

Provenance and diagenesis of the evaporite-bearing Burns formation, Meridiani Planum, Mars

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Abstract

Impure reworked evaporitic sandstones, preserved on Meridiani Planum, Mars, are mixtures of roughly equal amounts of altered siliciclastic debris, of basaltic provenance ($40 \pm 10\%$ by mass), and chemical constituents, dominated by evaporitic minerals (jarosite, Mg-, Ca-sulfates \pm chlorides \pm Fe-, Na-sulfates), hematite and possibly secondary silica ($60 \pm 10\%$). These chemical constituents and their relative abundances are not an equilibrium evaporite assemblage and to a substantial degree have been reworked by aeolian and subaqueous transport. Ultimately they formed by evaporation of acidic waters derived from interaction with olivine-bearing basalts and subsequent diagenetic alteration. The rocks experienced an extended diagenetic history, with at least two and up to four distinct episodes of cementation, including stratigraphically restricted zones of recrystallization and

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