AN EXAMINATION OF FOUR VENUSIAN SHIELD FIELDS. N. J. Kelly[1], N. P. Lang[1], and B.J. Thomson[2], [1]Department of Geology, Mercyhurst University, 501 E. 38th Street, Erie, PA 16546 (nlang@mercyhurst.edu; nkelly87@lakers.mercyhurst.edu), [2]Boston Univ. Center for Remote Sensing, Boston, MA 02215 (bjt@bu.edu).

Introduction: Small shields represent perhaps the most dominant manifestation of volcanism on Venus. Defined as volcanic constructs <20 km in diameter and <<1 km in height, many small shields (or shields) typically occur in fields that are either associated with a larger volcanic edifice (e.g. a corona) or as isolated clusters [1]. Although much work has examined the physical characteristics of shields and the timing relations of shield fields with surrounding units, the origin and history within individual shield fields remains unclear.

Methodology: With the goal of better understanding the geologic history recorded within Venusian shield fields, we have examined shield clusters in four regions using Magellan Synthetic Aperture Radar (SAR) imagery (~75 m/pixel) [2] sourced from the USGS Map-a-Planet website. The SAR imagery was then imported to ArcGIS 10. The shields were the first units mapped, followed by structures such as fractures and wrinkle ridges. Finally flow material was separated out and mapped resulting in a complete geologic map for the four fields.

Field Areas: 1) Chernava Colles (335°E, 10°N), 2) Ran Colles (162°E, 0°N), 3) Llorona Planitia (146°E, 4°N), and 4) Jurate Colles (156°E, 55°N). Chernava Colles is a ~164,000 km2 shield field with predominantly cone-shaped edifices ~1-2 km in diameter. Llorona Planitia hosts a ~185,000 km2 field; the average edifice diameter is ~4 km with constructs displaying morphologies ranging from a flat, pancake like shape to cone-like edifices. Ran Colles measures ~643,000 km2 and hosts edifices ~6 km in diameter with a large width:height ratio where shields are mostly defined by circular changes in backscatter. Jurate Colles, is ~617,000 km2 with edifices ~3 km in diameter; Jurate's shields are the most defined of the examined fields where they typically occur as steep-sided conical edifices with visible summit pits. Although an array of edifice morphologies may be present within a single field, one type of edifice morphology typically dominates over others within each field (e.g., cone-shaped edifices in Jurate vs. flatter edifices at Ran). This intra-field dominance of one edifice type may reflect magma viscosity variations and/or eruption rate/style at each field – factors possibly influenced by each field's surrounding geology, suggesting that each field should be put into a regional context when interpreting its evolution.

Results: The shield field in Chernava Colles exhibited a northwest trend which coincided with the trend of the fractures in the field. A large flow of material enters the map area from the east and contains wrinkle ridges. Shields located in this flow have a smaller average diameter than the shields located in the rest of the map, suggesting that they may be embayed by the flow.

The shields located in Ran Colles displayed a northwest trend which is consistant with the trend of wrinkle ridges however perpendicular to the Northeast trending fractures. The main shield field appears to be younger than the surrounding flows due to flow material associated with the shields marking the endpoint for various structures on the older surface. There is also a large area of radar backscatter marked by a black boundary line.

Llorona Planitia contains a northwest and northeast trending shield fields and northeast trending fractures. There is a large corona in the center of the map that is embaying shields located in the southern extent of the flow. Basement material is exposed in the westen portion of the map and shares a similar trend direction with the shields.

The final mapped field Jarate Colles displaying edifices that trend in a northwest direction. The shield field trend is consistant with that of structural fractures and wrinkle ridges. The shields at Jarate are well-defined with steep slopes and summit pits. Jarate is also the most northern map area of the four. This along with large amounts of basement exposure and well defined edifices could possibly infer a composition change in the erupted material.

Conclusions:

- Shields are perhaps the largest manifestation of volcanism on Venus
- The surface of the planet is dominated by flows
- Fractures represent extensional settings, while wrinkle ridges represent contraction
- Fractures and ridges intersection with flows can provide cross cutting relationships that enable a rough stratigraphy to be established
- This information can be used with a statistical tool to further research into Venus' volcanic history
- Research will continue to build upon what has been presented here

References: [1] Crumpler L.S. et al. (1997) in *Venus II* 697– 756. [2] Ford, J. P., et al. (1993) JPL Pub. 93, 24, 148 pp.

