

Poster session

GRS constraints on the character of possible ancient oceans on Mars: consistencies with Earth analogues

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The Gamma Ray Spectrometer (GRS) has revealed elemental distributions of potassium (K), thorium (Th), and iron (Fe) on Mars that require fractionation of K (and possibly the others) consistent with aqueous weathering, transport, sorting, and deposition in the northern plains basins, as well as first-order geomorphological boundaries identified as putative shorelines. The elemental abundances occur in patterns consistent with deposition of weathered materials (salts and clastic minerals) and weathering/transport under neutral to acidic brines. The evidence is explained by hydrogeology, including playa (dry lake) environments that may have wet episodes during which water inundates the whole area [1,2]. The formation of evaporite deposits, which includes the reworking of parent rock materials (e.g., leaching) and transport and subsequent precipitation, can be enhanced during aqueous acidic conditions as is commonly associated with mining operations [3]. One of the best examples of the influence of mining on environmental conditions, which includes acidic aqueous conditions, leaching, transport of rock materials including elements, and precipitation of minerals such as hematite and jarosite, is the Tinto River in Spain [4]. Even though the GRS elemental signatures, particularly the enrichment of K and Th, may be explained by differing igneous compositions [3], they are also consistent with ancient acidic oceans.

References:

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