POTENTIAL LANDING FOR FUTURE MISSIONS TO VENUS. A.T. Basilevsky[1,2] , M.A. Ivanov[1,2] and J. W. Head[2] [1]Vernadsky Institute, RAS, Moscow 119991, Russia; [2]Brown University, Providence, RI 02912 USA alexander_basilevsky@brown.edu

Introduction: Selection of landing sites for planetary missions requires consideration of at least three issues: 1) safety of landing, 2) target(s) of high scientific interest and 3) avoidance of materials/landforms which are not the target of interest. The first issue can be resolved by the appropriate lander design and by selection of terrain with relatively smooth surface relief. The second issue implies study of materials and landforms of key significance for understanding of composition and history of the studied body. In the case of future landings on Venus the most important seems to be a study of tessera terrain [e.g., 1,2]. The third suggested issue implies an intention to avoid the situation when at the landing site located in the area of the targeted terrain, the target material is overlain by some foreign material not related to the targeted one. In the case of Venusian tesserae such foreign material seems to be the material of crater-related radar-dark parabolas originated from non-tessera regions (Fig. 1).

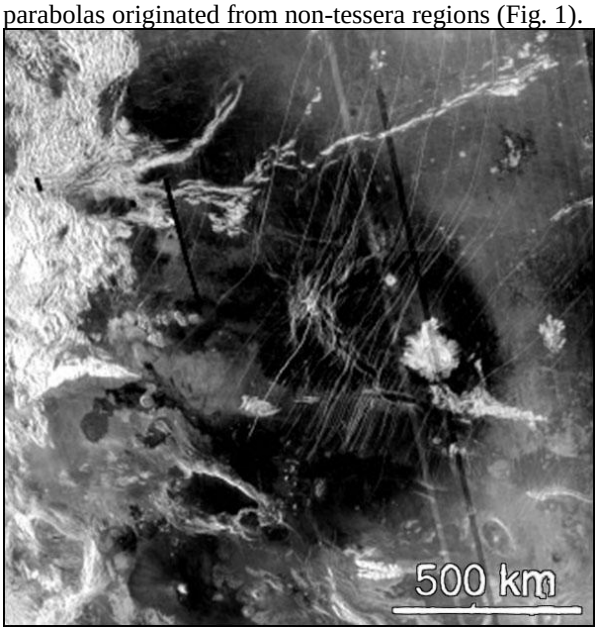

Figure 1. Radar-dark parabola of crater Stuart whose material originated at regional plains and now overlays the radar-bright material of Alpha Tessera.

As shown by [3] the finely layered mechanically weak materials seen at the Venera 9, 10, 13 and 14 landing sites (Fig. 2) are probably of sedimentary origin. Their presence at all sites where TV panoramas of the surface were taken as well as the measured dyamics of overloads during the Vega-1,2 landings, suggest the presence of crushable porous materials [3] imply that these deposits are of wide areal distribution. Analysis of Magellan radar roughness, emissivity, and reflectivity data provides additional evidence of their wide areal distribution [4,5].

