Artist's Misconceptions

Reality vs. Depictions of the Lunar Surface

Dan Britt

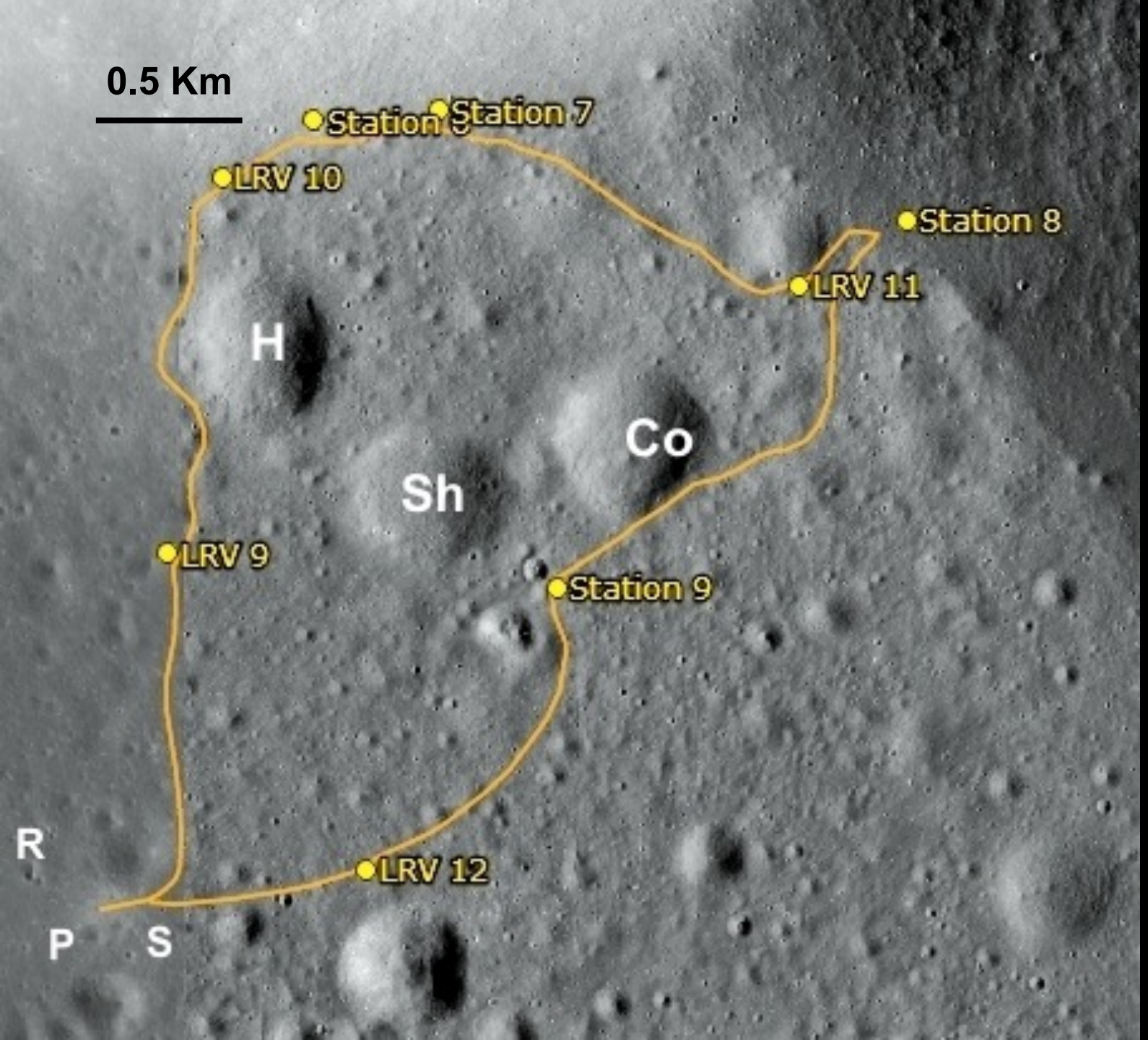
University of Central Florida

Center for Lunar and Asteroid Surface Science (CLASS)

