

NSS North Houston Space Society

Space News

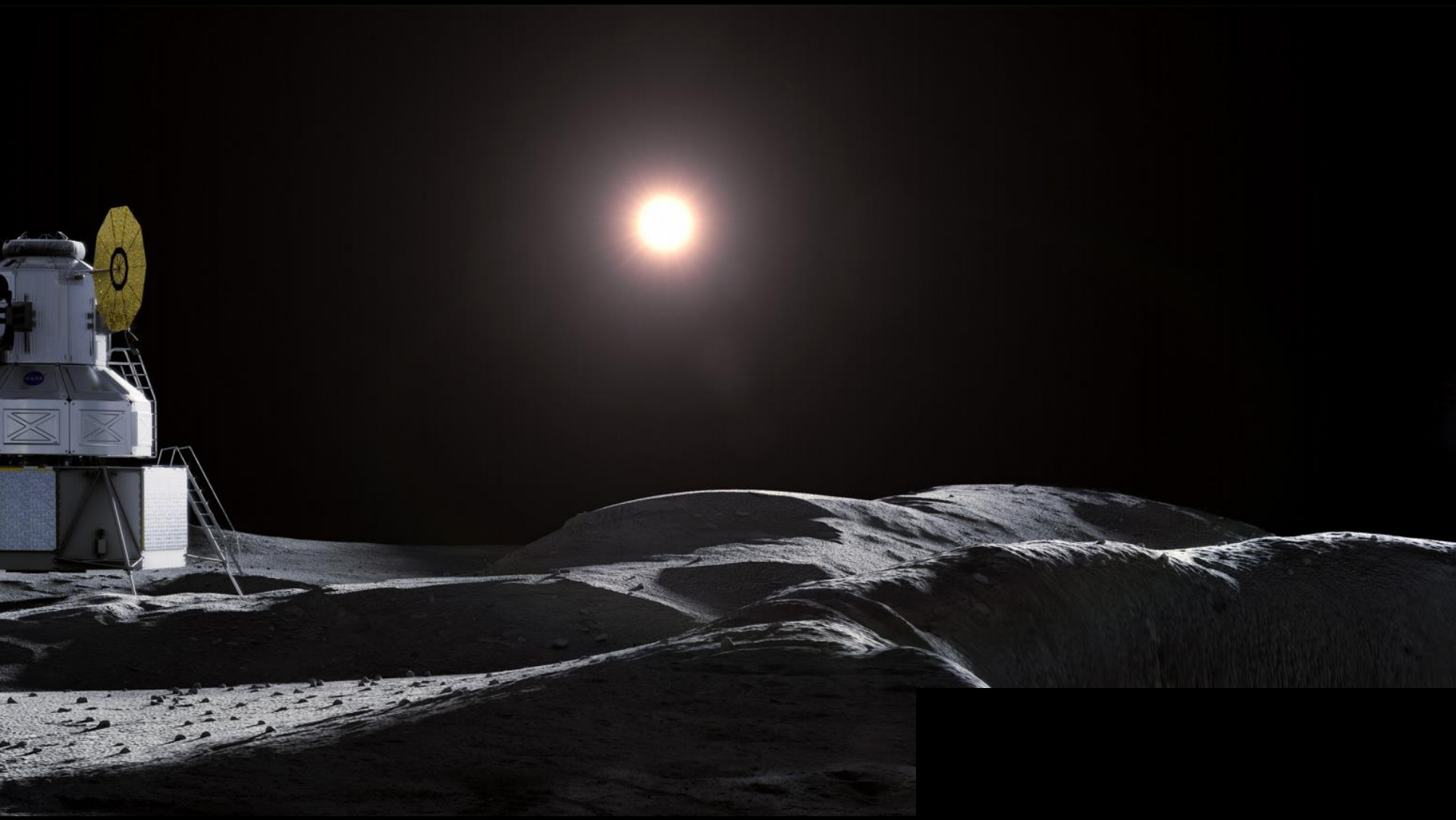
October 3, 2020



Greg Stanley



NASA lunar news



NASA Artemis program

- Artemis = twin sister of Apollo, goddess of the Moon
- Return astronauts to the moon in 2024
- Longer-term: permanent presence, in-situ resource use
- “Moon to Mars” emphasizes Moon missions as proving ground



HUMANITY'S RETURN
TO THE MOON

NASA released a new Artemis plan

- NASA released 5-year, \$28 billion phase 1 plan
- Phase 1 returns astronauts to moon by 2024
 - SLS (Space Launch System) rocket
 - Orion space capsule
 - HLS (Human Landing Systems) (to be chosen from 3 service providers)
- Phase 2 for long-term presence includes Gateway, base camp
 - Launch of 2 Gateway modules starting in 2023
- NASA warning: timing depends on \$3.2 B for HLS this year
- NASA now hedging on Artemis landing sites
 - Astronauts might not go to lunar south pole at first
 - South pole is strategic: water in crater, etc.

