PLUTO'S PUTATIVE CYROVOLCANIC CONSTRUCTS.

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Overview: New Horizons imaged two large mounds with deep central depressions, informally called Wright Mons and Piccard Mons [1]. Wright Mons (Fig. 1) stands ~4 km high and the main mound spans ~150 km. Piccard Mons was past the terminator but visible in haze-light, and is ~6 km high and 225 km wide. Both features appear constructional, and have relatively young surfaces (few craters). We focus on Wright Mons here, but Piccard displays many similar features. Some form of cryovolcanism is the most likely geologic process to both build up a mound, and create younger crust. These mounds are unique among the potential cryovolcanic features in the solar system.

Image dataset: The Ralph Multispectral Visual Imaging Camera (MVIC) performed a high resolution scan of Pluto near the time of closest approach, resulting in an ~320 m px^{-1} panchromatic mosaic. This dataset forms the base mosaic (Fig. 1a). Stereo topography over the mons is available from several combinations of MVIC and Long Range Reconnaissance Imager (LORRI) observations (Fig. 1b; [1]). All feature names used in this abstract are informal.

Terrains: Initial mapping was conducted on the basis of morphology and topography. The main Wright Mons mound consists of several different surface textures. The very deep (~4 km) central depression (cavus; ca) is surrounded by wrinkly material, which is ~concentric with the cavus in some areas. A flow-like feature extends from the cavus to the SE (ff), and another more effusive-appearing dark region (eff) lies on the northern flank. The material on the lower flanks and extending away from the mons has a hummocky texture with a typical wavelength of ~8 km.

Wright Mons abuts the chaotic mountain region named Norgay Montes to the east, and an extension of Sputnik Planum to the north. Rubbly material (rm; coined in [2]) to the north displays several craters and may represent an older, more degraded cryovolcanic flow. The region west of Wright Mons is distinct but also a potentially cryovolcanic terrain (ctz, kp, rpm). Most of the depressions (ca, sca, sd, md) found there are sub-circular and lack rims or ejecta. Some flow- or spatter-like features (ff) appear to originate from these depressions. Although a few of these pits may be craters, most appear either collapse or caldera-like. A good portion of the western plains are relatively flat, with either 1-2 km-scale knobs (kp) or a few large scarps (ctz). Many transitions between units are gradual, but some have distinct contacts.

Age: One possible 5.5-km-diameter crater sits in the wrinkly terrain near the Wright Mons cavus. If this is indeed a crater, it would yield an age of less than 1 Ga [3] for the "knee" model from [4]. The possible crater has no obvious ejecta and is not perfectly circular, although it could be degraded or deformed. The wrinkly material around the cavus is made up of ridged structures that can tend to look arcuate on small scales, and the ridges are emphasized in ~the E-W direction by the oblique lighting (Wright Mons lies near the terminator). Thus, it is not clear if this feature is an impact crater.

Composition: The mons were potentially formed through viscous effusion/flow, but the material must also be able to sustain topography. The highest resolution color data from MVIC (~650 m px^{-1}; Fig. 1c) highlights the dark material on and around Wright Mons as redder, consistent with other dark areas on Pluto, but no other color features stand out. Preliminary analysis of the highest resolution Linear Etalon Imaging Spectral Array (LEISA) cube (~3 km px^{-1}) suggests methane is associated with much of the region around, and including, the Mons. The Wright Mons cavus and several of the larger depressions display a stronger water signature than the surrounding terrain [5-8].

Future work will include modeling of material compositions and cryovolcanic processes, mapping of Piccard Mons, and correlation of features with topography.

References:

[1] Moore J.M. et al. (2016) *Science,* submitted. [2] White O. L. et al. (2016) this conference, #2479. [3] Singer K.N. et al. (2016) this conference, #2310. [4] Greenstreet S. et al. (2015) *Icarus* 258**,** 267-288. (erratum available on www.phas.ubc.ca/~sarahg) [5] Cook J.C. et al. (2016) this conference, #2296. [6] Grundy W.M. et al. (2016) this conference, #s 2284 & 1737. [7] Protopappa S. et al. (2016) this conference, #2815. [8] Cruikshank D.P. et al. (2016) this conference, #s 1676 & 1700.

