LATE-STAGE FLOOD LAVAS IN THE ELYSIUM REGION, MARS J.B. Plescia, U.S. Geological Survey, 2255 N. Gemini Drive, Flagstaff, AZ 86001

In the southeastern part of the Elysium region, centered near lat 5° N., between long 180° and 210°, and adjacent to the Cerberus Rupes fractures, is a unit that exhibits little texture and a generally low albedo and that has a very low crater frequency (Figure 1). This unit has been mapped as "smooth plains material" and interpreted as an eolian deposit on the basis of Mariner 9 images (Scott and Allingham, 1976). More recently, Scott and Tanaka (1986) mapped the unit as material deposited during a channeling episode. Here, however, I interpret the smooth plains unit as being a volcanic deposit composed of low-viscosity lava flows: both flood lavas and individual flows.

In images that have resolutions of 200-300 m/pixel, the unit is characterized by a smooth texture and albedo patterns suggestive of flowage in an easterly to northeasterly direction. In higher resolution images (30-40 m/pixel), the large-scale albedo patterns in some locations are recognized to be lava flows having well-defined lobate margins. This surface represents the youngest widespread unit in the Elysium region and one of the youngest volcanic units on the planet (Table 1).

The plains formed by these young volcanics are locally interrupted by inselbergs of knobby material and by kapukas of a brighter material. The brighter material typically lies adjacent to dark, narrow channels or forms teardrop-shaped islands within the channels. In the high-resolution images, the brighter material is seen to be an older, more cratered unit that has been channelized, the channels being filled with a dark, smooth material — the volcanic flows.

The volcanics flowed through preexisting channels eastward and northeastward into and across the knobby terrain east and west of Orcus Patera and continued to the north into western Amazonis Planitia (Figure 1). East of Orcus Patera, the volcanics flowed through well-defined channels whereas west of Orcus Patera, it moved through a myriad of narrow channels. This region is mapped in Figure 1 as Volcanic plains, mixed (vpm) because individual flows cannot be differentiated from older units at this scale.

The volcanics apparently have a source around Cerberus Rupes as indicated by the flow pattern, and several vents have been recognized in the southwestern part of the region (Figure 1). The vents are poorly resolved but appear to be low shields having a central vent surrounded by radial flows. All of the vents occur in areas where the lavas are thin, as indicated by the degree of exposure of preplains craters and the frequency of inselbergs. These vents may reflect either a late-stage eruptive style or one specific to this area. Elsewhere, where such vents have not been observed, the lavas may have erupted through fissures ultimately buried by the eruptions. Although centrally located, Cerberus Rupes can not be confidently considered a vent because flows have not been observed to originate along it. In addition, Earth-based radar-topography profiles across Cerberus Rupes suggest that it is a series of normal faults having several hundred meters of displacement; hence it is probably a late-stage tectonic feature.

Tanaka and Scott (1986) studied this same region and came to a different conclusion regarding the nature of the smooth, young material. They recognized the channeling aspects of the region, but attributed the origin of the unit directly to the channeling episode; hence they interpreted the young age of the unit as indicative of a major late-stage fluvial episode. In contrast, I interpret these plains to be volcanic flows which locally fill preexisting channels. Thus, the channels represent an older, probably unrelated event. The source region for the channeling fluid is unknown; perhaps it is now buried by the volcanic plains, or perhaps it lies to the south beneath material interpreted to be ash flow and ignimbrite material (Malin, 1979; Scott and Tanaka, 1982).

This volcanic unit is important for several reasons. Its presence indicates that in Elysium, unlike in Tharsis, plains volcanism continued or resumed after shield building ended. Additionally, this late-stage volcanism was of sufficent volume and low viscosity that it covered a wide area. The lack of topography, even in high resolution, and the distance the flows traveled suggest the material had a very low viscosity. Only at its distal end, in Amazonis, are flow features and lobate fronts well developed. This material further indicates that there was sufficent heat in the upper mantle to generate considerable quantities of "basaltic" lava at a high eruption rate late in Martian history.

REFERENCES: Malin, M.C., 1979, Mars: Evidence of indurated deposits of fine materials: NASA Conf. Pub. 2072, p. 54; Scott, D.H., and Tanaka, K.L., 1982, Ignimbrites of Amazonis Planitia region of Mars: J. Geophys. Res., v. 87, p. 1179-1190; Scott, D.H., and Allingham, J.W., 1976, Geologic map of the Elysium quadrangle of Mars: U.S.G.S. Misc. Inv. Series Map I-935; Tanaka, K.L., and Scott, D.H., 1986, The youngest channel system on Mars: Abstracts Lunar and Planet. Sci. Conf. 17th, p. 865-866.

