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Evidence for widespread sedimentation in the northern plains of Mars.

Additional HiRISE/MOC Observations

High Resolution Imaging Science Experiment (HiRISE) and Mars Orbiter Camera Narrow Angle (MOC-NA) images were the two datasets utilized in this investigation (Table DR1). Figure DR1 shows an additional four HiRISE/MOC images that demonstrate the range of morphologies observed within this unit.

Two annotated sketches are provided of HiRISE image ESP_026957_2200 (Fig. DR2a and DR2b, shown in the main text as Fig. 2A) and HiRISE image ESP_018385_2215 (Fig. DR2c and DR2d, shown in the main text as Fig. 2B). These annotated sketches are helpful to identify broad patterns in small-scale morphologies, including stratigraphic relationships and orientations.

In Figure DR2b, Unit #1 is located off of the crater wall and in the surrounding ejecta deposit. Unit #2 is the uppermost wall unit and exhibits a mixture of high- and low-albedo materials. Possible banding and/or layering may be present near the resolution of the HiRISE image (0.5 m pix^{-1}). Unit #3 consists of high-albedo and coherent material, exhibiting fine-scale layering with relatively thin low-albedo material between beds. Unit #4 is also high-albedo and is more massive than Unit #3. Thin and regular bedding is less common than thicker, irregular, and offset bedding. The unit appears more cliff-forming, and is similar to exposures seen in central Chryse Planitia and southern Acidalia Planitia. Unit #5 consists of blocky, fragmented, and rounded high-albedo material that appears to be set within a low-albedo matrix. This unit is observed in the northwestern portion of the image as well. There appears to be a clear shift in resistance, from the highly resistant Unit #4 to the less resistant Unit #5, as is apparent in the textures observed on the wall. Unit #4 forms rough, craggy features, while Unit #5 forms smooth, low-albedo talus slopes. Unit #6 is thick and contains large packages of finely layered units. It is similar in morphology to Unit #2, and may represent the pre-impact stratigraphic context for Unit #2. Unit #7 consists of unconsolidated and non-layered wall materials, and is likely derived from debris shed from the crater wall.

In Figure DR2d, Unit #1 exhibits fine-scale layering and largely horizontal thick bedding planes separating thinner, less horizontal beds. This unit is massive, competent, and cliff-forming, as indicated by its topographic expression relative to the surrounding crater wall material (Unit #3). Unit #2 consists of the same sequence of material reported as Unit #1, except evidence of cross-cutting, lensing, pinching, and undulating textures are visible. Larger beds are

generally preserved, indicating that the fine-scale undulating textures are not likely the result of impact-related processes, and are instead associated with the pre-impact stratigraphic sequence. Unit #3 represents the mantled crater wall, which is much smoother than Unit #1 or Unit #2. Layering is either significantly or completely obscured by low-albedo materials.

Additional CRISM Observations

Several additional Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) images are provided in Figure DR3. These images are all consistent with Figure 3 presented in the main text.

The high-albedo unit is spectrally dissimilar from the mafic-bearing materials previously identified throughout Chryse and Acidalia Planitia (e.g., Salvatore et al., 2010) for several reasons. First, the high-albedo unit lacks mafic absorption features. Second, the unit exhibits a higher overall albedo throughout the visible and near-infrared wavelength range. Third, the high-albedo unit also exhibits a uniquely strengthened 3.0 μm absorption feature, which is not observed in the mafic materials identified using CRISM. As such, and in conjunction with the unique morphological properties, this unit is a distinct stratigraphic unit that, as mentioned earlier, lies stratigraphically above the underlying mafic materials that have been previously observed throughout this region.

Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) image FRT000190B8 is shown in Figure DR4. Olivine- and high-calcium pyroxene-bearing bedrock is shown stratigraphically above and below the high-albedo unit examined in this study. Most notably, the presence of mafic materials exposed in the crater floor indicates that the mafic unit originates from a stratigraphically lower unit than the high-albedo materials. The outcropping material seen stratigraphically higher than the high-albedo unit in the crater wall is, therefore, the result of overturned stratigraphy in the crater ejecta deposit. High Resolution Imaging Science Experiment (HiRISE) image ESP_017990_2105 confirms that the materials observed to be both rich and poor in mafic signatures are low- and high-albedo in situ bedrock material, respectively.

In addition to this stratigraphic assessment, the presence of in situ mafic materials on the crater floor allows for the estimation of a maximum thickness of the high-albedo unit at this particular location. Robbins and Hynek (2012) measured the crater floor elevation to be -4920 m below the martian datum. Gridded Mars Orbiter Laser Altimeter (MOLA) data indicate that the regional elevation surrounding this crater is -3980 m below the martian datum. Assuming that the high-albedo unit is located immediately below the surface, and that the mafic materials observed on the floor of the crater represent the contact between the high-albedo unit and the underlying mafic materials, the maximum thickness of the high-albedo unit is 940 m. This thickness is not likely reasonable, as mafic materials are observed in the crater wall both above

and below the high-albedo unit, as discussed above. A more reasonable estimation of this unit's thickness is the apparent thickness observed in the crater wall, although this may also be an overestimation due to the influences of inverted stratigraphy. However, because of the clear stratigraphic relationships and the presence of in situ mafic materials on the crater floor, maximum unit thicknesses can be derived in this location.

Possible Terrestrial Analogs

Two possible terrestrial analogs are shown here, and their morphological similarities are discussed in further detail.

Figure DR5 shows a poorly sorted diamictite from Argentina and represents catastrophic, high-energy sedimentary deposition. The depositional environments recorded in this sequence vary as a function of rapidly changing sea level. These debris flows and high-energy sedimentary deposition, as described in Kneller et al. (2004), stemmed from rapid deglaciation and subsequent aqueous outflow, although we do not speculate as to whether such a source for the circum-Chryse outflow channels is possible. Regardless, these morphologies resulting from catastrophic sedimentation are proposed as potential analogs to the high-energy depositional environments that may have been experienced along the southern and western margins of Chryse Planitia.

While the scale of this figure is not discussed in Kneller et al. (2004), a compass is shown in the top right corner of the image. Assuming this compass is approximately 15 cm in height, the height of this outcrop is slightly greater than 2 meters. The thickness of Unit #5 in Fig. DR2b, which may be the most appropriate analog to the sequence shown here, is on the order of 10 m thick, based on our best estimates from HiRISE imagery. As such, while the observed martian features are larger than those shown in this example, their sizes are within an order of magnitude of those presented as possible terrestrial analog environments.

Figure DR6 shows a well sorted and alternating sequence of sandstones and siltstones from the Graafwater Formation in South Africa and represents sedimentary deposition in a suite of low-energy depositional environments. These sediments were deposited in tidally influenced shallow marine environments and alternate between siltstone and sandstone (Tankard and Hobday, 1977). Such variations in unit thickness and resistance are observed in many crater walls throughout northern Chryse Planitia and southern Acidalia Planitia. What is not observed in the Graafwater Formation, however, is clear indications of lensing and/or pinching, which are likely more representative of subaerial sedimentary deposition as fluvial channels migrate across the landscape. Although not all of these morphologies are observed, the morphological similarities between the Graafwater Formation and those observed on Mars are compelling and suggest low-energy depositional settings.

The scale shown in Figure DR6 is approximately 1 m, as estimated from additional field photographs available via the University of Cape Town, Department of Geological Sciences. In total, the Graafwater formation approaches 500 m in thickness (Compton, 2004), which is slightly greater than previous estimates of outflow channel effluent thicknesses (Kreslavsky and Head, 2002) and the unit exposures observed in this study. However, as mentioned throughout the text, unit thickness is extremely difficult to assess and appears to be highly variable across small spatial scales, likely representing the pre-depositional surface topography.

Table DR1. List of all images analyzed in this investigation.

Column labeled “Y/N/Q” indicates whether the high albedo unit was observed (“Y”), not observed (“N”), or whether the image quality or resolution precluded the identification of this unit, should it be visible (“Q”). Imaging system and image ID are provided, along with crater latitude, crater longitude, crater diameter, and crater floor elevation as reported by Robbins and Hynek (2012).

Imaging System	Image	Y/N/Q	Latitude	Longitude	Crater Diameter	Crater Floor Elevation
HiRISE	PSP_007270_2240	Y	43.5	319.3	14.78	-4.79
HiRISE	ESP_029607_2155	Y	35.3	327.9	2.17	---
HiRISE	ESP_026970_2180	Y	37.5	316.5	5.1	-4.06
HiRISE	PSP_006690_2280	Y	47.6	315.1	16.33	-4.88
HiRISE	PSP_008061_2290	Y	48.8	318.3	7.66	-4.75
HiRISE	ESP_027853_2210	Y	40.4	331.1	3.6	-4.54
HiRISE	ESP_027115_2295	Y	49.2	316.2	9.83	-4.47
HiRISE	ESP_017792_2285	Y	47.9	323.7	15.03	-5.34
HiRISE	ESP_025295_2090	Y	28.7	325	10.84	-4.89
HiRISE	PSP_008694_2235	Y	43.4	315.4	10.17	-4.35
HiRISE	ESP_011357_2285	Y	48.1	326.8	8.03	-4.66
HiRISE	PSP_008984_2135	Y	33.3	315.9	8.13	-4.52
HiRISE	ESP_027483_2270	Y	46.6	350.2	4.77	-4.79
MOC-NA	S1601295	Y	35.1	331.9	2.69	---
HiRISE	ESP_028790_2260	Y	45.5	310.9	6.56	-3.98
HiRISE	ESP_025757_2105	Y	30.1	312.5	1.08	---
HiRISE	ESP_027669_2260	Y	45.6	313.6	1.13	---
HiRISE	ESP_019295_2235	Y	43	330.7	1.27	---
HiRISE	PSP_008997_2135	Y	33.4	321.4	1.34	---
HiRISE	ESP_023316_2210	Y	40.6	353.2	1.55	---
HiRISE	ESP_018227_2270	Y	46.7	331.1	1.77	---
HiRISE	PSP_006795_2040	Y	23.7	331.8	1.92	---
MOC-NA	S1400270	Y	37.9	328.4	2.12	---
HiRISE	PSP_010355_2005	Y	20.5	328.1	2.42	---
MOC-NA	R0902185	Y	34.9	328.1	2.42	---
HiRISE	ESP_028777_2055	Y	25.1	310.2	2.83	---
HiRISE	ESP_025624_2205	Y	40.1	341.8	1.4	---
HiRISE	ESP_015933_2125	Y	32.3	319	6.57	-4.4
HiRISE	ESP_016380_2290	Y	48.7	354.7	2.58	---
HiRISE	ESP_029448_2265	Y	45.8	346.4	12.98	-5.36