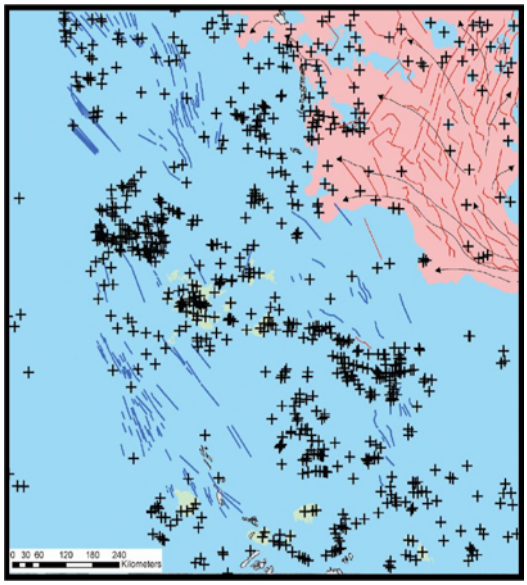

Figure 1: Geologic map of Chernava Colles

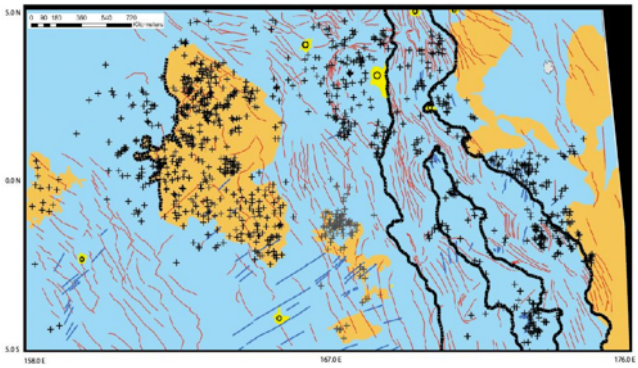

Figure 2: Geologic map of Ran Colles

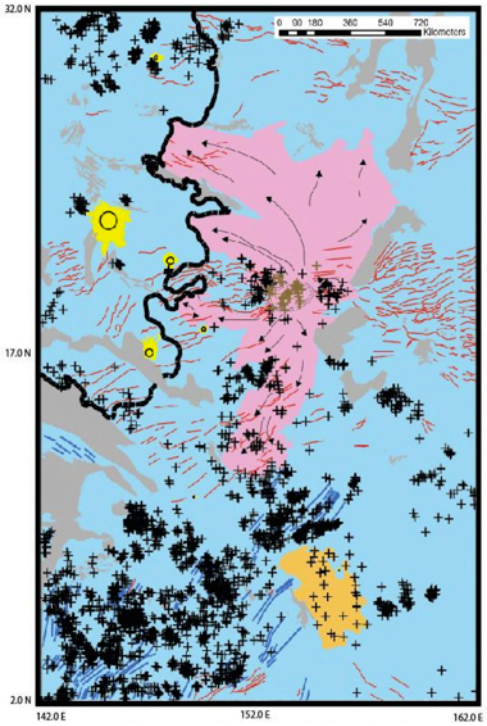

Figure 3: Geologic map of Llorona Planitia

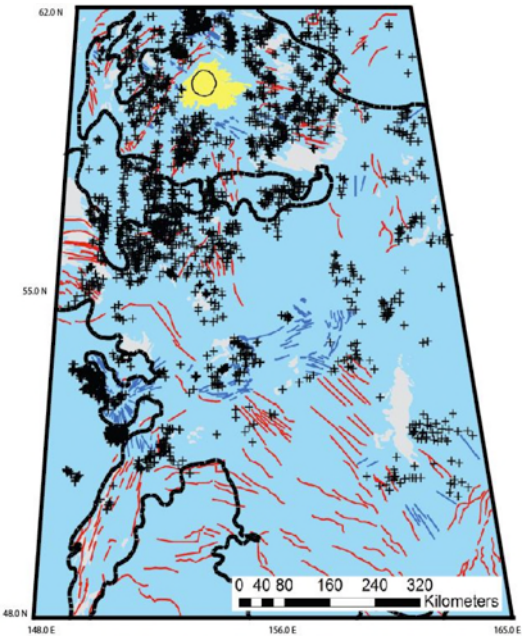

Figure 4: Geologic map of Jarate Colles