MAGELLAN VENUS RADAR MAPPING MISSION: GEOLOGIC QUESTIONS FOR THE
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The Magellan spacecraft will be placed in orbit around Venus on 10 August 1990 for a 243 day
primary mission. During this mission 70-85% of the planet will be mapped by synthetic aperture radar at
resolutions from 120m to 300m, representing nearly three times improvement in coverage and ten times
improvement in resolution over previous data sets. The orbit will be near polar with 3.15 h period. The
longitude of arrival at Venus is 276 deg E. and Venus turns beneath the orbit track 1.48 deg. per day.
An In-Orbit-Checkout (IOC) period of 21 days is planned before the start of mapping. During IOC some
imaging is planned as early as day six (~285 deg. lon.). Multiple mapping swaths are planned for day
twelve, and some image data may be obtained on day 17 as part of tests of the SAR operating envelope.
Mapping will start on Day 21, at 308 deg. E. longitude, with the caveat that the best mapping parameters
may not have been found. The planned start of mapping is past the longitude of Beta Regio, but, for-
tunately, occurs at the western edge of Ishtar Terra.

The following geologic features are covered in the first days of mapping:

Day 6 - Part of IOC Radar Tests
- Ben Dorsa, a 50-100 km wide ridge belt west of Akna Montes, and paralleling the
deformation trend of the Akna Montes. What is the deformational style?
- Golubkina Crater, a 28 km diameter bright halo crater with central peak. A major question for
this type of crater is to understand the higher reflectivity and processes involved in reducing
reflectivity with time.
- Devana Chasma is a major rift zone in Beta Regio with complex faults. Is this a continental
type rift or analogous to seafloor spreading?

Day 12 - Part of IOC Radar Tests - 4 to 8 revs of image
- Brooke Crater, a 24 km, somewhat degraded crater with a central peak and no bright halo.
- Atropos Tessera is an intersecting ridge and groove terrain adjacent to the Akna Montes, with
the dominant fabric parallel to Akna deformation. Is this a deformed Akna mountain belt?
- Demeter Corona is a large (665 x 330 km), elongate, subdued corona (1). A possible end
member in Corona evolution.
- Pomona Corona is a subdued feature (280 x 440 km). The region appears to have many
relatively fresh appearing volcanic flows (2). The region could demonstrate the extent of volcanic
resurfacing.
- Eastern Beta Regio, contains tessera of intersecting ridges but of unknown type (3).
- Lachesis Tessera is a degraded tessera of apparently low relief in the plains east of Beta Regio.
Do the plains materials embay the tessera. Do tessera underlie much of the plains in this area?
- Tefnut Mons, a 400 km diameter dome about 2 km high, may be a plume related volcano. Are
these types of features in the process of relaxation?

Day 17 - May acquire some useful images in this radar test.
- Passing over eastern edge of Pomona Corona.
- Dashkova Crater, 48 km degraded, central peak crater.
- Venera 13 landing site. Images show a mix of platy rocks and soil. Venera analyses suggest
basaltic composition (4).

Day 21 - Nominal start of mapping.

The first three weeks of mapping offer the opportunity to map 13 features interpreted by the Soviets
as impact craters. They cover a range of size from 10 km to 85 km and a range of morphologic types
including bright halos and complex basins. These features will be studied to develop criteria for
distinguishing impact from volcanic features and for understanding surface modification processes.

Mapping begins at the western part of Akna Montes and the related Itzpapalotl Tessera. We map
Akna until day 33. This is a major mountain belt on Venus with linear ridges and valleys which may be
analogous to terrestrial folded mountain belt. Itzpapalotl Tessera is near the transition from polar plains
to Ishtar Terra. Proposed as site of underthrusting and accretion (5).
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- Venera 14 Landing Site images show platy rocks, very little soil, basaltic composition suggested by elemental analyses (4).
- Navka Planitia is a region of equatorial plains with domes, flows, and unidentified circular features.

Day 22
- Meitner Crater is an 85 km basin thought to be a complex impact crater. What is the evidence for volcanic or impact origin?

Day 24
- Begin mapping Lakshmi Planum, a highland plateau region characterized by volcanic plains with domes, major caldera and subsidiary calderas (6). Also contains embayed tessera fragments.

Day 25
- Begin mapping Vesta Rupes, Ut Rupes, Danu Montes, the southern boundary of Ishtar Terra/Lakshmi planum. The high rim of Lakshmi (Danu) is characterized by linear ridges, with two outlying scarps (Ut and Vesta) of unknown origin.

Day 27
- Xilonen Corona is a degraded corona about 350 km across.
- Hathor, Ushas, Innini Mons are mapped until day 33. They are similar in gross morphology to Tefnut and may be plume swell type volcanic constructs with distinct flow features.

Day 29
- Freyja Montes mapping begins. This is a major Venus mountain belt, appear to be folds with some evidence of thrusting. Especially interesting will be transition with Akna and Maxwell Montes, and transition to Lakshmi Planum.
- Collette Patera is the central caldera of a low volcanic shield with flows that may extend to the western edge of the plateau.

Day 30
- Bethune and Sachs (day 37) Pateras are both highly subdued with little topographic relief.

Day 37
- Begin mapping the "Crater Farm" group of craters in the southern hemisphere seen in Arecibo images (7). The grouping is unusual for impact, although they appear to have impact morphology
- Sacajewea Patera is a major caldera with accompanying flows, and may be relatively older than Collette. What is the reason for the elongation of the caldera?
- Clotho Tessera and Moira Tessera are complex ridge and groove or disrupted terrain adjacent to Danu/Vesta that has been proposed to be site of thin-skin gravity sliding (8)

Day 38
- Eostre Mons is a low dome 50 km across.

Day 39
- The Venera 8 Landing Site appears to be underlain by granitic composition from the lander elemental analyses (9). Could this be a region of ancient crust or exposed, highly evolved rocks?

Data from the first three weeks of mapping will provide information to address many important questions. These include the nature of rifts and ridge belts, tectonics of western Ishtar and the issues of convergence versus spreading, tessera mechanics, coronae and hot spot volcanics, volcanic processes, surface modification processes, and criteria for distinguishing volcanic from impact craters.