of erosional processes were active (e.g. Sharp and Malin, 1975 GSA Bull. 86, 593; Malin, 1976 JGR 81, 4825; Pieri, 1975 Icarus 27, 25). The other believes in a long history of eroding throughout most of the martian history (e.g. Masursky, 1973 JGR 78, 4009; Masursky et al., 1977 JGR 82, 4016). These views, concealed from analyses of Mariner 9 data, have changed recently with the advent of Viking Orbiter data. The analysis of Viking Orbiter data, which by virtue of their higher resolution and quality, permit detailed crater count and stratigraphic studies. In an attempt to reconcile these divergent views, "bed" and "bank" morphology and transitional relationships on many separate channels was studied. Several key channels, channel-like depressions, and fault-bounded tectonic depressions show evidence of a variety of processes studied and resulted in bedrock surface. Landslide scars are not always formed; the material appears to produce sheet-like flows that can travel considerable distances both laterally across and longitudinally down channel. Thus the differences between interpreted ages of martian channels can be traced to younger ages for post-channeling, resurfacing processes.

2.23 Mars: Discovery of Undulating Polar Plains and a Possible Mechanism for Their Formation

J. A. CUMPS, K. R. BLASTUS, W. J. ROBERGIS - Planetary Science Division, NASA Jet Propulsion Laboratory - Undulating deposits on Mars have provided new insights into mechanisms of topographic evolution of these thick accumulations of dust. Here we report the discovery of wave-like topographic relief on areas previously supposed to be flat plains. These undulations and the layers that previously have been recognized exposed on steeper terraced slopes are attributed to the same basic cause - periodic episodes of dust accumulation. Each layer is interpreted to have formed by the sweeping action of accumulating annual frost during a single climatic cycle of dust storms activity. The undulating topography is considered to be generated at the edge of an advancing or receding perennial ice cap. We also report here a mechanism for the formation of the systems of curvilinear defrosted troughs which are the dominant physiographic features of the perennial polar caps. We suggest that troughs are derived from a primary undulating landscape by an insolation controlled process. First, the steeper slopes within the undulating landscapes lose their perennial ice surfaces. Then, as dust deposition continues, these steeper slopes evolve into troughs because, in the absence of perennial ice cover, they are unable to trap deposited dust. We attribute the observed complexity of the troughs, including changes in orientation, lateral offsets and branching, to interactions between undulations with different orientations. In summary, undulating landscapes and trough complexes of the polar layered deposits appear to record growth and recession of permanent ice caps in response to climatic variations.

2.24 Streamlined Crater Islands in Martian Outflow Channels. W. J. ROBERGIS, J.A. CUMPS, K.R. BLASTUS, Planetary Science Institute - Outflow channels originating from the chaotic terrains on Mars exhibit a variety of topographic forms including hundreds of meters above the channel bed. An improved understanding of the origin and evolution of these features may provide the key to resolving the controversial issue of channel origin. We have chosen for detailed examination a subset of all streamlined islands in Kasei Vallis and in channels associated with Chryse Planitia on Mars. This subset is characterized by a remarkable symmetry of form, in part because the obstacle to the erosive flow creating the islands is a symmetrical crater, and in part because the flow appears to have been approximately constant in direction and character over distances greater than the linear dimensions of the islands. We have devised a classification scheme that we hope will be useful in establishing a sequence of degradation stages. The islands that define the apparent lateral shape of the island can be least squares fit to a variety of streamlined shapes; we give some examples. From a topographic map of one of these islands we have obtained slopes perpendicular to the flow curve and along the flow curves. It seems possible that such information, when considered in the context of the widths, depths, and spacing of the striations, may be sufficient to deduce the nature of the erosive fluid.

2.25 Dynamic Phenomena in the North Polar Region of Mars Seen by Viking. Philip B. James, H. Missouri- St. Louis-Viking orbiters have monitored the north polar region of Mars from Ls=330° (late winter) to the present time (Ls=30°). North of 65° the hood was generally featureless and diffuse, while wave clouds and cumulus like clouds were frequently seen in the zone between 45°N and 65°N. Intermittent cloudiness persisted until Ls=50° (mid spring); after this time only isolated weather systems were seen. Only isolated observations of the cap edge could be made during the re-