MARS CORRECT:
CRITIQUE OF ALL NASA MARTIAN WEATHER DATA

By Barry S. Roffman,
Lieutenant, USCG-Retired
January 29, 2015
Why go to or care about Mars?

Many think life started on Mars, came here via meteorites

- An asteroid or comet probably wiped out dinosaurs here.
- The last asteroid near miss was January 26, 2015 (diameter 1,800 feet).
- We have all our survival “eggs” in 1 basket (Earth).
- Martian land area = Earth’s, + it has natural resources. We may need it for a future home.
Why go to or care about Mars?

- Mars once had an ocean, and likely life. It may still have life (lower forms likely, past higher forms possible).

- The key to our place in the universe may be on Mars.
- Mars provides science/career goals to make the future exciting to today’s youth.
Air pressure is central to establishing a human presence there. Accepted average pressure 6.1 Mbar at Mars areoid

- Areoid is Mars equivalent of Sea Level.
- Average Earth sea level pressure = 1,013.25 Mbar.
- 6.1 Mbar is nearly a vacuum – no fun to experience.
Martian Sky Color is an Issue.

In the Moon’s vacuum the sky is black.

At high altitudes over Earth, like 83,600 feet (with 11.3 mbar) our sky goes black.
Dust devils on Mars and Earth are similar.
(seasons, electricity, core temperature rises, formation times and often size but they can be much bigger on Mars)

http://www.lpl.arizona.edu/~lemmon/mer_dd/dd_enhanced_587a.gif
Similar dust particle size (a thousandth of a millimeter). But at 6.1 mbar pressure, an impossible 1,118 MPH wind is required to lift dust.
DUST DEVILS ARE THE MOST OBVIOUS WEATHER ANOMALY

With so little air on Mars, how can there be enough change in pressure to form them at all?

Pressure drops associated with 79 convective vortices over 83 sols at Mars Pathfinder. The largest drop in pressure was 0.0477 mbar for the 19th event on sol 34 at 11:32:24.1
Why Question Pressure?

Dust devils even form at a height of 10.6 miles (17 km) on the Arsia Mons mountain where pressure should only be 1/1000 th of Earth's pressure.
Why Question Pressure?

Dust storms enormously increase opacity and air density. Can block 99% of light.

\[
\begin{array}{cccc}
\tau = 0.94 & \tau = 2.9 & \tau = 4.1 & \tau = 3.8 \\
1205 & 1220 & 1225 & 1233 \\
11:14 & 11:04 & 11:30 & 10:55 \\
\end{array}
\]
Phoenix, AZ Dust Storm of 5 July 2011

• Pressure increased by 6.6 mbar — that’s more than average 6.1 mbar pressure on Mars.

• Pressure measured on MSL on 1/29/2013 was 9.25 mbar. That + 6.6 mbar = 15.85 mbar. MSL can’t even measure over 11.5 mbar.
Why Question Pressure?

- Snow on Mars with ice particles in clouds ten times too small for accepted pressure.
Spiral Clouds on Arsia Mons look like Hurricane Eye Walls. 1 mbar seems too low.

These clouds go up to 18.75 miles above the mountain. Pressure should be 0.07 Mbar.
STRATUS CLOUDS 16 KM ABOVE MARS SUGGEST A PRESSURE AT AREOID OF 511 MBAR AND AT HELLIS BASIN HIGHER THAN PRESSURES ON EARTH AT SEA LEVEL.

1. CIRROSTRATUS CLOUDS ARE FOUND ON EARTH UP TO 13,000 METERS HIGH.

2. PRESSURE AT 13,000 METERS IS ABOUT 163 MILLIBARS

3. STRATUS CLOUDS ON MARS AT ALTITUDE OF 16,000 METERS ABOVE MARS PATHFINDER PHOTO TAKEN 1 HOUR 40 MINUTES BEFORE SUNRISE ON 7/19/1997!

4. Pathfinder was 3,682 m below areoid. 16,000 m above that is 12,318 m. Table assumes stratus clouds cannot form at pressures lower than on Earth (163 mbar).
In 2012 from August to September MSL pressures were half a mbar above the expected curve. On Aug 20, 2013 MSL recorded a 11.49 mbar pressure far greater than any pressure ever seen on Mars.

When we pointed out pressures above the curve to NASA, they dropped them back to the curve.
If the dust filter clogged on landing, the rover could have hit something on Sol 370 that jarred a hole in the clot. This could have finally allowed real ambient pressure to be felt for the first time.

