**Imdr Regio: the geology of a possible active hot spot on Venus and a target for future exploration by the ESA EnVision mission.**

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**Abstract**

With Venus being the focus of future new missions like ESA’s EnVision, we need to look for target sites for future investigations on Venus. The different instruments will help to study the planet in a unprecedented detail. In particular, the VenSAR instrument will map the 20% of the surface of Venus at a resolution of 5 to 10 meters/pixel, so it gets crucial to select what areas of Venus deserve to be targeted for such a high-resolution mapping. We propose here Imdr Regio as a good candidate location for combined high resolution SAR mapping and for study with the rest of the mission instruments (e.g., Subsurface Radar Sounder).

Imdr Regio is a large topographic rise that extends approximately from 35ºS-50ºS and 195ºE-225ºE between the volcanic plains of Helen, Nsomeka and Wawalag Planitiae. Imdr Regio was classified as a volcano-dominated topographic rise with a minimum-maximum diameter of 1200-1400 km and a swell height of 1.6 km. The southeast of Imdr Regio is dominated by Idunn Mons (46.5ºS/214.5ºE). Studies using the 1 mm (derived) surface emissivity from the Venus Express mission of the volcanic flows surrounding Idunn Mons suggest that high emissivity values in the volcano flanks are related to relatively unweathered basaltic rock and therefore indicative of a recent or even ongoing volcanic activity.

We have carried out geologic mapping in the area to constrain volcanic and tectonic structures, and the geologic history of the large topographic rise. This geologic mapping reveals that different styles of volcanism are present across Imdr Regio and that this volcanic activity takes place in all the hot spot in close relation with the formation of a rift throughout all time represented by in the area.

The first stages on the evolution of this large volcano are characterized by the formation of a radial fracture system and contemporaneous large sheet flows. These large sheet flows are locally difficult to distinguish from regional plains and are also deformed by regional N-trending wrinkle ridges.

After this initial phase, multiple overlapping digitate flow units form the flanks and summit of the volcano and are contemporaneous with NW-SE trending fractures and graben of Olapa Chasma, a rift system that cross the topographic rise.

To the northwest another large volcano also presents a system of radial fractures but lacks clear large sheet flows. Numerous pit chains are associated to fractures and graben, suggesting that transport of magma under the surface is important.

The geologic history based on the mapping suggests that activity in Imdr Regio started with the emplacement of a plume/diapir in the southeast, which resulted in the formation of a radial dyke system and the emplacement of large sheet flows in Idunn Mons. The presence of other large volcanoes to the northwest suggests the presence of another magmatic source (plume or diapir). After this initial stage, volcanism continues in Idunn Mons and activity in the topographic rise is strongly related to the formation of Olapa Chasma. Rift-related volcanic flows postdate these other volcanoes and are contemporaneous with the late activity in Idunn Mons. Monogenetic volcanism is present in the rift and in all the units that are in the area.