

**ANNEX Z TO
MARS CORRECT: CRITIQUE OF ALL NASA MARS WEATHER DATA
MSL Year 4 SUMMER Weather Data (LS 270 TO 0, Sols 2203 to 2357)**

This Annex reveals all Mars Science Laboratory (MSL) weather data for MSL's Mars Year 4 summer. It shows what was published by the Rover Environmental Monitoring Station (REMS) Team and JPL. It also reveals what the Roffman Team sees as weather anomalies, and how the REMS Team and JPL altered their data after we color-highlighted what was off the expected temperature and pressure curves. Note: Some sources refer to the first year that MSL was on Mars as Year 0. For those using that system sols 2,203 to 2,357 are Year 3.

On Table 1 column subjects and color codings are as follows (Note: JPL calls the first year of MSL on Mars "Year 0," the second year Year 1, the third year "Year 2" and the fourth year “Year 3.”

Column A (Sol). The Martian day is about 39 minutes longer than the terrestrial day. Column B is solar longitude (Ls). MSL is in the Southern Hemisphere on Mars. The landing was at Ls 150 in winter. Ls 180 begins the spring there. Ls 270 starts summer, Ls 0 starts the fall. Ls 90 starts the winter. Column C shows the pressure reported by the REMS Team. Column D shows the date on Earth. Column E shows the maximum air temperature. With respect to the freezing point, from 0° C at 1 atm pressure it will increase up to 0.01° C at 0.006 atm (which is about the average pressure on Mars as given by NASA). This is the triple point of water. At pressures below this, water will never be liquid. It will change directly between solid and gas phase (sublimation). The temperature for this phase change, the sublimation point, will decrease as the pressure is further decreased Column F shows minimum air temperature. Column G shows the air temperature range for each sol. On Earth temperatures can vary by 40 °C in deserts. In column G where the range is 59 °C or less yellow background coloring points that out. The National Park Service claims the world record in a diurnal temperature variation is 102 °F (57 °C) (from 46 °F (8 °C) to −56 °F (−49 °C)) in Browning, Montana (elevation 4,377 feet/1,334 meters) on January 23 to 24, 1916. There were 2 days in Montana where the temperature changed by 57 °C.	Column H shows temperature range divided by 40. This allows us to compare terrestrial deserts with Gale Crater, Mars. How much cooling occurs at night is related to the density of the atmosphere. Here we see the ratio of cooling on a Mars sol to the typical 40 °C cooling figure for Earth's deserts shown with a green background when that ratio is under 1.5. For MSL Year 1 when we altered the divisor from 40 °C to 57 °C then 88 of the ratios were altered to 1 or less than 1, meaning that Martian air pressure is indeed likely much higher than NASA claims. Column I shows maximum ground temperature. As with terrestrial deserts, the ground on Mars heats more during the day than the air does, and it cools more at night than the air does. In Column K when the maximum ground temperature is given by REMS is above 0°C it is shown with a red background. Column J shows the minimum ground temperature. When it is -90 °C or colder the background is in purple. The ground temperatures are not very precise. The requirement was to measure ground brightness temperature over the range from 150 to 300 K with a resolution of 2 K and an accuracy of 10 K. Column K. Drop in ground temperature from day to night. Column L shows the increase in temperature from the mast 1.5 meters above the ground down to the ground during the daylight hours. In column N anytime there is an increase in temperature of 11 °C or more this is indicated with a dark blue background.	Column M shows the decrease in temperature from the ground to the air at nights. If the data were valid we would expect similar heating or cooling to occur over the set distance from ground to boom. A quick survey of the data immediately shows that this was not found. In column L we see a variation in heating between 0 °C and at least 15 °C with a 54 °C anomaly on Sol 1,070. For nighttime cooling any variation from 11°C to 19°C is shown with a medium blue background. More than that is shown with a dark blue background. Column N shows the pressure for the same Ls in MSL Year 1. Column O shows the absolute value of the change in pressure in Pascals from the same Ls in the previous year (Column [M] - [C]). Column P shows the original pressure for the same Ls in MSL Year 1 before JPL revised their data. Column Q shows the Ls during Year 1. Column R shows the UV for the sol in Year 2. Column S shows the UV for the sol in Year 1. All sols in MSL Year 1 and Year 2 have opacity listed as “sunny” which seems dubious. Column T shows comments, if any.
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A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C, YELLOW IF <60 °C	AIR TEMP RANGE °C/40, GREEN IF<1.5	MAX GROUND TEMP °C, RED IF > 0°C	MIN GROUND TEMP °C, PURPLE IF -90°C OR COLDER	Δ GROUND TEMP DAY TO NIGHT, YELLOW = -80 TO -89, RED = -90 OR COLDER DROP	DAYTIME CHANGE IN TEMP °C AIR TO GROUND BLUE = >10°C	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUND, PURPLE = >10°C	PRESSURE AT SAME LS IN MSL YEAR 2	Δ PRESSURE YEAR 3 TO YEAR 2 SAME LS, YELLOW = > 7 Pa)	~LS year 2	PRESSURE YEAR 1 BEFORE REVISION	UV YR	UV YR	(MSL YEAR 2 SOL FOR THIS LS)/COMMENTS	MSL Altitude meters below areoid
																	3	2		

Q

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C	AIR TEMP RANGE °C/40	MAX GROUND TEMP °C	MIN GROUND TEMP °C	Δ GROUND TEMP DAY TO NIGHT	DAYTIME CHANGE IN TEMP °C AIR TO GROUND	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUND	PRESSURE AT SAME LS IN MSL YEAR 3	Δ PRESSURE YEAR 4 TO YEAR 3 SAME LS	~LS year 3	PRESSURE YEAR 1 BEFORE REVISION	UV YR	UV YR	MSL YEAR 3 SOL FOR THIS LS/ COMMENTS	MSL Altitude meters below areoid
						YELLOW IF <60 °C	GREEN IF<1.5	RED IF > 0 °C	PURPLE = >-90°C OR COLDER	YELLOW NUMBERS = -80 to -89 °C, red background = -90°C or colder drop	BLUE = >10°C	PURPLE = >10°C		YELLOW = > 7 Pa)						
2203	270	Issue on Curiosity preventing it from sending science and engineering data.	10/17/2018	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	898	N/A	270	N/A	N/A	H	(1534)	N/A

