

## The Origin of Vera Rubin Ridge: Oxidative Weathering on Mars?

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The Mars Science Laboratory Curiosity rover recently completed an *in situ* investigation of Vera Rubin ridge (VRR). In orbital data, VRR was mapped as a distinct geomorphic unit of Aeolis Mons (informally Mt. Sharp) due to its positive topographic expression and its association with a strong spectral signature of red crystalline hematite.

*In situ* mapping revealed the morphological change at the base of the ridge does not correspond to a distinct stratal boundary. While strata are conformable across the transition, the morphological transition to the VRR is not parallel to the sub-horizontal bedding.

*In situ* data also show rocks within VRR are the reddest and have the deepest 860 nm hematite spectral absorptions seen anywhere in Mt. Sharp. The depth of all ferric spectral absorptions varies across VRR and variability cross-cuts bedding. Interestingly, crystalline oxidized iron phases are not significantly more abundant in VRR than underlying strata. The bulk of VRR is mineralogically and geochemically similar to underlying strata, but the discovery of gray hematite and akaganeite at the top of the VRR suggests these rocks experienced different aqueous conditions.

We propose cementation by diagenetic fluids created the topographic ridge and generated localized spectral and colour variability. We will discuss how Curiosity observations can further constrain the possible geochemical characteristics of these fluids. One possibility is incipient weathering by oxidizing fluids, which could explain the lack of large elemental trends and strong colour differences.

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