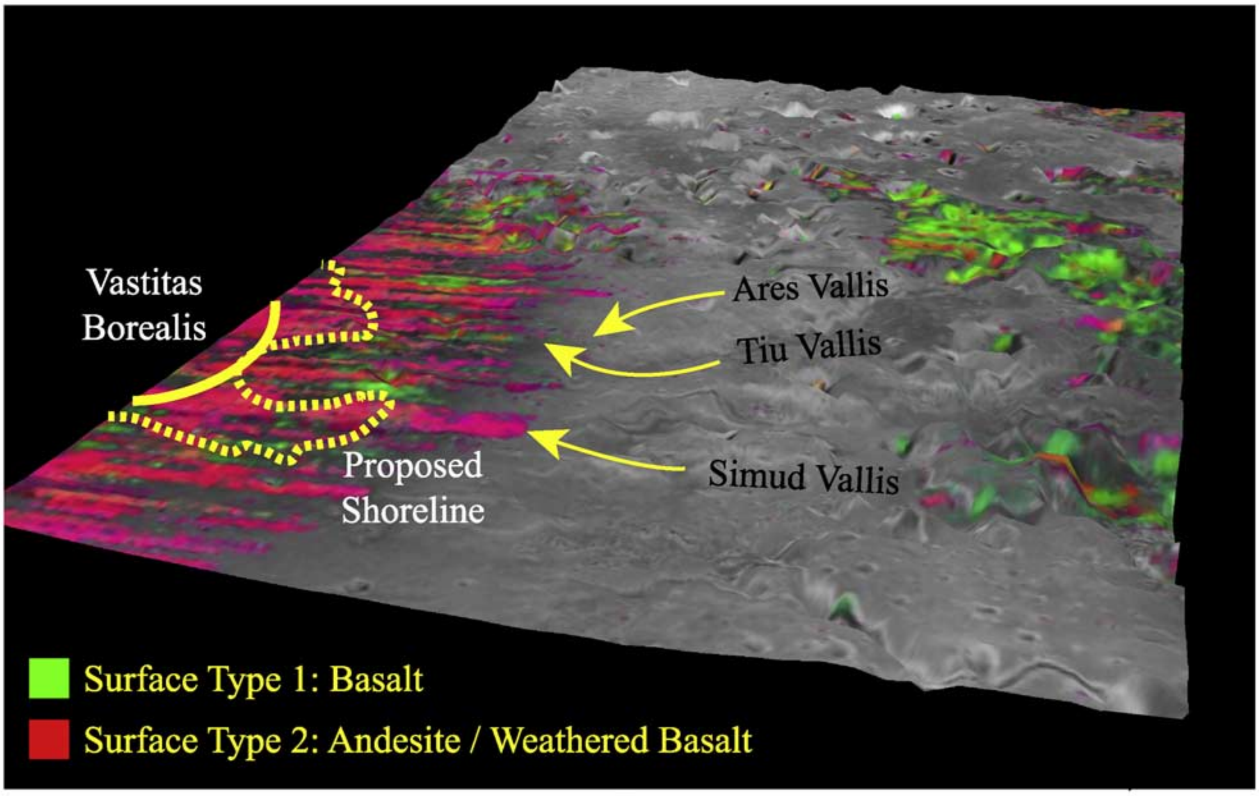

Figure 11. Composite MOC, MOLA, and TES map showing the distribution of surface type 1 and type 2 materials in southern Acidalia Planitia and the southern highlands. Arrows indicate the direction of surface type 1 material (basalt) transported in the "dry" model to southern Acidalia Planitia (over indigenous surface type 2 andesite) by large outflow channels in Chryse Planitia. Curved yellow solid line shows extent of the Vastitas Borealis Formation ("wet" deposit model: surface type 2 weathered basalt). Curved yellow dashed line shows geomorphic contacts previously interpreted as ancient shorelines (indigenous coastal marine model: surface type 2 weathered basalt).

[e.g., *Soderblom et al.*, 1978]. Conversely, *Thomas and Veverka* [1986] proposed that dark wind streaks formed by the deposition of fine dark silt from plumes of suspended material. This view is now supported by MOC observations that suggest the dark materials are mantle deposits of fine-grained sediment deflated from adjacent crater floors, not sand-sized particles [*Edgett and Malin*, 2000]. Fine-grained particles in wind streaks compared to intracrater material agree with the lack of observed dunes (formed by sand-sized particles) in MOC high-resolution images.

[46] The observation of surface type 1 material grading to surface type 2 material in wind streaks (Figures 5 and 6) may support a combination of depositional and erosional/remnant models. We will first examine the end-members of depositional and erosional models, and then offer a combination model as an alternative.

[47] In a depositional model, both surface type 1 sandy floor material and surface type 2 wall material are deflated from within the crater and deposited to form the wind streak. There are two uncertainties with this model. First, if surface type 1 sandy floor material is deflated out of the crater, why does it not also cover the intervening crater wall observed as surface type 2 material? Second, why are there not dune formations, which form in an eolian environment with sufficient sand supply, in the sandy surface type 1 material in the wind streak? It is thus difficult to account for the observed surface type 1 and type 2 distributions using only a depositional model.

[48] In an erosional model, both surface type 1 and type 2 materials would be locally derived and exposed as overlying material is removed. Uncertainties with this model include how to explain either basalt-andesite or basalt-weathered basalt compositional contacts with no prevailing geologic evidence for different lava flows or different amounts of alteration.

[49] A model that combines deposition and erosion is more consistent with the observed surface type 1 and type 2 distributions in wind streaks. In this model, surface type 2 material is deflated from intracrater walls and deposited on an erosional or protected remnant type 1 surface in the lee of impact craters. Thermal inertia data indicate that particle sizes in the northern extent of wind streaks, where basaltic surfaces are observed, are smaller compared to the sand-sized basaltic particles in intracrater deposits. This may imply that fine-grained surface type 2 materials are mixed with the erosional/remnant surface type 1 materials. This may also explain the less evident mixing trend in wind streaks compared to within impact craters. Remnant material corresponding to surface type 1 basalt would imply a basalt-dominated region, with surface type 2 materials being