Artist's Misconceptions

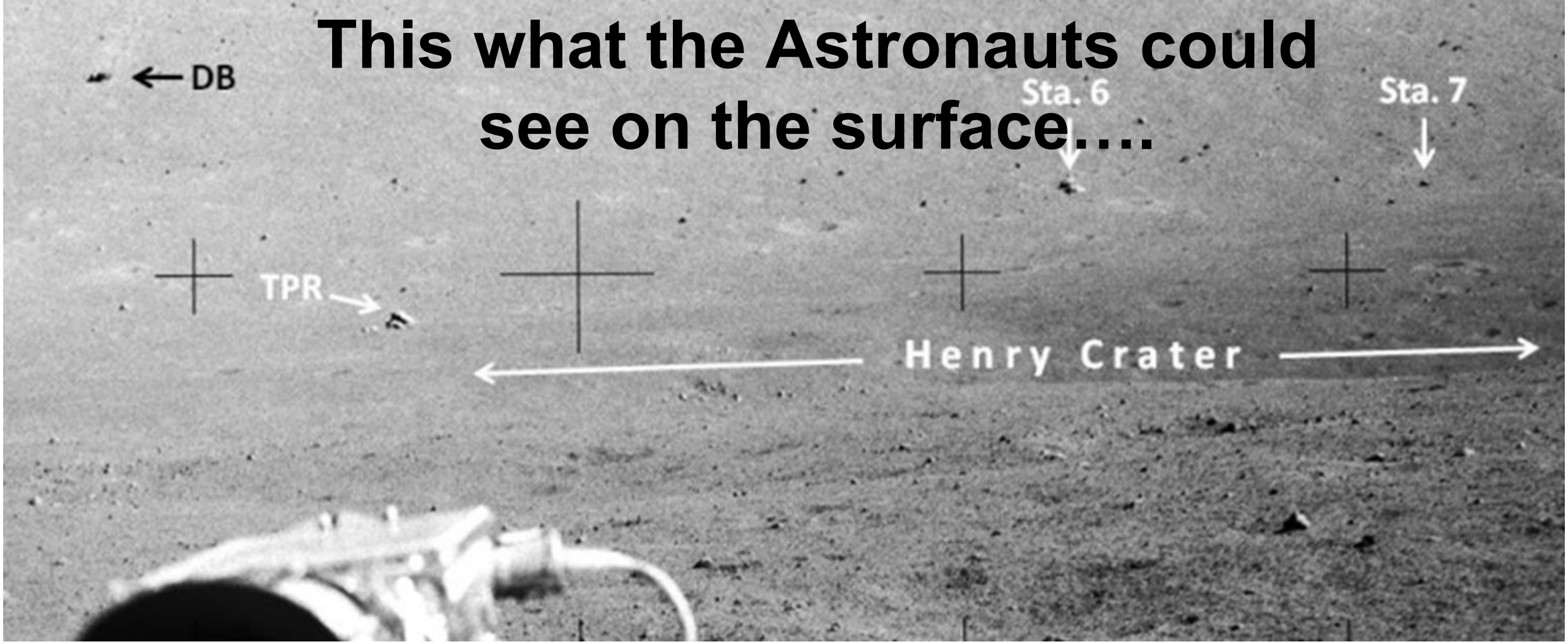
- A flat, crater-free, dustless Moon is a staple of NASA, ESA, other space agencies, and commercial company's press releases.
- Let's land on this Moon! It will be way safer!