**MEAN PRESSURE MEASURED FOR SOL 370 IS CONSTRAINED DATA BECAUSE THE VAISALA TRANSDUCER COULD NOT MEASURE ABOVE 11.5 MBAR!**
REMS Team
NASA/JPL Critical Data changes After Hearing from the Roffman Mars Correct Team.

Pressure reported as 1149 Pa BEFORE we brought it to JPL's attention.

About 7 months after we brought the 1149 Pa pressure to JPL's attention, they changed it to 865 Pa!
While the REMS Team/JPL changed 1149 Pa (11.49 hPa/mbar) to 865 Pa (8.65 hPa/mbar) to cover up the significant pegging out at maximum measurable pressure on Sol 370, as of 1/23/2015 Ashima Research still shows the original data.

Printscreen captured at 1:02 pm on 1/23/2015
Viking pressure spikes (up to 0.62 mbar) at 7:30 am local time were evidence for internal (not external) processes at work.

Note apparent symmetry between 0630 to 0730 and 0730 to 0830 pressure change curves.
Occam's Razor

The simplest solution is usually correct.

This suggests repeatable pressure data should be believed. But, consistent Viking-Pathfinder-Phoenix-MSL pressures data may only exist because they all had pressure sensor air access tubes clog in similar fashion (or because, as was just shown, the data has been altered).
Viking-2 provided pressure data for over a Martian year.

Figures 9A and 9C show that as temperature fell pressure recorded rose.

Figure 9B is 9C inverted to show quality of pressure and temperature link.

Hypothesis: Above annual trend will be matched at the hourly level when RTG heaters are on & increasing pressure behind a dust clot.
Why Trash Occam?

Initial MSL daily pressure also varied in inverse proportion to outside temperature.
Problems with Viking Pressures

*When Viking pressures weren’t stuck,* they varied inversely with outside temperatures. This suggests heating of the gas behind a dust clot that isolated the pressure sensor from Martian air.

![Image of pressure calculation](http://www.1728.com/gaspres.htm)

**Note:**
- $177.19 \text{ K} = -137.128^\circ \text{ F}$
- $255.77 \text{ K} = +0.716^\circ \text{ F}$
FMI knew it had a problem with Phoenix

In 2009 they wrote, "We should find out how the pressure tube is mounted in the spacecraft and if there are additional filters etc." FMI designed the sensor.
TINY DUST FILTERS HAD NO CLEANING MECHANISM

- Dust filters on Vikings, Pathfinder, Phoenix, + MSL likely clogged immediately on landing.
"That we at FMI did not know how our sensor was mounted in the spacecraft and how many filters there were shows that the exchange of information between NASA and the foreign subcontractors did not work optimally in this mission!"

(Kahanpää [FMI] Personal communication, December 15, 2009)
International Traffic in Arms Regulations (ITAR)

“After Phoenix landed... the actual thermal environment was worse than the expected worse case... Information on re-location of the heat source had not been provided due to ITAR restrictions.” (Taylor, P.A., et al, 2009)
Accurate pressure prediction times had a slow drift as seasons changed. 

http://davidaroffman.com/ANNEX%20F%20%20%2024%20OCT%202012.pdf

| V1.1 SOL | 0.02 | 0.06 | 0.1 | 0.14 | 0.18 | 0.22 | 0.26 | 0.3 | 0.34 | 0.38 | 0.42 | 0.46 | 0.5 | 0.54 | 0.58 | 0.62 | 0.66 | 0.7 | 0.74 | 0.76 | 0.82 | 0.86 | 0.9 | 0.94 | 0.98 | V1.1 SOL |
|----------|------|------|-----|------|------|------|------|-----|------|------|------|------|-----|------|------|------|------|-----|------|------|------|------|-----|------|------|------|------|------|
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| 249      | 193  | 194 | 191 | 189  |      | 193  | 192  | 191  |      | 249 |
| 250      | 190  | 189 | 187 | 185  | 187  | 197  | 194  | 194  |      | 250 |

**Blocks in red are within 2% of predictions based on Gay-Lussac/Amonton's gas laws.**

**Formula used is**

\[ P = 6.51 \text{ mbar} \times 255.17K - T_k \]

\( T_k \) measured in cell.

28K Temperature range for accurate pressure predictions this page (185 to 213K).
Hard to explain sand dune features, especially in Martian craters if pressure is as low as advertised.
Why Trash Occam?

