

Contemporary Formation of Layered Sedimentary Rocks on Mars

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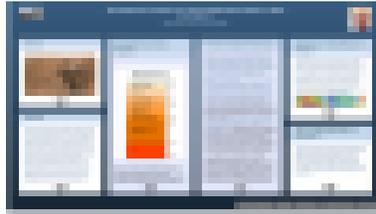
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Abstract

Martian dust, which likely formed by non-aqueous chemical weathering [Huguenin, 1976] following broad-based support from recent Mars mission data, is susceptible to rapid diagenesis when exposed to macro-seepage from the sub-permafrost aqueous aquifer system on Mars . The modeled silicate components of the dust, derived from the non-aqueous weathering of primarily olivine and pyroxene, are $\text{Mg}_2\text{HSiO}_4(\text{OH})$ and $\text{Mg}(\text{HSiO}_3)(\text{OH})$. These are M-S-H compounds, counterparts to the C-H-S compounds that form the commercial binder in concrete, forming an $\text{Mg}_3\text{Si}_2\text{O}_5(\text{OH})_4$ counterpart binder on Mars upon exposure to liquid H_2O macro-seepage from the aquifer below. Macro-seepage, triggered largely by geothermally heated water near impact sites, magmatic intrusions and volcanoes, is proposed to rapidly cement layers of regolith dust and fines into layers of M-S-H counterpart “concrete.” The matrix binder on Mars is predicted to be a member of the serpentine family ($\text{Mg}/\text{Si} = 5$), possibly having disordered Antigorite T structure. Layered sedimentary rock formations could have formed throughout geologic history up to the present time. Materials from the aquifer, transported by and introduced from the macro-seepage, including organic matter, may be contemporary rather than ancient. This contradicts the prevailing assumption that the sedimentary rocks were formed early in the planet’s history.

Contemporary Formulation of Layered Sedimentary Basins and Mass



Abstract

October 10, 2022, 10:00 AM



Author



Background



The rover is shown in a wide, flat, reddish-brown landscape under a hazy sky. The terrain appears to be a dry, rocky plain with some small depressions and scattered rocks. The rover is positioned in the lower right quadrant of the frame, facing towards the left.

The rover is a small, six-wheeled vehicle with a complex structure on top, including a camera mast and various instruments. It is parked on a surface that looks like fine-grained sand or silt with some small pebbles.

The background shows a vast, flat expanse of land stretching to a low horizon. The sky is a pale, uniform color, suggesting a clear or slightly hazy atmosphere. The overall scene is desolate and appears to be on another planet or moon.

Summary

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References

More from the author

Item	Date
Layer 1: Sedimentary	10/10/2022
Layer 2: Sedimentary	10/10/2022
Layer 3: Sedimentary	10/10/2022
Layer 4: Sedimentary	10/10/2022