Concept art of Artemis Base Camp

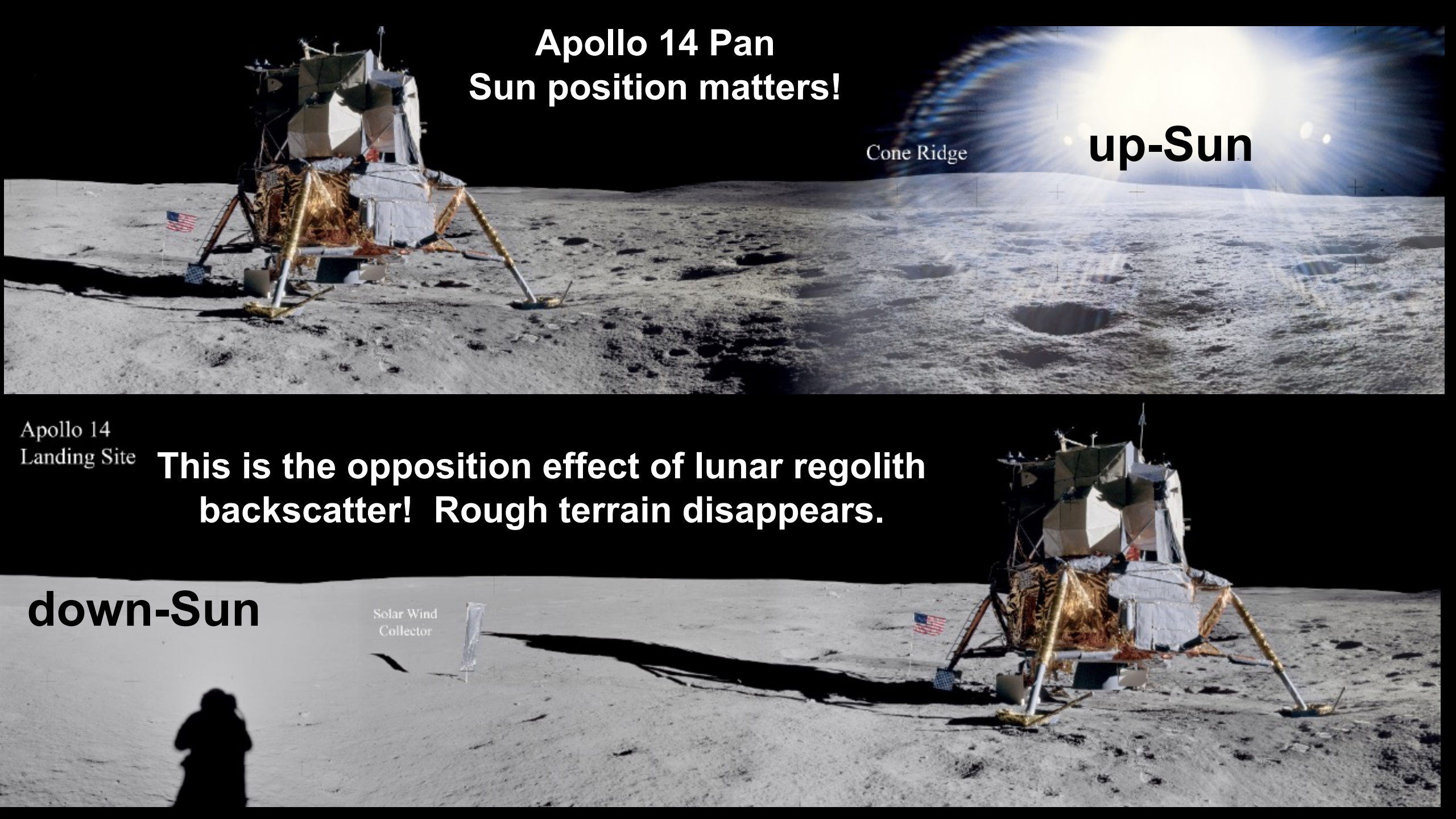


- This is Apollo 17's third EVA from orbit.
- Note the heavy cratered surface and H (Henry) crater