MOC-NA	R0101573	Y	35.2	328.4	2.17	---
HiRISE	ESP_024306_2165	Y	36.4	325.3	4.32	-4.69
HiRISE	ESP_020245_2190	Y	38.7	316.1	4.42	-4.39
HiRISE	ESP_020258_2240	Y	43.6	321.1	4.51	-4.65
HiRISE	ESP_030174_2060	Y	25.9	328.2	4.16	-4.45
HiRISE	ESP_028473_2300	Y	49.6	325.3	10.76	-4.83
HiRISE	ESP_016131_2140	Y	33.5	315.8	5.26	-4.32
HiRISE	PSP_009037_2160	Y	35.6	309.1	15.18	-4.36
HiRISE	ESP_019876_2185	Y	38.2	309.5	19.33	-4.26
MOC-NA	M0301812	Y	43.4	335.4	5.03	-4.76
HiRISE	ESP_016381_2165	Y	36	329.8	10.55	-4.87
HiRISE	ESP_027022_2070	Y	26.5	338.4	1.21	---
HiRISE	ESP_016289_2175	Y	37.3	320.4	1.32	---
HiRISE	ESP_027022_2070	Y	26.6	338.4	1.56	---
HiRISE	PSP_008641_2105	Y	30.7	323.3	1.69	---
HiRISE	ESP_028763_2040	Y	23.7	332.1	2.14	---
HiRISE	ESP_016736_2210	Y	40.9	356.7	2.21	---
HiRISE	ESP_028579_2275	Y	47	311.2	2.27	---
HiRISE	ESP_016736_2210	Y	40.7	356.8	2.43	---
HiRISE	ESP_016736_2210	Y	40.9	356.7	2.47	---
HiRISE	ESP_020917_2075	Y	26.4	331.6	2.51	---
HiRISE	PSP_007441_2060	Y	26	332.4	2.68	---
HiRISE	ESP_028289_2090	Y	28.9	311.1	2.85	---
HiRISE	PSP_007151_2055	Y	25.4	331.3	3.05	-4.06
HiRISE	PSP_006649_2230	Y	42.7	354.7	4.49	-4.06
HiRISE	ESP_021708_2070	Y	26.7	335.9	5.61	-4.18
HiRISE	ESP_028552_2250	Y	44.7	330	7.96	-4.95
HiRISE	ESP_019941_2275	Y	46.9	335.1	8.3	-4.7
HiRISE	ESP_028908_2260	Y	45.8	329.8	11.69	-4.85
HiRISE	PSP_010408_2070	Y	26.9	319.9	12.89	-4.58
HiRISE	PSP_001493_2235	Y	42.9	354.7	17.49	-5.07
MOC-NA	R1004748	Y	40.8	315.7	30.82	-4.91
MOC-NA	R2300667	Y	34.8	341	2.66	---
MOC-NA	E0201619	Y	40.4	317.8	3.08	-4
MOC-NA	S0900843	Y	34.2	340.9	3.66	-4.62
MOC-NA	S1802367	Y	30.7	314.7	4.78	-4.16
HiRISE	PSP_002747_2030	Y	24.5	328.5	16.07	-3.99
HiRISE	ESP_028974_2170	Y	36.6	329.6	26.54	-5.47
MOC-NA	R1401102	Y	37.9	309	11.8	-4.06
MOC-NA	E1401323	Y	33	338.8	12.59	-4.76
HiRISE	ESP_019704_2195	Y	39.1	325.8	11.19	-5.03
MOC-NA	R1801528	Y	38	330.6	5.22	-4.8
HiRISE	ESP_028579_2275	Y	47.1	311.2	5.83	-4.1
HiRISE	ESP_027088_2175	Y	37.4	335.7	9.05	-5.37
MOC-NA	E1203510	Y	23.9	324.5	1.3	---
MOC-NA	E1002518	Y	27.4	324.9	2.93	---
MOC-NA	E0401366	Y	32.4	327.5	4.23	-4.33
HiRISE	PSP_010276_2050	Y	24.7	324.6	7.26	-4.52
HiRISE	ESP_016236_2015	Y	21.5	330.5	17.33	-3.89
MOC-NA	R1502084	Y	31.9	330.9	5.38	-4.87

HiRISE	PSP_007757_2190	Y	38.7	341.6	25.3	-5.31
HiRISE	PSP_007731_2060	Y	25.8	333.2	9.27	-4.48
HiRISE	PSP_004000_2040	Y	23.6	321.1	5.53	-4.71
HiRISE	ESP_027048_2160	Y	35.4	347.4	23.73	-4.64
HiRISE	ESP_012346_2140	Y	33.5	328.4	28.03	-5.25
HiRISE	ESP_026508_2035	Y	23.1	330.6	31.19	-4.32
HiRISE	ESP_020891_2065	Y	26.5	321.4	34.22	-4.89
HiRISE	ESP_016197_2205	Y	40.2	312.2	17.45	-4.31
HiRISE	ESP_013981_2085	Y	28	332.3	21.15	-4.56
MOC-NA	S1201491	Y	35.6	339.2	6.81	-5.06
HiRISE	ESP_028275_2110	Y	30.9	332.9	9.19	-4.49
HiRISE	ESP_017700_2160	Y	35.8	319.2	33.36	-5.14
HiRISE	ESP_019955_2165	Y	35.9	313.5	20.71	-4.55
HiRISE	PSP_006794_2200	Y	39.7	357	55.7	-5.12
HiRISE	ESP_016037_2225	Y	42.3	359.7	17.3	-4.69
HiRISE	ESP_022697_2030	Y	22.6	334.4	16.2	-4.06
MOC-NA	R1402811	Y	33.5	327	4.59	-4.12
MOC-NA	S1402763	Y	35.9	329.2	4.91	-4.57
MOC-NA	R1600595	Y	35.8	343.9	5.73	-4.58
HiRISE	ESP_028948_2205	Y	40.2	318.9	7.01	---
HiRISE	ESP_018385_2215	Y	40.9	335.4	7.11	-5.31
MOC-NA	S0400882	Y	36.2	311.1	5.92	-4.28
MOC-NA	R1602480	Y	37.3	311.1	6.52	-4.26
MOC-NA	M1301951	Y	31.8	321.1	9.02	-4.73
HiRISE	PSP_009023_2225	Y	42	329.6	40.67	-5.75
MOC-NA	M2301357	Y	33.8	325.8	5.74	-4.92
MOC-NA	S2201460	Y	33.3	327.2	3.86	-4.65
MOC-NA	S1700580	Y	36.1	332.8	5.99	-5.01
HiRISE	ESP_026957_2200	Y	39.6	310.3	6.83	-4.01
HiRISE	ESP_024306_2165	Y	36.5	325.2	3.47	-4.22
MOC-NA	E2000341	Y	32.1	311.4	4.29	-4.12
HiRISE	ESP_016210_2195	Y	39.1	318	8.62	-4.49
MOC-NA	R1400500	Y	45.1	312.8	3.95	-3.88
HiRISE	ESP_016289_2175	Y	37.2	320.4	11.9	-4.64
HiRISE	ESP_028526_2120	Y	31.7	320.6	5.36	-4.75
HiRISE	ESP_026007_2210	Y	40.7	325.4	6.03	-5.01
HiRISE	ESP_028381_2200	Y	39.6	319.1	6.98	-4.49
HiRISE	ESP_027761_2275	Y	47.1	321.9	7.79	-4.89
HiRISE	ESP_023475_2150	Y	34.7	332.5	12.96	-5.18
MOC-NA	R2200376	Y	40.1	342.7	3.37	-4.81
MOC-NA	R1800061	Y	32.9	342.9	5.16	-4.82
MOC-NA	S1400523	Y	39.1	332	1.97	---
MOC-NA	R1601209	Y	40	313.3	4.25	-4.02
MOC-NA	S1802369	Y	33	314.3	5.14	-4.31
MOC-NA	R0101524	Y	42.7	339.4	6.98	-4.85
MOC-NA	S1001008	Y	30.9	343	4.55	-4.31
MOC-NA	S1501007	Y	34.2	327.7	2.6	---
MOC-NA	S0701283	Y	32.8	309.7	3.66	-4.02
MOC-NA	R0201514	Y	42.4	344.2	5.34	-4.68
MOC-NA	R1004264	Y	38.3	324.9	6.38	-4.85

