Preliminary Geological Overview of the Mahuea Tholus Quadrangle (V49), Venus. N. Patrick Pierce and Nicholas P. Lang, Geology Department, Mercyhurst College, Erie, PA (npierc48@lakers.mercyhurst.edu).

Introduction: This article seeks to identify and describe the geological features of the Mahuea Tholus Quadrangle (V49) (25-50°S, 150-180°E) on Venus. Mapping this region can improve our understanding of an unsual volcano Mahuea Tholus, canali, and shield fields. We open the article with the methods we used to understand the region, including Magellan SAR data and Adobe Illustator. Next, we give an overview of the area, which includes geologic structures, history, and future work.

Methods: To begin describing the region, it was necessary to make a geological sketch map (Figure 1) of the area. This was accomplished using Magellan Synthetic Aperture Radar (SAR) data at ~100 m/pixel, which is publicly available on the USGS Map-a-Planet web site. In conjunction with this data, we used the computer program Adobe Illustrator CS5 15.1.0. to trace landforms and examine connections. Additionally, the authors sought out existing research on V49, the volcano Mahuea Tholus, and surrounding quadrangles V37 and V48 in order to better understand the context of the region's landforms.

Initial Mapping: Although our mapping has been at the reconnaissance level, we can pull out some useful details of the area.

Morphology. The most readily visible features in the quadrangle are the plains. In the north is Zhibek Planitia and in the south-east is Nsomeka Planitia. Dominating Nsomeka Planitia are NE-trending wrinkle ridges, which are spaced out regularly from ~20km to 30km apart and occur with various lengths. Moore, Arriola, and Israel (1994) postulated that the ridges in this area were caused by compression and uplift from under the coronae in the NW [1]. Four named coronae and their associated undescribed lava flows are located in the northern section of the quadrangle. Annapurna, Colijnsplaat, and Mayauel coronae are all located in the NW, while Agraulos Coronan is north and centered. In the NW corner of V49 is a NE trending rift zone, which also has flows of undertermined range and composition.

At the center of the quadrangle resides Mahuea Tholus, which Moore et al. (1992) described as an unusual Venusian volcano in that it is in the middle of a plains region and its domical structure has a sudden 0.5-1.1 km high relief from the surrounding topography [3]. Moore et al. (1992) indicated that the volcano's flows may be highly siliceous due to: the volcano being positioned in a planar region, the seemingly high viscosity of the volcano's flows, and the flows' unusual relief [3]. This volcano is younger than the wrinkle ridges, as its lava flows cover the wrinkle ridges. Four, prominant small shield fields are located in the quadrangle, as well, centered on the following locations: (1) 158.1°E, 29.6°S (2) 160.2°E, 30.7°S (3) 154.0°E, 48.5°S (4) 160.1°E, 46.3°S. Shield fields (1) and (2) might be interpreted as "companion shield fields", as these shield fields are tucked between coronal fractures [4]. Likewise, (3) and (4) might be "simple shield fields", because they are in the middle of the plains and are not clearly associated with any surrounding features [4]. Urd Terrsera (174.5°E, 40.0°S) and the larger Nortia Tesserae (160°E, 49°S) are also located in the quadrangle. Urd Tessera sits amid the wrinkle ridges in the east, while Nortia Tesserae borders the ridges to the south.

Predominantly east-west trending and segmented canali are also present in the quadrangle: one set at ~34°S and another set at ~48°S. Canali are simple channels with a regular width and depth, likely capable of transporting large volumes of low-viscosity lava over vast distances [5]. The segments of the canali could be connected in the subsurface, but this is just one interpretation.

Impact structures: We also observe 13 named possible impact craters and their undifferentiated materials in the quadrangle. The most obvious and largest impacts are Howe (38.5km) and Valadon (26.2km), both of which we interpret as displaying impact melt and fluidized ejecta from the impact of their respective meteorites.

Geologic History: Timing of unit emplacement is still being studied. However, wrinkle ridges have proven to be useful in relative dating of features here. The shield fields, Mahuea Tholus, and the largert crater flows appear to be younger than the wrinkle ridges, as their flows cover the ridges. The NW rift zone may post-date the wrinkle ridges, as we observe rift flows covering them`.

Future Work. In order to refine understanding of the area and create a better map, the next step is to outline the lava flows associated with each corona, where able. Investigation into the significance of the tesserae and the rift zone will also need to be completed for this quadrangle if it is to be fully understood.

