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Enabling Future Venus Science Missions with VERITAS Global High-Resolution Surface Mapping

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Abstract

Global, high-resolution mapping of Venus' surface as proposed in the VERITAS mission concept [1] is an essential stepping-stone for a programmatic and systematic scientific exploration of Venus, in that the VERITAS' new topographic and compositional maps and other data would complement and enable a variety of important new Venus science missions in coming years. We provide scenarios to illustrate how these global, high-resolution data are brought to bear and leveraged by future ultra-high-resolution and subsurface radars and emissivity instruments flown on an orbiter; set the stage for future seismology done from orbit based on ionospheric modulation [2]; and provide key target science site/region, plus contextual and landing site safety data, on which to base campaigns to plan future Venus landed surface and areal missions c.f. [3, 4].

1. Introduction

As detailed in [1], VERITAS topography, imaging, spectroscopy, and gravity will be on par in accuracy and resolution with mapping and data now in hand for Mercury, Mars and the Moon. Beyond their essential scientific value, these new Venus surface maps and data are highly desirable and even crucial as a resource and focus for future Venus missions, motivating a systematic "program-style" campaign by agencies to dramatically increase human knowledge of Venus, much as has been done at Mars for the past two decades.

For example, global topography is needed to enable both clutter removal for subsurface sounding, and as part of the data reduction for VEM at tessera. Active surface deformation detections would lead to site targeting and inform design for a seismic mission. And topography with VERITAS resolution and accuracy, plus surface rock type, would optimize site selection and safe targeting for landed assets, analogous to what is done for lunar and Mars landed missions [3], and selection of corridors/regions to be traversed by areal missions.

2. Summary and Conclusions

The paper will include a tabulation of the maps and data products that VERITAS proposes to deliver, with approximate dates of availability i.e. if it were to go forward as a NASA Discovery mission, and the manner(s) in which each of those data could impact future mission development, planning, operations and science data interpretation.

Acknowledgements

References

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