GEOLOGIC CHARACTERISTICS AND STRATIGRAPHIC RELATIONSHIPS OF SHIELD FIELDS VERSUS SHIELD PLAINS ON VENUS. D. M. Miller[1], and Tracy K.P. Gregg[1], [1]Department of Geology, 411 Cooke Hall, University at Buffalo, Buffalo, NY 14260 dianamil@buffalo.edu.

Introduction: The surface of Venus displays > 550 clusters of small (< 20 km basal diameter) shield volcanoes. Aubele [2] proposed the existence of 2 morphological classes of these Venusian shield clusters: shield fields (Fig. 1) and shield plains (Fig. 2). Shield fields consist of small shield volcanoes that are contained within a 10^3 – 150^2 km^2 region, whereas shield plains are shield volcanoes distributed over 10^3 – 10^6 km^2. Based on image interpretation, Aubele [2] stated that shield fields may have deep magma sources with low magmatic flux; comparitively, shield plains may have relatively shallow, and more widespread magma sources. Shield fields may be either stratigraphically older, younger, or concurrent with the plains units that surround them. In contrast, shield plains consistently appear stratigraphically above densely lineated plains and below wrinkle-ridged plains [3].

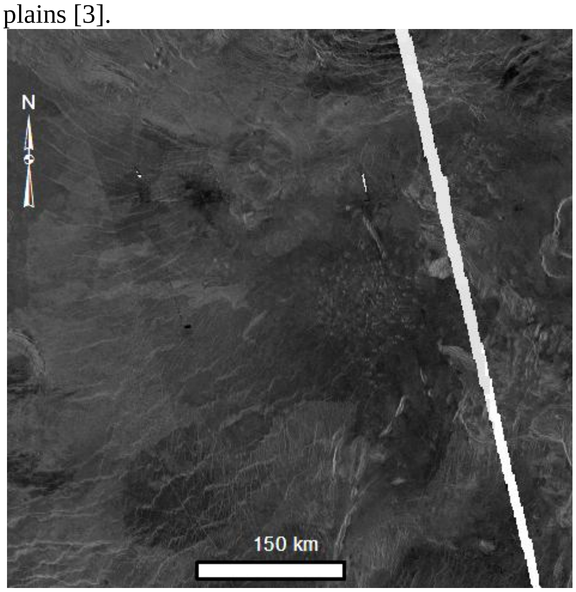

Figure 1. A Venusian shield field [2], centered at 52°S 302°W. Shields are radar bright, circular features near the center of the image. (Right-looking CMIDR courtesy of mapaplanet.com.)

Hypotheses: Individual volcanic shields within shield plains have different morphological characteristics and spatial distributions than those contained in shield fields. These variations include: spacing between volcanoes, edifice shape, relationships with adjacent geologic and tectonic features, and lava flow morphology and distribution. Geologic mapping and spatial analysis can be used to characterize and quantify Venusian shield clusters.

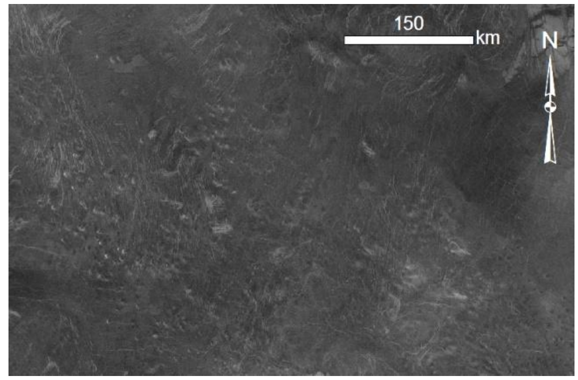

Figure 2. Venusian shield plains [2], centered at 38°N 119°W. Shields are radar-bright near-circular features that occur across the image. (Right-looking CMIDR courtesy of mapaplanet.com)

Methodology: This study encompasses 3 shield plains (centered at 11°N, 130°W; 58.5°N, 149°W; and approximately 25°N, 120°W) and 3 shield fields (centered at 52°S, 302°W; 54°N, 167.5°W; and 27°N, 136.5°W). The shield plains and shield fields have been identified through examination of USGS maps of Venusian quadrangles and include 1 shield plain and 1 shield field from the type areas [2]. Detailed mapping was used to determine the characteristics and stratigraphic relationships between the shield felds, shield plains, and surrounding materials.

The morphological characteristics and stratigraphic relationships in both shield fields and shield plains were constrained through localized, detailed geologic mapping (Fig. 3, 4).

Local geologic maps were created at scales appropriate for the specific shield field or shield plain, with detailed maping of the feature and sketch mapping of the structures surrounding the feature. The maps were based on Magellan (F-MIDR, left-look) images of the shield fields and shield plains and were created with ArcGIS 10.0 software.

Discussion: Shield fields and shield plains appear to be distinct geologic formations. Neither have a set stratigraphy in relation to most of their surroundings, but both seem to have occurred after the formation of any tesserae identified within the map areas.

Shield fields occur as small shield volcanoes that are visually clustered in a tight central group. They occur over small areas, in comparison to shield plains. They appear to be constrained by the surrounding preexisting topography. This is especially evident when they are seen in the summit of coronae or adjacent to tesserae. There are few fractures or ridges that are visible through shield fields. An individual lineament that crosses a shield field may be younger or older than the shields.