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C, YELLOW IF <60 °C	AIR TEMP RANGE °C/40, GREEN IF<1.5	MAX GROUND TEMP °C, RED IF > 0°C	MIN GROUND TEMP °C, PURPLE IF -90°C OR COLDER	Δ GROUND TEMP DAY TO NIGHT, YELLOW = -80 TO -89, RED = -90 OR COLDER DROP	DAYTIME CHANGE IN TEMP °C AIR TO GROUND BLUE = >10°C	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUND, PURPLE = >10°C	PRESSURE AT SAME LS IN MSL YEAR 2	Δ PRESSURE YEAR 3 TO YEAR 2 SAME LS, YELLOW = > 7 Pa)	~LS year 2	PRESSURE YEAR 1 BEFORE REVISION	UV YR 3	UV YR 2	(MSL YEAR 2 SOL FOR THIS LS)/COMMENTS	MSL Altitude meters below areoid

		Spring ends, summer begins.																		
2204	271	854, Data may not be for a full sol	10/18/2018	-14	-56	42	1.05	7	-60	-67	21	-4	900	-46	270	N/A	M	H	(1535)	N/A
2205	271	880	10/19/2018	-13	-70	-57	1.425	6	-80	-86	19	-10	901	-21	271	N/A	M	H	(1536)	
2206	272	881	10/20/2018	-14	-74	-61	1.525	6	-73	-79	20	+1	900	-19	272	N/A	M	H	(1537)	
2207	273	881	10/21/2018	-14	-72	-58	1.45	7	-73	-80	21	+1	898	-17	272	N/A	M	H	(1538)	
2208	273	880	10/22/2018	-18	-75	-57	1.425	7	-73	-80	25	+2	896	-16	273	N/A	M	H	(1539)	
2209	274	879	10/23/2018	-18	-73	-55	1.375	6	-74	-80	24	-1	896	-17	274	N/A	M	H	(1540)	
2210	275	877	10/24/2018	-11	-74	-63	1.575	6	-74	-80	17	0	895	-18	274	N/A	M	H	(1541)	
2211	275	876	10/25/2018	-13	-71	-58	1.45	7	-83	-90	20	-12	895	-19	275	N/A	M	H	(1542)	
2212	276	877	10/26/2018	-13	-71	-58	1.45	7	-74	-81	20	-3	896	-19	276	N/A	M	H	(1543)	
2213	276	874	10/27/2018	-12	-70	-58	1.45	6	-71	-77	18	-1	894	-20	276	N/A	M	H	(1544)	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C, YELLOW IF <60 °C	AIR TEMP RANGE °C/40, GREEN IF <1.5	MAX GROUND TEMP °C, RED IF > 0°C	MIN GROUND TEMP °C, PURPLE IF -90°C OR COLDER	Δ GROUND TEMP DAY TO NIGHT, YELLOW = -80 TO -89, RED = -90 OR COLDER DROP	DAYTIME CHANGE IN TEMP °C AIR TO GROUND BLUE = >10°C	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUND, PURPLE = >10°C	PRESSURE AT SAME LS IN MSL YEAR 2	Δ PRESSURE YEAR 3 TO YEAR 2 SAME LS, YELLOW = > 7 Pa)	~LS year 2	PRESSURE YEAR 1 BEFORE REVISION	UV YR 3	UV YR 2	(MSL YEAR 2 SOL FOR THIS LS)/COMMENTS	MSL Altitude meters below areoid

2214	277	872	10/28/2018	-13	-73	-60	1.5	7	-73	-80	20	0	891	-19	277	N/A	M	M	(1545)	-4,150 METERS
2215		NO DATA											889	N/A	278	N/A	No data	H	(1546)	
2216	278	868	10/31/2018	-12	-69	-57	1.425	7	-71	-78	19	-2	887	-19	278	N/A	M	H	(1547)	
2217	279	868	11/1/2018	-13	-71	-58	1.45	7	-72	-79	20	-1	887	-19	279	N/A	M	H	(1548)	
2218	280	866	11/2/2018	-7	-71	-64	1.6	7	-74	-81	14	-3	887	-21	280	N/A	M	H	(1549)	-4,150 METERS
2219	280	868	11/3/2018	-7	-71	-64	1.6	7	-70	-77	14	+1	888	-20	280	N/A	H	VH	(1550)	
2220	281	866	11/4/2018	-10	-73	-63	1.575	7	-71	-78	17	+2	886	-20	281	N/A	H	H	(1551)	
2221	282	866	11/5/2018	-4	-70	-66	1.65	9	-73	-82	13	-3	886	-20	281	N/A	H	H	(1552)	-4,147 METERS
2222	282	865	11/6/2018	-3	-70	-67	1.675	10	-72	-82	13	-2	884	-19	282	N/A	H	VH	(1553)	-4,147 METERS
2223	283	850	11/7/2018	2	-64	-66	1.65	11	-68	-79	9	-4	882	-44 revised to -32	283	894	M	VH	(1554)	
2223	283	863 REVISIED	11/7/2018	2 revised	-71 revised	73 revised	1.825	11	-72 revised	-82 revised	9	-1	882	-44 revised to -32	283	894	M	VH	(1554)	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C, YELLOW IF <60 °C	AIR TEMP RANGE °C/40, GREEN IF<1.5	MAX GROUND TEMP °C, RED IF > 0°C	MIN GROUND TEMP °C, PURPLE IF -90°C OR COLDER	Δ GROUND TEMP DAY TO NIGHT, YELLOW = -80 TO -89, RED = -90 OR COLDER DROP	DAYTIME CHANGE IN TEMP °C AIR TO GROUND BLUE = >10°C	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUND, PURPLE = >10°C	PRESSURE AT SAME LS IN MSL YEAR 2	Δ PRESSURE YEAR 3 TO YEAR 2 SAME LS, YELLOW = > 7 Pa)	~LS year 2	PRESSURE YEAR 1 BEFORE REVISION	UV YR 3	UV YR 2	(MSL YEAR 2 SOL FOR THIS LS)/COMMENTS	MSL Altitude meters below areoid