MOC-NA	S1402114	Y	41.5	316.8	7.3	-4.08
HiRISE	ESP_029634_2040	Y	23.6	312.6	8.73	-4.2
MOC-NA	S1502221	Y	39.2	333.6	3.79	-4.5
MOC-NA	M0300102	Y	38.7	330.7	2.83	---
MOC-NA	R1602013	Y	32.9	316.9	5.35	-4.35
MOC-NA	E0201249	Y	35.4	311.2	9.97	-4.3
HiRISE	PSP_008905_2105	Y	30.3	313.3	7.18	-4.22
HiRISE	ESP_013810_2085	Y	28.4	319.6	15.85	-4.77
HiRISE	PSP_007916_2010	Y	20.7	322.4	10.12	-4.61
MOC-NA	R1003248	Y	34.3	330.4	9.19	-5.5
HiRISE	ESP_017990_2105	Y	30.1	323.5	5.83	-4.92
HiRISE	ESP_016025_2140	Y	33.6	329.6	6.63	-5.1
MOC-NA	R2000648	Y	40.5	328.2	4.16	-4.94
MOC-NA	R2201701	Y	43.7	313.3	7.04	-4.17
MOC-NA	R2201695	Y	45.4	341.7	7.35	-4.94
HiRISE	PSP_009036_2250	Y	44.6	335.3	7.78	-5.07
HiRISE	ESP_025110_2195	Y	39	334.8	8.68	-5.22
HiRISE	ESP_026152_2135	Y	33	328.9	11.41	-5
HiRISE	PSP_006953_2245	Y	44.3	333.7	12.53	-5.31
HiRISE	ESP_025651_2150	Y	34.4	325.8	12.6	-5.17
HiRISE	ESP_016170_2230	Y	42.7	328.8	22.13	-5.51
HiRISE	ESP_019123_2230	Y	42.4	345	24.76	-5.92
HiRISE	PSP_006479_2090	Y	28.6	318.7	2.85	---
MOC-NA	R1500645	Y	44.1	343.9	7.06	-4.88
HiRISE	ESP_018478_2150	Y	34.8	318.6	5.24	-4.57
MOC-NA	M2001107	Y	38.5	324.4	3.53	-4.59
MOC-NA	S1501976	Y	35.4	330.4	4.66	-4.82
MOC-NA	S1100484	Y	30.4	321	4.9	-4.68
MOC-NA	M1600940	Y	43.1	323.6	6.49	-4.45
MOC-NA	S1700659	Y	47.2	318.4	7.04	-4.73
MOC-NA	S1502534	Y	32.3	326.2	2.82	---
HiRISE	ESP_017014_2215	Y	41.3	328.2	7.04	-5.06
MOC-NA	S1102912	Y	42.5	348.7	5.43	-4.83
MOC-NA	E0101630	Y	32.6	331.2	2.31	---
MOC-NA	E1500469	Y	33.3	344.7	6.14	-4.85
MOC-NA	S1302834	Y	42.3	332.5	3.65	-4.92
HiRISE	ESP_030161_2090	Y	28.8	323.1	2.99	---
HiRISE	ESP_021708_2070	Y	26.5	335.9	10.19	-4.54
MOC-NA	M0905758	Y	33.8	327.1	4.28	-4.71
HiRISE	ESP_017898_2100	Y	29.6	314.3	4.92	-4.22
HiRISE	ESP_028710_2215	Y	41.3	336.6	2.57	---
MOC-NA	R1602552	Y	48	354.1	2.92	---
MOC-NA	S1501311	Y	41.7	317.8	7.37	-4.13
MOC-NA	R1601133	Y	44.5	325	4.14	-4.9
HiRISE	ESP_020402_2265	Y	46.3	348.2	14.44	-5.15
MOC-NA	R1702498	Y	44.8	349.7	7.12	-5.39
MOC-NA	R1600177	Y	45.9	318.5	8.61	-4.31
HiRISE	PSP_009129_2075	Y	27	318.4	9.34	-4.66
MOC-NA	S1801797	Y	46.5	357.9	3.69	-4.45
MOC-NA	S1500895	Y	31.8	340.5	4.97	-4.76

MOC-NA	E1600668	Y	40.1	337	8.04	-5.32
MOC-NA	R1901546	Y	30.5	344.7	5.02	-4.5
HiRISE	ESP_020759_2210	Y	40.9	323.2	8.57	-5.12
HiRISE	PSP_009458_2240	Y	43.6	334.6	11.02	-5.56
MOC-NA	S1400634	Y	39	348.3	6.68	-4.66
MOC-NA	S0401209	Y	36.8	322.2	7.3	-4.94
MOC-NA	R1801697	Y	39.8	334.1	5.73	-5.13
MOC-NA	R1001836	Y	40.8	342.7	2.47	---
MOC-NA	S0301349	Y	39.7	330.4	3.38	-4.76
MOC-NA	S1601032	Y	41	310.8	3.44	-3.99
MOC-NA	R1104608	Y	40	336.2	4.1	-4.9
MOC-NA	R1301602	Y	39.5	326.7	1.13	---
MOC-NA	S1302624	Y	39.6	329.1	1.46	---
MOC-NA	M2101657	Y	28.1	331.4	1.52	---
MOC-NA	M0300375	Y	41.4	346.7	1.7	---
MOC-NA	S1601019	Y	41.9	339.4	2.11	---
MOC-NA	R1202747	Y	37.4	321.5	2.17	---
MOC-NA	S1100885	Y	21.8	329.9	2.27	---
MOC-NA	M0203099	Y	27	327	2.3	---
MOC-NA	S0700163	Y	36.9	318.9	3.97	-4.12
MOC-NA	R1103021	Y	39	313.4	4.72	-3.94
MOC-NA	R0902390	Y	36.8	315.5	1.56	---
MOC-NA	S1400136	Y	44	339.8	1.81	---
MOC-NA	R1000047	Y	27.6	325.3	2.76	---
MOC-NA	S0501531	Y	39.2	320.7	3.16	-4.41
MOC-NA	E1601727	Y	38.7	336.1	3.16	-4.67
MOC-NA	R1602015	Y	35.1	316.5	3.85	-4.27
MOC-NA	S0801898	Y	36.1	344.1	4.15	-4.32
MOC-NA	R1700105	Y	35	315.2	4.96	-4.4
MOC-NA	S0802251	Y	39.6	334.9	5.11	-5.04
MOC-NA	R1501547	Y	39.6	347.1	5.11	-4.53
MOC-NA	E1600095	Y	43.1	320.8	5.45	-4.27
MOC-NA	R2300601	Y	47.6	351.2	7.1	-4.68
MOC-NA	M0001504	Y	36.1	331.6	1.38	---
MOC-NA	S0401427	Y	37.6	329.6	7.54	-5.02
MOC-NA	R1600958	Y	47.2	349.4	9.45	-5.18
MOC-NA	S1601030	Y	30.6	312.5	4.21	-4.1
MOC-NA	S1900847	Y	38.4	324.1	3.37	---
MOC-NA	R2301212	Y	34.3	334.9	3.39	-4.66
MOC-NA	M1001369	Q	22.1	322.9	1.01	---
MOC-NA	E1501475	Q	42.3	354.2	1.01	---
MOC-NA	R0902581	Q	30.4	332.9	1.03	---
MOC-NA	S0602912	Q	33.7	344.3	1.06	---
MOC-NA	E1104343	Q	38.6	317.8	1.08	---
MOC-NA	R0800276	Q	30.8	336.2	1.08	---
MOC-NA	R0902831	Q	48.7	317.6	1.1	---
MOC-NA	M0807065	Q	44.9	354.3	1.1	---
MOC-NA	S1403016	Q	41.2	332.2	1.12	---
MOC-NA	E0401113	Q	45.6	332.9	1.13	---
MOC-NA	S1302497	Q	20.2	315.7	1.14	---

MOC-NA	S1901535	Q	48.5	325.1	1.14	---
MOC-NA	SP249704	Q	43.8	356.5	1.15	---
MOC-NA	S1500897	Q	38.6	339.4	1.16	---
MOC-NA	M1102224	Q	34.2	338.3	1.21	---
MOC-NA	SP249505	Q	46.5	336.7	1.25	---
MOC-NA	S0601986	Q	43.6	340.2	1.27	---
MOC-NA	R1702142	Q	39.3	343.2	1.28	---
MOC-NA	E1203146	Q	46.7	329.4	1.29	---
MOC-NA	E1100771	Q	27.5	330.7	1.29	---
MOC-NA	S1403016	Q	41.7	332.1	1.34	---
MOC-NA	S1600909	Q	37.2	352.6	1.35	---
MOC-NA	E1103119	Q	34.6	327.8	1.42	---
MOC-NA	M0905758	Q	33.4	327.1	1.48	---
MOC-NA	R0900687	Q	27	308.7	1.54	---
MOC-NA	S1401762	Q	40.3	325.6	1.54	---
MOC-NA	E0302275	Q	32.6	315	1.61	---
MOC-NA	R1301774	Q	47.7	341.4	1.64	---
MOC-NA	R2301317	Q	36.8	338.2	1.69	---
MOC-NA	SP249505	Q	46.7	336.8	1.88	---
MOC-NA	E1001835	Q	32.9	316.4	1.95	---
MOC-NA	E0201729	Q	28.8	335.8	1.98	---
MOC-NA	R1900769	Q	48.2	324.8	2	---
MOC-NA	S1101199	Q	37.9	318.9	2.08	---
MOC-NA	E1500639	Q	45.9	317.9	2.1	---
MOC-NA	M1001369	Q	22.1	322.9	2.11	---
MOC-NA	R1005423	Q	36.5	353	2.18	---
MOC-NA	R1304174	Q	30.4	329.1	2.19	---
MOC-NA	R0700657	Q	22.3	318.5	2.27	---
MOC-NA	SP245905	Q	44.4	340.8	2.67	---
MOC-NA	S0500867	Q	37.1	318.5	3.15	-4.19
MOC-NA	M1100274	Q	40.7	351.7	3.68	-4.55
MOC-NA	S0700532	Q	35.7	310.4	4.2	-4.14
MOC-NA	R0700657	Q	22.3	316.6	5.56	-3.87
MOC-NA	SP249505	Q	46.9	336.8	1.27	---
MOC-NA	E1004621	Q	43.1	316.7	1.33	---
MOC-NA	M0105300	Q	39.1	351.3	1.33	---
MOC-NA	M0104174	Q	45.5	353.9	1.42	---
MOC-NA	S1802178	Q	30.6	339.5	1.49	---
MOC-NA	S0703050	Q	28.1	324	1.54	---
MOC-NA	S0801182	Q	25.4	334.4	1.54	---
MOC-NA	E1001655	Q	38.7	327.8	1.62	---
MOC-NA	S1400509	Q	47.2	359.2	1.63	---
MOC-NA	S0602096	Q	46.7	327.1	1.74	---
MOC-NA	E2001652	Q	41.5	325.7	1.78	---
MOC-NA	R0902585	Q	47.8	329.9	2.09	---
MOC-NA	S1102789	Q	38.8	333	2.23	---
MOC-NA	R1700928	Q	42.8	316.4	2.35	---
MOC-NA	M0002234	Q	34.4	311.7	2.39	---
MOC-NA	M0805707	Q	45.9	357.5	2.52	---
MOC-NA	E1202356	Q	45.7	330.3	2.62	---

