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Investigating the volcanic activity on Venus with Magellan data

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Previous studies have inferred volcanic activity on Venus from indirect evidence, including variations in atmospheric composition and thermal emissivity data [1, 2, 3]. More recently, a study hypothesized ongoing volcanic activity on Venus, evidenced by a volcanic vent that collapsed between two different Magellan observing cycles [4]. Expanding upon this premise, we are investigating the surface geology of Venus using the extensive radar and altimetric data acquired by the Magellan spacecraft.

In particular, by properly processing the SAR images, we are conducting a detailed geomorphological analysis of Venus' surface, in order to identify and characterize various surface morphologies. Additionally, the altimetric data provided valuable insights into the topographical variations across Venus, further contributing to the geomorphological assessment.

Our research not only enhances the understanding of the geology of Venus but also underscores the significance of radar imaging in the study of planetary surfaces, where no other imaging techniques are available. The findings highlight the crucial role of continued exploration of Venus, which could be greatly advanced by upcoming missions such as VERITAS and EnVision [5, 6]. Equipped with superior radar technology, these missions are expected to provide images of Venus's surface at an unprecedented resolution and signal-to-noise ratio, far surpassing that of the Magellan SAR, thus enabling a more detailed characterization of Venus's surface morphology.

References

1. Truong, N. & Lunine, J. Volcanically extruded phosphides as an abiotic source of Venusian phosphine. *Proceedings of the National Academy of Sciences* **118**, e2021689118 (2021).

2. Esposito, L. W. Sulfur dioxide: Episodic injection shows evidence for active Venus volcanism. Science **223**, 1072-1074 (1984).

3. Smrekar, S. E. *et al.* Recent hotspot volcanism on Venus from VIRTIS emissivity data. *Science* **328**, 605-608 (2010).

4. Herrick, R. R. & Hensley, S. Surface changes observed on a Venusian volcano during the

Magellan mission. *Science*, eabm7735 (2023).

5. Hensley, S. et al. VISAR: Bringing Radar Interferometry to Venus. In Proceedings of International EnVision Venus science workshop, Berlin, Germany (2023).

6. Ghail, R. C. *et al.* VenSAR on EnVision: Taking earth observation radar to Venus. *International journal of applied earth observation and geoinformation* **64**, 365-376 (2018).

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