Tessera, in a region referred to as chevron tessera [*Vorder Bruegge and Head*, 1989]. These plains regions are distinctly polygonal to linear or arcuate, display relatively indistinct boundary-parallel structures, and lie within a broad topographic low in Fortuna Tessera. Some of the larger P_{it} near the southern boundary of Fortuna appear to be deformed, displaying a pattern of small (~3 km wide) ridges on the plains. Deformation is minor compared to the surrounding tessera terrain. Despite some differences, P_{it} in Laima and Fortuna are similar to those in Tellus in terms of postdating most deformation, and thus they appear to be relatively young.

MODELS

Previous models for the tessera terrain include deformation driven by asthenospheric flow [*Basilevsky*, 1986], gravity sliding above asthenospheric upwellings [*Sukhanov*, 1986; *Smrekar and Phillips*, 1988], and gravity sliding driven solely by topographic gradients [*Kozak and Schaber*, 1986]. Unresolved questions as to the nature of Venus tectonics [e.g., *Kaula and Phillips*, 1981; *Arvidson and Davies*, 1981; *Solomon and Head*, 1982; *Phillips and Malin*, 1983; *Morgan and Phillips*, 1983; *Phillips*, 1986; *Grimm and Solomon*, 1987; *Head and Crumpler*, 1987; *Turcotte*, 1989] and the diverse morphologies of tesserae have led us to formulate a number of models for the formation and evolution of this terrain by considering these and other tectonic processes. Models are then evaluated by comparing their predictions to the basic characteristics of tessera terrain.

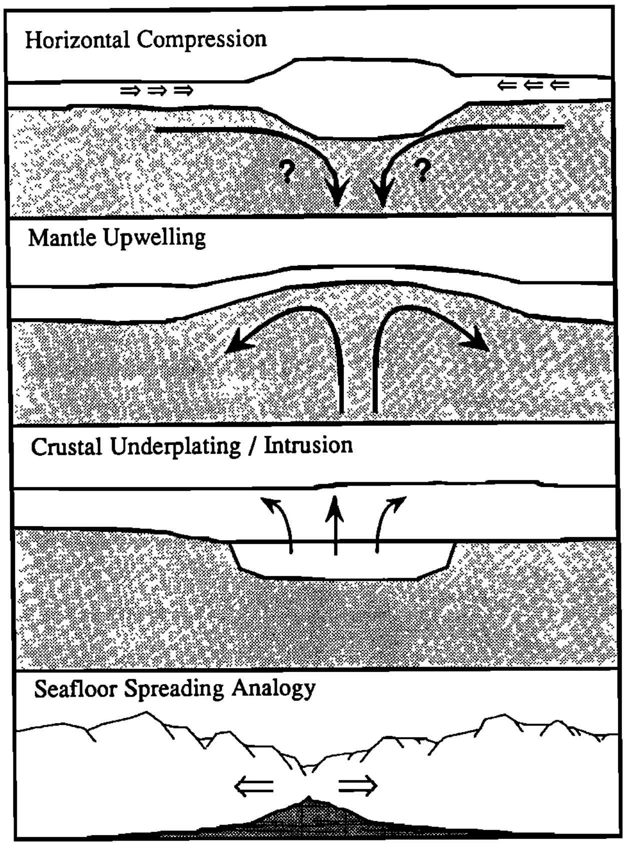

Fig. 8. Sketches representing formational models for tessera terrain. Question marks indicate uncertain nature of forces driving horizontal convergence.

Two types of models are considered: formational and modificational models. Formational models lead to the creation of a deformed region of high topography and include horizontal convergence, mantle upwelling, crustal underplating, and a process analogous to seafloor spreading (Figure 8). Modificational models consider the effects of body forces on a region of high topography, opposed by the strength of the lithosphere and by any formational processes that continue to operate. On Earth, gravitational collapse may be an important process in the history of mountain belts [e.g., *Froidevaux and Ricard*, 1987; *Dewey*, 1988], but the action of gravity is overshadowed by water-related erosional processes which weather material in elevated regions, transport it, and ultimately deposit it at or below sea level. On Venus, there is no free water on the surface, and erosion rates are much lower than on Earth [*Ivanov et al.*, 1986; *Sharpton and Head*, 1985; *Bindschadler and Head*, 1988*a*]. Tectonic processes may be much more important for reducing surface relief than on Earth. We consider two modificational models: gravity sliding and gravitational relaxation of compensated topography (Figure 9). These models imply that the morphology of tessera terrain evolves over time and that this evolution can involve more than a single process.

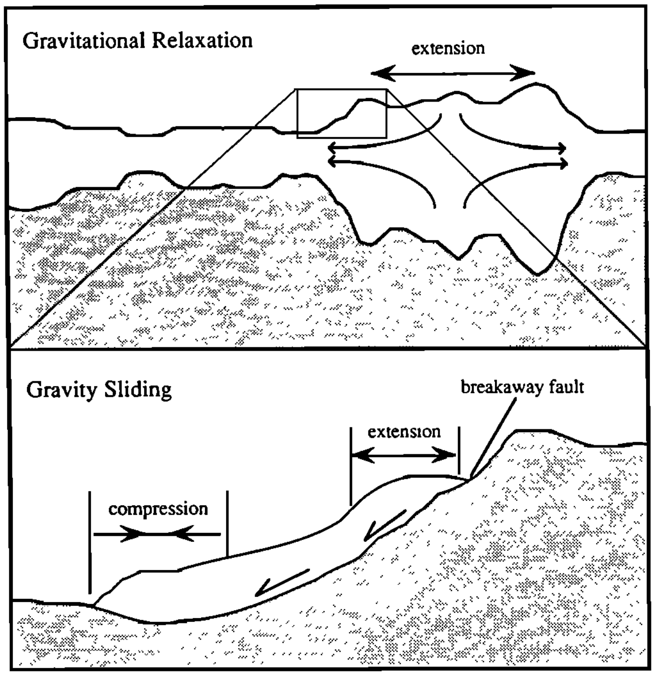

Fig. 9. Sketches representing modificational models for tessera terrain. Inset box for gravity sliding indicates possible relative scale of gravitational relaxation and gravity sliding.

Horizontal Convergence and Crustal Thickening

In this model, the high topography of the tesserae is due to compressional thickening of crustal material. Such deformation may be driven by the convergence of large lithospheric plates, as it is on Earth, or in response to downwelling flow within the mantle [*Bindschadler and Parmentier*, 1990], as represented by the arrows in Figure 8. Structures due to convergence should be dominated by horizontal compressional features. Unless the crust attains