

STRATIGRAPHY OF THE SOUTH POLAR REGION OF GANYMEDE

R. A. De Hon, Department of Geosciences, Northeast Louisiana University, Monroe LA 71209.

This paper reports a preliminary assessment of the stratigraphy and geology in the south polar region of Ganymede. Geologic mapping is based on inspection of Voyager images and compilation on an airbrush base map at a scale of 1:5M. Illumination and resolution vary greatly in the region. Approximately half of the quadrangle is beyond the terminator. Low angle illumination over a large part of the area precludes distinction of some units by albedo characteristics.

Several types of grooved terrain (2,3) and groove related terrain occur in the southern polar region (Fig. 1). Grooves typically occur in straight to curvilinear sets or lanes. Bright lanes and grooved lanes intersect at high angles outlining polygons of dark cratered terrain. Groove sets exhibit a range of ages as shown by superposition or truncation (4) and by crater superposition ages.

The region of grooved lanes and cratered polygons passes into a region of complex grooved terrain (5; furrowed terrain of Ref. 1) characterized by subparallel sets of closely spaced groove sets lanes. Truncation and truncation of groove sets in the complex grooved terrain indicate a prolonged period of complex crustal fracturing. The complex grooved terrain spans a wide range of time in its formation, but it is generally older than the smooth bright lanes and older than most bright grooved lanes. The grooves may be grouped into subparallel groove sets which in turn may be grouped into super sets made up of progressively younger sets. Most of the complex grooved terrain is older than the Gilgamesh basin and apparently older than the palimpsest associated with Hathor, but some of the grooved sets in the complex cratered terrain cut, hence are younger than, the twin palimpsests. The youngest groove sets in the complex grooved terrain transect all other sets and contain fewer grooves.

The largest basin in the polar region is Gilgamesh which consists of a 150-175 km diameter central plain surrounded by hummocky and radial basin ejecta. A clearly defined basin rim is not present. Hence, Gilgamesh has some characteristics in common with palimpsests. Ejecta and well defined secondaries from Gilgamesh are superposed on complex grooved terrain. A well defined double ringed basin

at -83°; 140° is superposed on complex grooved terrain and in turn overlain by Gilgamesh secondaries. Two palimpsests near -70°; 270° partially overlie complex cratered terrain, yet are cut by younger groove sets of the complex crater terrain.

Craters range from subdued, incomplete rings to sharp, well defined craters with bright haloes that overlie all other materials. Remnants of old, large craters are scarce. In fact, dark cratered terrain, the oldest in the quadrangle does not exhibit large crater remnants. Apparently small craters are retained while larger craters are lost, perhaps by topographic relaxation.

Acknowledgements. This study represents one phase of research conducted under NASA Planetology Programs Grant NSG 7628 at Northeast Louisiana University. Geologic mapping of the south polar region of Ganymede (Jg-15, 1:5M) by Hal Masursky, William McKinnon and Rene De Hon is part of the Jovian Satellite Mapping Program.

TABLE I. RELATIVE AGES OF GEOLOGIC UNITS: Jg-15

(c3) Craters w/ bright rays
(ps) Smooth plains material
(sb) Smooth bright lane material
(gb) Bright grooved lane material
(c2) Craters without rays
(g) Gilgamesh basin material
(p) Palimpsests material (tf) Complex grooved terrain
(gd) Dark grooved terrain material
(c1) Crater remnants
(pc) Cratered plains material
(gg) Groove and groove material
(gc) Cratered and grooved material
(tc) Dark cratered terrain materials

REFERENCES

- (1) De Hon, R. A. (1982) NASA Tech Mem. 85127, 349-351.
- (2) Smith B. A. et al. (1979) Sci. 204, 13-32.
- (3) Smith B. A. et al. (1979) Sci. 206, 9225-950.
- (4) Luchitta B. K. (1980) Icarus 44, 481-501.
- (5) Squyres S. W. (1981) Icarus 52, 545-559.