2224	283	865	11/8/2018	0	-72	72	1.8	11	-82	-93	11	-10	883	-18	283	N/A	M	VH	(1555)	
2225	284	864	11/9/2018	1	-71	72	1.8	10	-77	-87	9	-6	883	-19	284	N/A	M	VH	(1556)	
2226	285	863	11/10/2018	-4	-73	-69	1.725	10	-73	-83	14	0	883	-20	284	N/A	M	VH	(1557)	
2227	285	863	11/11/2018	-3	-72	-69	1.725	10	-75	-85	13	-3	880	-17	285	N/A	M	H	(1558)	
2228	286	884	11/12/2018	-31	-71	-40	1.0	-4	-77	-73	27	-6	879	+5	286	N/A	M	VH	(1559)	Expect pressure & temp. revision. See Fig. 1 below.
2228	286	860	11/12/2018	0	-71	-71	1.775	10	-77	-87	10	-6	879	-19	286	N/A	M		(1559)	Predicted pressure and temp. revision posted.
2229	287	862	11/13/2018	-2	-71	-69	1.725	11	-80	-91	13	-9	877	-15	286	N/A	M	VH	(1560)	
2230	287	859	11/14/2018	-5	-72	-67	1.675	10	-74	-84	15	-2	877	-18	287	N/A	M	VH	(1561)	
2231	288	860	11/16/2018	-10	-73	-63	1.575	10	-75	-85	20	-2	877	-17	288	N/A	M	VH	(1562)	
2232	289	858	11/16/2018	-3	-73	-70	1.75	11	-72	-83	14	+1	879	-21	288	N/A	M	VH	(1563)	
2233	289	861	11/17/2018	-4	-72	-68	1.7	11	-73	-84	15	-1	872	-11	289	N/A	M	VH	(1564)	
2234	290	857	11/18/2018	2	-70	-72	1.8	12	-72	-84	10	-2	874	-17	290	N/A	M	VH	(1565)	
2235	290	853	11/19/2018	2	-70	-72	1.8	12	-72	-84	10	-2	876	-23	290	N/A	M	VH	(1566)	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C, YELLOW IF <60 °C	AIR TEMP RANGE °C/40, GREEN IF<1.5	MAX GROUND TEMP °C, RED IF > 0°C	MIN GROUND TEMP °C, PURPLE IF -90°C OR COLDER	Δ GROUND TEMP DAY TO NIGHT, YELLOW = -80 TO -89, RED = -90 OR COLDER DROP	DAYTIME CHANGE IN TEMP °C AIR TO GROUND BLUE = >10°C	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUND, PURPLE = >10°C	PRESSURE AT SAME LS IN MSL YEAR 2	Δ PRESSURE YEAR 3 TO YEAR 2 SAME LS, YELLOW = > 7 Pa)	~LS year 2	PRESSURE YEAR 1 BEFORE REVISION	UV YR 3	UV YR 2	(MSL YEAR 2 SOL FOR THIS LS)/COMMENTS	MSL Altitude meters below areoid

2236	291	857	11/20/2018	-3	-71	-68	1.7	11	-74	-85	14	-3	870	-13	291	N/A	M	VH	(1567)	
2237	292	854	11/21/2018	-3	-70	-67	1.675	10	-73	-83	13	-3	876	-22	291	N/A	M	VH	(1568)	
2238	292	853	11/22/2018	-2	-69	-67	1.675	11	-72	-83	13	-3	873	-20	292	N/A	M	VH	(1569)	
2239	293	852	11/23/2018	-2	-70	-68	1.7	10	-83	-93	12	-13	873	-21	293	N/A	M	VH	(1570)	Altitude estimated at -4,150 m. See https://mars.nasa.gov/msl/mission/mars-rover-curiosity-mission-updates/
2240	294	849	11/24/2018	0	-70	-70	1.75	11	-71	-82	11	-1	873	-24	293	N/A	M	VH	(1571)	
2241	294	850	11/25/2018	-2	-70	-68	1.7	10	-73	-83	12	-3	869	-19	294	N/A	M	H	(1572)	
2242	295	848	11/26/2018	-2	-70	-68	1.7	11	-74	-85	13	-4	872	-24	295	N/A	M	H	(1573)	
2243	295	848	11/27/2018	-3	-70	-67	1.675	11	-74	-85	14	-4	868	-20	295	N/A	M	VH	(1574)	
2244	296	849	11/28/2018	-5	-70	-65	1.625	13	-81	-94	18	-11	871	-22	296	860	M	H	(1575)	
2245	297	845	11/29/2018	-7	-70	-63	1.575	11	-79	-90	18	-9	869	-24	296	N/A	M	VH	(1576)	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C, YELLOW IF <60 °C	AIR TEMP RANGE °C/40, GREEN IF<1.5	MAX GROUND TEMP °C, RED IF > 0°C	MIN GROUND TEMP °C, PURPLE IF -90°C OR COLDER	Δ GROUND TEMP DAY TO NIGHT, YELLOW = -80 TO -89, RED = -90 OR COLDER DROP	DAYTIME CHANGE IN TEMP °C AIR TO GROUND BLUE = >10°C	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUN, PURPLE = >10°C	PRESSURE AT SAME LS IN MSL YEAR 2	Δ PRESSURE YEAR 3 TO YEAR 2 SAME LS, YELLOW = > 7 Pa)	~LS year 2	PRESSURE YEAR 1 BEFORE REVISION	UV YR	UV YR	(MSL YEAR 2 SOL FOR THIS LS)/COMMENTS	MSL Altitude meters below areoid
																	3	2		