MOC-NA	M2202298	Q	44.8	336.9	2.64	---
MOC-NA	R0902585	Q	47.8	329.9	2.65	---
MOC-NA	R0901240	Q	44.3	330.5	2.83	---
MOC-NA	S1501831	Q	46.9	340.8	2.86	---
MOC-NA	S1401980	Q	48.2	356.6	2.88	---
MOC-NA	R1301774	Q	47.7	341.4	3.03	---
MOC-NA	R1700206	Q	48.1	329.1	3.07	-4.61
MOC-NA	S2001821	Q	42.6	357.9	3.28	-4.29
MOC-NA	S0500730	Q	39.5	343.1	3.77	-4.85
MOC-NA	S1102682	Q	22.1	319.3	3.8	-4.22
MOC-NA	S1201921	Q	46.8	344.9	4.53	-4.65
MOC-NA	S1201706	Q	37.5	314.1	4.91	---
MOC-NA	R1303384	Q	45.4	331.6	5.81	-4.6
MOC-NA	R1301774	Q	47.6	341.4	6.99	-4.84
MOC-NA	M2202369	Q	31.3	326.8	1.54	---
MOC-NA	M2101106	Q	49.5	340	1.54	---
MOC-NA	S0400209	Q	41.9	341.3	1.59	---
MOC-NA	R1103320	Q	39.7	345.8	2.53	---
MOC-NA	R1200442	Q	37.2	315.7	2.85	---
MOC-NA	M0702009	Q	39.7	312.3	4.64	-3.92
MOC-NA	M2202369	Q	31.3	326.8	1.07	---
MOC-NA	S0800492	Q	41.2	349.6	4.51	-4.92
MOC-NA	R1601049	Q	45.1	337.3	4.73	-4.66
MOC-NA	S0802460	Q	39.2	338.8	4.87	-5.03
MOC-NA	E1800659	Q	34.9	329.5	9.94	-5.04
MOC-NA	S1600909	Q	37.2	352.6	3.95	-3.92
MOC-NA	E1000933	Q	40.3	319.9	2.6	---
MOC-NA	R1701508	Q	48.1	326.6	7.28	-4.53
MOC-NA	R1502502	Q	47	352	4.91	-4.52
MOC-NA	E1001835	Q	33	316.4	6.21	-4.4
MOC-NA	SP254705	Q	44.7	311.6	1.44	---
MOC-NA	S0800849	Q	32.5	313.5	5.05	-4.26
MOC-NA	E1501614	Q	47	328.6	1.03	---
MOC-NA	M0204810	Q	44.8	313.1	3.13	---
MOC-NA	R1200708	Q	46.5	334.1	9.4	-4.55
MOC-NA	E1101917	Q	30.1	341.8	6.46	-3.92
MOC-NA	M0805529	Q	46.2	312.4	1.71	---
MOC-NA	M0204251	Q	27.1	323.7	5.18	-4.63
MOC-NA	S0902223	Q	39.7	321.6	1.06	---
MOC-NA	M0705789	Q	39	351.7	1.39	---
MOC-NA	M0800884	Q	50	358.3	1.49	---
MOC-NA	M0204776	Q	45	341.7	1.55	---
MOC-NA	S0400269	Q	38.9	329.3	1.67	---
MOC-NA	E1300640	Q	40.6	349.9	1.68	---
MOC-NA	S1202584	Q	19	319.7	1.92	---
MOC-NA	R1202473	Q	39.1	317.5	1.94	---
MOC-NA	R1104636	Q	30.3	309.1	2.23	---
MOC-NA	M0902393	Q	39.3	353	2.57	---
MOC-NA	M0804601	Q	40.7	349.8	3.04	-4.53
MOC-NA	S1301711	Q	46	353.8	3.42	-4.46

MOC-NA	E1300292	Q	49.7	311.8	4.17	-4.07
MOC-NA	S1801523	Q	19.4	313.4	4.32	---
MOC-NA	R0903529	Q	44.9	326.6	4.76	-4.44
MOC-NA	E1300371	Q	46.6	328.7	1.01	---
MOC-NA	R0401885	Q	34.4	335.9	1.43	---
MOC-NA	M1100274	Q	40.6	351.8	3.69	-4.66
MOC-NA	E1001494	Q	39	311.6	3.74	-4.09
MOC-NA	R1601804	Q	35.4	341.4	2.56	---
MOC-NA	E0400863	Q	32.5	331.5	3.51	---
MOC-NA	R1701414	Q	44.3	339.8	4.43	-4.68
MOC-NA	S0601506	Q	20.6	319.9	17.36	-4.78
MOC-NA	R1602002	Q	37.9	344.8	4.46	---
MOC-NA	R1302144	Q	22.7	320.4	1	---
MOC-NA	R1802057	Q	41.2	357.4	1.01	---
MOC-NA	S0301349	Q	40	330.3	1.02	---
MOC-NA	E0300331	Q	38.3	347.5	1.03	---
HiRISE	ESP_015933_2125	Q	32.6	318.9	1.05	---
MOC-NA	S0100840	Q	33.3	335.1	1.05	---
MOC-NA	S1402763	Q	35.6	329.3	1.07	---
MOC-NA	S1901788	Q	39.7	346.8	1.07	---
HiRISE	ESP_024359_2240	Q	43.5	318.4	1.08	---
MOC-NA	R1600594	Q	32.1	344.5	1.1	---
MOC-NA	S1900113	Q	41.3	320.7	1.11	---
MOC-NA	S1900847	Q	38.2	324.1	1.11	---
MOC-NA	S0301421	Q	46.4	316.8	1.13	---
MOC-NA	S1402890	Q	36.4	345.4	1.17	---
MOC-NA	R1600101	Q	30.5	333.5	1.19	---
MOC-NA	E0402083	Q	22.3	325.9	1.2	---
MOC-NA	S1701679	Q	36.5	343.3	1.22	---
HiRISE	PSP_008641_2105	Q	29.9	323.4	1.25	---
HiRISE	ESP_016552_2175	Q	37.2	340.9	1.27	---
HiRISE	ESP_026415_2220	Q	41.8	347.3	1.27	---
MOC-NA	E1104449	Q	39.1	334	1.29	---
MOC-NA	R1601702	Q	38.7	324.7	1.32	---
MOC-NA	E2200574	Q	39	325.2	1.33	---
MOC-NA	R1200593	Q	39.4	347.9	1.34	---
MOC-NA	R10005451	Q	34.9	324.6	1.35	---
HiRISE	ESP_018030_2085	Q	28.4	310.9	1.38	---
MOC-NA	R1001858	Q	30.7	315.7	1.44	---
MOC-NA	R1401102	Q	37.8	309	1.48	---
MOC-NA	M1600634	Q	32.7	328.7	1.54	---
MOC-NA	S1201815	Q	21.5	332.8	1.54	---
MOC-NA	S1600921	Q	39.9	323.5	1.55	---
MOC-NA	R1102437	Q	40.5	350.5	1.55	---
HiRISE	ESP_020693_2030	Q	22.6	327.1	1.59	---
HiRISE	ESP_029409_2185	Q	38.2	332.9	1.67	---
MOC-NA	S0801632	Q	35.1	340.6	1.76	---
MOC-NA	R1004892	Q	48.4	359.5	1.86	---
MOC-NA	S0801632	Q	35.2	340.6	1.87	---
MOC-NA	S2100845	Q	45.3	314.5	1.91	---

MOC-NA	M2001369	Q	30.7	334	1.93	---
MOC-NA	S0802329	Q	37	322.9	2.01	---
MOC-NA	E1700450	Q	37.9	347.4	2.18	---
MOC-NA	M0803987	Q	25.6	319.1	2.23	---
MOC-NA	M0201849	Q	37.7	353	2.26	---
MOC-NA	S0301279	Q	31	344.2	2.29	---
MOC-NA	R0901236	Q	27.6	333.2	2.33	---
HiRISE	ESP_029568_2060	Q	25.7	313.3	2.88	---
MOC-NA	R1500643	Q	37.2	345.1	2.92	---
HiRISE	PSP_007758_2165	Q	36.2	314.2	3.17	---
HiRISE	PSP_007758_2165	Q	36.2	314.2	3.29	---
MOC-NA	S1500797	Q	42.1	351.2	3.3	-4.51
MOC-NA	E1602239	Q	21.6	321.8	3.8	-4.18
MOC-NA	R1602467	Q	31.8	340.7	4.42	-4.56
HiRISE	ESP_017410_2145	Q	34.1	317	4.56	-4.37
HiRISE	ESP_018531_2040	Q	23.5	312.5	5.17	-3.88
HiRISE	PSP_003143_2065	Q	26.1	316.7	6.26	-4.23
HiRISE	ESP_023555_2100	Q	29.9	308.8	7.79	-4.05
HiRISE	PSP_003776_2020	Q	21.6	316.8	10.21	-4.38
MOC-NA	R1800309	Q	39.3	333.1	1.17	---
MOC-NA	S0400320	Q	44.5	315.8	1.2	---
MOC-NA	E1401611	Q	40.2	345.5	1.41	---
MOC-NA	R0200434	Q	33.9	344.8	1.47	---
MOC-NA	R1801264	Q	32.3	311.6	1.51	---
MOC-NA	S0702572	Q	31.8	344.6	1.68	---
HiRISE	ESP_022974_2210	Q	40.4	326.5	2.1	---
MOC-NA	R1301600	Q	24.4	329	2.18	---
MOC-NA	R1103419	Q	39.8	333.3	2.26	---
MOC-NA	E2000115	Q	45.1	329.8	2.44	---
HiRISE	ESP_029435_2250	Q	45	342.7	2.54	---
MOC-NA	S1200492	Q	22.2	322.1	2.57	---
MOC-NA	S1601019	Q	41.9	339.4	2.6	-4.66
MOC-NA	R0500301	Q	22.1	313.1	3	-3.9
MOC-NA	S1500797	Q	42	351.2	3.08	-4.54
MOC-NA	E1100424	Q	23.4	327.4	3.13	---
MOC-NA	R1005449	Q	28	325.6	3.47	-4.46
MOC-NA	R1501822	Q	37.3	338.7	4.03	-4.56
MOC-NA	S1201931	Q	31.9	318.8	4.44	-4.3
MOC-NA	R1402532	Q	37.1	335.2	4.48	-4.53
MOC-NA	S0500629	Q	45.2	338.3	4.63	-4.76
MOC-NA	S0401374	Q	39.9	313	4.71	-3.9
MOC-NA	S0600140	Q	42.3	319	4.77	-4.11
MOC-NA	R0502281	Q	44.1	330.1	4.88	-4.55
MOC-NA	S0801474	Q	48.2	351	4.88	-4.6
HiRISE	PSP_007916_2010	Q	20.9	322.3	5.01	---
MOC-NA	E2200813	Q	43.7	332.4	5.02	-4.66
MOC-NA	R1701250	Q	32.7	309.3	5.05	-3.78
MOC-NA	R0902183	Q	30.3	328.8	5.24	-4.6
MOC-NA	R1800385	Q	36.9	349.7	5.28	-4.46
HiRISE	ESP_019731_2020	Q	21.8	311.4	5.46	-4.14