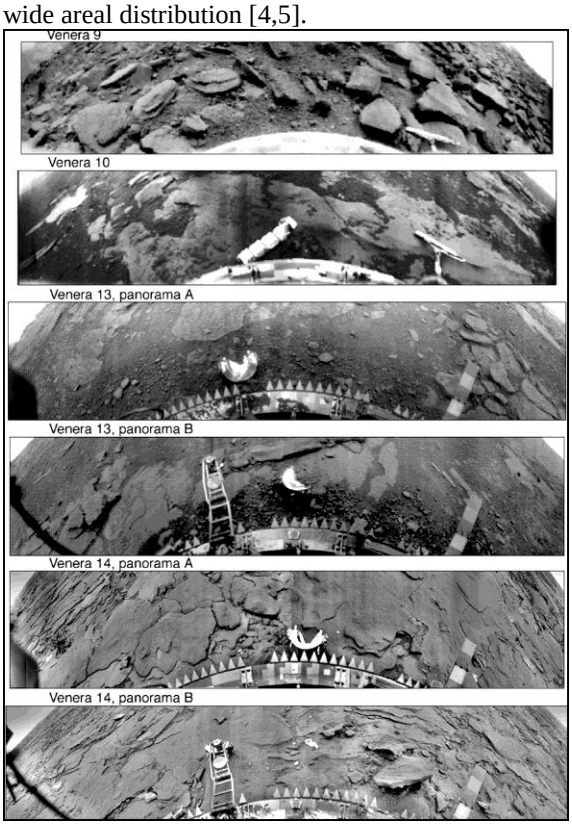

Figure 2. TV panoramas of the Venera 9, 10, 13 and 14 landingt sites. Finely layered materials are seen and are interpreted as eolian deposits representing the radar-dark parabolas.

These deposits are interpreted to be airfall sediments representing materials of present and past radar dark parabolas and associated non-parabolic deposits [5,6]. They are the materials which are foreign to the underlying target material so special attention has to be paid to select sites free of it. Figure 2 shows the global geologic map of Venus [2] with areas of tesera unit emphasized, and Figure 4 shows map of model parabolas associated with craters of Venus larger than 11 km in diameter, the minimum size of fresh craters which have associated radar dark parabolas. Landing sites recommended to sample materials of tesserae terrain, tesserae transitional terrain, shield plains, regional plains with wrinkle ridges and lobate plains are shown in this map. More work is needed to analyze these sites and characterize their surface proprties.

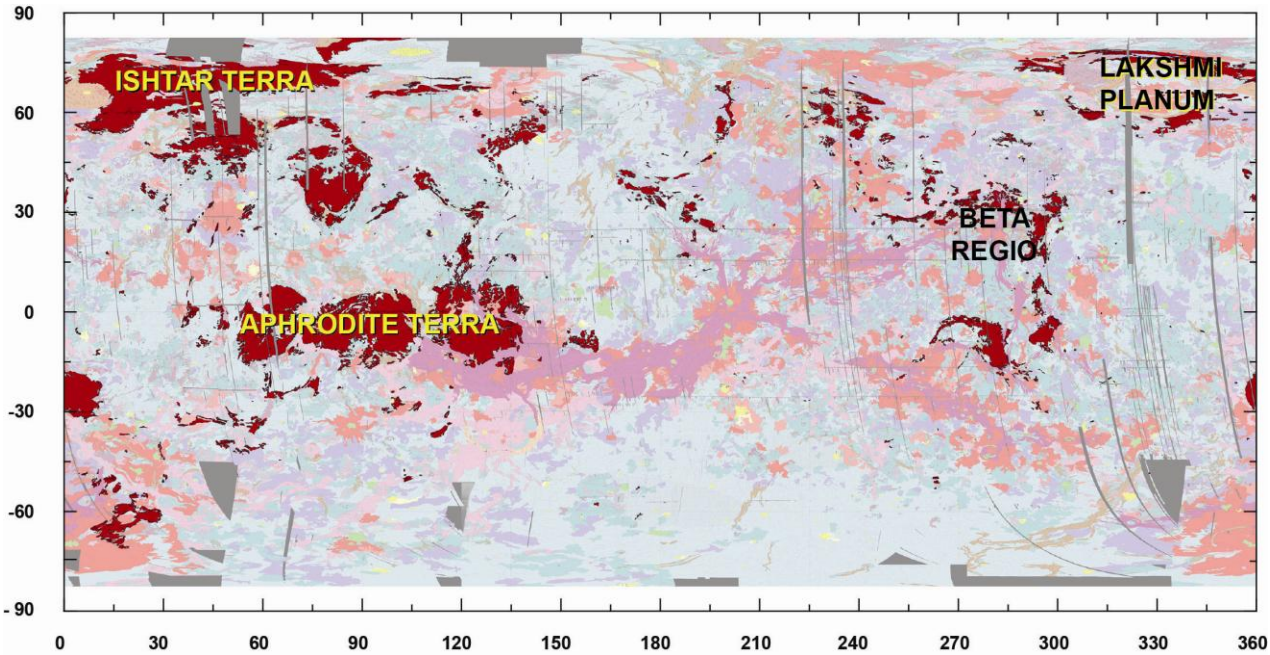

Figure 3. Global geologic map of Venus with tesserae material unit emphasized, modified from [2].