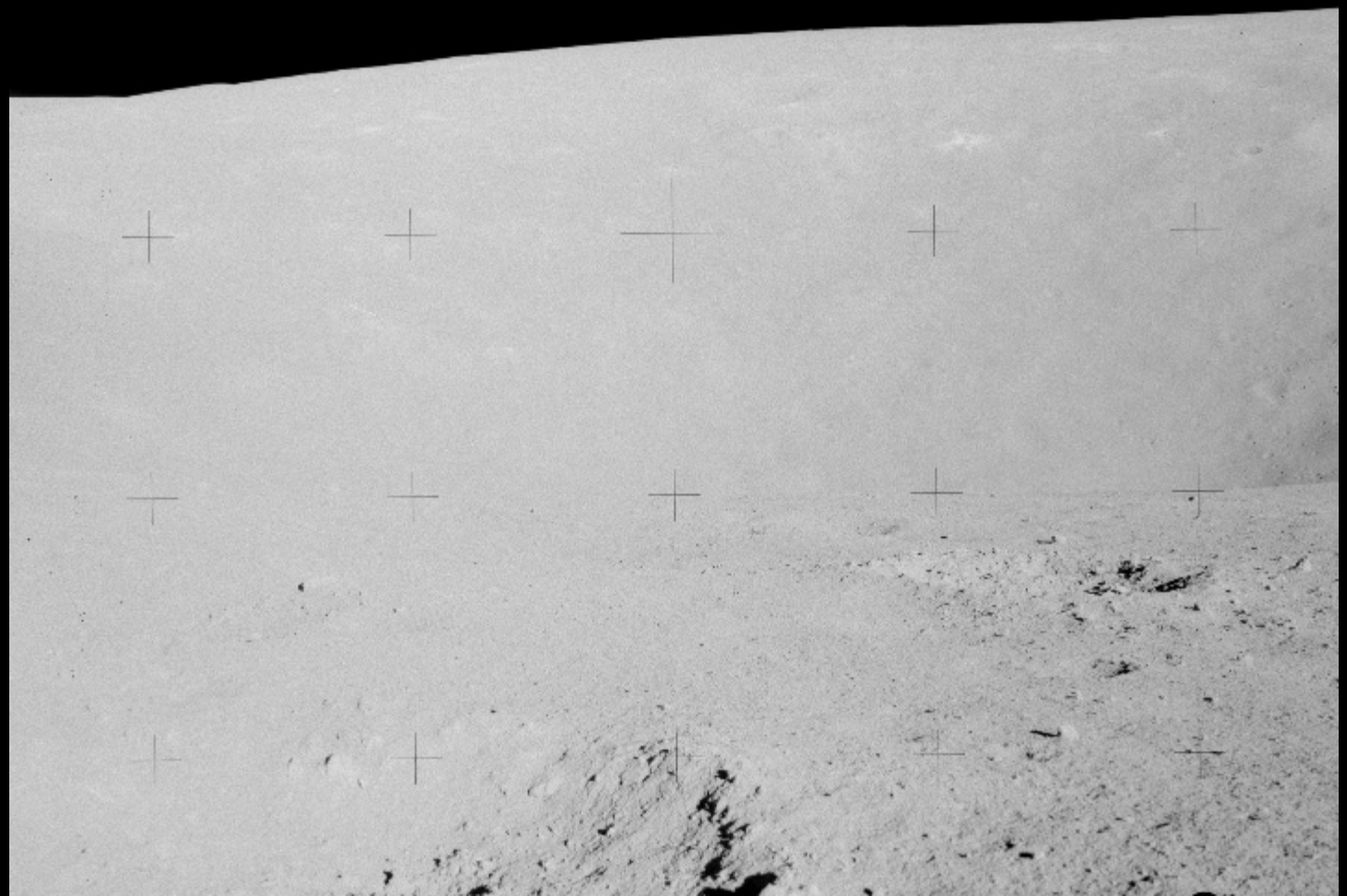
This what the Astronauts could see on the surface….



- The Sun angle washes out the rough terrain.
- Almost all the pictures taken from the surface give the (very false) impression of a flat, gentle terrain.
- The reality is that the Lunar surface is heavy cratered, rough, very dusty, and covered in Regolith.


Apollo 14 Pan
Sun position matters!
Cone Ridge
up-Sun
Apollo 14
Landing Site
This is the opposition effect of lunar regolith
backscatter! Rough terrain disappears.
down-Sun
Solar Wind
Collector

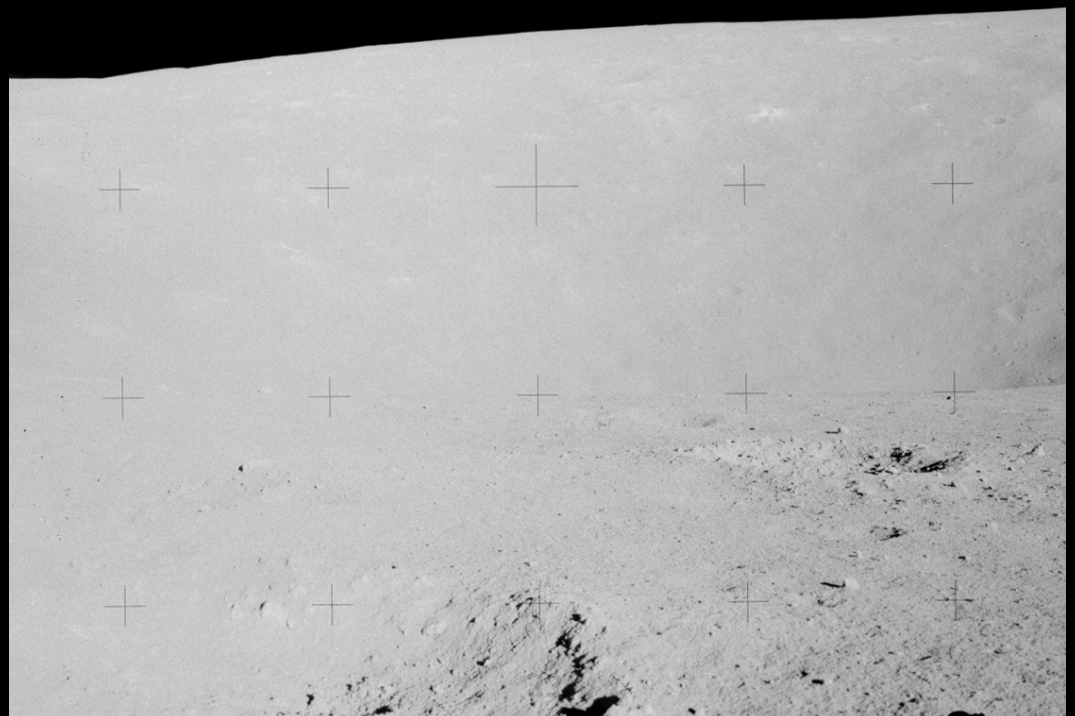
Apollo 16-Traverse #1
The terrain looks just fine…..