HiRISE	ESP_025968_2050	Q	24.6	312.9	5.88	-3.99
MOC-NA	S0803059	Q	23	323.5	5.89	-4.28
MOC-NA	R1601476	Q	43	332.7	6.2	-4.65
MOC-NA	S1600709	Q	45.5	318.6	6.31	-4.28
MOC-NA	S1201063	Q	24	333.3	6.93	-4.23
MOC-NA	S1900027	Q	46.9	332	8.01	-4.88
HiRISE	ESP_025546_2025	Q	22.5	314.7	8.92	-4.27
MOC-NA	E1800341	Q	46.7	331.8	8.99	-4.83
HiRISE	ESP_020904_2005	Q	20.3	327.3	9.74	-4.29
MOC-NA	R0402239	Q	41.6	314.1	13.59	-4.41
HiRISE	ESP_028157_2060	Q	25.7	315	20.12	-4.73
MOC-NA	R2300713	Q	21.7	330.4	1.03	---
MOC-NA	R1200593	Q	39.4	347.8	1.65	---
MOC-NA	M1800405	Q	20.6	333.3	2.58	---
MOC-NA	R1701116	Q	45.2	319.7	3.49	-4.34
MOC-NA	S0500228	Q	38.6	340.7	3.52	-4.8
MOC-NA	R0100349	Q	24.4	328.1	33.83	-3.8
MOC-NA	S1502347	Q	47.5	319.7	3.35	-4.33
MOC-NA	S1000562	Q	33.3	318.8	4.7	-4.49
MOC-NA	E1202798	Q	35	339.9	5.09	-4.75
HiRISE	PSP_004066_2010	Q	20.6	318.9	11.24	-4.56
HiRISE	ESP_025691_2030	Q	22.9	317.9	11.59	-4.53
MOC-NA	R1801439	Q	44.3	342.1	4.77	-4.64
MOC-NA	S0401267	Q	34.6	310.1	6.14	-4.06
HiRISE	ESP_014351_1995	Q	19.4	312.2	20.3	-4.2
MOC-NA	M0100484	Q	43.8	316	2.5	---
MOC-NA	S0400055	Q	21.6	324.4	8.56	-4.2
MOC-NA	E0200076	Q	20	328.8	8.91	-3.87
MOC-NA	R1602192	Q	49.8	317.6	9.71	-4.54
MOC-NA	E2001131	Q	38	338.8	10.88	-5.08
MOC-NA	R1900021	Q	43.8	351.9	12.5	-4.73
MOC-NA	E1500475	Q	30	316.5	14.59	-4.7
MOC-NA	R1402607	Q	36.5	351.4	10.78	-4.58
MOC-NA	R1601135	Q	47.9	324.3	5.55	-4.54
MOC-NA	R1400483	Q	45.1	341.5	6.47	-4.63
MOC-NA	M0704328	Q	39.3	350.6	2.05	---
MOC-NA	S2100304	Q	42.1	312.2	12.23	-4.39
MOC-NA	R1200808	Q	43.4	351	12.74	-4.88
MOC-NA	S1701156	Q	38.2	331.5	6.5	-5.08
MOC-NA	R1600870	Q	45.7	333.5	6.11	-4.63
MOC-NA	E1104343	Q	38.7	317.8	7.05	-4.4
MOC-NA	R1401091	Q	49.3	335.7	9.48	-4.73
MOC-NA	E1500469	Q	34	344.6	7.9	-4.53
HiRISE	ESP_016579_2025	Q	22.2	325.9	19.06	-4.4
MOC-NA	E1600095	Q	43.2	320.9	1.02	---
MOC-NA	M0201545	Q	41.8	319.3	1.53	---
HiRISE	ESP_024359_2240	Q	43.8	318.5	2.61	---
MOC-NA	S1100164	Q	25.6	330.3	2.75	---
MOC-NA	E2100607	Q	29.6	339.7	2.91	---
MOC-NA	E2001589	Q	41.7	338.1	2.96	---

MOC-NA	R1000049	Q	38.7	323.7	2.99	---
MOC-NA	E2201392	Q	30.7	326.2	3.08	---
MOC-NA	R1400034	Q	36.5	323.1	3.15	-4.03
MOC-NA	E2000341	Q	32.3	311.4	4.06	-4.08
MOC-NA	S1701423	Q	47	321.4	4.12	-4.33
MOC-NA	R1501320	Q	43.8	314	4.45	-3.91
MOC-NA	R1700827	Q	35.7	330.1	4.77	-4.84
MOC-NA	R1300689	Q	49.5	358.6	5.29	-4.42
MOC-NA	E2100295	Q	35.4	326.6	1.2	---
MOC-NA	R1600594	Q	32.1	344.5	1.26	---
MOC-NA	S1400023	Q	32.3	325.5	1.67	---
MOC-NA	R0400630	Q	32.1	336.3	2.45	---
MOC-NA	SP249404	Q	34	326.3	2.5	---
MOC-NA	S0602003	Q	36.1	312.7	4.94	-4.13
MOC-NA	S0401427	N	37.5	329.6	1	---
MOC-NA	S1401990	N	29.5	331.2	1.01	---
HiRISE	ESP_016802_2190	N	38	355.8	1.02	---
MOC-NA	R1601209	N	40	313.2	1.03	---
MOC-NA	S0601508	N	36.6	317.6	1.03	---
MOC-NA	R1001654	N	46.2	325.5	1.03	---
MOC-NA	R0500819	N	38.1	335.2	1.03	---
HiRISE	PSP_008035_1990	N	19	312.8	1.04	---
HiRISE	ESP_018978_2195	N	38.7	346.8	1.04	---
HiRISE	PSP_001810_2175	N	37.2	348	1.05	---
MOC-NA	E2300131	N	26	326.7	1.07	---
HiRISE	ESP_025663_2280	N	47.8	356	1.07	---
MOC-NA	R1102647	N	34.8	310.3	1.08	---
MOC-NA	S1300145	N	28.5	313.6	1.08	---
HiRISE	ESP_025663_2280	N	47.7	356	1.08	---
MOC-NA	S1201815	N	21.1	332.8	1.09	---
HiRISE	ESP_017383_2050	N	24.7	334.9	1.09	---
HiRISE	PSP_006004_2055	N	25.4	328.3	1.1	---
HiRISE	ESP_022829_2210	N	40.3	332.1	1.11	---
MOC-NA	S1401980	N	48.4	356.6	1.11	---
MOC-NA	E0302275	N	32.8	315	1.12	---
MOC-NA	M0301672	N	27.5	321.3	1.13	---
HiRISE	ESP_027616_2215	N	41.3	321.1	1.15	---
HiRISE	ESP_024689_2030	N	22.9	312	1.16	---
MOC-NA	S1100779	N	26.8	312.9	1.18	---
MOC-NA	S0601508	N	36.4	317.6	1.18	---
HiRISE	ESP_018886_2280	N	47.9	335.9	1.18	---
HiRISE	ESP_028657_2285	N	48.1	342.1	1.18	---
MOC-NA	E0301207	N	19.9	323.7	1.19	---
MOC-NA	E1700005	N	37.6	335.7	1.19	---
MOC-NA	E0301207	N	19.4	323.8	1.2	---
MOC-NA	M0905406	N	18.6	324.9	1.2	---
HiRISE	ESP_027853_2210	N	40.6	331.1	1.21	---
HiRISE	ESP_027035_2265	N	46.3	340.2	1.21	---
HiRISE	ESP_021708_2070	N	26.7	335.9	1.22	---
HiRISE	ESP_017383_2050	N	24.6	334.9	1.23	---

