LINEAMENT ANALYSIS OF FORTUNA TESSERA; A PRELIMINARY EVALUATION OF A COMPLEX RIDGED TERRAIN, VENUS.

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It is essential to identify the structural pattern of a region in order to fully understand its tectonic history . A method commonly used in terrestrial studies is to map lineaments and identify dominant trend directions. The purpose of this project is to identify major and minor lineament trend directions for Fortuna Tessera and its immediate surroundings. In this presentation, we will be showing results obtained from ongoing research.

Fortuna Tessera and other complex ridged terrains (CRT) are extremely deformed, elevated regions found on the surface of Venus. CRT comprise 10% of the surface, and are distributed widely across the planet (Solomon, et al., 1992). They generally contain sets of structural features (ridges, faults and grabens) of diverse orientations with various geometric relations.Truncation of these features by smooth plains material indicates that CRT may be some of the oldest surfaces in existence on the planet.

Fortuna Tessera is an irregularly shaped elongate region of complex ridged terrain located within the eastern portion of Ishtar Terra, 65° to 70.3° latitude., 14.7° to 82.1° longitude. Surrounding Fortuna are a variety of volcanic and tectonic features.Volcanic plains lie to the north, south and east of Fortuna. Adjacent to Fortuna in the west is Maxwell Montes,the highest mountain on Venus, which has been interpreted as a compressional feature. Just further west are other high, compressional mountain belts that surround Laksmi Planum. The elevation of Fortuna above the planetary datum (6054 km) decreases from west to east: about 6 km in the west near Maxwell Montes to about 3 km on the eastern edge (Vorder Bruegge and Head, 1989).

Features typically found in CRT, including Fortuna, have the following general properties: (1)The **ridges** can have a range of widths from about 1 km across to as much as 20 km across. The fine ridges are usually only a few ten of kilometers long, while the broad ridges can be up to 100 km long. Broad ridges are spaced about 10-20 km apart, and the fine ridges are usually spaced much closer (Solomon, et al., 1992). Ridges are typically the oldest structures in CRT. (2) **Zones of disruption** that cut across ridges are common in CRT. These zones are thought to be caused by small degrees of shear or strike-slip motion (Bindschadler et al., 1992, Solomon et al., 1992). (3) **Grabens** and other extensional features are an integral component of complex ridged terrain. These structures cut across the ridges and disruption zones, and are thus interpreted to have formed last. The graben are up to hundreds of kilometers long, vary in width from under a kilometer to several kilometers wide, and are 1-10 km apart (Bindschadler et al, 1992).

One problem regarding CRT is the mechanism of formation and their high persistence to survival. One way to attack this problem is to delineate structural features and to classify these features by trends and cross-cutting relationship. A mathematical method used to identify dominate lineaments trends on Mars (Anderson, 1993) has been applied in this study.

Four Magellan C1 MIDR photoproducts, which include all of the available image data for Fortuna Tessera, were examined, and the lineaments were traced onto mylar overlays at photo scale. Each lineament was digitized, and the endpoints were measured and recorded in an X-Y reference coordinate. Several analytical methods have been applied to the dataset, including length-weighted frequency contour diagraming and dominate trend analysis. Rose diagrams were also constructed from the data in order to identify the dominate lineament trends.

References

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