Table 1. THEMIS Units Within Gusev Crater[a]

Units	Thermophysical Properties			Morphologic Properties	U.S.G.S. Equivalent Geologic Units[b]
	Vis.	Day IR	Night IR		
Ma'adim Vallis (MV)	high	warm	cold	- low ridges parallel to Ma'adim length (apparent flow direction) but do not extend into Gusev - smaller perpendicular ridges nearer to Gusev	$AHch_3$, $AHgf_2$
Plains (PL)	high	warm	warm craters (hot)	- smooth with moderately dense, small crater population	$AHgf_2$
Mesa (MS)	high	warm	tops: cold slopes: hot	- flat-topped surrounded by steep slopes	$AHbm_1$
Etched (ET)	high	cold	knobs: hot underlying: cold	- small knobs with rare "channelized" areas; devoid of most craters	$AHbm_1$, $AHgf_1$
Wrinkled (WR)	high	warm	warm craters: cold	- low subdued ridges trending NE-SW and N-S - older, degraded craters present	$AHbm_1$, $AHgf_1$
Thira Rim (TR)	high	warm	warm	- crater rim with collapsed terrace	c_2
Low Albedo (LA_t and low-albedo materials)	low	hot	hot	- overlapping wind streaks, tracks - multiple prevailing/local wind patterns - variable distributions with time	$AHgf_2$
High Thermal Inertia (HTI_t)	high/low	warm/cold	hot	- rough terrain with high thermal inertia (TES) and low-albedo deposits	$AHbm_1$, $AHgf_2$
Lobate (LB)	high	cold	warm/cold	- smooth unit with lobate terminal margins	$AHgf_1$

[a]The first six units occur as both thermophysical and morphological units, the second two units occur only as thermophysical units.
[b]*Kuzmin et al.* [2000].

[18] The Ma'adim Vallis (MV_t) unit extends from Ma'adim Vallis, through Downe and New Plymouth craters (Figure 1) onto the floor of Gusev crater (Figure 4a). THEMIS and MOC visible imagery do not indicate noticeable albedo variations between MV_t and adjacent units. Daytime TIR images show this unit as having warm temperatures, also making it indistinguishable from surrounding units. Nighttime TIR data does show this cold nighttime unit extending into Gusev toward a small unnamed crater (14.74°S, 174.82°E). Relative nighttime TIR temperatures show a discernible eastern boundary for the unit (Figure 5).

[19] The Plains (PL_t) unit extends from the terminus of Ma'adim to the northwest breach in the crater rim near Zutphen crater (Figure 4a). PL_t has a high albedo (Figure 1) with warm daytime and nighttime TIR temperatures (Figure 2). Thermal inertia values for PL_t are 290 ± 70 J m^{-2} K^{-1} $s^{-1/2}$, consistent with a surface dominated by coarse sand [*Pelkey et al.*, 2001]. Nighttime TIR images reveal that PL_t can be distinguished by the presence of craters with hot nighttime TIR rim material and ejecta (Figure 6). Daytime TIR images show PL_t as warm material with craters containing cooler ejecta (Figure 2a). These thermophysical characteristics are not common to other units within Gusev.

[20] The Mesa (MS_t) unit is present just north of the Ma'adim terminus (Figure 4a) and has been previously interpreted by others [*Landheim et al.*, 1994; *Grin and Cabrol*, 1997a, 1997b, 1997c] as deltaic sediment deposited by Ma'adim. The MS_t unit is composed of flat-topped positive relief features that are identifiable in visible images, have high albedos (Figure 1), and have warm temperatures in daytime TIR (Figure 2a). Mesas are separated by steep-walled valleys that are oriented in multiple directions. At night, MS_t mesas have relatively warm to cold tops and hot slopes (Figure 2b). Our observations are similar to those of other mesas on Mars [*Christensen et al.*, 2003]. A variety of scenarios could account for this temperature variation, such as well-indurated, coarse-grained rock overlain by unconsolidated sediment cover, changes in grain size or porosity, or the contribution of nighttime radiative heating from nearby lowlands reflected off MS_t slopes, thus contributing to their increased temperatures at night. MS_t can be distinguished from PL_t by the lack of craters with hot nighttime TIR rim material that are common to PL_t.

[21] The Etched (ET_t) unit occurs in the southeastern quadrant (Figure 4a) beyond the rim of Thira crater (14.46°S, 175.75°E). ET_t has a high albedo, is relatively cold in daytime TIR, and in nighttime TIR has a "mottled" (warm-cold) appearance (Figures 1 and 2). ET_t's "mottled" nighttime TIR temperature correlates with its dissected nature. ET_t's landscape represents an erosional surface (warm nighttime TIR areas) superimposed upon distinctive underlying material (cold nighttime TIR areas). The northern and southwestern thermophysical boundaries of ET are gradational with adjacent units.

[22] The Wrinkled (WR_t) unit occupies the northeastern quadrant of Gusev and the central region of the crater (Figure 4a). WR_t has a high albedo and warm daytime and nighttime TIR temperatures (Figures 1 and 2), with a thermal inertia of 200 ± 20 J m^{-2} K^{-1} $s^{-1/2}$, consistent with