TABLE 1
CRATER FREQUENCIES

	FREQUENCY OF CRATERS $\geq$ D / 10^6 km^2 DIAMETER			
TERRAIN	**1 km**	**2 km**	**5 km**	**10 km**
Knobby terrain (kt)	2780±275	1580±205	790±145	390±100
Ridged plains (rp)	2730±190	780±100	252± 60	80± 30
Elyisum plains (Epu)	1420± 74	440± 40	90± 20	35± 10
Volcanic plains (vp)	90± 15	23± 8	5± 4	3± 3

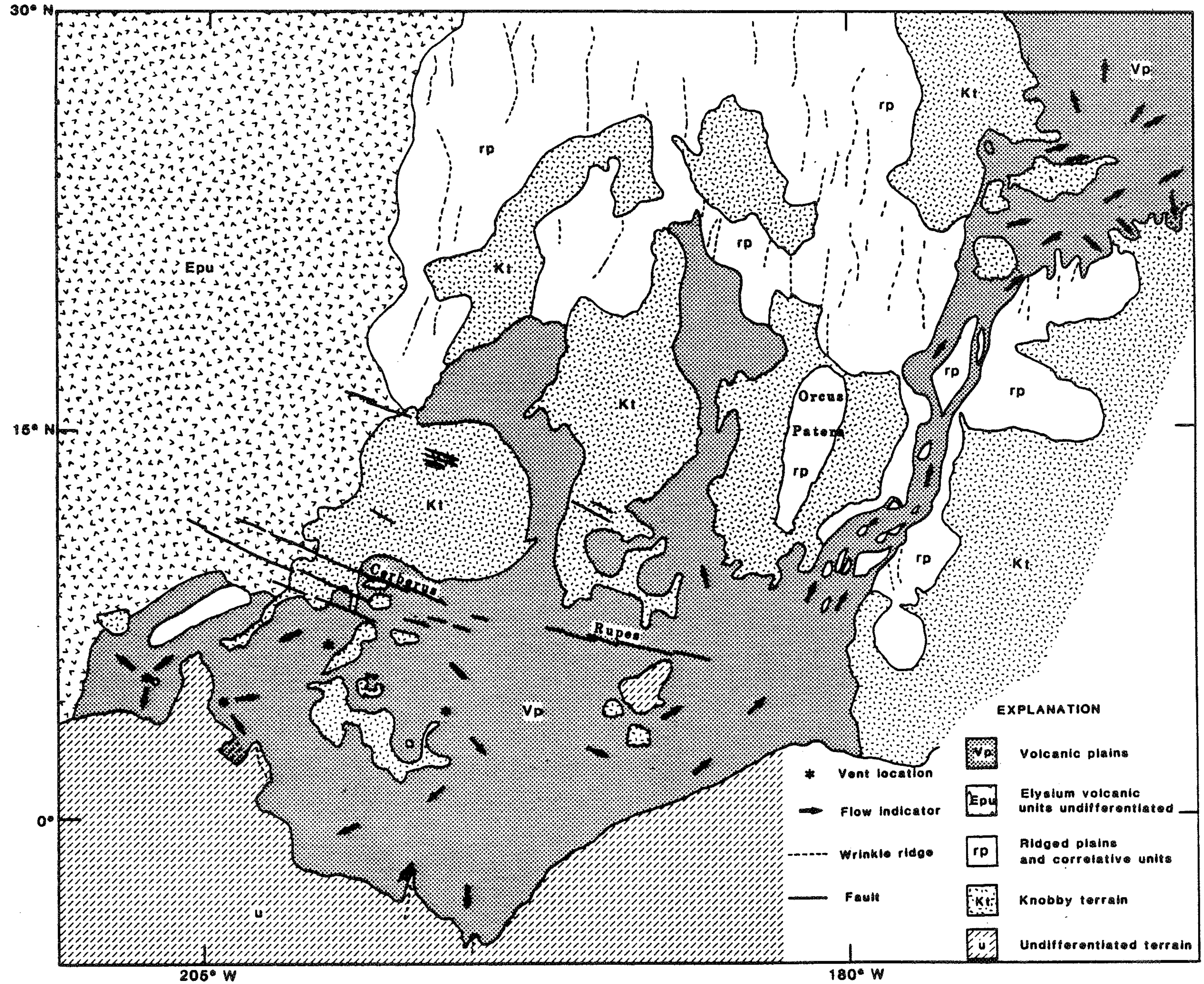

FIGURE 1. Geologic map of southeastern Elysium Region, Mars.