LINEAMENT ANALYSIS OF FORTUNA TESSERA, VENUS: RESULTS FROM AN ONGOING STUDY. Kevin M. Riley, Robert C. Anderson and Brian J. Peer. Department of Geology and Planetary Science, University of Pittsburgh, Pittsburgh, PA 15250.

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 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 [1]. Features typically found in CRT, including Fortuna, are the following: ridges, zones of disruption due to shear, and graben. See [2] for a summary and [3] and[4] for a detailed discussion.

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 relationships. A mathematical method used to identify dominant lineaments trends on Mars [5] has been applied in this study.

Four Magellan C1 MIDR photoproducts, 75N29, 75N74, 60N14 and 60N70, which include all of the available Magellan image data for Fortuna Tessera (unfortunately, a gap in the data runs down the center of Fortuna), provide the data set. The lineaments are traced onto mylar overlays at photo scale. Each lineament is digitized, and the endpoints are measured and recorded in an X-Y reference coordinate. Dominant trend analysis is applied, and rose diagrams are constructed from the data in order to identify the dominant lineament trends. Thus far, trend analysis has been completed for the C175N29 and C175N74 MIDRs, and as of this writing the other two MIDRs are being digitized.

General Lineament Trends

C175N29 (Figure 1)

18,405 lineaments were digitized on this MIDR, and most of the lineament directions fall within the range N45W to N45E. The northern portion of the MIDR are plains units that surround and sometimes embay the CRT. The lineaments on this terrain trend to the north near the western edge of the MIDR, and swing around to about N45W toward the east and south. As CRT is encountered toward the south, the number of lineament increases dramatically, and the major trends occupy a range from N20W to N20E. The eastern portion of the CRT has significantly fewer lineaments than the central and western portions of the image. Toward the south west corner of the image the major trends swing west of north, to about N20W.

C175N74 (Figure 2)

30,359 lineaments were digitized on this MIDR. The northern half and eastern fifth of this MIDR are plains units that surround and embay the CRT. The exception to this is a tongue of terrain that extends northward from the CRT and goes off of the northern edge of the MIDR. The lineaments on the plains along the western edge of the image have two major trend ranges: greater than N60W and greater than N60E. Toward the east the NE tending lineaments decrease sharply in number., but the NW trend remains pronounced. In the NE and SE corners of the image the NE trending lineaments reappear. The lineament trends in the CRT go from two major trends of N70W and N60E in the west to a jumble of smaller trends spread over about 120 degrees in the central and eastern portions of the CRT.

Future Work

As this is written the C175N29 and C175N74 MIDRs are being digitized, and the analysis of that data will be presented at this conference. Preliminary analysis of all four data sets relative to the entirety of Fortuna Tessera will also be completed for the conference. In the near future we will map and digitize the Venera data that fills the gap in the Magellan data in order to make the Fortuna data set as complete as possible. The next major phase of this project will be the delineation of geological units within Fortuna Tessera.

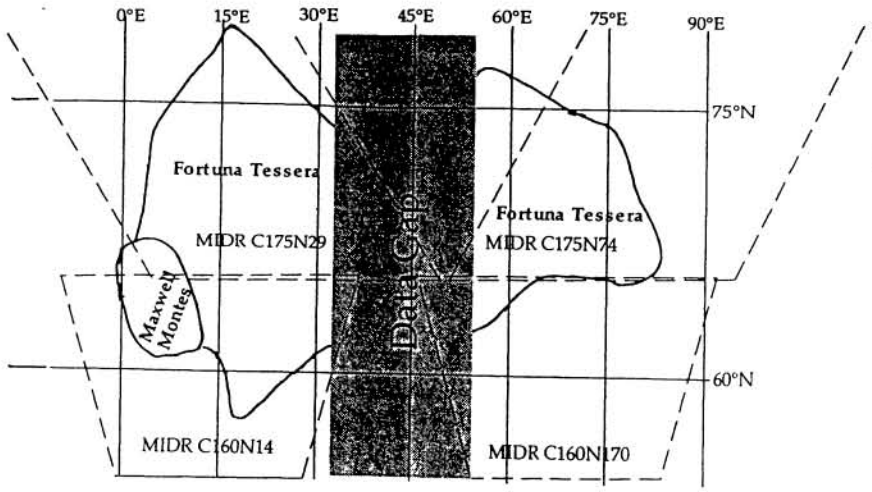


Figure 1

Figure 2 C175N29

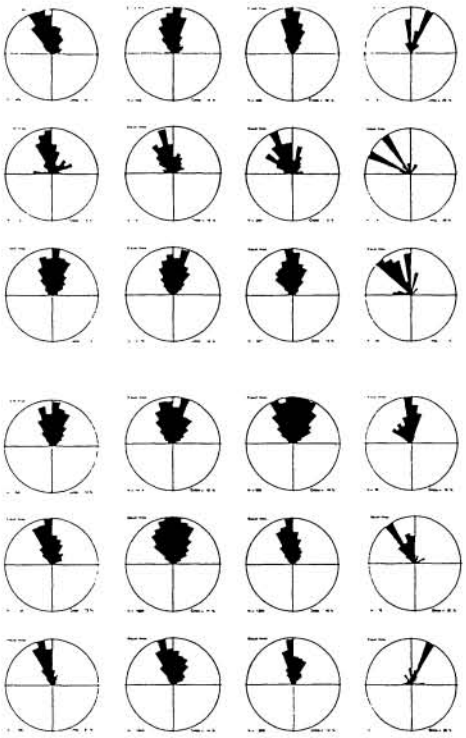
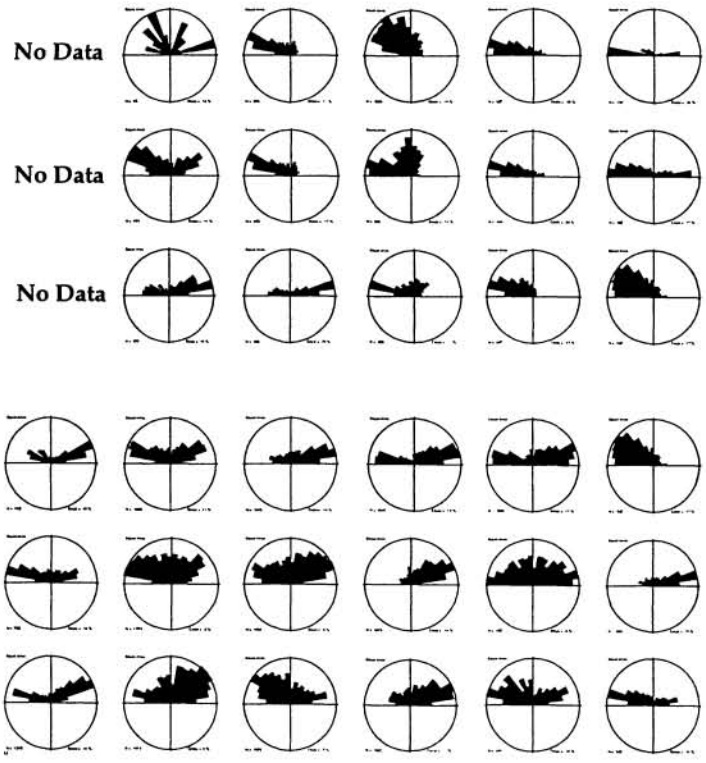


Figure 3 C175N74



References

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