

Analysis of Magellan radar images on Venus: A useful tool for education on general tectonics and structural cartography.

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Abstract

The structural analysis of Magellan radar images on Venus has an high potential as an innovative and attractive material for teaching general tectonics and structural cartography. The main advantage of using Venus come from the absence of water on the surface that preserves pristine for very long periods the topography associated to tectonic structures.

1. Introduction

We have tested the utility of SAR (synthetic aperture radar) images obtained by the Magellan spacecraft from 1992 to 1994 on Venus as an innovative material for practical classes of general tectonics and structural cartography.

The material used is a left-looking radar image of a region of Lavinia Planitia (345.6-351.0 E 37.0-39.6 S) obtained from <http://www.mapaplanet.org/> sponsored by USGS. It has been tested in the course 2011-2012 with four groups of Tectonics (graduate on Geology) in the Faculty of Geological Sciences (Universidad Complutense de Madrid). The image has been inverted for enhancing the structural lineaments. Each student performed an individual structural map following [2] and also a tectonic interpretation in terms of strain field generating a map of strain ellipses. That map of deformation was later used to do a kinematic interpretation of the strain recorded on different deformational belts present in the image. This material is also interesting for introducing the students with the interpretation of radar images, including the origin of artifacts [1].

The good results of the experience demonstrate the utility of Venus images for education on general Tectonics and structural geology not only for planetary students but also for general geology students, always indicating the special environmental differences between Venus and the Earth.

2. Why Venus?

The absence of water due to a strong greenhouse effect on the Venusian atmosphere and surface strongly reduces the power of exogenous processes. Erosion and sedimentation are almost negligible. The rocks on the surface of Venus are limited to be volcanic in origin. The processes that on Earth erode and cover with sediments previous tectonic structures do not work on Venus. Therefore, it is a very useful laboratory to understand the topographic signature that the generation of each specific tectonic structure has.

3. Conclusion

Magellan SAR images of Venus have an high potential as and innovative tool for teaching general tectonics and structural cartography

Acknowledgements

This study was funded by the program of innovation on education of the Universidad Complutense de Madrid PID64/2011. The study has been possible thanks to the website <http://www.mapaplanet.org/> sponsored by USGS, that freely distribute Magellan Venus images.

References

- [1] Connors, C. (1995), Determining heights and slopes of fault scarps and other surfaces on Venus using Magellan stereo radar, *J. Geophys. Res.*, 100(E7), 14,361–14,381, doi:10.1029/95JE01134.
- [2] Tanaka, K. L. (1993) *The Venus Geologic Mappers' Handbook*. Diane Publishing Company, 1993