- Wind-tunnel trials show a patch of sand would take wind 80 mph to move on Mars (vs. 10 mph on Earth). No lander ever saw wind so high on Mars.


- Grains of sand dotting the rovers' solar panels
- Rovers' track marks filling in with sand.
VL-1 WINDS NEVER REACHED 80 MPH NEEDED TO MOVE SAND. THE HIGHEST WIND EVER SEEN WAS 57.9 MPH.
"Mars either has more gusts of wind than we knew about before, or the winds are capable of transporting more sand."

Nathan Bridges,
Planetary scientist, Johns Hopkins University's Applied Physics Laboratory

Winds of Mars are sufficient to move the collapsed MSL parachute.

Video for the MSL parachute flapping in the wind is found at [http://photojournal.jpl.nasa.gov/figures/PIA16813_fig1_thumb.gif](http://photojournal.jpl.nasa.gov/figures/PIA16813_fig1_thumb.gif).

Data Reporting Fiasco
REMS Reported 6 Days of Earth-like Pressure

Pressure like Earth at 8,192.6 feet above sea level.

100 Pa = 1 hPa = 1 Mbar. Sol 29 was first given as 747 hPa, while Sol 30 was given as 747 Pa (7.47 hPa) after questions by us and others.

ALL WINDS (2 M/S) REPORTED WRONG UNTIL MAY 2013
Data Reporting Fiasco

From August 22, 2012 to April 2, 2013 Ashima reported all sunrises as 6 am and sunsets as 5 pm except Sol 56. All their times were very wrong.

ALL WIND DATA WAS WRONG
One of the REMS Booms broke on Landing. It would have been more honest to list winds as *Not Available.*
We know from the Vikings that there is an enormous amount of variation in winds.

Profile of the windiest Viking day on Mars with the greatest wind gust recorded at VL-1 sol 214.78.
Mistakes were published that raised concerns about basic competence.
We notified JPL that there could not be only 11 hours of daylight at MSL. Finally David Roffman did the math. There is as much as 12 hours 19 minutes of daylight and little as 11 hours 43 minutes. NASA accepted the fix.

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There is never a day at MSL with only 11 hours of daylight and with 13 hours of darkness.
BOGUS GROUND TEMPERATURES?

Boom 1 broke. It alone measures ground temperature but with accuracy of only 18 Fahrenheit.

Guy Webster (JPL) claims: “Damage on landing did not include the Infrared sensor that provides ground-temp information.” But an accuracy of 18 degrees Fahrenheit is almost worthless.
But the weak ground temperature answer did not address altered air temperatures. Who is killing warm days on Mars, and why?

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REMS Relative Humidity Sensor

Only Boom 1 broke on Landing. Why do we see no relative humidity reported from Boom 2? Probably because of calibration problems with the Thermal and Electrical Conductivity Probe (TECP) G.M. Martinez et al., 2013
The REMS Team leaves Relative Humidity off daily reports, but published this on 6/27/2013:
REMS Asserts Huge Changes in Relative Humidity Over Very Short Distances

Relative humidity $\approx 40$ to 60% in landing blast zone.

At Rocknest relative humidity drops from about 58% to $\approx 9\%$ over 50 sols.

Note distance scale. Changes in RH over $\approx 400$ m.

Between Rocknest & Glenelg RH was about 6 to 9%.

At Glenelg RH varies from about 6% to 17%.
If temperature measurements are wrong, as saw earlier, and pressure measurements are wrong, RELATIVE HUMIDITY READINGS WILL BE WRONG TOO.
September 26, 2013:
JPL Announces Martian Soil is 2% Water.

• There are 2 pints of water in every cubic foot of soil.

• If pressure was as low as NASA claims, water should have evaporated out of the soil, not absorbed it from the atmosphere.
Attitudes at REMS

- Seemed oblivious to mistakes pointed out.
- May have a real problem understanding English. In January, 2013 its “English” reports started having abbreviations for the month that read “ene” (a Spanish abbreviation for Enero (January)). Here a comma is used rather than a decimal point.

- Published 9 months of wrong wind data until we asked JPL to fire them in May, 2013. Then they stopped carrying wind data.
What aspects of MSL Weather Reports are or were known to be flawed?

2. Constant winds.
3. Relative Humidity.
4. Sol numbering and air temperatures.
5. Early wrong month labeling (3 vs. 6) = wrong place in orbit & wrong distance from the sun.
6. Exact ground temperatures issued when accuracy (18 F) was worthless.
7. Pressure units used August 30 To Sept. 5, 2012 (confusion by REMS between hPa and Pa); and pressures off the curve in 2012 and 2013.
Why Trash Occam?

