UPPER DAO VALLIS: A BASIN DOMINATED BY ICE-RICH VISCOUS MATERIALS. J. D. Arfstrom, University of Colorado, Boulder. John.Arfstrom@Colorado.edu.

Introduction: I present preliminary geomorphic interpretations of Upper Dao Vallis, based on MOC images and MOLA data.

Upper Dao Vallis: The head of Dao Vallis is topographically isolated from its lower course by what appears to be a deposit of valley wall material. Viscous materials cannot flow past this deposit and therefore, this section of Dao Vallis is, in effect, a basin (Figure 2). It is about 170 km long and as much as 40 km wide and will be referred to in this abstract as Upper Dao Vallis.

There is no significant regional slope along the length of the floor of Upper Dao Vallis, which is predominately level with numerous rounded hills interspersed throughout. It lies as much as 2.4 km below the surrounding plateau which is flat and smooth, except for a pitted zone near the rim. The slope of the walls of the valley averages between 20 and 30 degrees.

MOC images and MOLA data indicate the presence of viscous-flow features on the NW walls of Upper Dao Vallis (Figure 1). The features appear to originate near the rim in association with gullies and alcoves and extend 10 to 15 km down onto the valley floor.

Interpretations: I interpret the viscous-flow features as ice, glaciers, and rock glaciers derived from seepage and eroded valley wall material associated with gully and alcove formation [1 and 2]. I suggest that ice formation and accumulation have occurred on the NW wall of the valley under conditions of relatively low sublimation due to reduced insolation on pole-facing slopes [3].

Ice and ice-rich debris built up over time and began to flow under the influence of gravity in the form of glaciers and rock glaciers. These eventually reached the floor of the valley and continued to flow until areas of higher insolation were encountered. In these areas, the sublimation rates were high enough to ablate the glaciers to the point that they could advance no further.

Controlled by obliquity cycles [4], the glaciers and rock glaciers may have advanced and retreated and gradually deposited wall material across the floor of the valley through history. These ice-rich deposits may have flowed by creep to fill the Upper Dao Vallis basin to a nearly uniform level. The rounded hills on the floor of the basin, which rise above these near-level ice-rich deposits, may be the remnants of past landslide deposits.

References: [1] Arfstrom, J.D. (2002) LPSC Abstract, 33, 1174. [2] Arfstrom, J.D. (2002) LPSC Abstract, 33, 1092. [3] Carr, M.H. (1990) Icarus, 87. [4] Mellon, M.T. and Jakosky, B.M. (1995) JGR, 100, E6.

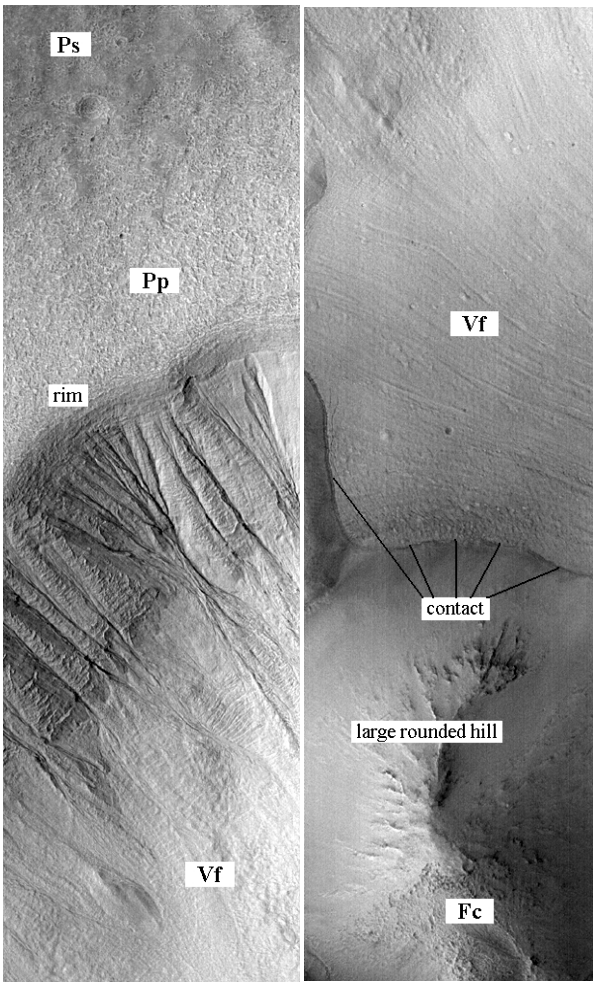

Figure 1: Top half (left) and bottom half (right) of MOC image M0902875 (traverse C on Figure 2). The plateau is at extreme top showing smooth (**Ps**) and pitted (**Pp**) surface. Below the rim are gullies and alcoves, some of which are filled with a material that I interpret as ice. Below the alcoves and gullies is a material exhibiting viscous-flow features (**Vf**). There is an obvious contact between **Vf** and a large rounded hill of the valley floor (**Fc**). North at top and lighting from top left. Image width is 2.86 km.

Figure 2: (next page) Viking mosaic of Upper Dao Vallis showing geomorphology. Lighting from top left.

UPPER DAO VALLIS. J. D. Arfstrom