Apollo 16-Traverse #1
Except it is not! Big Crater…..

Most Apollo surface images were taken “down-Sun” because looking “up-Sun” was hard.

This leaves a very false impression of a flat Moon with gentle terrain.



We see the misconception of a flat, gentle Moon everywhere

ARTEMIS
ELEMENTS
& SYSTEMS

Artist concept of the
Habitable Mobility Platform


ARTEMIS
ELEMENTS
& SYSTEMS
I love the idea of landing and operating on a Moon without dust, small craters, and rough terrain

Commerical Providers are Just as Bad….

No dust, almost no small craters, no tipping problems.

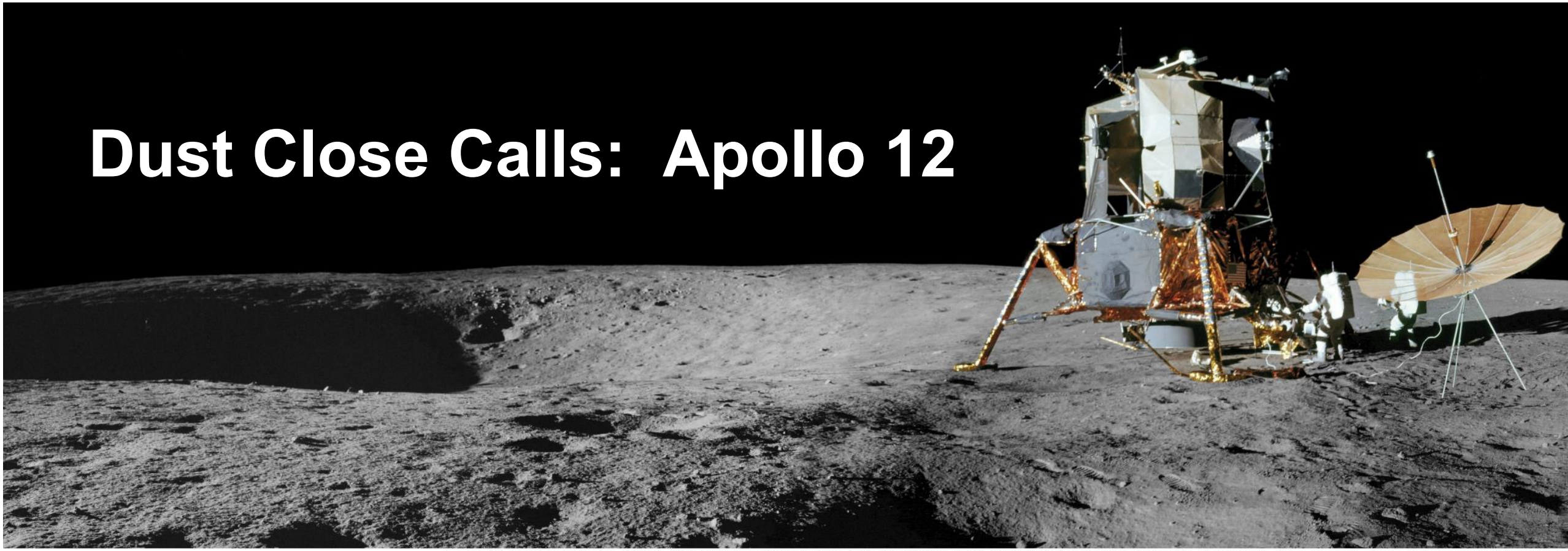
Yes, these are “artist’s impressions”….but somebody is telling the artists what to draw.

