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By Timothy Parker,[1] Kenneth Tanaka,[2] *and* David Senske,[3] *Editors*

With a section on
Field Trip to the Spring Deposits of the Western Rift and to the Very Large Array, New Mexico

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NEMESIS TESSERA QUADRANGLE (V14), VENUS

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Goals Investigation of the geological relationships preserved in the Nemesis Tessera quadrangle (25-50°N, 180-210°E), a mapping project initiated in June of 2001, is driven by four main science goals:

[1] Interpret the volcanic and tectonic history of two giant radiating fracture systems (dike swarms?) which formed in unusual geological settings—one is centered at the triple junction of a Y-shaped ridge belt while the focus of the other lies upon the rim of an odd fracture annulus [*Summer, 2001*];

[2] Evaluate whether systematic variations in the dominant style of volcanism occur within the region as a function of time [*Summer, 2002*], and use the altitude distribution of volcanic features interpreted to be reservoir-derived to test the hypothesis that their formation is controlled in part by neutral buoyancy [*Summer, 2001*];

[3] Characterize the origin and history of the regional stress fields by interpreting the distribution and relative timing of the diverse array of structural deformation preserved within the region [*Summer, 2002*];

[4] Integrate the stress field and volcanic history interpretations within this lowland area in order to assist with ongoing efforts to constrain competing regional/global resurfacing models and test the hypothesis that a global stratigraphic sequence exists on Venus [*Summer, 2003*].

Regional Setting The V14 quadrangle occupies the central portion of Ganiki Planitia, between the Beta-Atla-Themis volcanic zone and Atalanta Planitia, areas integrally linked to large scale mantle convection processes [e.g., 1-3]. The region immediately south of the quadrangle is dominated by Atla Regio, a major volcanic rise, while the area just to the north is occupied by the orderly system of compressional tectonic belts which characterize Vinmara Plantia. The V14 quadrangle thus lies between several key regions where mantle-related tectonic and volcanic activity has occurred, and careful analysis of the regional geology is expected to yield new insight into the relative timing of and interaction between these major, large scale, surface-shaping events.

Tectonic Features Structural deformation has produced tessera, ridge belts and rifts as well as a complex system of fractures and wrinkle ridges which extends throughout the region. Little is yet known about either the stratigraphy of these features or the sequence of stresses which produced them, but they are likely to record information about tectonic processes active both within and beyond the quadrangle's boundaries.

Volcanic Features Extensive, tectonically deformed volcanic plains characterize the quadrangle, which also contains at least 32 major volcanic centers identified during a global survey [4]. The latter include 2 calderas, 3 coronae, 6 large volcanoes, 10 shield fields and 11 arachnoids, but the details of their evolution and stratigraphic placement are not yet well constrained. At least one major volcanic center not identified during the global survey has already been recognized in the V14 quadrangle (one of the two radiating fracture systems), however, and other centers may exist—new FMAP-resolution studies elsewhere are identifying previously undetected volcanic centers at a variety of scales [e.g., 5]. In addition, it is unclear how many small volcanic features such as individual shields and localized fissure eruptions exist within the quadrangle, and thus the importance of this style of volcanism relative to the activity localized at the major centers remains poorly understood.

Summer, 2001 Mapping is proceeding using ESRI's ArcView software, and all FMAP framelets (Cycle 1) have been reprojected, mosaicked and integrated into this GIS system. I am currently mapping the two giant radiating fracture systems (Goal 1); with radii of 450 and >900 km these features, if they are dike swarms (rapidly emplaced, laterally extensive, discordant), may provide "tie points" which can be used to link together and interpret the regional stratigraphy. Four undergraduates are also working on the project this summer—one has chosen to focus on the neutral buoyancy question (Goal 2), one is studying the stress history recorded by a complex volcano-tectonic system near the center of the quadrangle (Goal 3), and two students are studying the development of shield fields within the region (Goal 2).

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