

# Large topographic rises, coronae, large flow fields, and large volcanoes on Venus: Evidence for mantle plumes?

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## **ABSTRACT**

Voluminous volcanic deposits at topographic rises, coronae, large flow fields, and large volcanoes have led researchers to link these features to mantle plumes. Topographic rises have broad, swell-like topography, large positive gravity anomalies, and associated volcanism. Coronae are circular to irregular features defined by their fracture annuli and associated with uplift and volcanism, followed by subsidence. Large volcanic flow fields (>30,000 km<sup>2</sup>) and large volcanoes (>100 km in diameter) are sites of voluminous outpourings of lava. We interpret the variations in types of volcanism, surface deformation, topography, and gravity signatures to indicate differences in the nature of the underlying thermal upwellings that formed these features. Most topographic rises are likely to be formed by primary or deep-seated plumes, whereas coronae and probably most volcanoes result from shallower upwellings or secondary plumes. Extension clearly plays a critical role in the formation of large flow fields, coronae, and some large volcanoes. We do not interpret large flow fields to be related to plumes. There are a similar number of primary plumes on Earth and Venus, but Venus has a much larger number of secondary plumes. The increased number of secondary plumes on Venus may result from the lack of slab cooling at the core-mantle boundary, the planet's lack of a low-viscosity zone, or its stronger lithosphere.