….and they are getting it wrong.

The flat, dustless Moon is not the one we are sending Artemis to!

- Rough terrain, pervasive dust, regolith unlike anything in the terrestrial environment. These are the facts of life in Lunar Ops (from Apollo 16).

Dust Close Calls: Apollo 12



Apollo 12, Ocean of Storms, EVA 1, 19 November 1969, frames A12-46-6746 to A12-46-6751 : Apollo 12 landing site showing the deep shadow on the eastern wall of Surveyor C

- ***"The dust went as far as I could see in any direction and completely obliterated craters and anything else… I couldn't tell what was underneath me. I knew I was in a generally good area, and I was just going to have to bite the bullet and land, because I couldn't tell whether there was a crater down there or not."*** **Pete Conrad-Apollo 12 debrief**

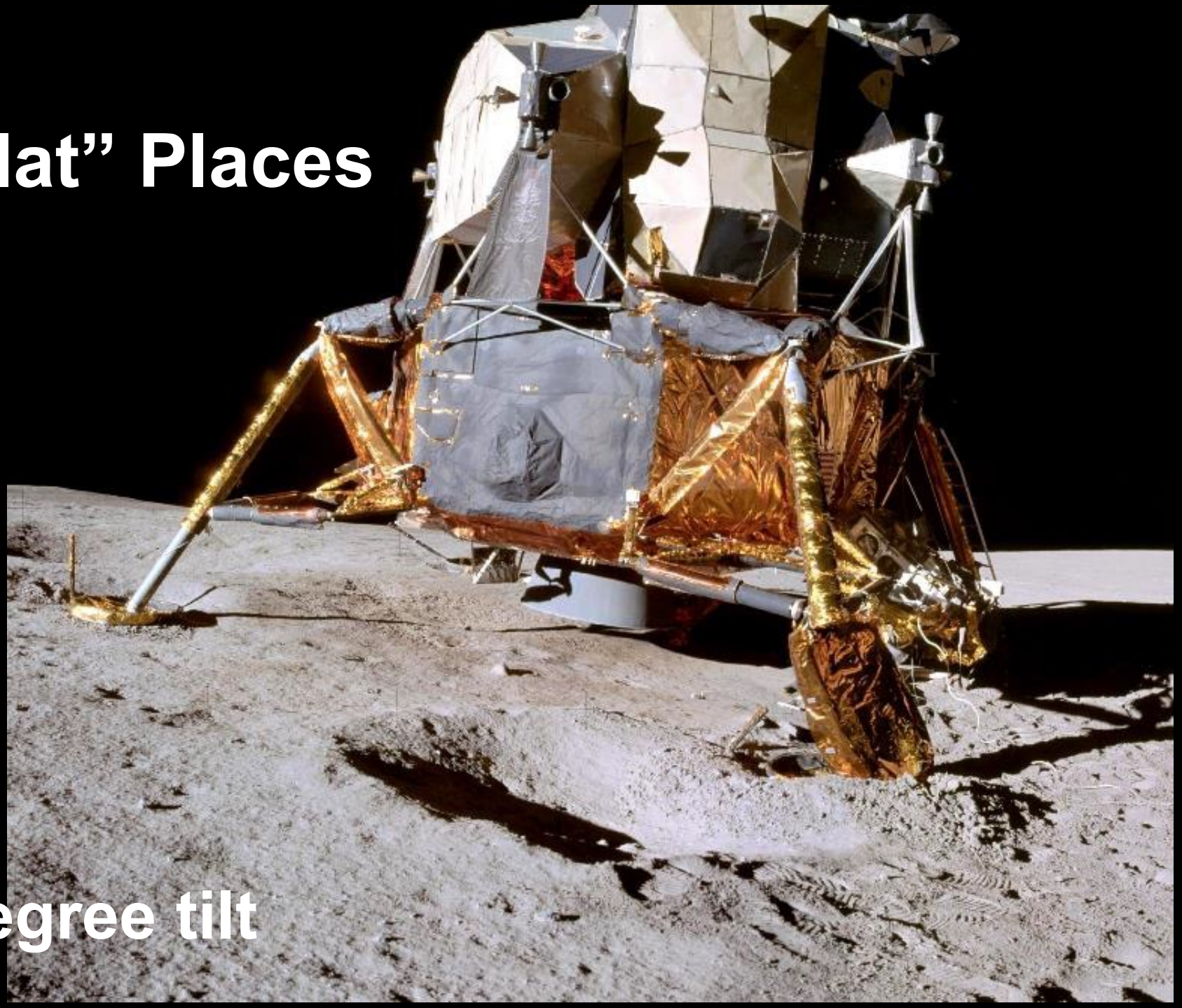
Landing on ”Flat” Places

- Apollo was pretty lucky, but 3 out of 6 had tilt problems.
- Apollo 12 and16 landed on the edge of big craters
- Apollo 11 had to dodge a boulder field
- Even small craters can be meters deep

