

## Volcanic and Tectonic History of the Ganiki Planitia Region on Venus

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### GENERAL GEOLOGICAL SETTING AND SIGNIFICANCE

The Ganiki Planitia quadrangle (180-210°E, 25-50°N; hereafter referred to simply as Ganiki Planitia), which covers the central portion of Ganiki Planitia, is located northwest of the Beta-Atla Themis volcanic zone and southeast of the Atalanta Planitia lowlands, areas commonly interpreted to be the result of large scale mantle convection [e.g., *Bindschadler et al.*, 1992; *Crumpler et al.*, 1993; *Phillips and Hansen*, 1998]. The region immediately south of Ganiki Planitia is dominated by Atla Regio, a major volcanic rise beneath which localized upwelling appears to be ongoing [*Bindschadler et al.*, 1992], while the area just to the north is dominated by the orderly system of compressional tectonic belts in Vinmara Planitia [*Zuber*, 1987]. Ganiki Planitia thus lies intermediate between several key regions where extensive, mantle-induced tectonic and volcanic activity has occurred, and careful analysis of the regional geology may provide new insight into the relative timing of and interaction between these significant, large scale, surface-shaping events.

Within Ganiki Planitia the geology is characterized by gently varying topography and a complex array of volcanic, tectonic and impact features which are generally surrounded by or superimposed upon a background of volcanic plains (Figure 1). Tectonic deformation has produced tessera, ridge belts and rifts as well as a distributed system of fractures and wrinkle ridges which extends throughout the region. Little is known about either the timing/stratigraphy of these tectonic features or the stress(es) which produced them; the latter, given Ganiki Planitia's location relative to Atla Regio and Atalanta Planitia, are likely to be related to processes active both within and outside of the region, underscoring the need to interpret the geological record carefully and in detail.

Volcanic activity has also been quite intense. In addition to the extensive volcanic plains deposits, thirty-two major volcanic centers, including two calderas, three coronae, six large volcanoes, ten shield fields and eleven arachnoids were identified during a global survey based primarily upon C1-MIDR image interpretation [*Crumpler and Aubele*, 2000]. Most of these features were examined in only a cursory fashion, however, and therefore the details of their evolution and stratigraphic placement are not yet well constrained. Furthermore, since at least one major volcanic center was not detected by *Crumpler and Aubele*—an arachnoid with radiating fractures which extend hundreds of kilometers [*Grosfils and Head*, 1994b]—it is probable that other major centers remain to be found; indeed, new high resolution studies in other areas are revealing numerous, previously undetected volcanic centers at a variety of scales [*Ernst et al.*, 2000]. It is also unclear how many small volcanic features such as individual shields and localized fissure eruptions exist within the region, and thus the importance of this style of volcanism relative to the activity which has occurred at the major centers remains poorly understood.