2246	297	848	11/30/2018	2	-71	-73	1.825	11	-73	-84	9	-2	866	-18	297	N/A	H	H	(1577)	
2247	298	844	12/1/2018	-4	-70	-66	1.65	11	-73	-84	15	-3	868	-24	298	N/A	M	VH	(1578)	
2248	298	846	12/2/2018	1	-71	-72	1.8	10	-75	-85	9	-4	862	-16	298	N/A	M	H	(1579)	
2249	299	846	12/3/2018	-4	-70	-66	1.65	11	-74	-85	15	-4	867	-21	299	N/A	H	H	(1580)	
2250	300	842	12/4/2018	-14	-70	-56	1.4	9	-75	-84	23	-5	862	-20	299	N/A	M	H	(1581)	-4,146 METERS
2251	300	847	12/5/2018	-15	-74	-59	1.475	9	-75	-84	24	-1	862	-15	300	N/A	M	H	(1582)	
2252	301	840	12/7/2018	-15	-72	-57	1.425	7	-80	-87	22	-8	862	-22	301	N/A	H	VH	(1583)	-4,145 METERS
2253	302	845	12/8/2018	-15	-70	-55	1.375	9	-70	-79	24	0	863	-18	301	N/A	H	VH	(1584)	
2254	302	845	12/9/2018	-13	-71	-58	1.45	8	-72	-80	21	-1	864	-19	302	N/A	H	VH	(1585)	
2255	303	841	12/10/2018	-11	-71	-60	1.5	9	-73	-82	20	-2	858	-17	303	N/A	H	VH	(1586)	-4,144 METERS
2256	303	843	12/11/2018	-11	-70	-59	1.475	8	-79	-87	19	-9	860	-17	303	N/A	H	VH	(1587)	-4,144 METERS
2257	304	836	12/12/2018	-4	-72	-68	1.7	7	-73	-80	11	-1	858	-22	304	N/A	H	VH	(1588)	-4,144 METERS
2258	305	841	12/13/2018	-6	-70	-64	1.6	8	-71	-79	14	-1	857	-16	304	N/A	H	VH	(1589)	
2259			NO DATA																(1590)	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
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			12/14/2018																	
2260			NO DATA																(1591)	
			12/15/2018																	
2261	306	839	12/16/2018	-7	-70	-63	1.575	6	-72	-78	13	-2	857	-18	306	N/A	H	M	(1592)	
2262			NO DATA																(1593)	
			12/17/2018																	
2263	308	838	12/18/2018	-6	-74	-68	1.7	8	-72	-80	14		855	-17	307	N/A	H	H	(1594)	
2264	308	856	12/19/2018	-49	-63	-14	0.35	-47	-65	-18	2	-2	855	+1	308	N/A	L	H	(1595) Sol 2264 weather is problematic. See Figure 2.	
2264 revised	308	833	12/19/2018	-6	-71	-65	1.625	8	-71	-79	14	0	855	-22	308	N/A	H	H	Data was revised after we pointed out problems above. See Figure 2.	
2265	309	836	12/20/2018	-5	-71	-66	1.65	7	-72	-79	12	-1	850	-14	309	N/A	H	VH	(1596)	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C, YELLOW IF <60 °C	AIR TEMP RANGE °C/40, GREEN IF<1.5	MAX GROUND TEMP °C, RED IF > 0°C	MIN GROUND TEMP °C, PURPLE IF -90°C OR COLDER	Δ GROUND TEMP DAY TO NIGHT, YELLOW = -80 TO -89, RED = -90 OR COLDER DROP	DAYTIME CHANGE IN TEMP °C AIR TO GROUND BLUE = >10°C	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUND, PURPLE = >10°C	PRESSURE AT SAME LS IN MSL YEAR 2	Δ PRESSURE YEAR 3 TO YEAR 2 SAME LS, YELLOW = > 7 Pa)	~LS year 2	PRESSURE YEAR 1 BEFORE REVISION	UV YR 3	UV YR 2	(MSL YEAR 2 SOL FOR THIS LS)/COMMENTS	MSL Altitude meters below areoid

2266	309	836	12/21/2018	-7	-71	-64	1.6	6	-82	-88	13	-11	855	-19	309	N/A	H	VH	(1597)	
2267	310	830	12/22/2018	-5	-73	-68	1.7	6	-72	-78	11	+1	849	-19	310	N/A	H	VH	(1598)	
2268	311	836	12/23/2018	-7	-71	-64	1.6	6	-73	-79	13	-2	853	-17	310	N/A	H	VH	(1599)	
2269	311	828	12/24/2018	-4	-75	-71	1.775	6	-71	-77	10	+4	850	-22	311	N/A	H	VH	(1600)	
2270	312	835	12/25/2018	-5	-75	-70	1.75	7	-73	-80	12	+2	853	-18	312	N/A	H	H	(1601)	
2271	312	831	12/26/2018	-7	-70	-63	1.575	6	-74	-80	13	-4	852	-21	312	N/A	H	VH	(1602)	
2272	313	831	12/27/2018	-4	-73	-69	1.725	6	-72	-78	10	+1	847	-16	313	N/A	H	VH	(1603)	
2273	314	834	12/28/2018	-5	-71	-66	1.65	7	-73	-80	12	-2	850	-16	313	N/A	H	H	(1604)	
2274	314	828	12/29/2018	-5	-74	-69	1.725	7	-73	-80	12	+1	846	-18	314	815	H	VH	(1605)	
2275	315	834	12/30/2018	-7	-71	-64	1.6	6	-72	-78	13	-1	850	-16	315	N/A	H	H	(1606)	
2276	315	830	12/31/2018	-6	-71	-65	1.625	6	-72	-78	12	-1	846	-16	315	N/A	H	H	(1607)	
2277	316	831	1/1/2019	-5	-71	-66	1.65	6	-75	-81	11	-4	847	-26	316	N/A	H	H	(1608)	
2278	317	828	1/2/2019	-5	-71	-66	1.65	6	-76	-82	11	-5	847	-29	316	N/A	H	VH	(1609)	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C, YELLOW IF <60 °C	AIR TEMP RANGE °C/40, GREEN IF<1.5	MAX GROUND TEMP °C, RED IF > 0°C	MIN GROUND TEMP °C, PURPLE IF -90°C OR COLDER	Δ GROUND TEMP DAY TO NIGHT, YELLOW = -80 TO -89, RED = -90 OR COLDER DROP	DAYTIME CHANGE IN TEMP °C AIR TO GROUND BLUE = >10°C	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUN, PURPLE = >10°C	PRESSURE AT SAME LS IN MSL YEAR 2	Δ PRESSURE YEAR 3 TO YEAR 2 SAME LS, YELLOW = > 7 Pa)	~LS year 2	PRESSURE YEAR 1 BEFORE REVISION	UV YR 3	UV YR 2	(MSL YEAR 2 SOL FOR THIS LS)/COMMENTS	MSL Altitude meters below areoid