Apollo 15 11-degree tilt

The down-Sun terrain looks pretty flat….but it’s not!

Landing on ”Flat” Places



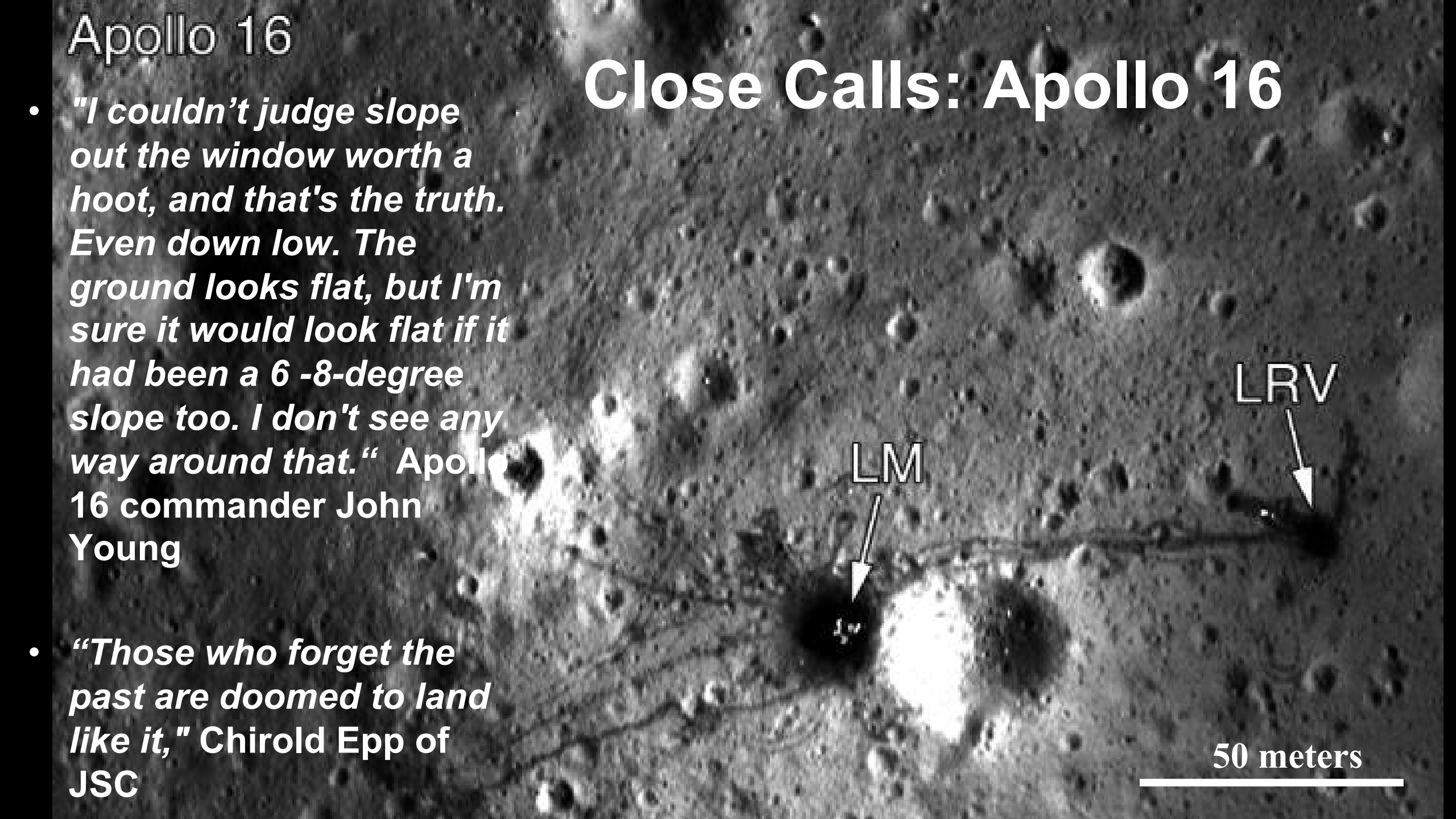
Apollo 14 7-degree tilt

Apollo 16

Close Calls: Apollo 16

- *"I couldn’t judge slope out the window worth a hoot, and that's the truth. Even down low. The ground looks flat, but I'm sure it would look flat if it had been a 6 -8-degree slope too. I don't see any way around that.“* Apollo 16 commander John Young

