A NEWLY RECOGNIZED TYPE OF MAGELLAN SAR ARTEFACTS. G. M. Wolff[1], A. H. Treiman[2], H. Dalton[3], and S. Milazzo[1], [1]University of Colorado, Colorado Springs (gwolff4@uccs.edu), [2]Lunar and Planetary Institute, [3]San Jacinto College.

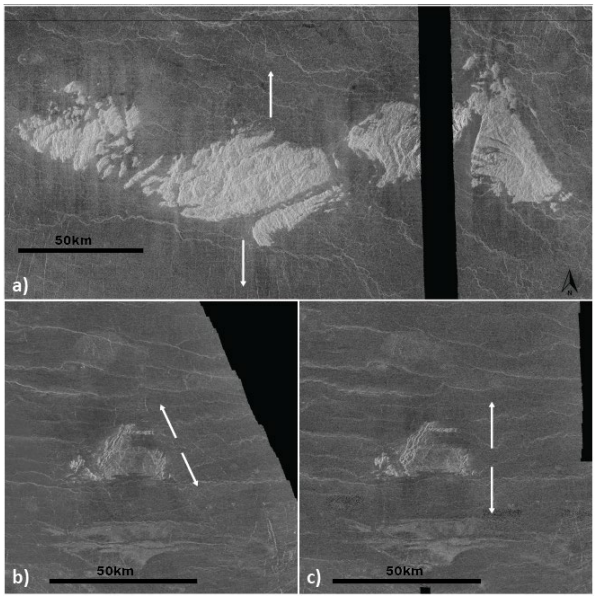
Introduction: Magellan Synthetic Aperture Radar (SAR) imagery has been the main source of knowledge about the surface of Venus and the processes that shape it. Unfortunately, there are many imperfections in the data and the way it was processed. These artefacts can make it difficult to analyze areas of interest, produce incomplete maps, and cause inaccurate geologic interpretations.

Here we show that a class of potential wind streaks are, in fact, artefacts in the SAR imagery.

Approach: We explored Magellan SAR map of Venus using the JMARS portal [2] and downloaded images from there and the USGS Map-a-Planet portal. Downloaded images were enhanced using commercial image processing software.

Results: Our investigation was inspired by the find of SAR-dark streaks north and east of Nissaba Corona and we found similar streaks on SAR images across much of Venus. The streaks typically are seen around highland massifs surrounded by lava plains (Figure 1), and extend northward and southwards from the massifs. They appear darker on SAR images than the plains, are typically ~20 km long, and fade and narrow away from the massifs. The streaks are spaced more-or-less regularly and are parallel to each other, even on opposite sides of their host massifs.

Figure 1: Examples of dark streaks on Magellan SAR images, contrast enhanced: a) left-look image at 29.5°N, 2.8°E, b) right-look image of 52.3°N, 112.7°E, c) left-look image of 52.3°N, 112.7°E.



Interpretation: These dark streaks are generally consistent with being typical aeolian wind streaks consisting of fine-grained material [1], but their orientations are not consistent with the current wind directions on Venus (west to east) nor with any expected Hadley circulation. To explain these streaks, we considered and rejected a range of hypotheses, including polar migration, transverse dunes influenced by adjacent highlands, and downdrafts induced by the highlands. However, the streaks' similarity on north and south sides of massifs, somewhat regular spacing, and almost perfectly parallelism to one another seems inconsistent with these ideas.

We noted that the dark streaks are essentially parallel to the SAR scan directions, easily noted in some views by the strips of missing data on SAR image mosaics (Figure 1). To test this idea, we looked for and found a massif that shows dark streaks on both left-look and right-look SAR mosaics, Figures 1b and c; in both cases, the streaks are parallel to the data gaps in the images. Thus, we conclude that this class of dark streaks are artefacts, related to acquisition or processing of the Magellan SAR data.

Conclusion: We infer that these dark streaks are artefacts in the Magellan SAR images. Potential causes include the unintended consequences of data compression, processing raw SAR data into images, conversion of BIDR data to F-BIDR, or perhaps interference caused by the way radar reflects off rough and raised surfaces. Determining the cause is beyond the scope of this project, but we hope this serves as a cautionary statement for future missions aiming to image the surface of Venus and for those using Magellan data to understand the morphology of Venus.

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References:

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