GEOLOGY OF THE SOUTHERN HEMISPHERE OF TRITON: NO POLAR CAP;

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The bright southern hemisphere, comprising Uhlanga Regio, is perhaps the most poorly understood geologic province on Triton. The entire bright southern hemisphere has been described as a bright polar 'cap' [1], implying a seasonal origin, or as a permanent geologic terrain distinct from the equatorial terrains [2]. Also, thermal models have predicted seasonal migration of frosts and ices from the presently sun-lit south latitudes to the dark northern latitudes [e.g., 3]. The distribution of frosts and geologic history of this region must be determined observationally. We reexamine the geology of this terrain with the goal of answering these questions.

MACULAE Uhlanga Regio consists of two major terrain types: bright spotted terrain (bs), and bright streaked terrain (bst) located mostly south of -50°. Bright spotted terrain occurs in a band between roughly 10° S and 45° S and consists of two geologic units: relatively dark spots (maculae) and relatively bright intervening material. Broad diffuse bright and dark streaks are also located in this terrain. Maculae are sharply defined and bulbous to ameboid in shape. Most are between a few and 50 km in size and are very smooth at kilometer scales. Digitate lobes extend from many maculae. Relief of this terrain is extremely low. Relative topography between bright and dark units is unknown because stereo separation is only 12°, insufficient for discrimination on low relief terrains. Relative ages of bright and dark units are also ambiguous.

We consider two possible origins for construction of maculae. Maculae may result from sublimation and mass wasting. In this hypothesis, plains-forming darker material has been eroded to produce scarp-bounded topographic lows, which were later infilled with bright material. A variant of this hypothesis is that the darker material is a thin layer that is being removed to reveal an underlying substrate of brighter material. The best analog for this mechanism is that proposed for formation of the etched and pitted terrain of the south polar region of Mars [4]. An interstitial volatile material within the deposit sublimates or is released resulting in loss of cohesion or mechanical strength, followed by ground and slope collapse, pitting, and scarp retreat.

Alternatively, maculae may be deposits or the product of an unusual volcanic mechanism. A possible morphologic analog is the bulbous-shaped floor mounds in the interior of the D-shaped 'caldera' *Ina* in Lacus Felicitatis on the Moon [5]. These smooth-textured mounds are a few hundred meters across and only 5 to 25 meters high. Small spots, which appear to be oblong pits, have been identified on several maculae. These resemble small pits on many of the floor mounds of Ina. Unfortunately, the origin of the Ina mounds is somewhat unclear. It is unlikely, that these lunar features are the result of sublimation and mass-wasting. Strain and El-Baz [r] conclude they are probably volcanic extrusions. Their size and morphology suggest they may be small volumes of low-viscosity material extruded onto flat terrain at a slow rate.

STRATIGRAPHY The bright material between the dark maculae is not uniform in albedo or texture. The bright unit is often brightest near maculae margins but tends to decrease in brightness southward, resulting in decreased contrast between the two units. Two prominent craters 10 & 11 km across are partially buried beneath the bright deposit; in one crater the central peak is just barely visible. A linear graben with raised rim (extending from the dark equatorial

plains) is also partially obscured by bright material. Dark maculae material avoids these two crater rims but partially buries the graben. These relationships suggest that both the dark maculae and bright materials are superposed on an ancient, partially exposed crust. If younger, bright material could have infilled depressions between the dark maculae. Contacts between bright and dark material are sharp, implying that any infilling may be volcanic. Although the emplacement mechanisms remain uncertain, the observations are consistent with independent evidence in cantaloupe terrain [6] that the upper crust of Triton is layered.

Two lines of evidence indicate these terrains are perennial over geologic time scales. Several global scale lineaments, similar to those found in equatorial terrains, cross this terrain. Also, seven relatively pristine impact craters have been identified within this terrain. The pristine crater population on Triton is strongly concentrated toward the apex of orbital motion. Within this distribution, however, the crater population appears to be random. Given the relatively low resolution and foreshortened viewing geometry and high local sun angles under which the southern terrain was imaged, the pristine crater population is consistent with an age that is not grossly younger than the equatorial terrains.

SOUTH POLAR REGION South of ~50° S, the geology changes rather abruptly to a more coarsely textured, geologically complex terrain, known as bright streaked terrain (bst). This terrain appears to be topographically rough. Numerous discrete geologic units are traceable. Most prominent are isolated smooth bright units, some of which have a flow-like morphology and may be topographically confined. Several global-scale lineaments also cross into this poorly viewed terrain. Poor viewing geometry makes interpretation difficult. Photometric studies are also underway to assist clarify the geology of the southern hemisphere.

[1] Smith, B., et al., *Science*, 246, 1422, 1989. [2] Moore, J., & J. Spencer, *Geophys. Res. Lett.*, 17, 1757, 1990. [3] Stansberry, J., et al., *Geophys. Res. Lett.*, 17, 1773, 1990. [4] Sharp, R, *J. Geophys. Res.*, 78, 4222, 1973. [5] Strain, P. & F. El-Baz, *Proc. 11th Lunar Planet. Sci. Conf.*, 2437, 1980. [6] Schenk, P., & M.P.A. Jackson, *Geology*, in press, 1993; this volume.

Bright spotted terrain of Triton. Scene is ~ 500 km across. Partially buried craters and graben are visible (arrows).