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## **Radar “Stealth” terrain on Mars: Evidence of a pyroclastic eruption west-northwest of Arsia Mons volcano**

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Over 1,000,000 km<sup>2</sup> of the equatorial surface of Mars west of the Arsia Mons volcano displays no 3.5-cm radar echo to the very low level of the radar system noise for the Very Large Array; the area displaying this unique property has been termed “Stealth” (Muhleman et al., *Science* 253, 1508–1513, 1991). Here we note that the eastern margin of the Stealth terrain closely corresponds to materials previously interpreted to be pyroclastic deposits superposed on the lobe-shaped “landslide” terrain on the lower western flanks of Arsia Mons. The west-northwest orientation of the Stealth region is identical to the orientation of both bright and dark wind streaks in the area. However, it seems unlikely that aeolian processes alone could have produced the unique Stealth area because it occurs within a much larger region with relatively uniform properties at thermal infrared wavelengths. We reconcile these observations with the hypothesis that the Stealth region corresponds to an extensive mantle of pyroclastics (locally > 2 m thick) which has subsequently been covered by a more pervasive aeolian dust mantle (generally > 10 cm thick). The proposed pyroclastic eruption cloud traveled down the shallow local slope, consistent with the orientation of the dominant winds in the area at present. The unique Stealth radar response then results from signal loss within copious quantities of fine-grained ash particles (lacking volume scatterers), hidden from direct exposure beneath the more pervasive (but relatively thin) dust mantle that coats the entire Tharsis region. We speculate that the Stealth material stratigraphically overlays all geologic terrains evidenced in Viking Orbiter images of the Tharsis region.