TECTONIC ANALYSIS OF MESHKENNET REGIO OF VENUS FROM VENERA 15 AND 16 DATA; V. Ansan, Ph. Masson, and C. Sotin, Laboratoire de Géologie Dynamique Interne et de Géophysique, Bât. 509, Université de Paris Sud, 91405 Orsay, FRANCE.

In preparation to the study of high resolution Magellan radar images, we have studied the Venera 15 and 16 quadrangles. The present study concerns the tectonic interpretation of quadrangle B6 which includes Fortuna Tessera located on the east of Ishtar Terra and the western part of Thetus regio. Three plains were identified (1) : Louhi and Snegurochko planitiae in the northern part of the quadrangle, and Audra planitia in the southern part of this photomosaic. These plains are about 1000 m in elevation. The central part of the image is composed of Fortuna tessera and Meshkenet tessera that are about 1500 m in elevation. Since these tesserae exhibit a smaller density of craters than the planitia, there are thought to be younger and from volcanic origin (2,3). Fortuna tessera exhibits a very distorted surface where folds and faults seem to be formed at the same period of time. Using statistics on the direction of linear structures, it is possible to define four tectonic events : three compressive episodes that formed the folds and faults and an extensive event in a N45 direction that produced chasma oriented in a NW/SE direction. These interpretations are consistent with geodynamic interpretations issued from the study of Fortuna Tessera on quadrangle B5 (4).

This paper specifically addresses the tectonics of the Meshkenet tessera area which is located between N65 and N70 in latitude, and E90 and E130 in longitude. In this area, three different units were defined (1) that are from West to East (Fig 1) : 1- Gloria and Tusholi Corona, 2- a smooth plain 1000 m high oriented in a southwest-northeast direction, 3- Meskenet tessera plateau (1500 m).

Gloria and Tusholi Corona are composed of a 300 km ring-shaped wrinkled surface whith four big volcanoes around which there is evidence of radial lava flows (1). The eastern boundary of Tusholi Corona seems to be a deep trough according to the radar image that displays a very dark boundary. This trough is about 200 km wide. The boundary between Gloria and the smooth plain to the southeast seems to be less deep and less wide (50 km). In this area, the smooth plain has a dome-like shape that can be explained by the bending of the lithosphere, or (and) the presence of active volcanism. The smooth plain seems to be very recent since the density of crater is very small compared to that of the tessera and is probably of volcanic origin. The Meshkenet plateau exhibits a NW-SE en echelon-like pattern. Each rectangular patch exhibits a wrinkle surface and is separated from the others by a linear trough. Ridges within each of these rectangular domains are oriented perpendicular to the long troughs. Such a pattern is charateristic of tessera.

From a statistical analysis of the linear features observed in this area, it seems that the tectonic history of Meshkennet domain requires five tectonic events (Fig 1). The first event is a right-lateral strike-slip with a compressive stress in a N135 direction that explains the movement along the very long troughs oriented in a N120 direction in the North of Meshkenet tessera. This event was followed by an inversion of the movement which lead to the formation of a pull-apart and NS "en echelon" fissures with a left-lateral strike slip. The third phase corresponds to a compressive N110 step that folded the surface. An alternative interpretation is to assume that the folds already existed (5). However, there is tectonic evidence to support the fact that the folds oriented in a N20 direction could not be formed before the first step.

The fourth and main tectonic event is a regional left lateral strike-slip movement produced by compressional forces in a EW direction. This event yields the formation of the regional en echelon pattern. During its evolution, this fault pattern was distorted and this can be interpreted by the rotation of the principal compressive stress from N90 to N45. Therefore, Meshkenet tessera was moving towards Gloria and Tusholi corona. The last event is a N45 extension that created the graben in the center of Meshkenet tessera and migth have widened the long troughs oriented in a NW-SE direction.

It seems that Meshkenet tessera had moved towards Gloria and Tushoni corona, squeezing the smooth plain that migth have subducted beneath Gloria and Tushoni corona. This tectonic event would have formed the trough and the dome-like shape of this area. Volcanoes on Gloria and Tushoni corona migth be related to this subduction or overthrusting event.