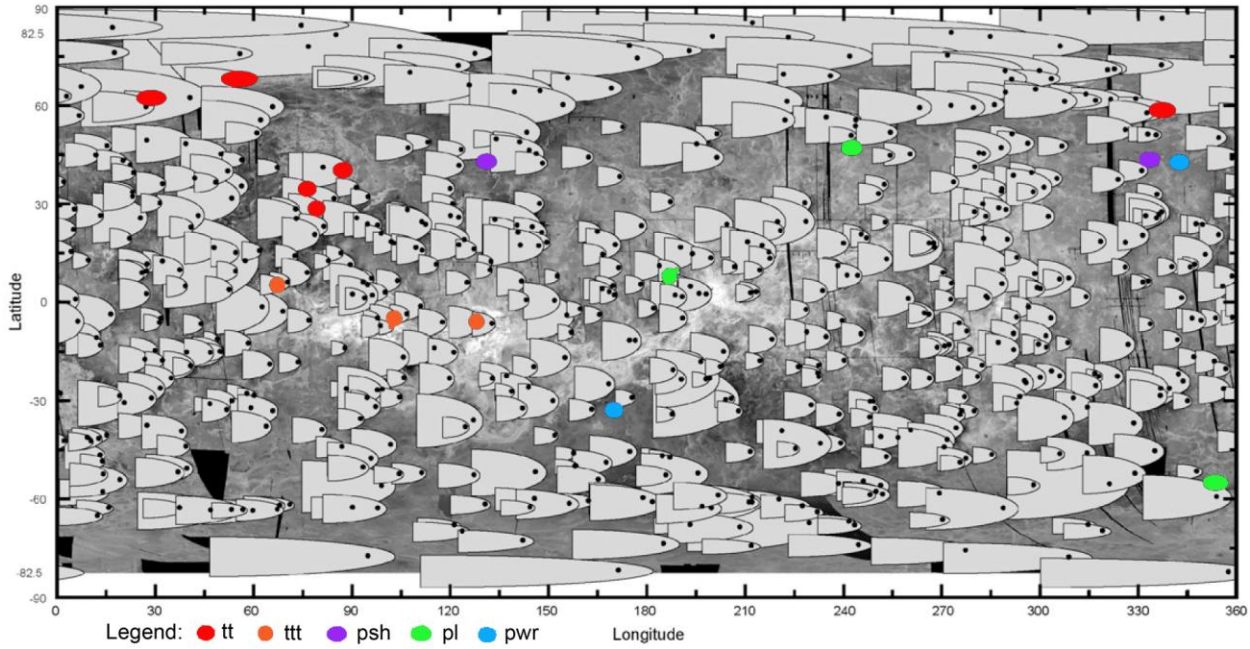

Figure 4. Global map of present and past radar-dark parabolas on Venus and suggested landing sites for future missions to this planet. Modified from [1]. Legend: tt – tessera terrain, ttt – tesserae transitional terrain, psh – shield plains, pl – lobate plains, pwr – plains with wrinkle ridges.

References; [1] Basilevsky et al. (2007) *Planet Space Sci. 55*, 2097-2112. [2] Ivanov and Head (2011) *Planet. Space Sci. 59*, 1559-1600, [3] Basilevsky et al (1985) *Geol Soc. Amer. Bull.. 96*, 137-144. [4] Bondarenko and Head (2004) *JGR, 109*, E09004. [5] Bondarenko and Head (2009) *JGR, 114*, E03004. [6] Basilevsky et al. (2004) *JGR, 109*, E12003.