

ERTH 1 - Planets

Homework #4 – Answer Key

1) Venusian Surface Features

- 1.1) Folding
Coronae
Faulting
Shield Field
Pancake Domes
Volcano
Impact Crater

1.2) 4, 5, 6

1.3) 1, 2, 3

1.4) 1, 3, 6, 7

1.5) 2, and 5 are tectonic. Coronae (#4) are also tectonic according to (Sandwell and Schubert, 1992) although the mainstream position is that coronae are volcanic.

2) Geological History on Venus

2.1) Two possible choices:

- 1 C Young lava is bright, it appears to flow into and fill topography, including C
- 2 A These faults appear to pass thru B and D
- 3 B Appears to flow over D
- 4 D Old lava is dark, and is covered by C and B and broken by C

- 1 C Young lava is bright, it appears to flow into and fill topography, including C
- 2 B This appears to subdue A
- 3 A Appears to flow over D
- 4 D Old lava is dark, and is covered by C and B and broken by C

2.2) The regular spacing and bright lines of A is evidence of tectonic expansion. B and C look like lava flows, and D looks like flood basalt. C looks like its source is in the crater, therefore volcanic. B has the same look, which isn't like impact ejecta into ice-laden ground. There seems to be a lot of directional change to the rounded flows. The low reflectivity and smoothness of D makes me think it's flood basalt. I can't tell if it's filling a large impact structure without being zoomed out more.

3) Venusian Geography

- 3.1.1 Ishtar Terra
Aphrodite Terra
Atlanta Plantia

Beta Regio
Phobe Regio
Lavina Plantia
Guinevere Plantia

- 3.2) Ishtar Terra contains the Maxwell Montes that are the highest mountains on Venus and were formed by compression tectonics.

- 4) Venus Exploration
 - 4.1) Topography & Geology
 - a) Aphrodite Terra is the large "continent" just south of the equator.
 - b) Ishtar Terra is the "continent" near the North Pole.
 - c) Atlanta Plantia
 - 4.2) Pioneer Venus Mission
 - a) 4 or 5
According to the map" there were 4 probes. (However the "bus" that carried the four probes previously was also sent down as a probe with instrumentation before burning up in the atmosphere - So, there were actually 5 probes.
http://nssdc.gsfc.nasa.gov/planetary/pioneer_venus.html)
 - b) December 9, 1978 (When "All four probes entered the Venus atmosphere on December 9, followed by the bus." - NASA)
 - c) The northern most landing location was at Maxwell Montes or more generally in the vicinity of Ishtar Terra.
http://www.adlerplanetarium.org/cyberspace/planets/venus/venus_map/
 - 4.3) Venera Mission
 - a) 11
 - b) 18 OCT 1967 – 5 MAR 1982 (landing dates)
 - c) 740K at 90 bars
 - d) Venera 9, 10, 13 and 14
 - 4.4) Magellan Mission
 - a) >98%
 - b) Besides the SAR data, gravity, atmospheric density profile, and solar wind scintillation.

Bibliography

Sandwell, D.T., and Schubert, G., 1992, Evidence for Retrograde Lithospheric Subduction on Venus: Science, v. 257, p. 766-770.