FORMATION OF EASTERN ISHTAR TERRA, VENUS, THROUGH ACCRETION OF CRUSTAL TERRANES. **R.W. Vorder Bruegge and J.W. Head, Dept. of Geo. Sci., Brown Univ., Providence, RI 02912.**

Introduction: Eastern Ishtar Terra, Venus, is characterized by a complex pattern of ridges, troughs, chasmata, and plains. Located between 0 and 90E longitude and 60 and 80N latitude, this highland region also exhibits elevations between 0 and 11 km above the mean planetary radius. The complex patterns of topography and morphology in this region have been interpreted as the result of a variety of processes including: crustal flow due to "asthenospheric plumes" and "thermal-gravitational sliding" [1]; rifting, gravity sliding, and fold/thrust belt formation [2,3]; and horizontal convergence and crustal thickening [4]. These models are described and assessed elsewhere [5], with the conclusion that horizontal convergence of crustal blocks is the process most likely responsible for the topography and morphology of Eastern Ishtar Terra. In this abstract, we identify the specific crustal blocks in Eastern Ishtar Terra, interpret their individual textures, and propose a sequence of accretion in the construction of Eastern Ishtar Terra.

Unit/Province Interpretations: Four provinces have been identified in Eastern Ishtar Terra based on consistency of morphological and topographical patterns [5]. The morphologies of the Western, Central, and Eastern Fortuna Tessera provinces are identical to tessera sub-types identified in a previous study [6]. The parallel ridges and valleys and oblique linear troughs in Western Fortuna Tessera represent the Sub-Parallel Ridged Terrain (Tsr), which has been interpreted as compressional in origin [4,6]. The orthogonal nature of ridges, troughs, and chasmata in Central Fortuna Tessera is the same pattern found in the Trough-and-Ridge Terrain (Ttr), which has been interpreted as resulting from a process analogous to terrestrial seafloor- spreading, with the parallel ridges representing abyssal hills, and the troughs and chasmata representing fracture zone-like features [7]. Eastern Fortuna Tessera resembles Disrupted Terrain (Tds), which has elements of both Tsr and Tds, and appears to be the result of the disruption of these preexisting fabrics through shear and, perhaps, gravitational relaxation. The final province, Northern Fortuna, with its series of scarps, troughs, and flanking rises has been interpreted as the location of large-scale crustal imbrication and underthrusting [8], similar to Itzpapalotl Tessera, north of Freyja Montes [9]. The differing nature of the provinces/units reflects their production as crustal terranes through distinct processes: Western Fortuna (Tsr) through compression and crustal thickening; Central Fortuna (Ttr) through a seafloor-spreading-type mechanism; Eastern Fortuna as a combination of Tsr and Ttr, followed by shear and relaxation; and, finally, Northern Fortuna through large-scale imbrication and underthrusting.

Sequence: The process of lateral movement, crustal underthrusting, and imbrication suggested for Northern Fortuna and Freyja Montes [9] provides a mechanism for bringing disparate crustal blocks together. While thin crust may be easily underthrust and imbricated beneath thicker crust in Northern Fortuna and Freyja [9], it is unlikely that thicker crust in the form of a pre-existing tessera block would be underthrust in this way. Instead, it is more likely that such a thick crust-thick crust collision would result in the production of a suture zone and some internal deformation of the blocks. Such a model has been suggested for the Danu Montes-Clotho Tessera region south of Lakshmi Planum [3,10]. Recognition of suture zone and related deformational features in Eastern Ishtar leads us suggest that the process of crustal accretion is occurring there. Relationships between the provinces enables us to determine a relative sequence of events for the accretion of terranes into Eastern Ishtar Terra. The first stage is the production of Maxwell Montes and Western Fortuna Tessera through east-west convergence (Fig. 2a). The easternmost extent of Western Fortuna shows an increase in shear features, with a disruption of the continuity of ridges there. We interpret this to be the result of the collision of Central Fortuna (Ttr) with this edge of Western Fortuna (Fig 2b). Several lines of evidence suggest that the majority of Central Fortuna has moved to the southwest. The WNW-orientation of ridges and orthogonal, NNE-orientation of fracture zone-like troughs in the Ttr suggest convergence in a SSW-direction. Similarly, ridges south of the Ttr in Central Fortuna [See Figure 1 in 5] are also oriented WNW. These observations indicate that this region was moving toward the SSW, resulting in oblique convergence with Western Fortuna, which is likely to produce more intense shearing in the preexisting fabric. A similar SSW sense of convergence is reflected in the orientation of scarps and ridges in Northern Fortuna Tessera, suggesting some form of backstepping away from the initial suture zone near Western Fortuna (Fig. 2c). Finally, ridge belts along the northwest edge of Laima Tessera suggest that it is undergoing a similar crustal motion from the ESE to the WNW. Laima intercepts Eastern Ishtar at the

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southern edge of Eastern Fortuna Tessera. We attribute the increased shear deformation in Eastern Fortuna to this interpreted collision (Fig. 2d). The fabric of Eastern Ishtar Terra can therefore be described as an amalgamation of tessera blocks that have undergone convergence, shortening, and shear deformations.

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Figure 1. Sequence of events in Eastern Ishtar Terra accretion: a. Maxwell Montes/Western Fortuna convergence. b. Central Fortuna Tessera convergence. c. Northern Fortuna underthrusting. d. Laima interaction, further disruption of Eastern Fortuna.