2279	317	830	1/3/2019	-8	-71	-63	1.575	5	-71	-76	13	0	N/A	N/A	317	864	H	L changed to N/A	(1610)	
2280	318	834	1/4/2019	-5	-71	-66	1.65	5	-72	-77	10	-1	N/A	N/A	318	798	H	N/A	(1611)	
2281	318	826	1/5/2019	-6	-71	-65	1.625	5	-72	-77	11	-1	N/A	N/A	318	812	H	N/A	(1612)	
2282	319	830	1/6/2019	-5	-71	-66	1.65	5	-72	-77	10	-1	846	-16	319	N/A	H	N/A	(1613)	
2283	319	825	1/7/2019	-9	-71	-62	1.55	6	-80	-86	15	-9	837	-12	319	N/A	H	N/A	(1614)	
2284	320	829	1/8/2019	-7	-70	-63	1.575	5	-74	-79	12	-4	842	-13	320	N/A	H	H	(1615)	
2285	321	823	1/9/2019	-8	-69	-61	1.525	5	-71	-76	13	-2	848	-25	320	N/A	H	H	(1616)	
2286	321	822	1/10/2019	-8	-68	-60	1.5	2	-69	-71	10	-1	840	-18	321	N/A	M	VH	(1617)	
2287	322	821	1/11/2019	-7	-69	-62	1.55	2	-70	-72	9	-1	845	-24	322	N/A	M	VH	(1618)	
2288	322	823	1/12/2019	-7	-68	-61	1.525	4	-69	-73	11	-1	841	-18	322	N/A	M	VH	(1619)	
2289	323	822	1/14/2019	-8	-69	-61	1.525	4	-70	-74	12	-1	844	-22	323	N/A	M	VH	(1620)	
2290	324	821	1/15/2019	-10	-69	-59	1.475	3	-71	-74	13	-2	842	-21	323	N/A	M	H	(1621)	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C, YELLOW IF <60 °C	AIR TEMP RANGE °C/40, GREEN IF<1.5	MAX GROUND TEMP °C, RED IF > 0°C	MIN GROUND TEMP °C, PURPLE IF -90°C OR COLDER	Δ GROUND TEMP DAY TO NIGHT, YELLOW = -80 TO -89, RED = -90 OR COLDER DROP	DAYTIME CHANGE IN TEMP °C AIR TO GROUND BLUE = >10°C	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUND, PURPLE = >10°C	PRESSURE AT SAME LS IN MSL YEAR 2	Δ PRESSURE YEAR 3 TO YEAR 2 SAME LS, YELLOW = > 7 Pa)	~LS year 2	PRESSURE YEAR 1 BEFORE REVISION	UV YR 3	UV YR 2	(MSL YEAR 2 SOL FOR THIS LS)/COMMENTS	MSL Altitude meters below areoid

2291	324	823	1/16/2019	-8	-70	62	1.55	2	-69	-71	10	+1	841	-18	324	N/A	M	H	(1622)	
2292	325	824	1/17/2019	-7	-72	-65	1.625	1	-69	-70	8	+3	840	-16	324	N/A	M	H	(1623)	
2293	325	821	1/18/2019	-9	-69	-60	1.5	1	-75	-76	10	-6	836	-15	325	N/A	M	H	(1624)	
2294	326	820	1/19/2019	-8	-70	-62	1.55	1	-68	-69	9	+2	839	-19	326	N/A	M	H	(1625)	
2295	326	820	1/20/2019	-8	-68	-60	1.5	1	-67	-68	9	+1	839	-19	326	N/A	M	H	(1626)	
2296	327	817	1/21/2019	-7	-73	-66	1.65	1	-69	-70	8	+4	839	-22	327	N/A	M	H	(1627)	
2297	328	818	1/22/2019	-12	-70	-58	1.45	2	-68	-70	14	+2	839	-21	327	N/A	M	H	(1628)	-4,143 METERS
2298	328	817	1/23/2019	-9	-71	-62	1.55	1	-67	-68	10	+4	837	-22	328	N/A	M	H	(1629)	-4,141 METERS
2299	329	818	1/24/2019	-5	-74	-69	1.725	2	-68	-70	7	+4	838	-20	328	N/A	M	H	(1630)	-4,140 METERS
2300	329	818	1/25/2019	-7	-73	-66	1.65	2	-75	-77	9	-2	837	-19	329	N/A	M	H	(1631)	-4,140 METERS
2301	330	817	1/26/2019	-17	-73	-56	1.4	0	-72	-72	17	+1	836	-19	330	N/A	M	H	(1632)	
2302	330	815	1/27/2019	-7	-73	-66	1.65	1	-70	-71	8	+3	834	-19	330	N/A	M	H	(1633)	-4,142 METERS
2303	331	815	1/28/2019	-7	-73	-66	1.65	5	-71	-76	12	+2	834	-19	331	N/A	M	H	(1634)	
2304	332	814	1/29/2019	-6	-73	-67	1.675	4	-72	-76	10	+1	833	-19	331	N/A	M	H	(1635)	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C, YELLOW IF <60 °C	AIR TEMP RANGE °C/40, GREEN IF<1.5	MAX GROUND TEMP °C, RED IF > 0°C	MIN GROUND TEMP °C, PURPLE IF -90°C OR COLDER	Δ GROUND TEMP DAY TO NIGHT, YELLOW = -80 TO -89, RED = -90 OR COLDER DROP	DAYTIME CHANGE IN TEMP °C AIR TO GROUND BLUE = >10°C	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUND, PURPLE = >10°C	PRESSURE AT SAME LS IN MSL YEAR 2	Δ PRESSURE YEAR 3 TO YEAR 2 SAME LS, YELLOW = > 7 Pa)	~LS year 2	PRESSURE YEAR 1 BEFORE REVISION	UV YR	UV YR	(MSL YEAR 2 SOL FOR THIS LS)/COMMENTS	MSL Altitude meters below areoid
																	3	2		

