MORPHOLOGICAL CHARACTERISTICS OF SMALL MONOGENETIC VOLCANOES IN SOUTHERN GUINEVERE PLANITIA: IMPLICATIONS FOR ERUPTION CONDITIONS. M.H. Bulmer, J.E. Guest and C.R. Wiles, University of London Observatory, University College London, London NW7 2QS, UK.

Within the plains area of Venus there is a wide range of types of volcanic edifices, most of which are less than about 20 km across. These differences in morphology are considered to reflect eruption conditions. Examples of many of these are found in Southern Guinevere Planitia.

The most common type of small volcanic edifice is shield-like ranging from about 2 km to 30 km in diameter. The low profile of these features is considered to indicate that they were produced by the piling up of relatively thin lava flows erupted in a relatively fluid condition from a central vent. As on earth, in most cases they were formed by a single eruption that may have lasted for up to several years. Effusion rates were probably relatively low, consistent with lava flow lengths of a few kilometres to tens of kilometres, probably similar to those occurring on Hawaii.

While some of the shields have a single summit crater, others have one or more pits on their flanks, probably resulting from magma withdrawal during or after the eruption. Some craters have weak raised rims that may be spatter ramparts caused by weak explosive activity. In other cases the shields have flat tops usually with a small crater in the middle. These may well have resulted from high standing lava lakes in summit pits with final collapse of the centre of the lake as a result of magma withdrawal in the central conduit after the lake had largely congealed.

Generally these shields occur in clusters, although they can also be found as isolated features on the plains. Clusters of shields are in the order of hundreds of kilometres across and they are usually associated with fracture belts. These shield complexes have much in common with those of the Eastern Snake River Plains in Idaho (1).

In other areas, radar dark shields are formed that consist of very thin lava flows, the margins of which are closely controlled by low relief fracture patterns in the underlying plains. These features also were erupted from a single vent. The radar dark character may suggest that the surface has a much finer texture than the normal shields consistent with the lava having been emplaced with a low effective viscosity.

As well as shields, there are individual lava flows of a few kilometres to tens of kilometres in length. These tend to be relatively radar bright and flow margins are visible. Where they occur associated with other edifices they can be seen to be topographically controlled. They appear in some cases to have erupted from fissures and were probably relatively short-lived eruptions compared with the shields, consisting of only one flow.

Although the majority of volcanic features in Southern Guinevere are suggestive of lavas erupted with relatively low viscosity and thus probably of basaltic or ultramafic composition, there are examples of edifices produced by lava with higher effective viscosities and comparable to silicic domes on earth. The presence of these features which may be up to 30 km across suggests that large high level magma reservoirs do occur allowing magma to evolve to more silicic compositions.

Reference

Greeley, R. (1977), NASA CR 154621, p.23-44.