

PRE-MAGELLAN MAPPING OF NORTHERN VENUS: COMPLETION OF A JOINT U.S./U.S.S.R. PROJECT; A.T. Basilevsky¹, R.M. Batson², and G.A. Burba¹, ¹Vernadsky Institute, Moscow, 117334, USSR and ²U.S. Geological Survey, Flagstaff, AZ 86001.

Compilation of the newly published maps of the northern part of Venus was a joint U.S./U.S.S.R. project initiated by the Vernadsky Institute, U.S.S.R. Academy of Sciences. The task was undertaken under the auspices of the U.S./U.S.S.R. Joint Working Group on Solar System Exploration, which served as a clearing house for data from Venus missions. The Working Group was co-chaired by G. Briggs, NASA Headquarters, and V.L. Barsukov, Vernadsky Institute [1]. The mapping began in March 1988 and was finished in June 1989. The U.S. Geological Survey in Flagstaff, Ariz., and the Vernadsky Institute, Moscow, were the institutions responsible for the project.

Data gathered by the U.S.S.R. and U.S. missions are complementary. Radar altimetry from the U.S. Pioneer Venus spacecraft (PV, launched in 1978) covers all of Venus except the polar regions, but it has lower resolution and wider spacing of measurements than the altimetry data that were gathered in the northern hemisphere by the Soviet Venera spacecraft 15 and 16 (V15/16, launched in 1983). V15/16 provided north polar coverage missing from the PV data and high-resolution (1-2 km/pixel) synthetic aperture radar (SAR) images for the northern 25% of the planet not obtained by PV. Ancillary data included Earth-based radar images provided by the Arecibo Radar Observatory. The new maps permit a clear association of the surface morphology seen in SAR and Arecibo images with topography measured by the spacecraft radar altimeters.

The maps have general scientific value as well as specific value for supporting planning and operations of the U.S. Magellan Mission to Venus launched in May 1989, and therefore then constitute part of the Magellan planning chart package.

The maps consist of a set of three sheets (topographic, radar image, and shaded relief maps [2] and a geomorphic/geologic map [3]. Each map covers the planet north of lat 20° N at a scale of 1:15,000,000 at lat 40°; projections are Polar Stereographic.

The topographic map has 0.5-km contour lines, color-coded elevation levels, feature nomenclature, and a subdued-shaded relief base. The combination of the V15/16 and PV datasets allowed more detailed and comprehensive portrayal than possible with data from either mission alone. The USGS reconciled altimetry from both missions to compile the contours.

The radar image map is a controlled digital mosaic of the B15/16 radar images. Landforms are shown as they appear on the images, illuminated from the east. The digital mosaic was made by the Institute of Radioengineering and Electronics and the Keldyshi Institute of Applied Mathematics, U.S.S.R. Academy of Sciences, Moscow, and the Central Institute of Geodesy, Aerial Survey, and Cartography, Moscow.

The shaded relief map was made by combining all data sources to produce a clarified portrayal of the surface of Venus. Illumination of landforms is from the west, to conform with current conventions and with images to be returned by Magellan. The map was made by P.M. Bridges at USGS.

The geomorphic/geologic map on a subdued shaded-relief base shows 13 terrain types, grouped as plains; volcanic constructs, and rough terrains, and several landforms classified by physiographic expression.

The three-sheet set of map [2] has been published and is being used by Magellan mission planners. The geomorphic map [3] is scheduled for publication prior to the XXI Lunar and Planetary Science Conference.

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References

- [1] Basilevsky, A.T. et al. (1989) Proc. Lunar and Planet. Sci. Conf. 20, 46-47.
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- [3] Sukhanov, A.L. et al. (1989) Geomorphic/geologic map of part of the northern hemisphere of Venus: U.S. Geol. Surv. Misc. Inv. Ser. map I-2059.