Artemis launches in phase 1

Credit: SpaceX

- Artemis 1: SLS/Orion 1-month test (Nov 2021)
 - Orbit the moon, return to earth (no astronauts)
 - Deploy 13 6U Cubesats for science, resource analysis, etc.
- Artemis 2: SLS/Orion 10-day mission (2023)
 - Orbit the moon with 4 astronauts (no landing)
 - Secondary payloads TBD
- Artemis 3: SLS/Orion/lander (2024)
 - 4 astronauts fly to lander already positioned by commercial launch
 - Land, stay 1 week, return
- Robotic landers starting in 2021, as CLPS contracts
 - Commercial Lunar Payload Services, total of \$2.6B through 2028
 - Contracts with commercial service providers, currently at 14
 - Includes rovers, scientific instruments for resource surveying, etc.
 - Prepositioning supplies for astronauts
 - Expect 2 flights/year



NASA plans to buy lunar dirt

- NASA issued RFP (Request For Proposals) to purchase lunar dirt from commercial companies
 - Deliveries of 50-500g on moon by 2024
 - Expecting to pay \$15,000 to \$25,000 each
- Kick start a market for extracting off-earth resources
- Establish precedent/regulatory certainty for a predictable investment environment for mining, transferring ownership of extraterrestrial material



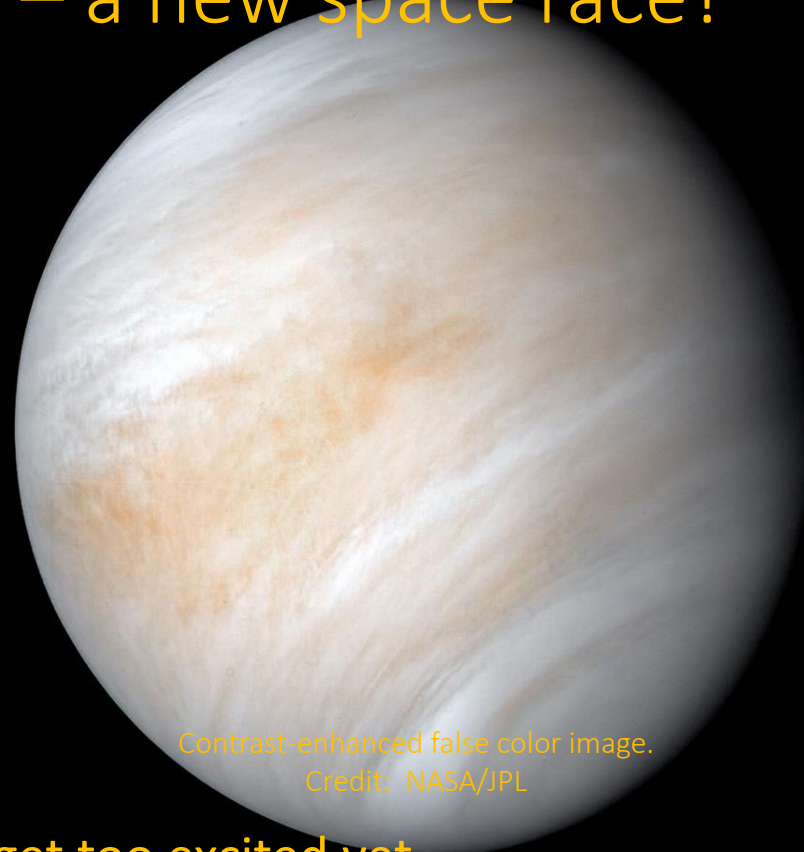
NASA lunar dirt purchase plan: treaty issues

- Consistent with 1967 Outer Space Treaty
 - No country can own off-earth land
 - Signed by 110 countries including the US, UK, China, Russia
- Inconsistent with 1979 Moon Treaty treating the moon as a “global commons”
 - Rejected by US, China, Russia, Japan, most European countries
 - Signed by only 18 countries including France, India
- NASA earlier this year outlined “Artemis Accords”
 - Peaceful exploration, transparency, interoperability, emergency assistance, registration of space objects, public release of scientific data, resource extraction, space debris mitigation
 - At a minimum, will be used with Artemis partners

