**Global Distribution of Venusian Channels and Implications for Venus Volcanism;** G. Komatsu, V.R., Baker, Lunar and Planetary Laboratory, Univ. of Arizona, Tucson, AZ 85721 and T.J., Parker, Jet Propulsion Laboratory, CA 91109

We have mapped the global distribution of venusian channels based on the classification described more in detail in [1]. The map is preliminary because of difficulties in recognizing narrow channels in compressed-scale mosaics and in tracing channels which are disrupted or buried by subsequent tectonism and volcanism. Nevertheless, it is possible to see a global pattern of channel distribution (**figure 1**).

1. Constructional channels are widely distributed. These channels feed extensive lava flows that are associated with various volcanic edifices (e.g., coronae, shield volcanoes, rift zones). Perhaps, the emplacement of these extensive flows was sufficiently rapid that lava did not deeply incise the channels. This condition (relatively short duration) may characterize one aspect of typical venusian volcanism.

2. Sinuous rilles are widely distributed. However, there are several regions of relatively high concentration. More than half of them occur on or near coronae, suggesting that channel-forming events are closely related to the coronae evolution. Corona volcanism may have provided conditions for the channel formation (high effusion, high temperature, low viscosity lava, sustained eruption). If coronae are indeed surface expressions of mantle plumes [2], the above mentioned factors are relatively easily explained. On Earth, the surface volcanism by mantle plumes is initiated by the high effusion, sustained flood basalt events [3]. In the Archean, when the mantle temperature was higher than at present, a high degree of partial melting generated high-MgO, ultramafic lava including komatiite. Komatiite is known to have a very low viscosity at its high melting temperature. Komatiite has erupted and formed long lava channels in Australian shield regions [4]. The venus mantle is thought to have a higher temperature than that of current Earth because of the higher ambient surface temperatures [5]. This may cause the generation of komatiitic lava during the venusian mantle plume events [6] and form channels.

3. Canali are concentrated in several plains regions, including southern Guenevera Planitia, Helen Planitia, eastern Aino Planitia (southeast of Artemis Chasma), and and plains north of Rusalka Planitia. These plains are quite smooth, leading to a potential observational bias, whereby we can easily recognize more of this channel type in these plains than in other geological units. In other geological units, the channels may be destroyed by subsequent geologic processes, or they may be more difficult to discern. However, not all plains have a high concentration of channels, suggesting that certain plains favor the formation of the channels. All of canali are more or less modified by subsequent tectonism and/or volcanism, indicating that their formation was not recent. The channels may be related to the massive resurfacing event that has been proposed to explain the cratering records [7].

4. Outflow channels are rare on Venus. This is probably attributable to the extremely high effusion rates and steep slopes that are required for catastrophic flooding to occur [8] - conditions that may only rarely have been met on Venus. On Earth and Mars, the accumulation of large quantities of water in unstable surface and subsurface aquifers provided the impetus for such floods. On Venus, which lacks surface water, lava appears to have been the transported fluid. The most spectacular venusian outflow channel (at lat. 45-52°S, long. 19-32°E) is located on the flanks of an 800 m high upland that resembles a corona. As in the case of sinuous rilles, coronae may occasionally provide the necessary source requirements for outflow channel formation. The channel's morphology (anastomosing reach, stream-lined islands and small depth/width ratio compared with sinuous rilles) is attributed to the catastrophic nature of its emplacement.

5. Valley networks are concentrated in the highlands, particularly on Aphrodite Terra. The valley networks are hypothesized as having formed by the fluid motion through underground fracture system [9][10]. Tectonically deformed Aphrodite Terra would be ideal the process. Tectonic deformation should have provided fractures that can be reactivated by fluid flow. Moreover, the fluid material (silicate, sulfur, carbonatite, etc.) must be supplied to the system by an active volcanic process. This view is consistent with the observation that Aphrodite Terra seems to have been a site of extensive volcanism.

We also found that equatorial highlands seem to have an usually high channel density. If this density is confirmed by later survey, it indicates that highlands were a focus of channel formation.