2305	332	814	1/30/2019	-4	-73	-69	1.725	4	-71	-75	8	+2	834	-20	332	N/A	M	H	(1636)	
2306	333	813	1/31/2019	-12	-70	-58	1.45	4	-71	-75	16	-1	833	-20	332	N/A	M	H	(1637)	-4,141.5 METERS
2307	333	814	2/1/2019	-13	-71	-58	1.45	5	-75	-80	18	-4	833	-19	333	N/A	M	H	(1638)	
2308	334	814	2/2/2019	-13	-71	-58	1.45	3	-74	-77	16	-3	832	-18	334	N/A	M	H	(1639)	
2309	334	814	2/3/2019	-16	-71	-55	1.375	4	-71	-75	20	0	828	-14	334	N/A	M	H	(1640)	-4,143 METERS
2310	335	815	2/4/2019	-6	-75	-69	1.725	7	-76	-83	13	-1	831	-16	335	N/A	M	H	(1641)	
2311	335	812	2/5/2019	-11	-73	-62	1.55	8	-87	-95	19	-14	829	-17	335	N/A	M	H	(1642)	-4,146 METERS
2312	336	813	2/6/2019	-13	-72	-59	1.475	9	-76	-85	22	-4	832	-19	336	N/A	M	H	(1643)	
2313	336	814	2/7/2019	-14	-71	-57	1.425	10	-76	-86	24	-5	832	-18	336	N/A	M	H	(1644)	-4,147 METERS
2314	337	814	2/8/2018	-16	-71	-55	1.375	5	-76	-81	21	-5	832	-18	337	N/A	M	H	(1645)	
2315	338	813	2/9/2019	-17	-71	-54	1.35	6	-73	-79	23	-2	831	-18	338	N/A	M	H	(1646)	
2316	338	814	2/10/2019	-14	-72	-58	1.45	4	-73	-77	18	-1	831	-17	338	N/A	M	H	(1647)	
2317	339	812	2/11/2019	-16	-73	-57	1.425	5	-85	-90	21	-12	830	-18	339	N/A	M	H	(1648)	
2318	339	811	2/12/2019	-17	-73	-56	1.4	4	-74	-78	21	-1	831	-20	339	N/A	M	H	(1649)	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C, YELLOW IF <60 °C	AIR TEMP RANGE °C/40, GREEN IF<1.5	MAX GROUND TEMP °C, RED IF > 0°C	MIN GROUND TEMP °C, PURPLE IF -90°C OR COLDER	Δ GROUND TEMP DAY TO NIGHT, YELLOW = -80 TO -89, RED = -90 OR COLDER DROP	DAYTIME CHANGE IN TEMP °C AIR TO GROUND BLUE = >10°C	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUND, PURPLE = >10°C	PRESSURE AT SAME LS IN MSL YEAR 2	Δ PRESSURE YEAR 3 TO YEAR 2 SAME LS, YELLOW = > 7 Pa)	~LS year 2	PRESSURE YEAR 1 BEFORE REVISION	UV YR 3	UV YR 2	(MSL YEAR 2 SOL FOR THIS LS)/COMMENTS	MSL Altitude meters below areoid

2319	340	812	2/14/2019	-17	-72	-55	1.375	5	-74	-79	22	-2	833	-21	340	N/A	M	H	(1650)	
2320 to 2332 NO DATA																			(1651 to 1662)	
2333	347	789	2/28/2019	-19	-57	-38	0.95	6	-61	-67	25	-4	832	-43	347	N/A	M	H	(1663)	Less than a full sol's worth of data?
2334	348	814	3/1/2019	-18	-73	-55	1.375	6	-77	-83	24	-4	832	-18	347	N/A	M	H	(1664)	
2335	348	815	3/2/2019	-18	-73	-55	1.375	6	-77	-83	24	-4	833	-18	348	N/A	M	H	(1665)	
2336	349	814	3/3/2019	-19	-73	-54	1.35	7	-76	-83	26	-3	834	-20	348	N/A	M	H	(1666)	
2337	350	817	3/4/2019	-17	-73	-56	1.4	7	-77	-84	24	-4	833	-16	349	N/A	M	H	(1667)	
2338	350	817	3/5/2019	-13	-75	-62	1.55	8	-84	-92	21	-9	831	-14	349	N/A	M	H	(1668)	-4,150 METERS
2339 to 2346 NO DATA																			(1669 to 1676)	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
SOL	~LS	PRESSURE Pa	EARTH DATE	MAX AIR TEMP °C	MIN AIR TEMP °C	AIR TEMP RANGE °C, YELLOW IF <60 °C	AIR TEMP RANGE °C/40, GREEN IF <1.5	MAX GROUND TEMP °C, RED IF > 0°C	MIN GROUND TEMP °C, PURPLE IF -90°C OR COLDER	Δ GROUND TEMP DAY TO NIGHT, YELLOW = -80 TO -89, RED = -90 OR COLDER DROP	DAYTIME CHANGE IN TEMP °C AIR TO GROUND BLUE = >10°C	NIGHTTIME CHANGE IN TEMP °C AIR TO GROUND, PURPLE = >10°C	PRESSURE AT SAME LS IN MSL YEAR 2	Δ PRESSURE YEAR 3 TO YEAR 2 SAME LS, YELLOW = > 7 Pa)	~LS year 2	PRESSURE YEAR 1 BEFORE REVISION	UV YR 3	UV YR 2	(MSL YEAR 2 SOL FOR THIS LS)/COMMENTS	MSL Altitude meters below areoid

2347	355	798	3/14/2019	-19	-60	-41	1.025	5	-65	-70	24	-5	835	-37	354	N/A	M	H	(1677)	-4,150 METERS. Less than a full sol's worth of data?
2348	355	818	3/15/2019	-19	-74	-55	1.375	5	-84	-89	24	-10	836	-18	355	N/A	M	H	(1678)	
2349	356	818	3/16/2019	-19	-74	-55	1.375	4	-78	-82	23	-4	836	-18	355	N/A	M	H	(1679)	
2350	356	819	3/17/2019	-17	-74	-57	1.425	5	-81	-86	22	-7	835	-16	356	N/A	M	H	(1680)	
2351	357	819	3/18/2019	-6	-75	-69	1.725	7	-80	-87	13	-5	837	-18	356	N/A	M	H	(1681)	
2352	357	818	3/18/2019	-16	-74	-58	1.45	6	-81	-87	22	-7	839	-21	357	N/A	M	H	(1682)	
2353	358	819	3/20/2019	-16	-74	-58	1.45	4	-80	-84	20	-6	837	-18	357	N/A	M	H	(1683)	
2354	358	819	3/21/2019	-18	-75	-57	1.425	3	-80	-83	21	-5	837	-18	358	N/A	M	H	(1684)	
2355	359	820	3/22/2019	-18	-75	-57	1.425	5	-80	-85	23	-5	838	-18	358	N/A	M	H	(1685)	
2356	359	821	3/23/2019	-16	-76	-60	1.5	4	-82	-86	20	-6	838	-17	359	N/A	M	H	(1686)	
2357 FALL BEGINS	0	820	3/24/2019	-19	-78	-59	1.475	5	-83	-88	24	-5	838	-18	359	N/A	M	H	(1687)	-4,154 METERS. See Figures 3 and 4 for spheres