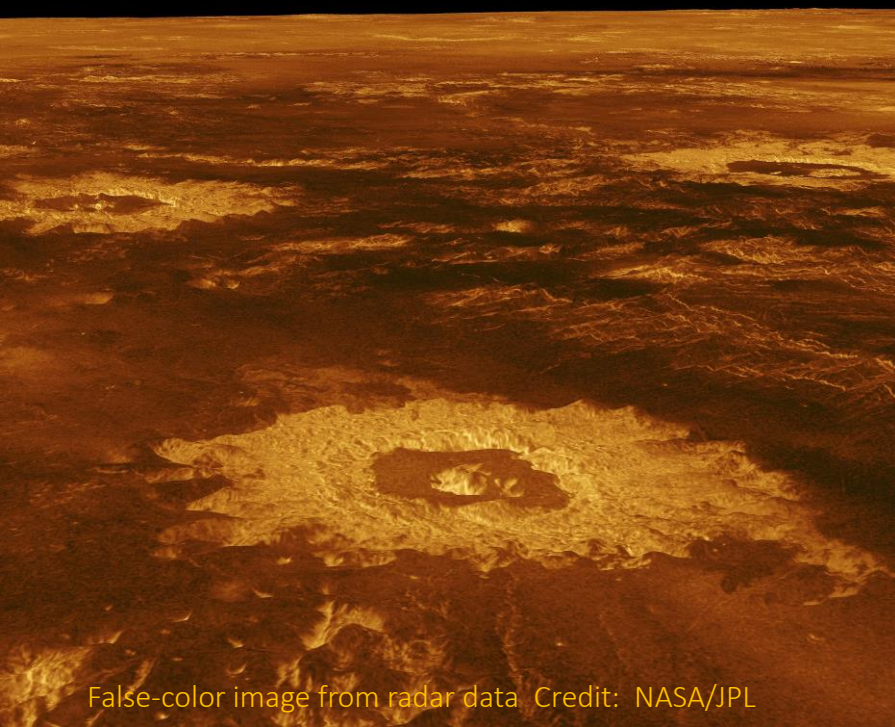


Venus gets renewed interest – a new space race?

- Astronomers found phosphine, which might be a product of life, in Venus clouds > 30 miles up (where it's cool)
- Rocket Labs (NZ/US) launching a private Venus mission in 2023
 - 60 lb. payload to the atmosphere
 - Similar rocket to \$10M 2023 lunar orbiter
- “*Venus is a Russian planet*” (Rogozin, head of Roscosmos)



Contrast-enhanced false color image.
Credit: NASA/JPL



False-color image from radar data. Credit: NASA/JPL

- Don't get too excited yet
 - Link between microbes and phosphine on Earth not clear – is it a valid biosignature?
 - Phosphine also exists on Jupiter, Saturn
 - Chemical reaction knowledge limited
 - Only one spectral line of several was found
 - Clouds are sulfuric acid
 - Surface: 90 atmospheres, 750 °F

How many launches since the last meeting (Sept 5)?

*This includes failed launches only if they lift off the launch pad
and only includes launches that attempt going into orbit*




Launches Since Last Meeting (September 5, 2020)

 Oct 2 – Antares/Cygnus (Northrop Grumman) – ISS cargo arriving Oct 5

 Sep 28 – Soyuz – 3 communications satellites, 19 smaller rideshares


 Sep 26 – Long March 4B – 2 environmental satellites

 Sep 21 – Long March 4B – Oceanography satellite

- 1st stage equipped with fins to guide descent (and not fall on Chinese villages)

 Sep 14 – Long March 11H – 9 small (88 lb) earth observation satellites

- Launched from a ship

 Sep 12 – Kuaizhou 1A – earth observation satellite - FAIL

- Small launcher, solid fuel, based on truck-mounted military technology

 Sep 11 – Rocket 3.1 (Astra) from Kodiak Island, Alaska – test - FAIL

 Sep 7 – Long March 4B – another Earth observation satellite

Part of a deployment of small satellites (Soyuz – Russian)

- Cubesats can use spring-loaded launchers



Artist's illustration of small satellites deploying from Soyuz rocket's upper stage. Credit: Exolaunch

Featured Speaker: Richard D. Easton

- Science and technology journalist
- Author of book: **GPS Declassified: From Smart Bombs to Smartphones**
 - Explores dual paths into space
 - Military and secret
 - Scientific and public
 - A peek behind the scenes at pivotal events in GPS history

