cd, Hg and μg/g for others, the content unit of Al_2O_3, K_2O, SiO_2 is weight % and the unit of Ti content is μg/g, and A, B, C, D are the fitted parameters. Empirical equations for 27 trace elements are regressed with well statistical significance, and the WIG value is limited to less than 120, SiO_2 content is in the range of 14% to 80%, and the value of $10000*Al_2O_3/Ti$ varies from ca. 8 to 160. These empirical equations have an important potential application on determining geochemical backgrounds of trace elements.

Keywords: Weathering index of granite (WIG); Empirical equations; Geochemical backgrounds; Trace element behaviors

1. Introduction

The behavior of elements caused by weathering, and the rates and mechanisms of regolith formation