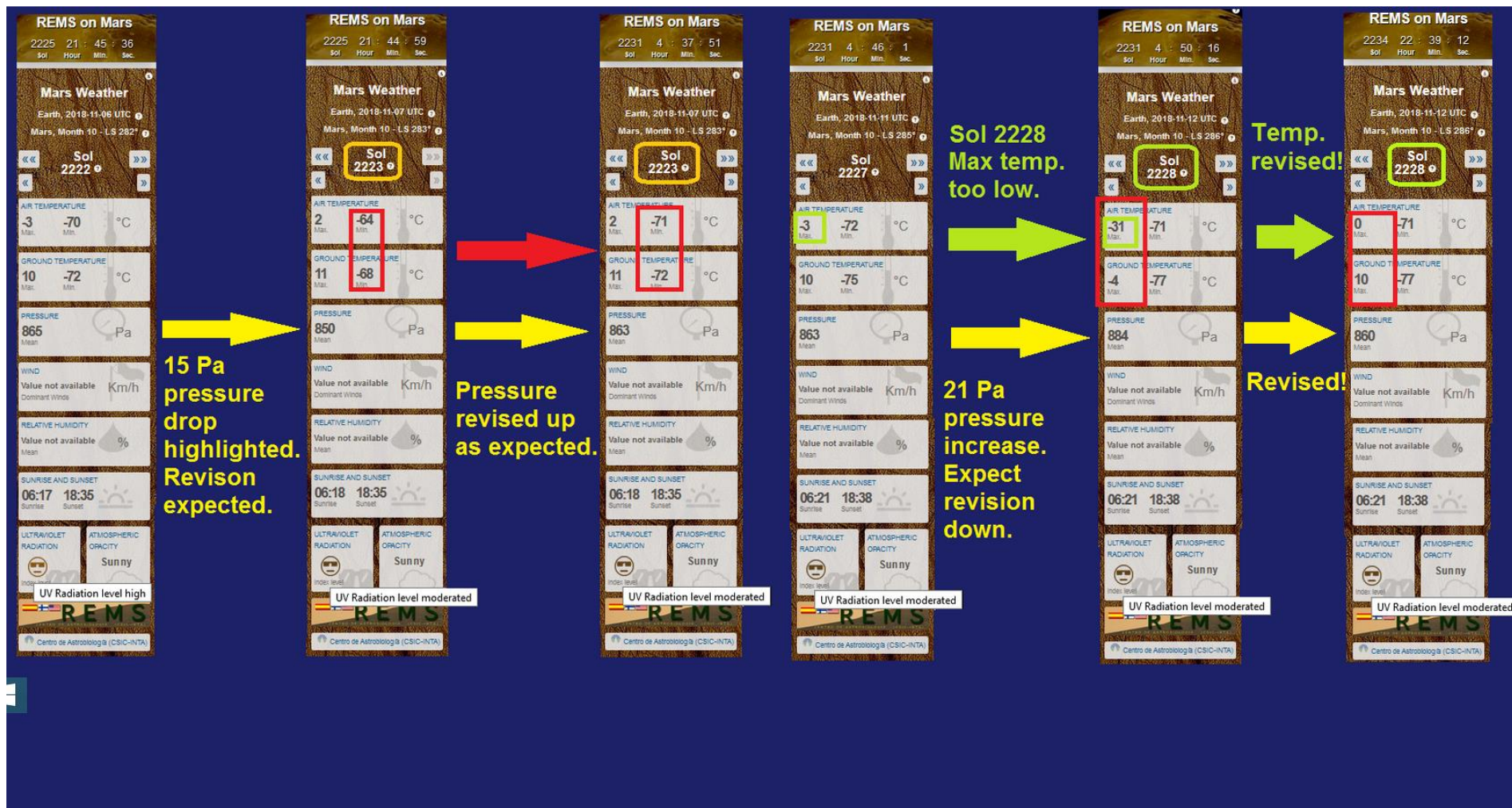


Figure 1 - Before and after print-screens showing weather that NASA published for sols 2223 and 2228 that we challenged and got NASA to change.

On examining the changes in temperature, pressure and UV from MSL Sol 2263 to 2264 we had to highlight them because only a nonexistent dust storm could cause them

Sure enough, the REMS Team had to revise the data for Sol 2264.



Figure 2 - Sol 2264 weather data seems out of line due to radical changes in temperature, pressure, and UV.

