Geophysical Research Abstracts
Vol. 21, EGU2019-6108, 2019
EGU General Assembly 2019

Genesis of the Giant Serra Verde Ion Adsorption REE Deposit, Brazil

Richard Herrington (1), Carmen Pinto-Ward (1), Jamie Wilkinson (1), Don Schissel (2), Alexandre Rocha de Rocha (3), and Andreas Sprecher (3)

(1) Natural History Museum, London, United Kingdom (r.herrington@nhm.ac.uk), (2) Independent Consultant, (3) Mineração Serra Verde

The Serra Verde Ion Adsorption REE Deposit (IAD), has a published inferred resource of more than 200 million million tonnes at 0.16% total REE, formed during deep weathering of the ca. 1430 Ma Serra Dourada A-type granite in Goiás state, Brazil. It is evident that prior to the weathering event, the primary granite had undergone alteration by F-CO_2-alkali-rich hydrothermal fluids, the primary apatite-allanite-titanite REE assemblage altered to a secondary fluorocarbonate-niobiate-phosphate-fluorite assemblage. During this overprinting event, Nb, Ta, Ga, and, most importantly HREE, were enriched around the carapace and edges of the granite body. Later faulting has then modified the geometry of the altered intrusive complex. During the Cretaceous-Tertiary period, central Brazil was levelled to form the South American peneplane with development of a regional deep weathering profile. The resultant profile at Serra Verde is characterized a REE depleted upper part with a zone of REE-accumulation in the lower, kaolinised part of the profile. The majority of REE have been adsorbed onto clay minerals, together with less-common fine-grained secondary REE-minerals. The dominance of kaolinite in the profile indicates that the profile was well-drained during mineral breakdown allowing the efficient mass transfer of REE to form the deposit. In the late Tertiary, there was then a shift from a regime dominated by chemical weathering, to one dominated by physical erosional processes. Drier climate conditions greatly reduced the rate of weathering, and the profile has been preserved in topographic plateau highs. In places, the deposit is cut by the rejuvenated drainage system, removing and redistributing the weathered profile material from significant areas.