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Clotho Tessera, Venus: A fragment of Fortuna Tessera?;

Richard C. Kozak and G.G. Schaber, U.S. Geological Survey, Flagstaff, AZ 86001

Clotho Tessera, adjacent to southeast Lakshmi Planum, may provide additional evidence for lateral crustal motions, and a model for the origin of small tessera fragments.

Clotho Tessera and Lakshmi Planum are so noticeably different, and in such close proximity, it is difficult to derive a reasonable model of their formation in situ. Squeezing of material out from beneath Lakshmi has been suggested as an origin for Moira Tessera [1], which is also adjacent to Lakshmi and 1400 km west of Clotho. However, a logical model of juxtaposition of the two different terrains, originally from points once distant, can be made for Clotho and Lakshmi (and perhaps other small tesserae as well).

The 4.5-km-high Danu Montes between Clotho and Lakshmi clearly indicate convergence. Parallel to the WSW trend of the eastern Danu Montes is a distinct lineament, across which the character of the terrain changes (in some places radically), and the tessera ridges appear deflected. The deflection of ridges along a 50-km segment of this Danu lineament suggests drag caused by right-lateral offset. At the northeast extent of both Danu Montes and Clotho Tessera is a 120-km-wide diffuse lineament zone (DLZ) trending southeast. These lineaments are traceable for 700 km before they disappear, apparently buried for almost 500 km by flows from the northeast that are related to a large volcano-tectonic depression whose southeast rim is roughly defined by Valkyrie Fossae. Beyond Valkyrie Fossae, a similar lineament zone continues an additional 800 km southeastward before abruptly terminating 150 km short of Sigrun Fossae. (The abrupt termination follows a line subparallel to Sigrun Fossae -- itself nearly perpendicular to the lineament zone -- and is probably one of the faults which form the Sigrun rift valley). This eastern segment of the DLZ is 100 km wide near Valkyrie and fans out eastward to as much as 400 km or more wide near Sigrun.

I suggest that Clotho Tessera was once part of Fortuna Tessera, but was cut off by a transcurrent fault zone (the DLZ) striking perpendicular to the Sigrun "rift" [1,2] and carried westward where it collided with Lakshmi Planum (forming Danu Montes). A gravity anomaly along the southern border of Lakshmi, in the area of Danu Montes, has been interpreted as indicating subduction there [3], providing additional supporting evidence for the collision hypothesis. The Danu Montes right-lateral fault(?) is explained by the obliquity of the collision of Clotho with Lakshmi (the path of least resistance for the migrating terrain being toward the southwest).

Diffusion of the DLZ with proximity to Sigrun Fossae may be due to either higher ductility near the postulated Sigrun "rift", or to burial by flows away from the rift nearer to Valkyrie Fossae. (The latter hypothesis is reinforced by inselbergs of the sheared-type terrain near Valkyrie). If this is indeed the case, it indicates that the visibilty of transcurrent structures resulting from crustal movements may be difficult to see in the plains, due to much higher ductility there and/or to burial by the plains-forming flows.

Other possible examples of migrating tesserae occur elsewhere: small pieces of Ananke Tessera can be fit back together as though they had rifted apart, and the spreading apart of Ananke and Virilis Tesserae has been suggested because of their symmetric locations about the axis of an inferred spreading zone [4]. Other tessera fragments appear to have been isolated by rifting, with little, if any, significant lateral motion (e.g., Meni and Tellus Tesserae, and Tethus and Fortuna Tesserae). The migrating terrain model for Clotho Tessera supports Sukhanov's [5] interpretation of tesseral fragments as rafts of lighter crustal material.

References

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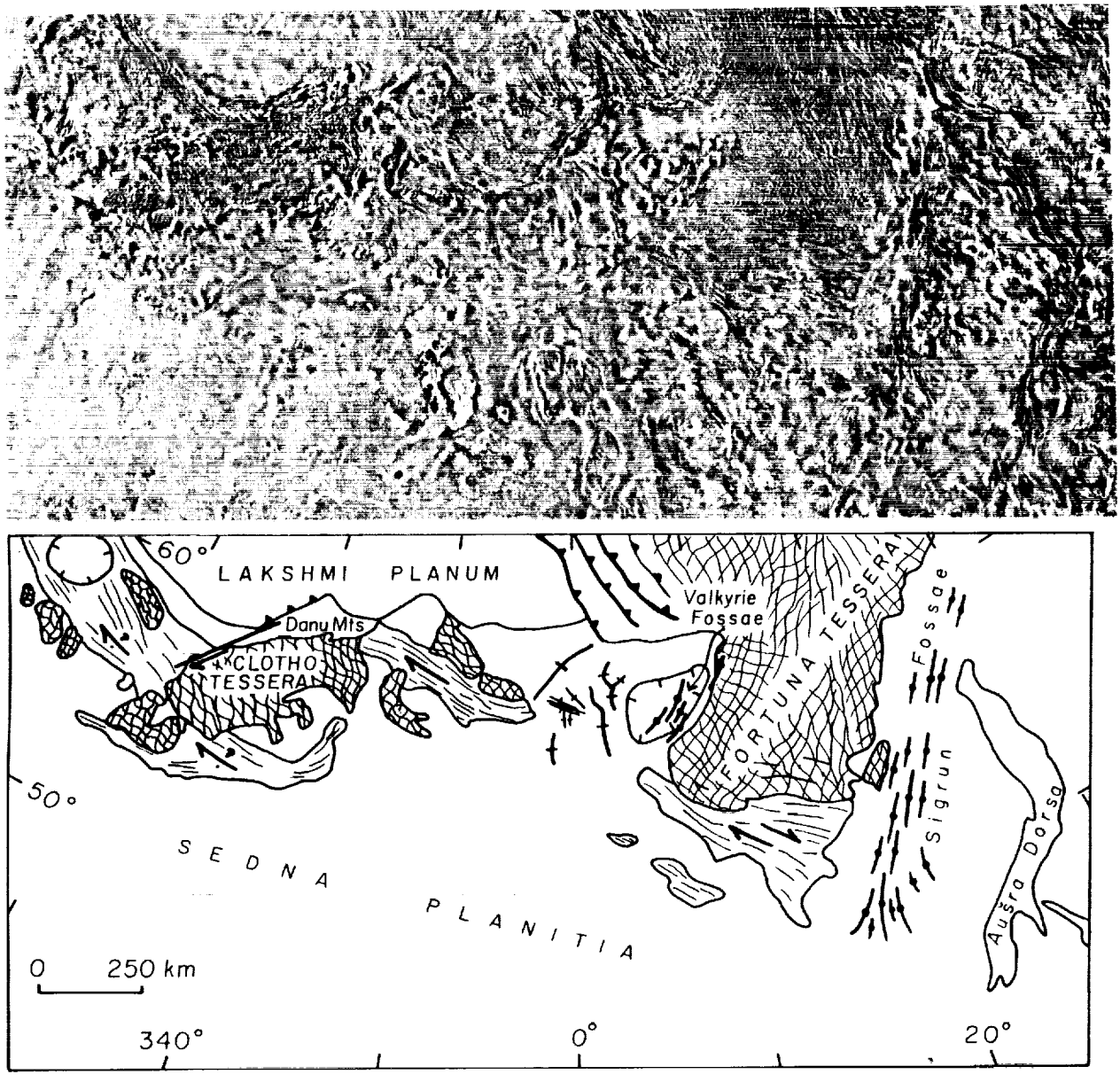

Figure 1. (top) Venera 15/16 mosaic of the suggested "Clotho-Sigrun shear zone" area. (bottom) Interpretive sketch map of the area.