Shield plains occur as large, widespread clusters of volcanoes with a difficult-to-distinguish edge between the shield plain and surrounding features. All 3 shield plains mapped in this study embay tesserae. Many fractures and ridges are visible cross-cutting the shield plains. Some fractures are covered by shields from the plains and some cross-cut shields. Coronae associated with the examined shield plains formed either before or after the shield plain.

References: [1] Crumpler L.S. et al. (1997) *Venus II*, pp. 697-756. [2] Aubele J.C. (2008) GSA Abstracts with Programs 40, 133-2. [3] Aubele J.C. (2009) *LPS XXXX* Abstract # 2396.

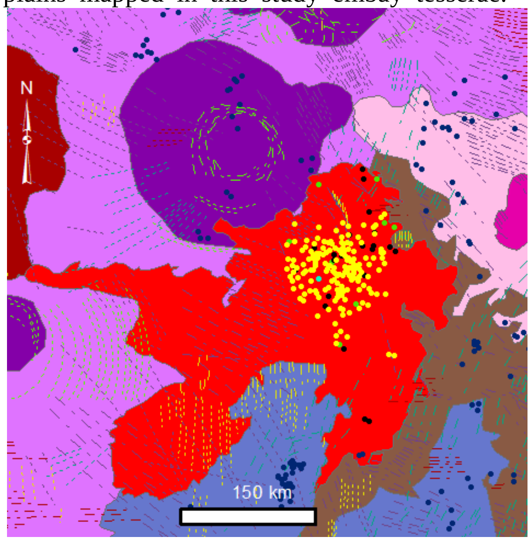

Figure 3: This is the same shield field (in red) as shown in Fig. 1, centered at 52°S 302°W. Dots are small shield volcanoes: blue – shields outside the field; black, yellow, and green – shields within the field boundaries. Lines indicate fractures or ridges with line color indicating orientation. Light purple – coronae material, dark puple – coronae, bright red – shield field, dark red – extraneous shield field, light pink – material associated with pancake domes, dark pink - pancake domes, dark brown – tesserae, blue - undifferentiated plains. Map was created in ArcGIS 10.0 from Magellan (F-MIDR, left-look) radar image.

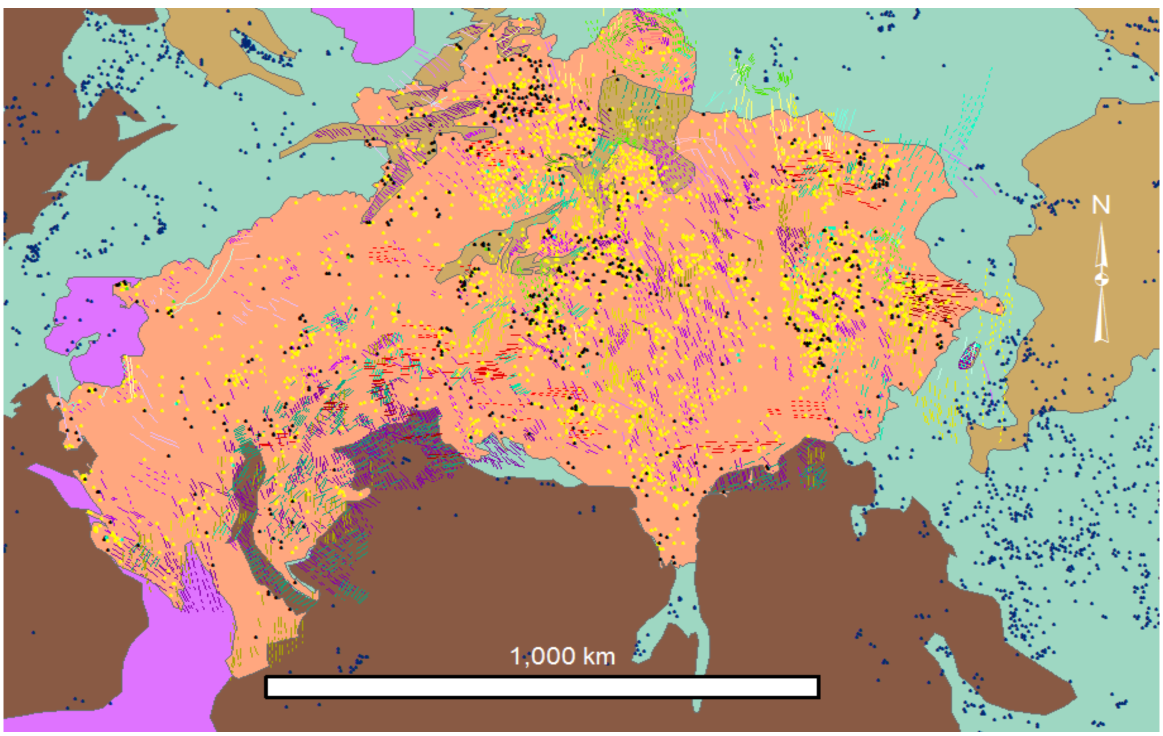

Figure 4: Geologic map of shield plain (centered at 11°N, 130°W). Dots are small shield volcanoes: blue – shields outside the plain; black, yellow, and green – shields within the plain. Lines indicate fractures or ridges with line color indicating orientation. Purple – flows from coronae, dark brown – tesserae, light brown – ridged terrain, peach – shield plain, light blue – plains material (exterior shield plains or undifferentiated plains). Map was created in ArcGIS 10.0 from Magellan (F-MIDR, left-look) radar image.