POSSIBLE SITES OF EXPLOSIVE VOLCANISM IN SOUTHERN GUINEVERE PLANITIA. M.G. Lancaster and J.E. Guest, University of London Observatory, University College London, London, NW7 2QS, UK.

The high temperatures (650-750K) and atmospheric pressures (55-95atm) at the surface of Venus have important consequences on eruption style (1, 2, 3). The high atmospheric pressure should inhibit volatile exsolution to such an extent that explosive volcanism would require large magmatic volatile contents (2.5-4.0 wt %). In the rare case of explosive activity, the high atmospheric density should enhance eruption cloud buoyancy, whereas the high temperature and pressure would tend to limit cloud height. Ballistic transport of pyroclasts would be impeded by atmospheric drag. Slowly ascending low viscosity magmas with lower volatile contents may cause strombolian activity. Hence pre-Magellan studies predicted only the rare occurrence of explosive volcanism with restricted areas of tephra.

Using the new Magellan data, possible sites of explosive volcanism have been identified in Southern Guinevere Planitia. An irregular radar bright deposit covering an area of some 60 x 100 km and centred around 22°N 322°E has been studied. The reticulate fracture pattern of the underlying terrain is visible through the deposit, suggesting it is a thin layer of mantling material. The deposit occurs in association with a cluster of some 20 volcanic craters. Each crater is seen to be surrounded by a roughly circular area of the deposit about 20 km in diameter, these areas coalescing to form an irregular network around and between the craters. The deposits appear darker immediately close to the craters where the underlying terrain is not visible, and they feather into the surrounding terrain at distance from the craters. These observations support the contention that the deposits are tephra formed by transport and deposition of pyroclastic material up to 10 km from each crater. Deposition by fallout from plinian columns is more consistent with the lateral extent of the deposits than strombolian activity.

The roughly circular planimetric shape of the tephra deposits implies that the shape of the eruption plume was not modified by the action of wind. An alternative explanation is that the whole complex of deposits may be aeolian in origin, but this is unlikely due to their close association with the volcanic craters. If the deposits are tephra formed by plinian eruptions under the present Venus environment, then a high volatile content magma is implied.

References

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