References : (1) Topographic map of part of northern hemisphere of Venus 1989. (2) Barsukov V.L. et al, J. Geophys. Res., 91, 378-398, 1986. (3) Basilevsky A. T., et al, J. Geophys. Res., 91, 399-411, 1986. (4) Vorder Bruegge R.W. et al, Geophys. Res. Let., 699-702, 1989. (5) Head J.W., J. Geophys. Res., 95, 7119-7132, 1990.

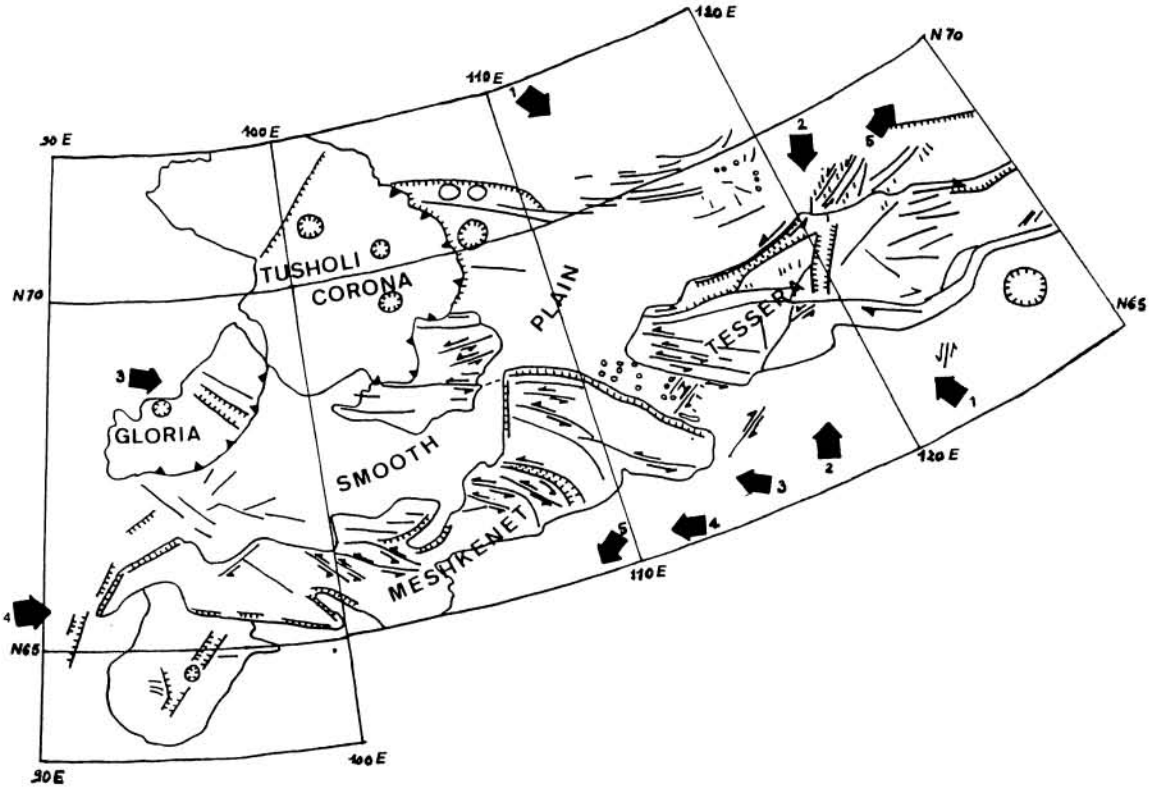

Fig 1. Tectonic map of Meshkenet Tessera from Venera 15/16 radar imagery (B6).
Scale : 0 —— 114 km.
Figure caption :

- Caldeira
- Ridge
- Scarp
- Shear fault
- Thrust fault

Tectonic chronology : 1. Dextral shear fault related to compressive stress (=>) trending N135. 2. Senestral shear fault related to compressive strengh (=>) trending N000. 3. Compressive stress trending N110. 4. Shear fault related to compressive stress (=>) trending N090 and N045. 5. Extensive stress trending N045.