[An online publication of the Milwaukee Lunar Reclamation Society,
a chapter of the Moon Society and of the National Space Society
as well as an "Outpost" of the Mars Society]

>> All past issues of Outbound are online at:
http://www.moonsociety.org/publications/outbound/

OUTBOUND #30, MAY, 2020
(plus APRIL 2020 postscript)

Is this the end of Humanity? The Covid-19 plague! I've figured it out

Sunday, April 5, 2020, 2:46 pm
from **Peter Kokh** (kokhmmm@aol.com)

500 some years ago, North and South America were populated by natives. Columbus called them Indians, because at the time Europeans did not know that North and South America existed and so Columbus thought he had landed in India.

Well the "Indians" weren't too happy about Europeans taking over their two continents and putting them on reservations

Now this is happening again, people from another star system, seem to have found another world to settle, our Earth, and what is happening now is that they have strewn all over the Earth's surface a super virus which in time should get rid of us humans and then this could become their new world.

Spread the news! We have to know what we are up against if we want tout a stop to it! We can't let the do this! *Peter Kokh* [End of April 2020 postsript.]

Two Russian satellites are stalking a US spysat in orbit. The Space Force is watching. (Report)
https://www.space.com/russian-spacecraft-stalking-us-spy-satellite-space-force.html

See the Evolution of SpaceX's Rockets in Pictures
https://www.space.com/40547-spacex-rocket-evolution.html

What's next for Solar Orbiter after its historic launch to the Sun
https://www.space.com/solar-orbiter-launched-whats-next.html

It will take Solar Orbiter about two years to reach its operational orbit around the Sun, where it will capture unprecedented views of our star's North & South poles. But the spacecraft still has plenty of work to do before it can start working on its science goals. Here's an overview of what's next for Solar Orbiter.

Space Force gets $15.4 billion in 2021 budget request
https://www.space.com/space-force-2021-budget-request.html

2021 NASA budget proposal axes 2 telescopes, 2 Earth science missions & STEM grants
https://www.space.com/nasa-2021-budget-cuts-earth-science-telescopes-stem.html

Iran satellite launch fails to reach orbit
https://www.space.com/iran-satellite-launch-failure-zafar-1.html

To find alien life, we should focus on white dwarf stars
https://www.space.com/search-alien-life-white-dwarf-stars.html
We know that life can appear around stars like our sun, and we know that stars like our sun will turn into white dwarfs(small, dense stars that are stellar core remnants approximately the size of planets) at the end of their lives. So, perhaps we should be focusing our search around white dwarfs.

Our Sun will never look the same again thanks to two solar probes and one giant telescope
https://www.space.com/three-big-missions-spotlight-the-sun.html

'Planetary simulator' could help identify habitable alien worlds
https://www.space.com/climate-models-for-alien-worlds.html
Scientists have much less data about what the climates of alien worlds could be like, and astronomers don't have a way to get a whole lot more data anytime soon. That's inconvenient, since climate will inevitably shape whether life can exist on these exoplanets and in what way. To try to bridge the gap, scientists are taking models of how Earth's climate works and applying them to other worlds.

Solar Orbiter launches on historic mission to study the Sun's poles
https://www.space.com/solar-orbiter-atlas-v-rocket-launch-success.html
Solar Orbiter is a collaboration between the European Space Agency (ESA) and NASA. The mission is expected to return unprecedented data and images, as well as our first views of the sun's polar regions, and the team of people behind it are thrilled.

Space Force: What will the new military branch actually do?
https://www.space.com/united-states-space-force-next-steps.html
The Trump administration established the Space Force as a separate military branch in December 2019.
Since then, America's Space Force has gotten its own official "Star Trek"-esque seal, with a logo being developed. Recently unveiled was a traditional camouflage uniform adorned with a blue "U.S. Space Force" nameplate on the chest and a full-color flag on the left arm. ###

Mars two mini moons, Phobos and Deimos
What we can do with them that speeds up Mars settlements?
Settlements Statistics (size, distance from Mars, orbit times

Slowing Deimos *so that it is always above* ***Pavonis Mons*** *Settlements on Mars' Equator*
(MMM articles) cable transit with possible collision by Phobos?
How that is handled, used mostly for Cargo

10 Exoplanets That Could Host Alien Life
https://www.space.com/18790-habitable-exoplanets-catalog-photos.html

7 Ways to Discover Alien Planets

https://www.space.com/20941-alien-planet-detection-techniques-countdown.html

The Strangest Alien Planets in Pictures

https://www.space.com/159-strangest-alien-planets.html

Massive asteroid Pallas has a violent, cratered past, study reveals

https://www.space.com/asteroid-pallas-craters-violent-history.html

Our best view yet of Pallas, the largest asteroid not yet visited by a spacecraft, reveals an extraordinarily violent history with numerous impacts, most likely due to its unusual orbit, a new study finds.

In 1802, Pallas became the second asteroid ever discovered. Named after Pallas Athena, the Greek goddess of wisdom, Pallas is the third most massive asteroid ever discovered, comprising an estimated 7% of the mass in the solar system's asteroid belt. This asteroid has an average diameter of about 318 miles (513 kilometers), which is about 15% of the diameter of the Moon.

Much remains unknown about this large asteroid. To shed light on Pallas' many mysteries, in a new study, scientists used the **S**pectro-**P**olarimetric High-contrast **E**xoplanet **R**esearch (SPHERE) imager on the **Very Large Telescope** in the Atacama Desert in northern Chile to analyze the asteroid's shape & surface in unprecedented detail.

