Supplemental File

V. L. Hansen and I. López

We delineated RTT exposures and trends of ribbon and fold fabrics through detailed global geologic mapping using NASA Magellan SAR and altimetry data. The final maps will be submitted to USGS for publication. Magellan data is available through USGS Map-A-Planet website. Venus is cartographically divided into 62 VMaps; we mapped 61 VMaps, V1-61 (data for V62, south polar region, was not available) using Adobe Illustrator[tm]; results were compiled using ArcGIS[tm] and ArcGlobe[tm], affording virtual global views that resolve cartographic issues that can hamper global spatial analysis. We estimate the global distribution of possible RTT-cover at depth <z using mapped RTT-cover contacts and regional RTT-slope (δ) (Fig. 1). Values of δ are taken from published studies. Given that steep slopes lend themselves to slope determination, the two locations where RTT-slopes were derived represent generally steep regional slopes of lowland RTT-inliers. Using DEM analysis Gleason et al. (2009) determined that an isolated RTT-inlier (length of 75-100km) sits 100-200 m above the adjacent plains, yielding δ values of 0.15-0.306° (avg. 0.197°), similar to δ=0.286° from an RTT-inlier in Niobe Planitia (Hansen, 2009), and similar to Earth's continental rises. Given high- and low-slope values *minimize* and *maximize* areal estimates of shallowly-buried RTT, respectively, we use δ=0.286° for a conservative estimate. Typical lowland regional slopes (over length scales >100s of km) are ~0.1° and as low as 0.05° (Zimbelman, 2003).

Regional RTT-slope varies with high slopes at crustal plateau boundaries (>0.286°) and low slopes (<0.286°) in lowland basins. RTT-cover contacts at plateaus represent a small linear distance compared to RTT-cover contacts in basins, thus δ used here likely exceeds average global RTT-slope; thus results provide a conservative estimate of RTT-cover distribution. Geologic mapping indicates that RTT covers $52.7 \times 10^6 km^2$, or 11.6% of the surface. Table 1 shows the effect of δ (or z) on area of shallow burial. Our study differs from Ivanov and Head (1996) wherein crustal plateau topography was virtually flooded in order to compare virtual and actual RTT-inlier patterns. That study did not estimate the depth of RTT-burial globally. Our study shows the distribution of RTT and shallowly buried RTT, independent of global topography.

Table 1. Estimates of global RTT-burial.

δ (°) with z=1km	z (km) with δ=0.29°	RTT and shallowly-buried RTT (km^2)	x (km)	Global surface (%)
0.29	1	225,649,845	200	49.8
0.32	0.9	217,838,889	180	48.1
0.38	0.75	147,199,147	150	32.5

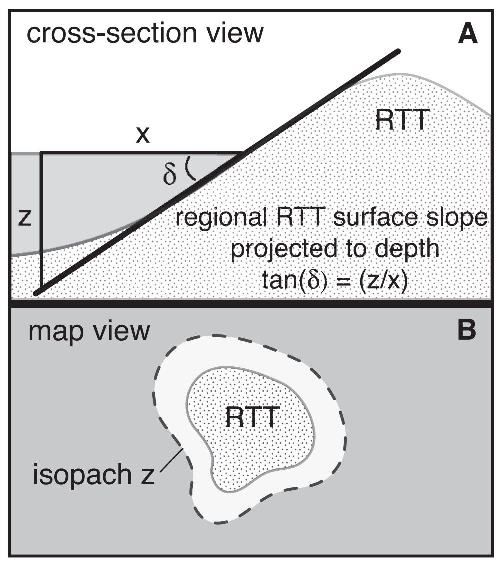

Fig. 1. Cross section (A) and map view (B) illustrating how we estimate where the cover layer reaches a model depth (z), given regional RTT-slope (δ). The value 'x' was used in ArcGIS[tm] to calculate a 'buffer' around RTT-cover contacts; the area on the RTT-side of the buffer (light gray) represents the region with RTT-cover less than z (<1km thick cover), with the remaining region (dark gray) representing the area where RTT-cover exceeds the value of z (>1km thick cover).

References Cited

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Data Repository Item 2010084

Video DR1

Video DR2