- Weather doesn’t match low pressure values
  - Dust Devils
  - Dust Storms
  - Eye walls on huge storms over Arsia Mons
  - Stratus clouds at 16 km.
  - Too much sand movement for low pressure
  - Light in the sky 1 hr 40 min before sunrise and after sunset. Just due to high dust, or a denser atmosphere?
Why Trash Occam?

- Viking data suspicious due to exact repeat over 4 yrs. Ditto for MSL shown on the graph below.

This graph does not include initial pressures reported for Sols 25 to 29 that were 100 times higher (742 to 747 hPa rather than Pa) or for Sol 370 (1149 Pa).
WHY TRASH OCCUM? MRO AEROBRAKING

“At some points in the atmosphere, we saw a difference in the atmospheric density ... 30% higher than the model, but ...

around the south pole

it was 350% off the model.”

Han You,
Navigation Team Chief for
Mars Reconnaissance Orbiter (MRO).
Why Trash Occam?

SPICAM spectrometer on ESA's Mars Express spacecraft reveal Mars air is supersaturated with water vapor (29 Sep 2011).

10 to 100 times more \( \text{H}_2\text{O} \) than expected at 20 to 50 km. Partial pressures imply denser air too.

http://sci.esa.int/science-e-media/img/be/MEx_water_vapour_animation_400.gif
WHY TRASH OCCAM?
MGS Dynamic Pressure Spike @ 121 km (75 miles altitude) Due to Dust Storms.
Pressure Doubles in 48 Hours, Up 5.6 Fold in 4 Weeks.

MARS GLOBAL SURVEYOR AEROBRACING AT MARS

Dynamic Pressure ($q_0$) @ Periapsis (N/m$^2$)
(Normalized to an Altitude of 121 km)

Pre-storm
Post-storm

Noachis "Regional" Dust Storm

SIMILAR PRESSURE CHANGE AT SURFACE???
Why Trash Occam?

- Pathfinder anemometers (wind sensors) went uncalibrated.
  - True again with MSL.

- Phoenix & MSL transducer design problems. FMI delivered the MSL pressure sensor to NASA in 2008 (before ITAR problems could be fixed)!
  http://space.fmi.fi/solar.htm

- No pressure sensors could measure > 18 mbar (two could only go up to 12 mbar, and MSL is limited to 11.5 mbar.)

- No way to change Viking, MPF, Phoenix & MSL dust filters that could clog.
There is an issue with which Tavis Pressure Transducers were actually sent to Mars.

For Pathfinder, the 0.174 PSIA is believed to be what was sent. The 15 PSIA transducer is good for Earth-like pressures, but why was it ordered?
Are JPL errors just mistakes, or deliberate? Disinformation requires a motive. Do radioactive isotopes on Mars point to it?
Brandenburg Hypothesis & Evidence for a Nuclear Explosion on Mars

- High concentration of $^{129}$Xenon.
- Evidence from $^{80}$Kr of intense neutron radiation
- Abundance of Uranium and Thorium on Mars surface
- Reactor on a km scale. Concentrated U and Th oxides similar to fossil reactors in Oklo, Africa.
- Reaction bred $^{233}$U and $^{239}$Pu. It went critical when water boiled out.
- The site at Mare Acidalium has no crater, only a large scorch mark similar to what is seen after a nuclear airburst, which is not a natural event.
Cydonia and Dr. Brandenburg’s two hypothetical nuclear detonation sites

The dark scorch mark of Acidalia Planitia (Mare Acidalium) is just northwest of the famous "face" at Cydonia which is at 40.8° North, 9.6° West.

Nili Fossae, Syrtis Major and Terra Sabae are areas where methane plumes, possibly related to life, have been found.
Where is the full report?

The Basic Report and all Report Annexes are maintained at
http://davidaroffman.com/catalog_1.html

We maintain the original MSL Daily Weather Record at
http://davidaroffman.com/photo4_28.html and the newer (corrected) record
at http://davidaroffman.com/photo4_33.html

CRATER LAKE, OREGON
(Maximum diameter = 9.7 km, Maximum depth = 594 meters,
average height of rim above lake = 305 meters)

VASTITAS BOREALIS, MARS
(Maximum width = 35 km)
Imaged centered at 70.1° North latitude,
103.21° East longitude