MOC-NA	S0803059	N	22.9	323.6	1.25	---
MOC-NA	M2001105	N	20.5	327.1	1.25	---
MOC-NA	M0401327	N	45.5	328.6	1.25	---
MOC-NA	E0402075	N	48.6	350.4	1.25	---
HiRISE	ESP_026772_2170	N	36.5	321.5	1.27	---
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MOC-NA	R0904034	N	28.5	321.1	1.28	---
HiRISE	ESP_024952_2250	N	44.4	326.9	1.28	---
HiRISE	ESP_021919_2135	N	33	336.7	1.31	---
HiRISE	PSP_008839_2265	N	46	313.5	1.35	---
MOC-NA	R1301027	N	20.1	309.7	1.36	---
MOC-NA	R0500819	N	38.2	335.1	1.39	---
HiRISE	ESP_026204_2175	N	37.4	348.4	1.4	---
MOC-NA	S0500734	N	41.5	314.1	1.42	---
MOC-NA	R2001101	N	33	344.3	1.42	---
MOC-NA	S0500867	N	37.1	318.5	1.43	---
HiRISE	PSP_007665_2060	N	25.7	335.1	1.46	---
MOC-NA	M1300818	N	27.7	331.6	1.59	---
HiRISE	ESP_027351_2205	N	39.9	354.7	1.59	---
HiRISE	ESP_028328_2150	N	34.6	326.4	1.6	---
HiRISE	ESP_026020_2210	N	40.6	330.5	1.61	---
MOC-NA	S0601508	N	36.6	317.6	1.62	---
HiRISE	PSP_001890_1995	N	19.1	326.8	1.62	---
MOC-NA	E1002864	N	24.3	329.1	1.7	---
HiRISE	ESP_016380_2290	N	48.4	354.9	1.7	---
MOC-NA	E0302664	N	24.9	323.4	1.74	---
HiRISE	PSP_007915_2185	N	38.4	347.2	1.74	---
HiRISE	ESP_016802_2190	N	38	355.9	1.74	---
MOC-NA	S1200492	N	22.2	322.1	1.83	---
MOC-NA	M0401327	N	45.4	328.6	1.89	---
HiRISE	ESP_019744_2055	N	25.1	315.4	1.9	---
MOC-NA	R1301600	N	24.2	329	1.93	---
MOC-NA	S0800065	N	27.8	315.3	1.94	---
MOC-NA	R0502381	N	20.2	321.5	1.96	---
MOC-NA	S1001012	N	48.6	340	1.99	---
MOC-NA	S0601822	N	20.7	311.2	2.09	---
HiRISE	ESP_025176_2030	N	22.6	334.7	2.19	---
MOC-NA	R1201188	N	20.5	329.7	2.23	---
HiRISE	ESP_028235_2285	N	48	342.5	2.25	---
HiRISE	ESP_029040_2160	N	35.9	326.8	2.28	---
HiRISE	ESP_028328_2150	N	34.7	326.4	2.36	---
MOC-NA	R2300759	N	49.9	313.4	2.37	---
HiRISE	ESP_015972_2265	N	46	334.1	2.44	---
MOC-NA	R0401234	N	20.3	309.3	2.52	---
HiRISE	ESP_018043_2290	N	48.8	311.4	2.7	---
MOC-NA	M0301672	N	27	321.4	2.83	---
MOC-NA	M0307656	N	48.9	327	3.02	---
MOC-NA	R1301413	N	29.1	312.1	3.06	-3.98
MOC-NA	S1302740	N	18	319.9	3.14	---
HiRISE	ESP_014126_2120	N	31.6	332.4	3.17	-4.5

MOC-NA	R1502407	N	31.1	309.8	3.27	-3.55
MOC-NA	S0400360	N	33.9	333.8	3.28	-4.57
MOC-NA	S0703175	N	28.1	311.6	3.37	---
MOC-NA	E1101752	N	18.2	327.3	3.85	-3.7
HiRISE	ESP_028249_2285	N	48.3	320.3	3.98	---
HiRISE	PSP_005951_2255	N	45.1	333.2	4.42	---
MOC-NA	R1501186	N	19.5	330.2	5.25	-3.39
HiRISE	ESP_021643_1985	N	18.2	310.8	13.31	-3.67
MOC-NA	S1700804	N	37.7	352.6	1.14	---
MOC-NA	S1400521	N	25.1	334.2	1.27	---
MOC-NA	S0100737	N	28.1	332.1	1.72	---
HiRISE	ESP_026442_2295	N	49	328.9	1.79	---
MOC-NA	S1301591	N	25.3	312.1	1.85	---
MOC-NA	R0903625	N	48.3	342.3	1.99	---
MOC-NA	S1501212	N	30.5	332.1	2.33	---
MOC-NA	M1002029	N	41.5	357.3	2.33	---
MOC-NA	R0100813	N	23.9	330.3	2.36	---
MOC-NA	E1401233	N	21.6	324.2	2.64	---
MOC-NA	S0501262	N	46.7	328.1	2.72	---
MOC-NA	R0401881	N	25.2	337.3	2.85	---
MOC-NA	M0307656	N	48.9	326.9	2.9	---
MOC-NA	R0501688	N	18.4	317.6	3.15	-4.07
MOC-NA	S1501831	N	46.7	340.8	4.25	-4.7
MOC-NA	S0300765	N	30	338.1	4.83	-4.23
MOC-NA	S1101412	N	46.3	349.9	4.93	-4.55
MOC-NA	S1402100	N	46	344.6	5.18	-4.76
MOC-NA	S2200579	N	48.3	351.3	5.3	-4.54
MOC-NA	S0400217	N	20.6	315.8	6.26	-4.27
HiRISE	ESP_028157_2060	N	25.9	315.1	6.58	-4.33
HiRISE	ESP_016579_2025	N	22	325.8	7.07	-3.5
HiRISE	ESP_020865_2030	N	22.9	311.4	8.01	-4.23
HiRISE	PSP_008562_2055	N	25.4	321	11.71	-4.65
HiRISE	PSP_009998_2165	N	36	349.4	45.95	-3.97
MOC-NA	S1601297	N	47.7	329.7	3.87	---
HiRISE	PSP_007796_2195	N	39	356.8	5.22	---
HiRISE	ESP_025716_2200	N	39.7	350.5	5.69	-4.87
HiRISE	ESP_017804_2265	N	46.2	357.9	1.36	---
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MOC-NA	R1801341	N	21.3	329.4	7.47	-3.73
MOC-NA	S1300052	N	29.6	325.8	13.82	-4.87
MOC-NA	M2100689	N	18.3	316	37.94	-4.83
MOC-NA	R1104263	N	42.9	331.9	5.62	-4.66
MOC-NA	M1302275	N	23.6	331.1	9.51	-4.14
MOC-NA	E1700211	N	46.8	325.7	7.11	---
MOC-NA	R1500116	N	30.6	341.5	16.92	-4.79
MOC-NA	R1202472	N	23.1	319.8	18.55	-4.69
MOC-NA	R1400862	N	43	333.1	5.58	-4.63
MOC-NA	R1800866	N	36.1	316.1	5.93	-4.2
MOC-NA	S1300639	N	27.8	337.5	20	-4.85

MOC-NA	R1700994	N	49.6	331.4	6.27	-4.62
MOC-NA	E2200398	N	47.2	332	9.92	-4.68
MOC-NA	E1401482	N	32.5	342.9	4.87	-4.74
HiRISE	ESP_020917_2075	N	26.4	331.6	6.64	-3.81
MOC-NA	R1901021	N	46.2	332.6	9.4	-4.63
MOC-NA	M0805247	N	21	328.5	7.6	-4.11
MOC-NA	S1602478	N	41.5	357.7	1.37	---
HiRISE	PSP_006004_2055	N	25.9	328.5	67.26	-3.83
MOC-NA	E2201502	N	43	356.9	15.03	-4.39
MOC-NA	R1901021	N	46.5	332.6	14.19	---
MOC-NA	E1201792	N	19.8	310.4	14.75	-3.73
MOC-NA	R1402532	N	37.2	335.2	1.11	---
MOC-NA	SP236603	N	19.4	323.3	5.74	-4.45
MOC-NA	E2000169	N	29.2	320.2	6.22	-4.9
MOC-NA	S0702943	N	24.5	308.3	6.75	-3.43
HiRISE	ESP_023739_2065	N	26.5	326.3	18.68	-3.87
HiRISE	ESP_025439_2210	N	40.9	352.5	3.09	---
HiRISE	ESP_029448_2265	N	46	346.6	1.1	---
HiRISE	ESP_026244_2130	N	32.9	336.8	1.32	---
MOC-NA	S1601543	N	45.3	321.6	1.34	---
HiRISE	ESP_013137_2190	N	38.7	333.3	1.36	---
MOC-NA	R0904034	N	28.5	321.1	1.41	---
MOC-NA	S1402098	N	40.2	345.8	1.54	---
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MOC-NA	M1900850	N	41.1	350.2	1.63	---
MOC-NA	M2000328	N	29.4	312.7	1.68	---
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MOC-NA	S0300765	N	30.1	338.1	3.11	---
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MOC-NA	S1801095	N	48.6	313.5	3.18	---
MOC-NA	S1400509	N	47.3	359.3	3.42	---
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HiRISE	ESP_029950_1985	N	18.1	323.6	3.91	-4.11
MOC-NA	S1200368	N	31.2	333.3	4.03	-4.7
MOC-NA	E0502334	N	33.4	317.4	4.29	-4.49
MOC-NA	S0602593	N	30.5	324.9	4.61	-4.62
MOC-NA	S1402531	N	26.1	327	4.98	-4.45
MOC-NA	R0401978	N	41	351.2	5.19	-4.41
HiRISE	ESP_020904_2005	N	20.4	327.3	5.5	-4.32
MOC-NA	M0901583	N	29.4	333.6	5.95	-4.35
MOC-NA	S1801363	N	26.7	337.2	5.96	-4.45
HiRISE	ESP_027022_2070	N	26.4	338.4	7.57	-4.51
MOC-NA	S0802865	N	30	318.9	23.85	-3.82
MOC-NA	S0802865	N	30	319.1	23.85	-3.82

HiRISE	ESP_016751_2070	N	26.6	309.4	24.05	-4.47
HiRISE	PSP_009998_2165	N	36.1	350.2	40.88	-3.9
MOC-NA	R0401883	N	31.1	336.4	1.4	---
MOC-NA	M0200225	N	47.6	346.2	1.54	---
MOC-NA	E2100911	N	44.7	333	1.86	---
MOC-NA	S0301279	N	31.2	344.2	1.95	---
MOC-NA	R0502103	N	47.3	325.4	2.07	---
MOC-NA	R1103023	N	49.2	311.6	2.53	---
MOC-NA	S1500493	N	34.4	332.4	2.94	---
HiRISE	ESP_017027_2050	N	24.9	335.5	5.16	---

