POTENTIAL MUD VOLCANISM TYPE PROCESSES ON PLUTO. C.J. Ahrens[1], V.F. Chevrier[1]. [1]Arkansas Center for Space and Planetary Science, University of Arkansas, Fayetteville, AR (ca006@email.uark.edu)

Introduction: Three large domed structures, two informally named Wright Mons and Piccard Mons, are found in the southern hemisphere of Pluto near Sputnik Planitia (SP). These domes are quasi-circular, raised with respect to the surrounding surface, show vent depressions at the summit and knobby terrain at the base [1-2], possibly relating to extrusion of subsurface material. Two possible mechanisms are proposed for these structures: (1) small scale igneous-type volcanism and (2) mud volcanism type.

Differentiating between the two processes is important due to the different implications they have for the Plutonian surface environment:

Small scale igneous-type volcanism implies the production of a subsurface chamber with cryo-magma material that is eventually exposed to the surface through tectonic faulting or convective forces upward [3-4]. Mud volcanism implies diapiric-type mobilization upward with pressurized subsurface material, such as clathritic, hydrocarbon, volatile mixtures, as observed in terrestrial mud volcanoes [5-6].

Our aim is to quantitatively compare the morphometries of various terrestrial and martian volcanic systems (i.e. scoria cones, maars, mud volcanoes, etc.) to the vented-dome structures we have observed on Pluto to find any structural relationships and comparisons. The first objective is to investigate the geometry of the domes and flow (moat) features. The height-base ratio of different morphologies is then compared. The second objective will be to map the area for any observable flow, fissure, and dome collapse orientation. The third objective will be to model the potential evolution of plutonian materials to form such structures.

Initial Measurements: On Earth, small scale volcanoes and mud volcanoes form similar landforms where steep-sided cones have central craters on the summits and are associated with flow-like units spreading from those cones [7]. On Mars, however, it depends on the environmental setting, mainly if faulting is involved (igneous-type) or deposition of sediment material through diapirism (mud volcanism) [7-9]. Although Pluto is not a silicate-based terrestrial body, the mechanisms involved in the volcanic processes should still be comparable. In the geometrical context, the base and height measurements of any volcanic structure can be correlated to the type of origin, such as upwelling from a large chamber or sill of material.

Wright Mons stands 4 km high and base width spans 150 km. Piccard Mons is 7 km high and has a 225 km base width [10]. An unnamed feature approximately 380 km east from Wright and Piccard shows a similar uplifted vented structure. The base width was measured to be 172 km and the height approximated to be 4.9 km. Comparing the average of the height/base (H/B) ratio of these plutonian structures to those of Earth and Mars (Table 1), we find that the plutonian domes share similar ratios to that of terrestrial offshore mud volcanoes.

Volcanic Type	**H/B Ratio**
(Earth) Lava domes	0.251
(Earth) Pingos	0.136
(Earth) Scoria	0.136
(Earth) Onshore Mud Volcanoes	0.062
(Earth) Offshore Mud Volcanoes	0.029
(Earth) Maars	0.031
(Mars) Mud Mounds	0.044
(Mars) Scoria	0.103
(Mars) Tharsis Tholi	0.053
(Pluto) This study	0.028

Table 1: Comparison of Height-Base ratios of various volcanic formations.

The distribution of these structures being clustered in the southern hemisphere of Pluto pose interesting questions regarding the build-up of volatiles and movements thereof. In comparison, terrestrial and martian mud volcanoes are typically found in clusters around regional fissures and source reservoirs [9]. Modeling such reservoir materials relative to Pluto compositions and the geometries of the structures could give insight to processes similar to mud volcanism.

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