

PRELIMINARY GEOLOGIC MAPPING OF IMDR REGIO, VENUS. I. López¹, L. Martín¹, A. Jiménez-Díaz¹, P. D’Incecco², G. Komatsu^{2,3} and, J. Filiberto⁴. ¹Universidad Rey Juan Carlos (ivan.lopez@urjc.es), ²Dipartimento di Ingegneria e Geologia (INGEO), Università d’Annunzio. ³International Research School of Planetary Sciences, Università d’Annunzio. ⁴Lunar and Planetary Institute, USRA.

Introduction: Imdr Regio is a large igneous rise that extends approximately from 35°S-50°S and 195°E-225°E between the plains of Helen, Nsomeka and Wawalag Planitiae. Imdr Regio is classified as a volcano-dominated igneous rise with a minimum-maximum diameter of 1200-1400 km and a swell height of 1.6 km (Smrekar et al. 1997). The principal volcanic feature in Imdr Regio is Idunn Mons (46.5°S/214.5°E), a large volcano (Crumpler et al., 1997). Studies on the infrared emissivity of the volcanic flows surrounding Idunn Mons suggest that high emissivity values in some of the volcano flows are related to low weathering and therefore indicative of a recent or even ongoing volcanic activity in Idunn Mons [1-4]. Idunn Mons is contemporaneous with the formation of Olapa Chasma, a NW-SE trending rift that extends across the large igneous rise and that also seems to play an important role on the geology of Imdr Regio area. Other styles of volcanism are also present in the area but no temporal relationship has been established between them and Idunn Mons.

In this work we present the preliminary geologic map of Imdr Regio and characterize the different types of volcanism present in the area, the relationship with the rift, and draw some initial conclusions on the geologic evolution of this large igneous rise.

Data and methodology: The geologic mapping was carried out using full-resolution NASA Magellan S-band Synthetic Aperture Radar (SAR) imagery and altimetry data. The data included both right- and left-illumination full-resolution “F” (75–100 m/pixel) SAR images, Magellan altimetry (8 km along-track by 20 km across-track footprint with 30-m average vertical accuracy which improves to 10 m in smooth areas [5]. Magellan data was downloaded from the USGS Map-a-Planet website (<https://www.mapaplanet.org>).

Geologic mapping: The preliminary geologic mapping reveals volcanic activity in two different areas: a) in the southeast of Imdr Regio the large Idunn Mons dominates the region, with multiples flow units that evolve from large sheet flows to multiple digitate flows that are contemporaneous with Olapa Chasma; b) in the northwest, where the deformation associated with the rift system is more important, large fractured flows dominate the igneous rise, together with the formation of several clusters of small shields [6]. Other large and intermediate volcanoes are also present in this area.

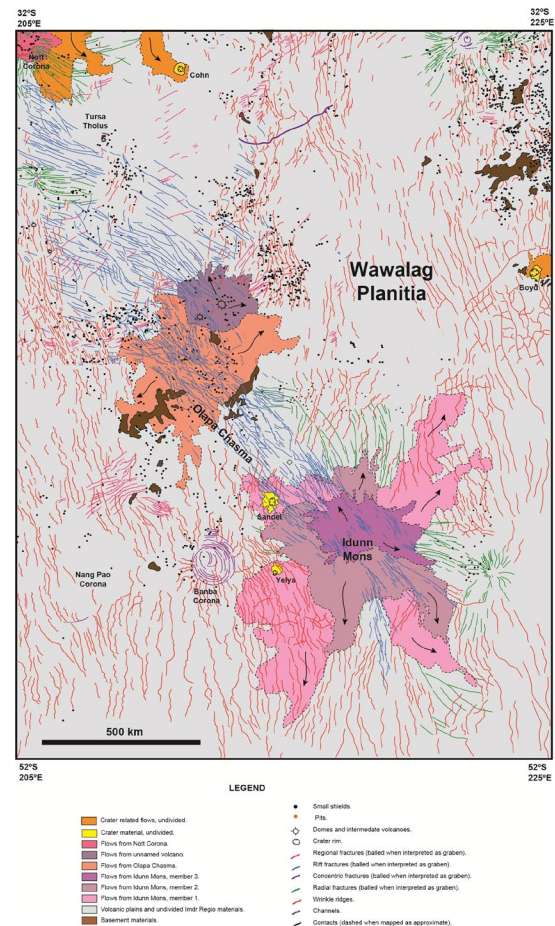


Figure 1. Preliminary geologic mapping of Imdr Regio, Venus.

Although we have not yet established a complete temporal relationship between the different styles of volcanism in Imdr Regio, this preliminary mapping suggests that most of the activity in the Imdr Regio is contemporaneous with the formation of Olapa Chasma, and that the different styles of volcanism could be the result of hot-spot evolution or differences in the local lithosphere under which the plume is emplaced.

References: [1] Smrekar et al. (2010) *Science*, 328, 605–608. [2] D’Incecco et al. (2017) *Planet. Space Sci.*, 136, 25-33. [3] D’Incecco et al. (2020) *Earth Planet. Sci. Lett.*, 546, 116410. [4] Filiberto et al. (2020) *Sci. Adv.*, 6, eaax7445. [5] Ford et al. (1993) *JPL Publication 93-24*. [6] Lang et al. (2020) *GSA Connects Online*, Paper No. 106-3.