rable temperatures, the crystallization of babingtonite requires more hydrous conditions, lower CO$_2$, and slightly higher O$_2$ fugacities in the fluid phase than ilahunite. Since similar temperatures, CO$_2$ pressures, and oxygen fugacities induced within skarn deposits exist on Venus, ilahunite and high autunite could have also formed on the surface of this planet by the interaction of the venusian atmosphere with extruded basaltic rocks. One factor that might mitigate against the formation of these calcic Fe$^{2+}$-Fe$^{3+}$ silicates on Venus, however, are the high abundances of Mg and Al measured during the Venera 13/14 [32] and Vega 2 [33] missions. The Mg$^+$ and Al$^{3+}$ cations are not accepted into the crystal structures of ilahunite and babingtonite.

Discussion: Although magnetite is generally regarded to be the predominant ferric-bearing mineral on Venus, other mixed-valence Fe$^{2+}$-Fe$^{3+}$ minerals known to exist on the surface of Earth could be stable in the venusian atmosphere. Thus, in addition to ilahunite (which is probably metastable) and ilahunite and babingtonite (both of which may be found in rocks depleted of Mg and Al), oxyanhydrite and oxygen-micas may also be major constituents of the venusian surface. The opposites and high electrical conductivities of such mixed-valence Fe$^{2+}$-Fe$^{3+}$ silicate minerals, the properties of which resemble magnetite [34], may also contribute to high radar-reflectivity regions in the highlands of Venus [35].

possibly producing a self-sustaining subduction system. Buoyancy remains negative until the slab becomes negatively buoyant. This rate of the slab's buoyant rise through the mantle is then important in determining whether the buoyancy can help drive subduction. The rise of the mantle before the basalt-eclogite phase change, tending to be negatively buoyant, by negatively buoyant, does not incorporate the full analysis.

These results indicate that for all cases of assumed Venus geotherm a lithospheric slab whose subduction has been initiated will instead be forced to underthrust the overriding lithosphere if the subduction rate is slow. This could then lead to crustal thickening, melting, and volcanism, and possibly provide one model to explain the association of compressional mountain belts and blocks of high-standing terraces, with apparent flexural rises and foredeeps, and with large volumes of volcanic deposits.


LV.0: EROSION VS. CONSTRUCTION: THE ORIGIN OF VENUSIAN CHANNELS. D. B. J. Bussey and J. E. Guest, University of London Observatory, University College London, London NW7 2QS, UK.

Lava channels are a common feature in the volcanic regions of the Moon, and have now been observed on Venus [1]. There has been much debate about the origin of lunar channels: Are they the result of erosional (either thermal or mechanical) or constructive processes? It is necessary to determine the criteria to distinguish between the different types of channels. The clearest evidence is that the presence of levees indicates that the channel experienced a constructive phase for a period.

Greeley [2] has proposed that Hadley Rille, on the Moon, was formed as a leaved channel and lava tube system. Evidence for this is its location along the crest of a ridge. In addition, Hadley Rille and other lunar mare sinuous rilles are discontinuous, suggesting that their origin was, in part, a lava tube that has subsequently undergone partial roof collapse. Carr [3] and Head and Wilson [4] have argued that these rilles were produced by lava erosion. For lunar highland channels, which tend to be larger than their mare counterparts, mechanical erosion of the megaregolith is a possible process.

Channels of several different types have been observed on the surface of Venus [1]. They are probably formed by more than one process. They range in size from a few kilometers to over 6000 km [1]. The relatively short ("tadpolelike") channels [5] (e.g., 24 S 347) appear similar to lunar mare sinuous rilles in morphology. They are so like certain constructive terrestrial channels (e.g., Kalaupapa, Hawaii [6]) that it appears reasonable to say that they too are constructive channels or collapsed lava tube systems.

However, the long sinuous channels referred to by Baker et al. [1] as "canals" pose a different problem in the understanding of their formation. One example of a channel of this type in the southeast region of Aphrodite Terra appears to show both erosional and constructive characteristics. This channel is represented in Fig. 1.

It is approximately 700 km long with an average width of about 1 km. It drops a distance of 700 m from beginning to end, which means that the average slope is 0.06°. Its source may have been a graben situated at the northwest end of the channel. It appears to have different origins along its length.

The lack of levees near the source suggests that the channel is erosional in this region. An inferred profile is shown as AA' in Fig. 1.