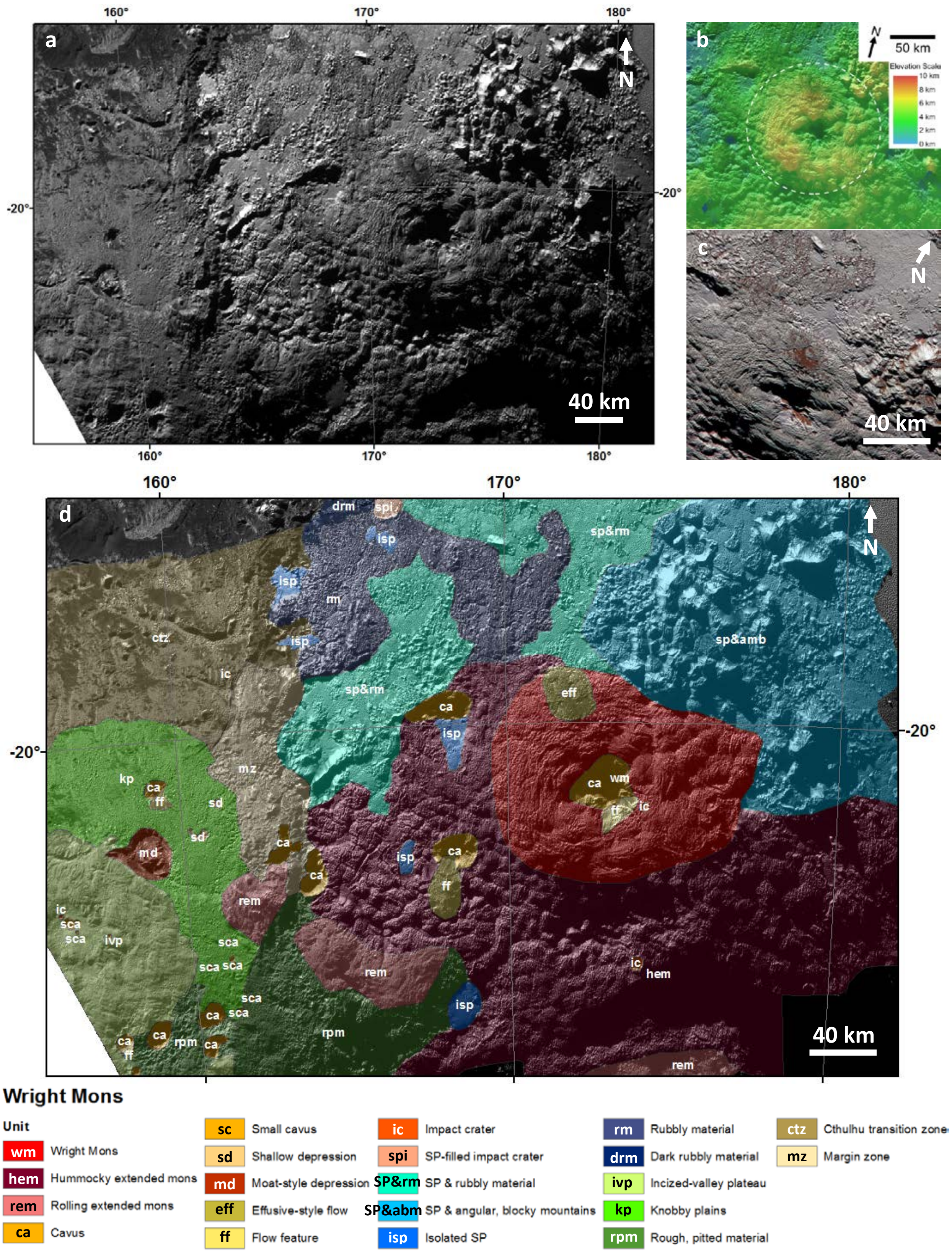

Figure 1. a) MVIC base mosaic, b) topography from [1], c) MVIC enhanced color over LORRI image, and d) initial mapping of cryovolcanic zone, showing extensive areas of younger terrain around the main Wright Mons mound and many depressions (ca, sca, sd, md) of varying sizes, depths, and morphologies.