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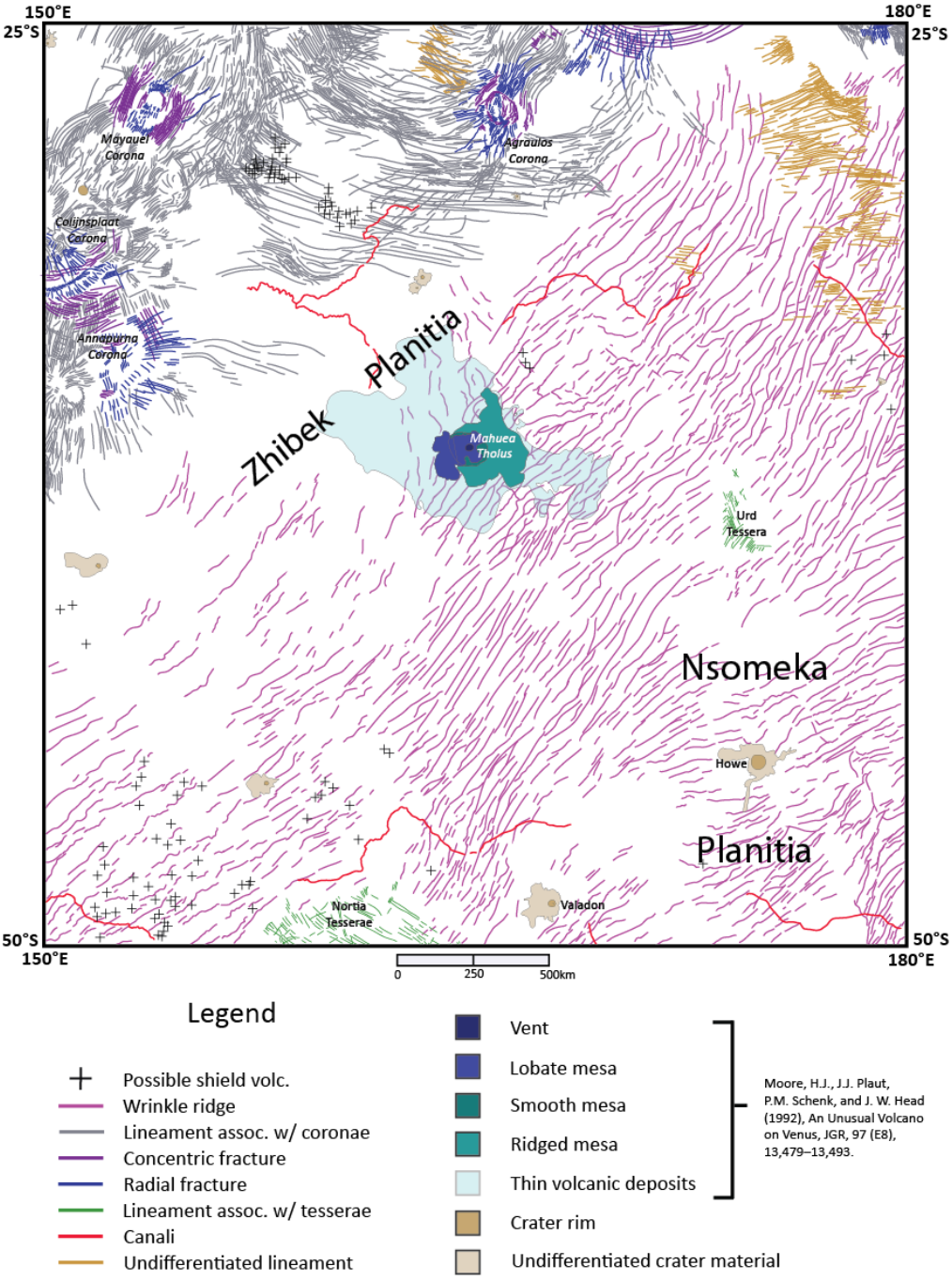

Figure 1: Geologic sketch map of Mahuea Tholus quadrangle (V49); Mahuea Tholus, an unusual volcano interpreted to have a high relief, large lobes, and highly-siliceous flows, is the central feature of the quadrangle [3]. It is surrounded by NE-trending wrinkle ridges, which may have been created by uplift and compression of the coronae in the northwest [1]. The white unit represents undifferentiated flow materials and basal materials.