

GRS Evidence and the Possibility of Ancient Paleoceans on Mars

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Abstract. The Gamma Ray Spectrometer (Mars Odyssey spacecraft) has revealed elemental distributions of potassium (K), thorium (Th), and iron (Fe) on Mars that require fractionation of K (and possibly Th and Fe) consistent with aqueous activity. This includes weathering, evolution of soils, and transport, sorting, and deposition in the northern plains basins, as well as with the location of first-order geomorphological demarcations identified as possible paleocean boundaries. The element abundances occur in patterns consistent with weathering *in situ* and possible presence of relict or exhumed paleosols, deposition of weathered materials (salts and clastic minerals), and

weathering/transport under neutral to acidic brines. The evidence is abundances are explained by hydrogeology consistent with the possibly overlapping alternatives of ancient paleoceans and/or heterogeneous rock compositions from diverse provenances (e.g, differing igneous compositions).

KEYWORDS: Mars, Gamma Ray Spectrometer; oceans; water, elemental;
hydrogeology