- *“Those who forget the past are doomed to land like it,"* Chirold Epp of JSC



Dust!

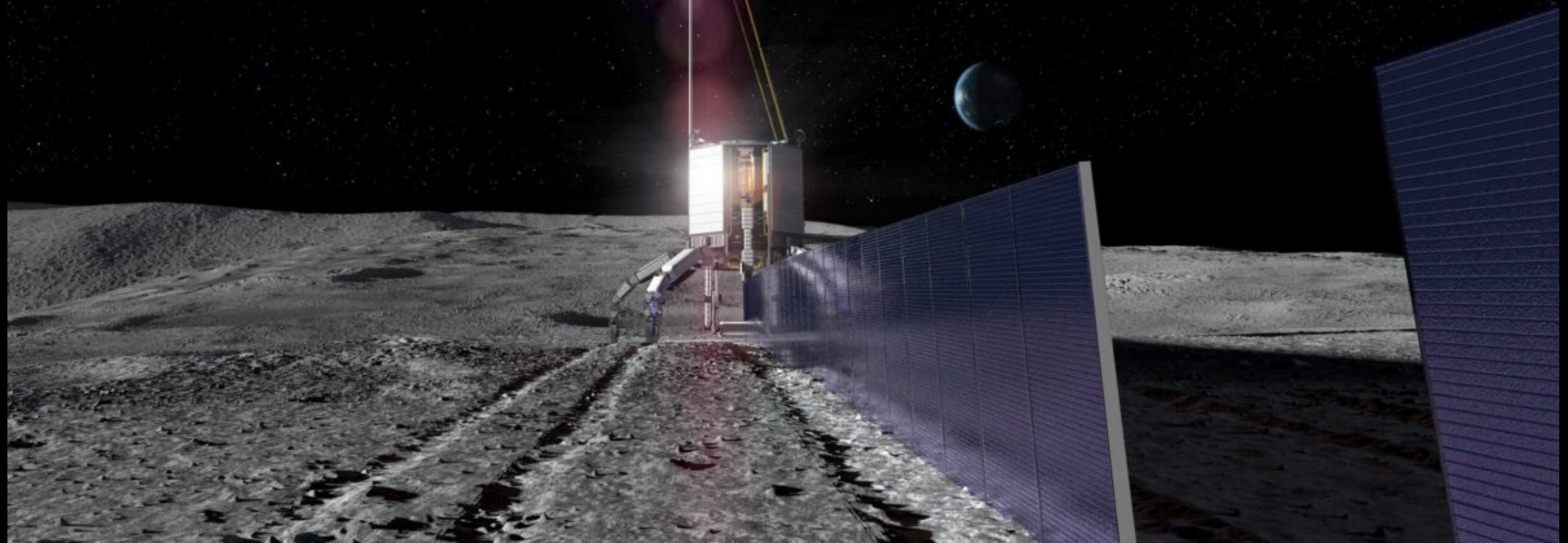
- Dust is a fact of life in Lunar ops. It gets EVERYWHERE!

Blue Origin MRE Reactor

What's wrong with this picture?

Missing:

- **Small craters**
- **Dust**
- **Dirty equipment**




Missing:
• Small craters
• Dust
• Dirty Astronauts
• Dirty Equipment
What's wrong with this picture?

NASA Moonbase Phase 3

What's wrong with this picture?

Missing:

- Small craters
- Dust
- Dirty Astronauts
- Dirty Habitats
- Dirty Equipment

The flat, dustless Moon is not the one we are sending Artemis to!

Why should we care about Artist's misconceptions?

- We are telling the public the Moon is easy….it is NOT!
- I wish I could say that engineers and mangers know better….. But they don't.
  - We are training a generation of engineers to not worry about terrain.
- If the artists are getting it wrong, it is our fault.
- **Let's stop fooling ourselves!**