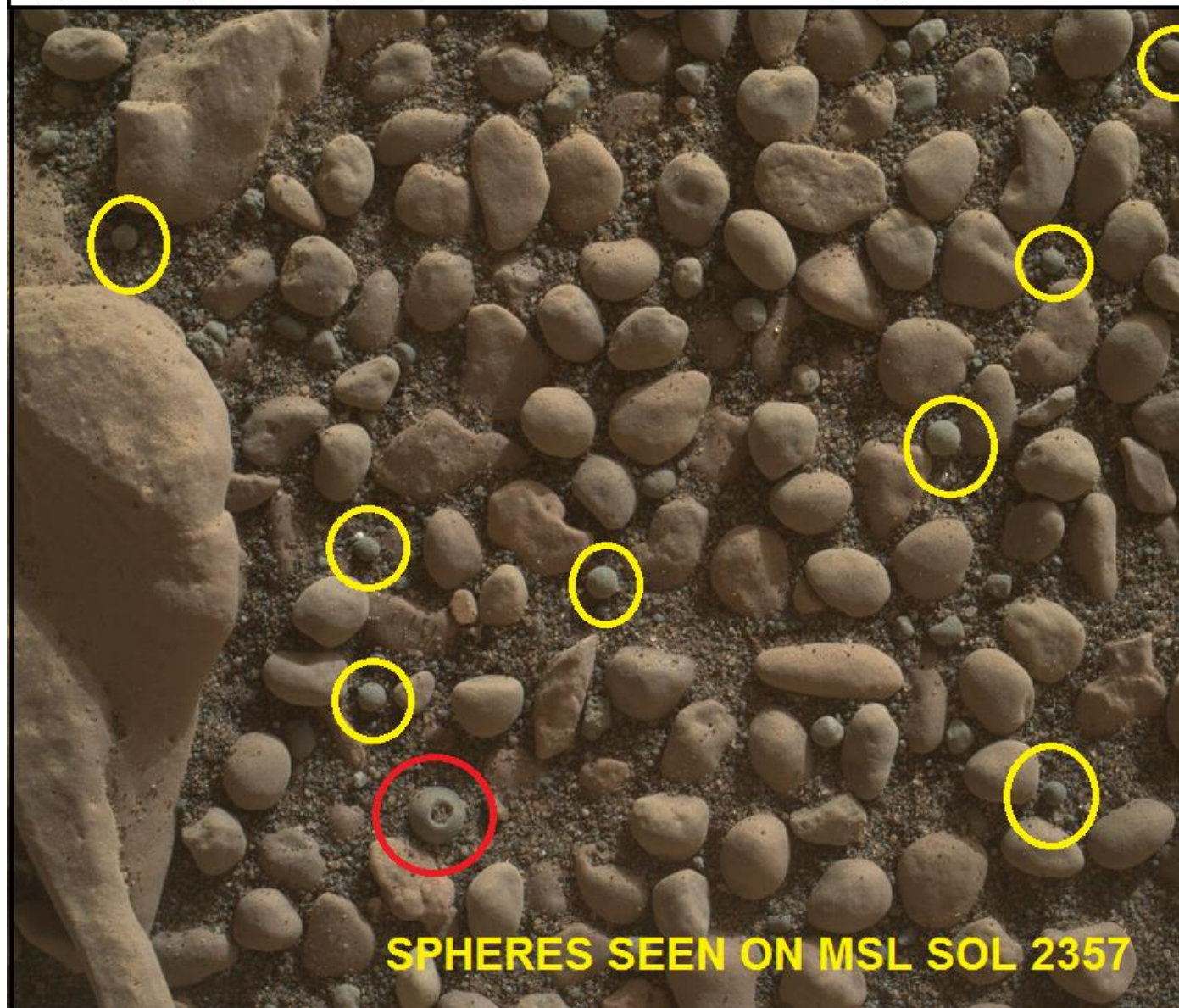


Figure 3 - Puffballs or Hematite? These spheres were seen on Sol 2357.

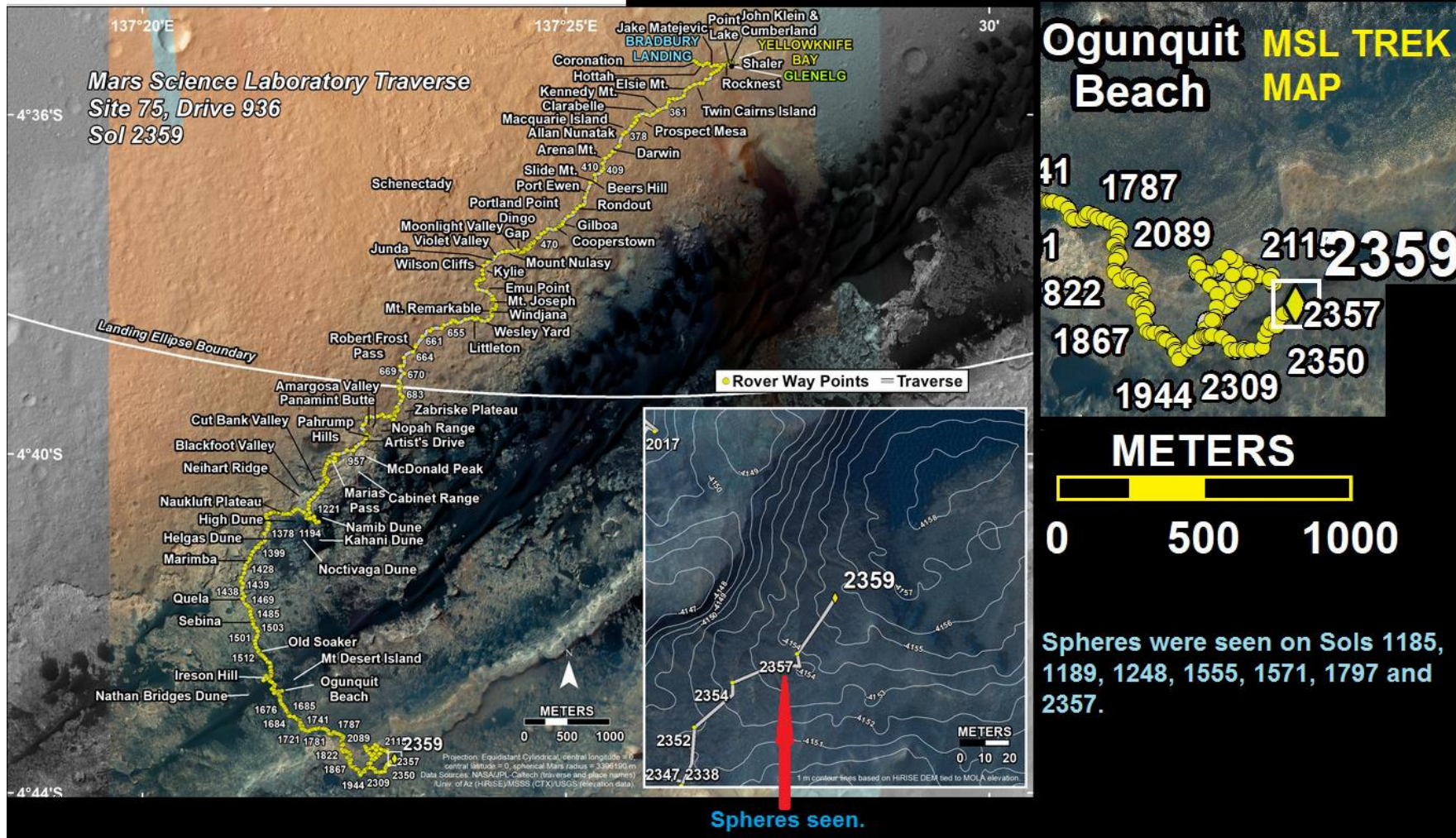


Figure 4 - Trek map for MSL Curiosity with note on when spheres were seen.