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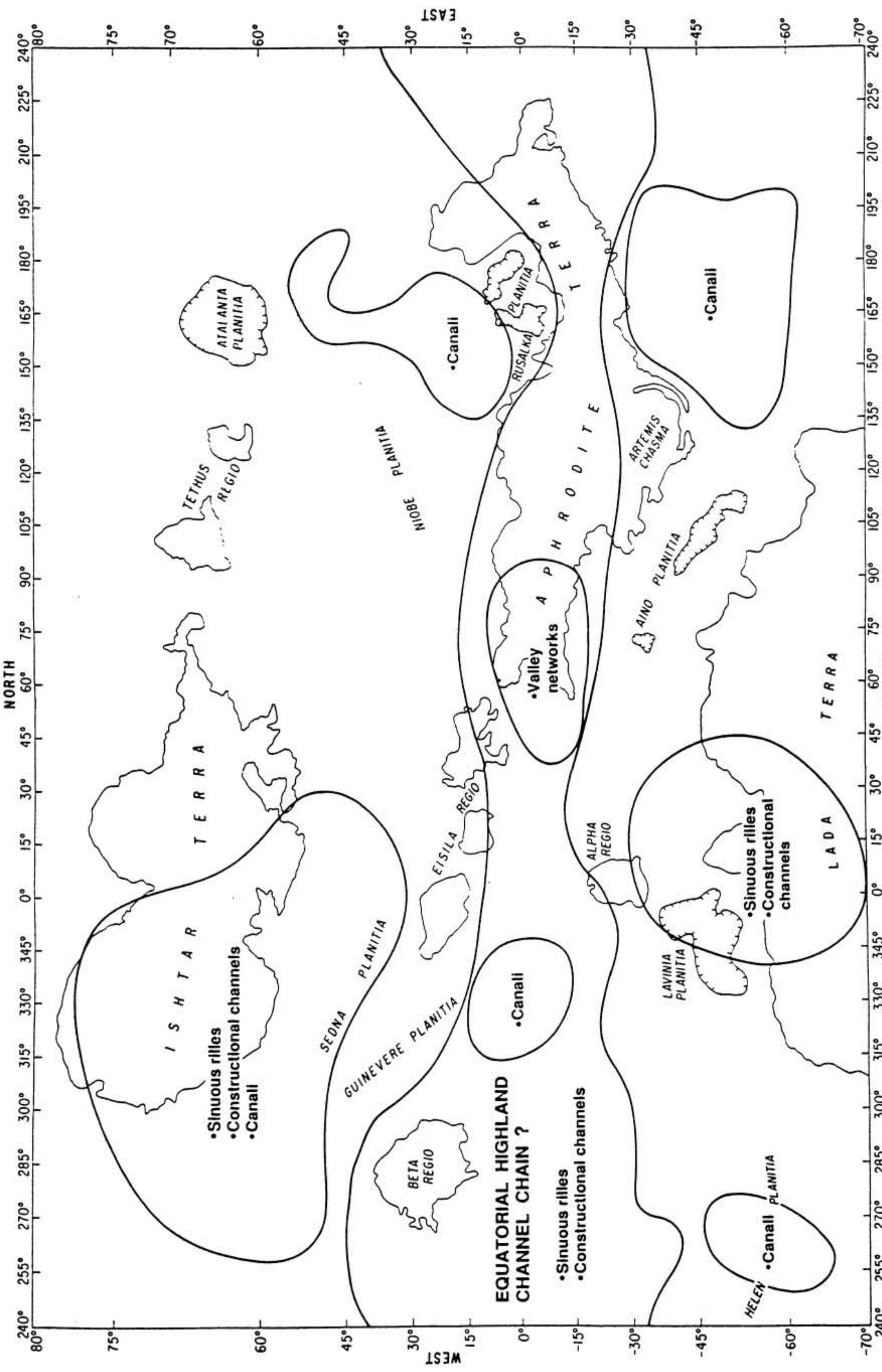


Figure 1. Regions of high concentration of venusian channels and valleys.