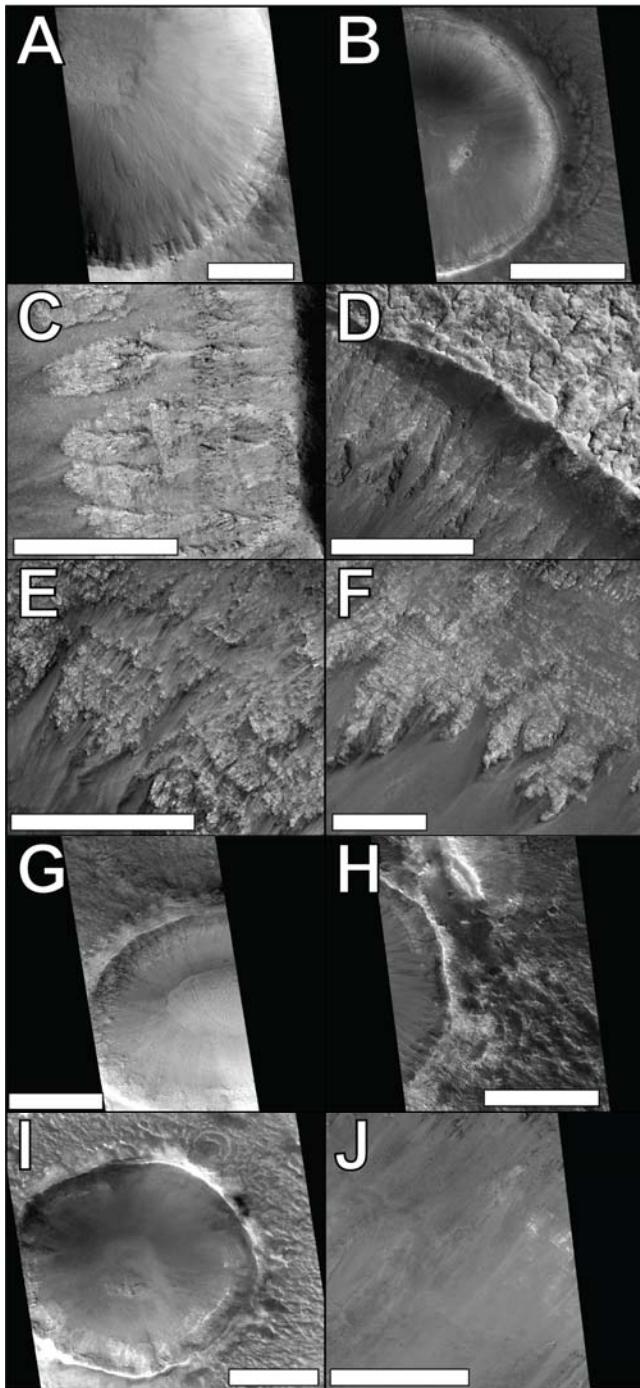


Figure DR1. Additional high-resolution image subsets of the observed high-albedo unit throughout the Chryse and Acidalia study region. All images are oriented with north towards the top of the image. (A) Mars Orbiter Camera Narrow Angle (MOC-NA) image S04-00882 (36.6° N, 310.8° E), scale bar is 1 km. (B) MOC-NA image E20-00341 (32.6° N, 311.1° E), scale bar is 2 km. (C) High Resolution Imaging Science Experiment (HiRISE) image ESP_016210_2195 (39.1° N, 318.0° E), scale bar is 250 m. (D) HiRISE image PSP_006479_2090 (28.6° N, 318.8° E), scale bar is 250 m. (E) HiRISE image PSP_009036_2250 (44.6° N, 335.4° E), scale bar is 500 m. (F) HiRISE image PSP_006953_2245 (44.2° N, 333.8° E), scale bar is 250 m. (G) MOC-NA image S17-00580 (36.4° N, 332.5° E), scale bar is 2 km. (H) MOC-NA image R14-02811 (33.9° N, 326.7° E), scale bar is 2 km. (I) MOC-NA image S15-02534 (32.6° N, 325.9° E), scale bar is 1 km. (J) HiRISE image ESP_021708_2070 (26.5° N, 335.9° E), scale bar is 250 m.

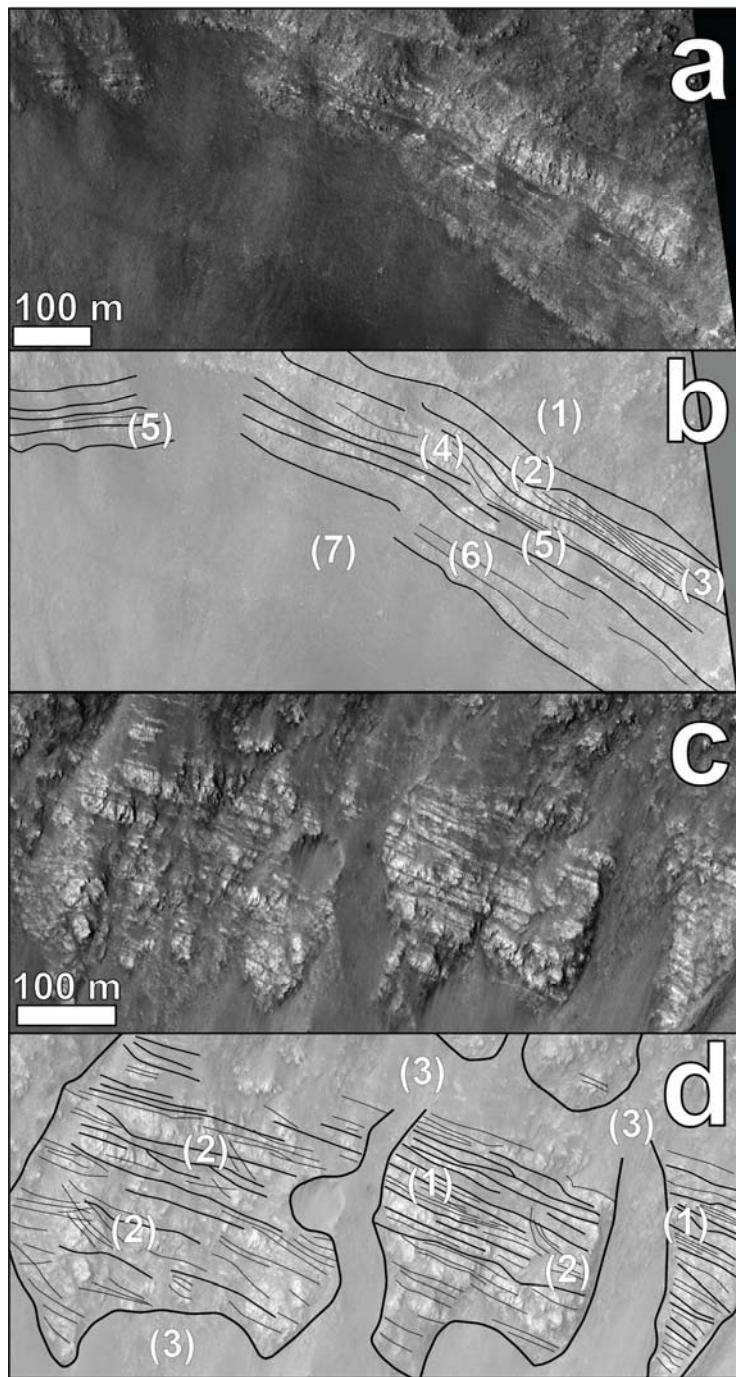


Figure DR2. (a) Subset of HiRISE image ESP_026957_2200 centered at 39.680° N, 310.326° E, and showing approximately the same location reported in Figure 2A of the main text. (b) An annotated sketch of the area shown in Fig. DR2a. See Data Repository text for detailed explanations of the different identified units. (c) Subset of HiRISE image ESP_018385_2215 centered at 40.992° N, 335.465° E, and showing approximately the same location reported in Figure 2B of the main text. (d) An annotated sketch of the area shown in Fig. DR2c. See Data Repository text for detailed explanations of the different identified units.

