MYLITTA FLUCTUS, VENUS: FLOW CHARACTERISTICS AND SOURCES; K. M. Roberts[1], J. W. Head[1], and J. E. Guest[2]; [1]Brown University, Providence RI 02912; [2]University College London, London, England NW72QS

Mylitta Fluctus (centered at 54°S, 354°E) is a distinctive unit of extensive, radar-bright lava flows located in the southern hemisphere of Venus within Lavinia Planitia. Individual flows have traveled downslope to the north from near the edge of Lada Terra into the lowlands of Lavinia Planitia to form a complex that extends approximately 800 km N-S and 380 km E-W. It was first observed in Arecibo data[1,2] and was recently imaged by Magellan[3,4].

Mylitta is characterized by generally radar-bright flows superposed on darker plains, although several darker flow units are observed in amongst the brighter flows. Dark flows are both superposed on and overlain by the brighter flow units. Features identified as individual flows within the complex are up to 800 km in length and range in width from 3 to 125 km. Widths are most narrow and closely spaced in the proximal region of the complex as the flows extend downslope away from the major source vent. North of ~56° latitude the flows broaden to 15-50 km in width; this corresponds to a decrease in local slope from 0.3° to 0.1°. The local topography descends approximately 1.5 km from the center of the main source to the distal regions of the complex where the flows pond and embay ridge belts within Lavinia (a distance of 625-800 km). Individual flow unit volumes are estimated to be on the order of 100 km^3. Extreme uniformity in brightness and surface texture typifies the flows of Mylitta Fluctus, particularly those flows in the eastern region of the complex where few structures of any kind (*e.g.*, channels, levees) are observed. Diffuse dark deposits 2-7 km in width are observed about the periphery of many flows. The origin of these deposits is unclear. They do not appear to be darker, underlying flow deposits but rather related in some manner to the emplacement of the bright flows they surround. In addition, diffuse dark deposits appear to superpose brighter flow units near the proximal region of the complex and may represent pyroclastic or soil deposits windblown from nearby sources[1]. Five distinctive flow episodes were identified on the basis of relative brightness and apparent superposition relationships from the Arecibo data[1,2]. The detailed characteristics and stratigraphic relationships of these units are currently being examined with the Magellan data.

Prior to the acquisition of Magellan data, the location and nature of source vents for the lava complex were poorly known. Several possible sources were predicted from Arecibo images[1,2], at least one of which has been confirmed with Magellan data. The majority of flow units appear to emanate from a single source located within the linear deformation belt (thought to be of extensional tectonic origin[1]) at the edge of Lada Terra (~ 58.3°S, 351.5°E) (Figure 1). This vent is characterized by an elongate depression or caldera ~40x20 km in dimension. The caldera is defined by multiple closely spaced arcuate ridges and graben that produce a hummocky texture, particularly to the SW. The SE border of the vent is defined more distinctly by a single ridge or scarp 30 km in length. Within the caldera are two domical rises including a small dome or shield ~3 km in diameter with a central pit and a larger, more elongate structure ~6 x 17 km in dimension containing a central trough 11 km in length. Both structures appear partially buried by extremely dark deposits that have flooded the interior of the caldera and extend outwards to the NE. Radial troughs located within topographic lows and approximately 0.6-5.0 km in width extend up to 60 km to the NW and NE from the caldera walls. Although now partially flooded, these features are best developed to the NW; troughs are less evident to the NE. Similar structures trending SE may have existed at the southern edge of the caldera although only a single ridge 11 km long is visible in the current images. In all three locations, the radial structures disrupt the caldera wall at their juncture, giving the appearance of channels along which flows have been directed downslope. Some radial structures may represent the surface expression of collapsed dikes within flanking rift zones. This is consistent with the presence of several small shields along the trend of the lineaments extending to the NE of the caldera.

A shield edifice surrounding this vent is defined by an older, diffuse bright flow unit comprised of very closely spaced flows extending radially downslope to the north 180-225 from the caldera. This unit is not observed to the south of the caldera. Preliminary topographic analyses indicate the volcanic vent is not situated along the crest of the linear deformation belt but rather on the northern slope. Thus, the edifice may have developed an asymmetrical form as flows were directed primarily to the north. This unit appears superposed by all additional flow units and is crosscut by multiple arcuate lineaments that are convex to the north, ~1.5 km wide and spaced 1-3 km apart. Later flows superpose these arcuate lineations or abut against them. (Similar arcuate features are observed to the north within the main body of the lava complex. They are spaced ~50 km apart and up to 300 km long. They are observed within flow units of varying ages; some flows appear crosscut while others appear to abut or flow around a topographic obstacle created by these structures.) Radially oriented lineaments up to ~10 km long and less than 0.6 km wide are also observed within this unit. The nature of these structures (*e.g.*, troughs, ridges, channels) and the cross-cutting relationship with the arcuate lineaments is unclear due to their fine scale.

A possible secondary source is located at ~55.7°S, 356°E (Figure 1). It is characterized by a quasicircular region approximately 55 km in diameter of diffuse dark deposits. A faint radial texture is observed within the dark deposits as well as a bright central region ~2.5 km in dimension that may represent a central pit. It is not yet clear whether this structure is the source of nearby bright, lobate flows as well as the dark diffuse deposits. Additional sources include, locally, small volcanic domes or shields less than ~8 km in diameter, many with central pits. The highest concentrations are associated with local topographic highs and occur immediately to the SW of the main vent, near a small ovoid structure also situated along the linear deformation belt, and at the distal regions of the complex near the northern ridge belts. Other domes may have been buried by the deposits of Mylitta.

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The majority of flow units within Mylitta have traveled downslope to the north. Older units appear to have flowed directly north, while younger units have traveled east, along the trend of the lineament belt, before turning to the north. These units may have been confined by broad channels created by processes of extension and rifting occurring within the linear deformation zone. Flow units are also observed south of the main source which flood the nearby ovoid and a 60-km-diameter impact crater. These units are more sheet-like in nature and lack the distinctive lobate flows that typify those to the north. Detailed analyses of the local topography and structural relationships are underway to determine whether these flows originate from the same source as those to the north or are simply related to the same general processes of uplift, extension, and volcanism which characterize this region of Lada Terra and Lavinia Planitia.

To summarize, Mylitta Fluctus is a complex of extensive, generally radar-bright lava flows superposed on dark plains that appear to emanate from a single major source within a linear deformation zone at the edge of Lada Terra. The origin of the flow complex apparently is linked to the processes of uplift and extension which characterize the region. In contrast to the situation at Beta Regio, where Theia Mons is being actively rifted by ongoing extension along Devana Chasma[5], there is no evidence for current rifting of the main source of Mylitta out to a distance of ~150 km along the linear deformation zone. The uniform character, paucity of central channels (suggesting a lack of appreciable drainage) and extreme length of the individual flow units suggests the eruption conditions involved the rapid emplacement of high volume, low viscosity, very low yield strength magmas similar to terrestrial flood basalts, lunar mare basalts or Archean komatiites[3,6,7].

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FIGURE 1: Sketch maps of a) southern portion of Mylitta Fluctus showing main source and regional setting; closed arrows indicate direction of lava flows; open arrows show position of topographic crest along linear deformation belt; diagonal strips outline missing data; and b) details of caldera structure; location given by box in (a); A, B, C represent NW, NE, and SE radial channels, respectively (see text for details).