THE RESIDUAL POLAR CAPS OF MARS:GEOLOGICAL DIFFERENCES AND POSSIBLE CONSEQUENCES. P. C. Thomas[1],R. Sullivan[1], A.P. Ingersoll[2], B.C. Murray[2], G. E. Danielson[3], K.E.Herkenhoff[4], L. Soderblom[4], M.C. Malin[5], and K.S. Edgett[5], P. B. James[6], W. K. Hartmann[7], [1]Center for Radiophysics and Space Research, Cornell University, Ithaca NY 14853 USA, [2]Cal. Inst. of Technology, [3]Jet Propulsion Laboratory, [4]United States Geologic Survey, [5]Malin Space Science Systems, [6]Univ. of Toledo, [7]Planetary Sci. Inst. (Correspondence Email: Thomas@cuspif.tn.cornell.edu).

The Martian polar regions have been known to have thick layered sequences (presumed to consist of silicates and ice), CO_2 seasonal frost, and residual frosts that remain through the summer: H_2O in the north, largely CO_2 in the south. The relationship of the residual frosts to the underlying layered deposits could not be determined from Viking images. The Mars Orbiter Camera on Mars Global Surveyor has provided a 50-fold increase in resolution that shows more differences between the two poles. The North residual cap surface has rough topography of pits, cracks, and knobs, suggestive of ablational forms. This topography is less than a few m in height, and grades in to surfaces exposing the layers underneath. In contrast, the south residual cap has distinctive collapse and possibly ablational topography emplaced in four or more layers, each ~2 m thick. The top surface has polygonal depressions suggestive of thermal contraction cracks. The collapse and erosional forms include circular and cycloidal depressions, long sinuous troughs, and nearly parallel sets of troughs. The distinctive topography occurs throughout the residual cap area, but not outside it. Unconformities exposed in polar layers, or other layered materials, do not approximate the topography seen on the south residual cap.

The coincidence of a distinct geologic feature, several layers modified by collapse, ablation, and mass movement with the residual cap indicates a distinct composition and/or climate compared to both the remainder of the south polar layered units and those in the north.