Style of deformation. The majority of ridges and troughs in all units are compressional in origin. The transitional units show evidence of multiple deformation which can be interpreted as an initial stage of compression, followed by an additional deformation due to interactions with the shear zones and gravitational deformation. The dissected terrain also underwent an initial compressional event, followed by a second stage of deformation related to the strike-slip faulting. The deposits of the bright terrain unit were the result of a late-stage event, since they are not deformed by tectonic processes that affected the other units. They may represent either volcanic flows or impact ejecta and melt. The other smooth units occur in local lows and may represent smooth volcanic flows since they are radar-dark, although they could have a low radar cross section due to their low altitude. Overall, we find that Maxwell Montes is a compressional orogenic belt, characterized by parallel ridges resulting from the horizontal convergence of crustal materials toward Lakshmi Planum from the east-northeast.

Cross-strike discontinuitites. Nine long, linear cross-strike discontinuities are observed to cut across the structure of Maxwell Montes, disrupting ridges and unit boundaries, and dividing the mountain range into 10 crustal domains. These cross-strike discontinuities represent strike-slip faults along which the crustal domains have been offset in a right-lateral sense from 10 to 125 km.

Large-scale evolution. Retrodeformation of crustal domains to their pre-strike-slip form creates a linear mountain belt remarkably similar to the Akna Montes mountain belt, suggesting that Akna Montes may represent the initial, relatively simple form of compressional orogenic belts on Venus. We have presented three models to account for the evolution of Maxwell Montes from this simple orogenic stage to the present configuration (Figure 13). The first two models suggest that strike-slip faulting occurred while the mountain belt remained in place, either with or without large-scale rotation, while the third model suggests that strike-slip faulting was accompanied by large-scale transport of the mountain range from east to west within converging shear zones without large-scale rotation. We favor a combination of the last two models (Figures 13*b* and 13*c*), in which some east-west lateral transport was accompanied by large-scale counterclockwise rotation of the range within the converging shear zones. This model can account for the observed morphology, topography, and sense of offset on the CSDs and shear zones.

Sequence of deformation. A sequence of deformation for Maxwell Montes that can account for the observations is as follows:

1. Formation of an Akna Montes-like long linear mountain belt between two converging shear zones, accompanied by formation of the dissected terrain. This mountain belt had up to 11 km of elevation.
2. Creation of the circular stucture Cleopatra, and emplacement of bright terrain associated with this structure.
3. Creation of, and movement along, strike-slip faults, resulting in the present configuration of Maxwell Montes.
4. Plains flooding to the west and south of Maxwell Montes.
5. Further deformation in the plains, creating folds in volcanic units to the immediate west of Maxwell Montes and arcuate, extensional troughs farther west.

Age of Maxwell Montes. The lack of obvious extensional features along the crest of Maxwell Montes indicates that gravitational relaxation has not significantly affected the mountain range as a whole, and that Maxwell Montes is a young feature (< 200-600 m.y. old) which may still be undergoing deformation.

Finally, from this study, one can conclude that horizontal motion of crustal materials in the form of large-scale compressional folding, strike-slip faulting, and shear represent fundamental aspects of the tectonics of Ishtar Terra and Venus in contrast to the smaller, one-plate planets, Mars, Mercury, and Moon.

QUESTIONS FOR MAGELLAN

In August 1990, the Magellan spacecraft will arrive at Venus and begin to take radar images of the Venusian surface at resolutions of better than 300 m. The data returned from this mission will enable us to test many of the observations and interpretations presented here and to distinguish more confidently between the three models for the second stage of the evolution of Maxwell Montes. Of primary importance will be the further defintion and characterization of the cross-strike discontinuities and features associated with them. Similarly, a better characterization of the shear zones that bound Maxwell Montes on the north and south will provide further insight into the evolution of Maxwell Montes. The high-resolution images should also enable us to determine if normal faulting has occurred near the crest of Maxwell Montes and therefore constrain the stress regime across the belt. Other features related to gravitational relaxation also might be observed in and around the mountain belt. In addition, the nature of Cleopatra and the deposits associated with it should further enhance our understanding of this region. Finally, the charcteristics of the dark bands unit west of Maxwell should provide insight into the process of orogeny on Venus, as we interpret this as the location of incipient mountain building.

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