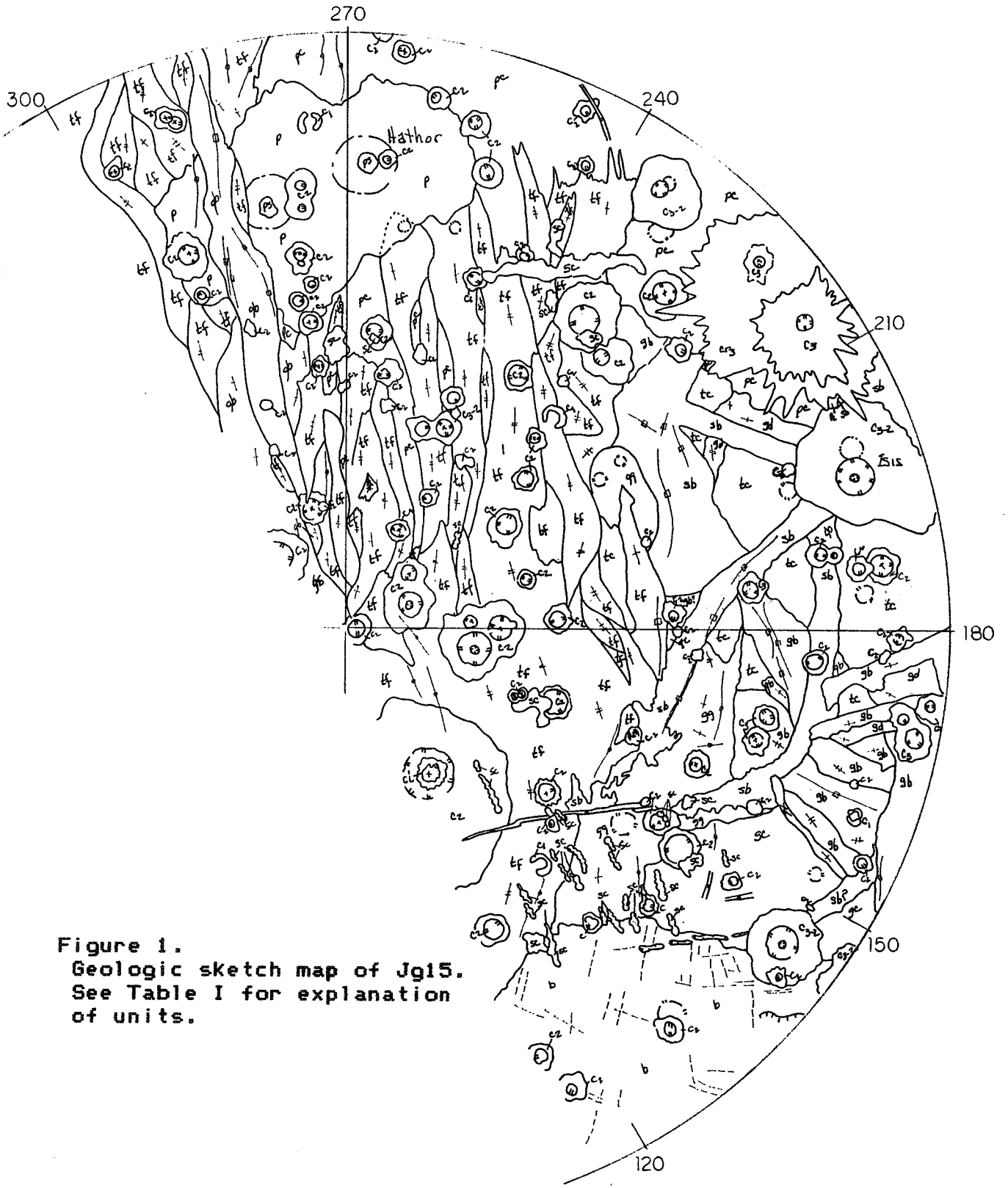


Figure 1.
 Geologic sketch map of Jg15.
 See Table I for explanation
 of units.