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VENUS INTERNAL MAGNETIC FIELD AND ITS INTERACTION WITH THE INTERPLANETARY MAGNETIC FIELD.
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In a previous study, Knudsen et al. suggested that Venus has a weak internal magnetic dipole field of the order of $7 \times 10+20$ G cm^{-3} that is manifested in the form of magnetic flux tubes threading the ionospheric holes in the Venus nightside ionosphere [1]. They pointed out that any internal field of Venus, dipole or multipole, would be weakened in the subsolar region and concentrated in the antisolar region of the planet by the supersonic transterminator convection of the dayside ionosphere into the nightside hemisphere. The inferred magnitude of the dipole field does not violate the upper limit for an internal magnetic field established by the Pioneer Venus magnetometer experiment [2]. The most compelling objection to the model suggested by Knudsen et al. has been the fact that it does not explain the observed interplanetary magnetic field (IMF) control of the polarity of the ionospheric hole flux tubes [3,4]. In this presentation I suggest that a magnetic reconnection process analogous to that occurring at Earth is occurring at Venus between the IMF and a weak internal dipole field. At Venus in the subsolar region, the reconnection occurs within the ionosphere. At Earth it occurs at the magnetopause. Reconnection will occur only when the IMF has an appropriate orientation relative to that of the weak internal field. Thus, reconnection provides a process for the IMF to control the flux tube polarity. The reconnection in the subsolar region takes place in the ionosphere as the barrier magnetic field is transported downward into the lower ionosphere by downward convection of ionospheric plasma and approaches the oppositely directed internal magnetic field that is diffusing upward. The reconnected flux tubes are then transported anti-Sunward by the anti-Sunward convecting ionospheric plasma as well as by the anti-Sunward-flowing solar wind. Reconnection will also occur in the Venus magnetic tail region, somewhat analogously to the reconnection that occurs in the magnetotail of the Earth.

The possibility that reconnection is occurring between the IMF and an internal dipole field may be tested by measuring the orientation of the IMF projected into a plane perpendicular to the solar wind velocity during time intervals for which ionospheric holes are observed. The orientations of the IMF components should fall within a 180° angle.

References: [1] Knudsen W. C. et al. (1982) *GRL*, 765–768. [2] Russell C. T. et al. (1980) *JGR*, 8319–8332. [3] Luhmann J. G. and Russell C. T. (1983) *GRL*, 409–411. [4] Marubashi K. et al. (1985) *JGR*, *90*, 1385–1398.

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VENUSIAN SINUOUS RILLES.
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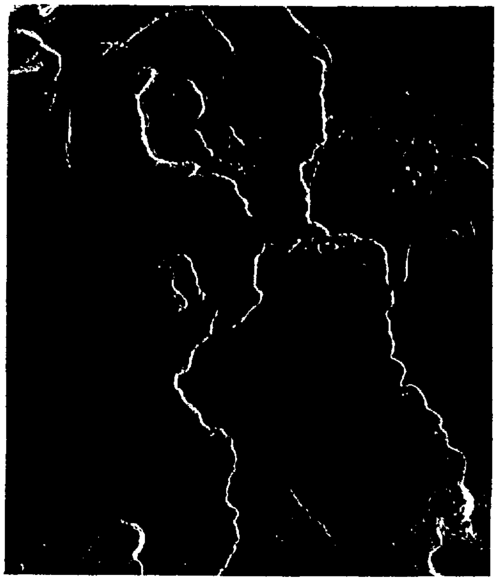
After a preliminary assessment of venusian channels [1], it now seems to be clear that the channels have distinctive classes, which imply a wide range of formation parameters and formation mechanisms [2]. They include outflow channels mainly formed by mechanical erosion from very high discharge flow [3], and canali-type channels requiring either constructional process or mechanical erosion by rather exotic low-viscosity lava such as carbonatite or sulfur [4]. Here we focus on venusian sinuous rilles.

Morphology: Venusian sinuous rilles are generally simple, and originate from a collapsed source. They are shallow and narrow downstream. The venusian sinuous rilles are distinct from canali-type channels, which exhibit almost constant morphologies throughout their entire length, and from outflow channels, which are characterized by wide anastomosing reaches. Venusian sinuous rilles are very similar to many lunar sinuous rilles in their morphologies [1] and even dimensions.

Hypothesized Origins: ***Thermal erosion.*** The close similarities of venusian sinous rilles to lunar sinuous rilles imply a similar formation by flowing lava. Many mechanisms of lunar sinuous rille formation have been proposed by various workers. Thermal erosion was argued to be a major process for their formation [5]. The lunar sinuous rilles could have been formed initially as constructional



Figs. 1 and 2. Venusian sinuous rilles have morphologies similar to lunar sinuous rilles. The channels have collapsed pits, and shallow and narrow downstream. These morphologies indicate loss of thermal erosion capacity as the lava cools.