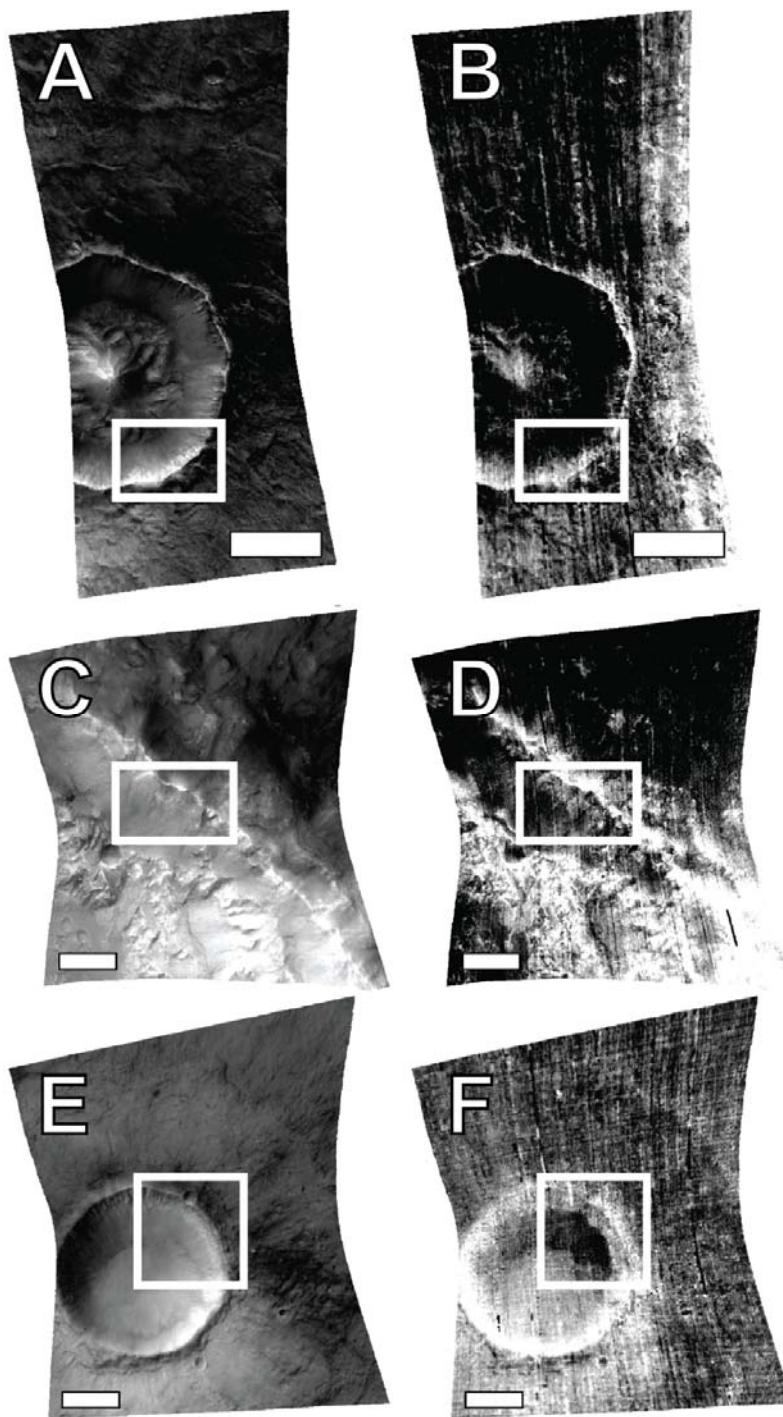


Figure DR3. Additional Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) 324 data, showing both infrared albedo signatures over high-albedo exposures in addition to 3.0 μm band depth parameter data (BD3000, Pelkey et al., 2007). High-albedo outcrops consistently show deeper 3.0 μm band depths than their surroundings. White BD3000 values indicate deeper 3.0 μm band depths, while black BD3000 values indicate shallower 3.0 μm band depths. All images are oriented with north towards the top of the image. All scale bars are 2 km. (A) CRISM image HRL000233CA infrared albedo. (B) CRISM image HRL000233CA BD3000 parameter. (C) CRISM image FRT0000B486 infrared albedo. (D) CRISM image FRT0000B486 BD3000 parameter. (E) CRISM image FRT000198FC infrared albedo. (F) CRISM image FRT000198FC BD3000 parameter.

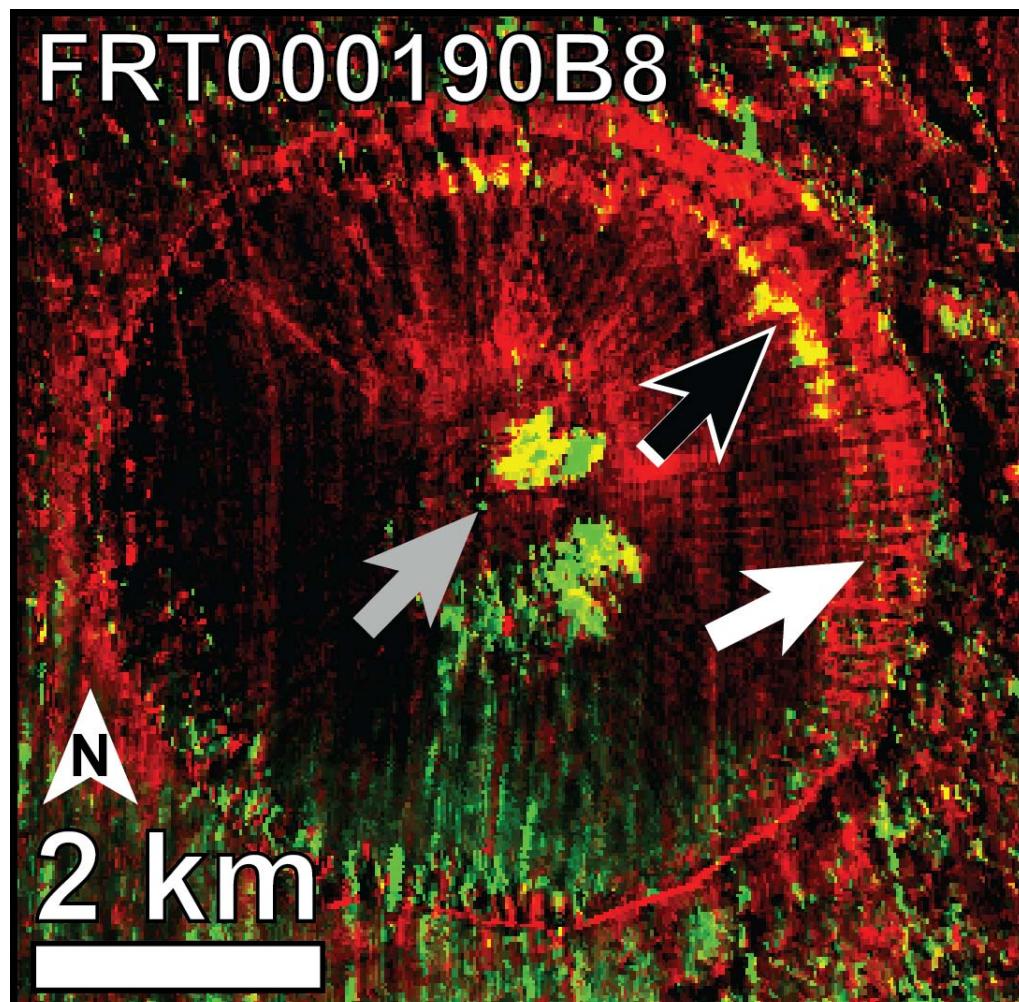


Figure DR4. Subset of CRISM image FRT000190B8, showing olivine- (red) and high-calcium pyroxene- (green) bearing materials within a crater in Chryse Planitia. Yellow indicates the presence of both olivine and high-calcium pyroxene. The high-albedo unit is indicated by a white arrow and appears as a dark band in the crater wall that does not exhibit any mafic signatures. The grey arrow indicates in situ mafic material exposed on the crater floor which, along with the mafic materials exposed underneath the high-albedo unit in the crater wall (black arrow), confirms that the high-albedo unit is stratigraphically above the mafic material.



Figure DR5. A potential analog for the high-energy depositional environments theorized to be present along the margins of Chryse Planitia. Catastrophic sedimentary deposition during an episode of abrupt deglaciation in Argentina results in poorly sorted diamictites (Kneller et al., 2004). Note compass for scale in top right corner, and discussion in Data Repository text. Figure is from Kneller et al. (2004), published in Geological Society of America Bulletin, doi:10.1130/B25242.1, Figure 16.

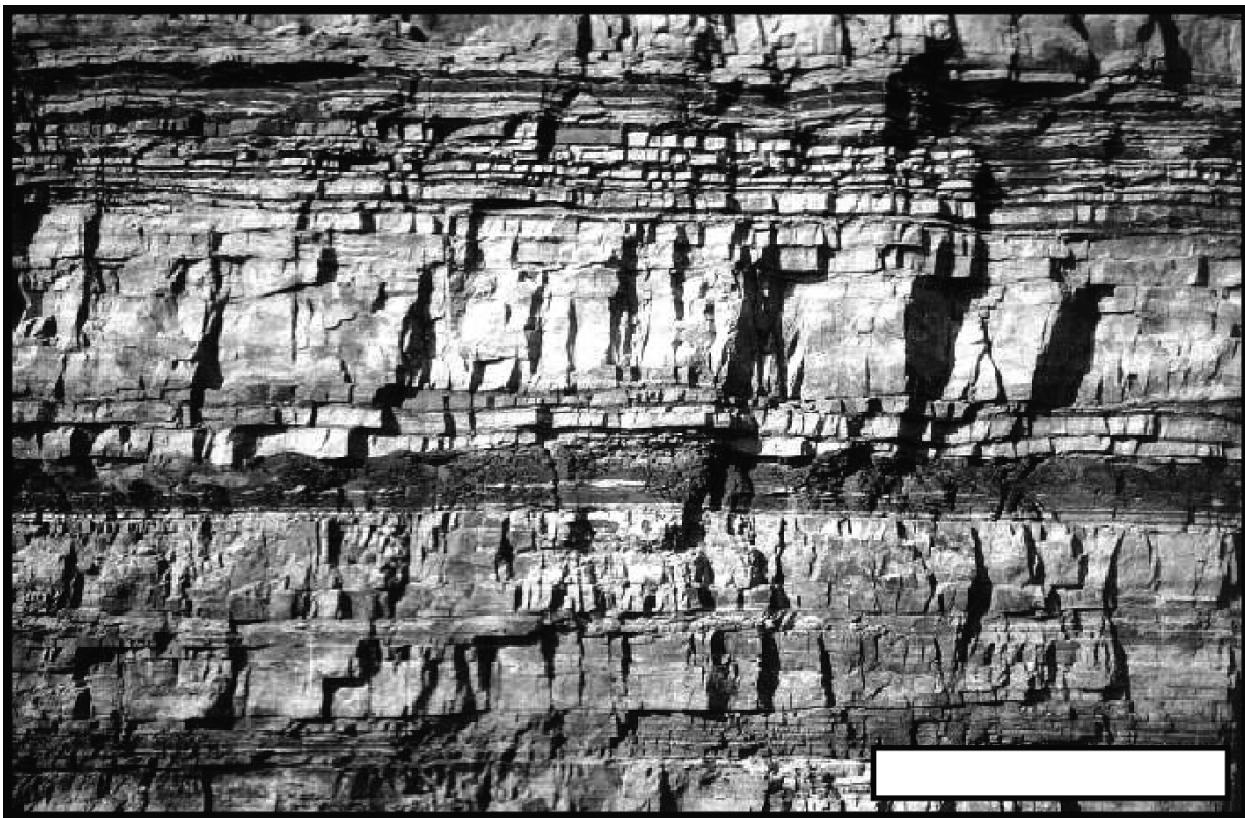


Figure DR6. A potential analog for the low-energy depositional environments theorized for the massive and layered sediments in Chryse and Acidalia planitiae. The sedimentary sequences of the Graafwater Formation (Cape Town, South Africa) were formed under tidally influenced shallow marine environments, creating alternating sandstone and siltstone strata (Tankard and Hobday, 1977). Scale bar is approximately 1 meter (see Data Repository text for additional discussion). Photo credit: University of Cape Town, Department of Geological Sciences, used with permission. web.uct.ac.za/depts/geolsci/dlr/106s_98/98119.jpg.

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