Based on 11 images they captured of Pallas' surface, the researchers discovered that the asteroid is pockmarked with numerous craters ranging from about 18.5 to 75 miles (30 to 120 km) wide. Their computer simulations also suggest that Pallas has about twice as many craters as the largest known asteroid, the dwarf planet Ceres, and three times as many as the second-largest (and brightest) known asteroid, Vesta.

"Pallas is heavily cratered, Its surface might resemble a golf ball." Two giant craters on Pallas — one near its south pole, the other near its equator — hint that the asteroid once experienced giant sideways impacts with projectiles about 37 to 65 miles (60 to 90 km) in diameter. The impact that created the crater near the equator may have formed the family of ***several hundred small asteroids surrounding Pallas, which are less than 12 miles (20 km) wide (and travel with Pallas in its highly inclined orbit around the Sum, which makes it a top***

candidate for an observatory focused on the Sun's northern and southern poles, out of sight from Earth and the Moon..

"We performed numerical simulations to determine the most probable age of the family, which is **1.7 billion years**, and this should correspond to the surface age of Pallas, or at least a substantial part of it," Broz said.

Computer simulations of past collisions in the asteroid belt, conducted as part of this study, suggest that the objects hitting Pallas were also traveling at unusually high speeds, averaging about 25,725 mph (41,400 km/h), compared with the average speeds of about 12,975 (20,880 km/h) for impacts generating craters the asteroid belt.

These high speeds were likely caused by the way that Pallas travels in an unusually tilted and elongated orbit, according to the study. Since fast impacts are more likely to generate craters than slower ones, Pallas' strange orbit likely also helps to explain why the asteroid is so cratered compared with Ceres and Vesta, .

Using their images along with previous estimates of the asteroid's mass, the researchers developed a 3D model of Pallas and found that **Pallas is denser than Ceres but less dense than Vesta.** [Editor: that may make it a better pick for a science lab at the zero-Gravity core.] With this information, the research team suggests that ***Pallas possesses a greater proportion of rock to ice than Ceres.***

Pallas' density, combined with how much the asteroid reflects a specific wavelength of infrared light, additionally suggests that the asteroid is most similar in composition to a kind of meteorite known as a CM chondrite.

Taking all this in mind, it appears to me, (Peter Kokh), that Pallas remains the best pick for **North and South polar observatories focused on the Sun's North and South poles**, as well as for "**a negative zero-G physics laboratory**" in its core. If we find a showstopper for such a project, second in line for such a laboratory would be Vesta, but Vesta's orbit does not take it to points well above, then well below the poles of the Sun. ##

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NASA has a plan for yearly Artemis Moon flights through 2030. The first one could fly in 2021.

https://www.space.com/nasa-artemis-moon-landing-timeline-2021-budget.html
https://www.space.com/33908-space-launch-system.html
https://www.space.com/27824-orion-spacecraft.html

https://www.space.com/nasa-sls-rocket-launch-to-moon-slip-to-2021.html

The first flight of NASA's Space Launch System (**SLS**) **megarocket** and Orion crew capsule — and the first big step in putting astronauts back on the moon — was originally scheduled to launch this year, but the mission is now expected to slip to 2021.

A new document from NASA explaining President Donald Trump's fiscal year 2021 budget request for the agency lists the uncrewed test flight, known as Artemis 1, as scheduled to launch in 2021. Although NASA Administrator Jim Bridenstine and other agency officials have said that an updated launch target has not yet been officially announced. ##

The Artemis Program

The **Artemis program** is an ongoing crewed spaceflight program crewed space flight program carried out predominately by NASA & U.S. commercial spaceflight companies, and international partners such as the European Space Agency(ESA), the Japan Aerospace Exploration Agency (JAXA), and the Canadian Space Agency (CSA) with the goal of landing "the first woman and the next man" on the Moon, specifically at the Lunar south pole region by 2024.[2] NASA sees Artemis as the next step towards the long-term goal of establishing a sustainable presence on the Moon, laying the foundation for private companies to build a lunar economy, and eventually sending humans to Mars.

√ https://en.wikipedia.org/wiki/List_of_human_spaceflight_programs
√ https://en.wikipedia.org/wiki/Private_spaceflight
√ https://en.wikipedia.org/wiki/European_Space_Agency
√ https://en.wikipedia.org/wiki/Lunar_south_pole

Not to be confused with the "Artemis Society"

Artemis Society International served as the meeting ground and educational forum for The Artemis Project. The Society was formed in August 1994 to provide an open door to all supporters and participants in **the Artemis Project's quest to establish a permanent, self-supporting lunar community.** The Society was a non-profit foundation incorporated in the State of Alabama, USA.

At a convention in Las Vegas, Nevada, in 2000, chaired by Peter Kokh, the Artemis Society became the current Moon Society. Kokh had been publishing Moon Miners' Manifesto ("MMM") as the publication of the Milwaukee Lunar Reclamation Society, the Milwaukee, Wisconsin chapter of the National Space Society. It then became the publication also of the Moon Society.

Serving members of both the National Space Society and of the Mars Society

And recently, MMM, began to serve members of the Mars Society in the SE area of Wisconsin, who have not founded a Mars Society chapter. ##

In 1996, February 25th to March 12, 2006, we assembled a crew for a 2 week Moon Society exercise at the Mars Desert Station in SE Utah.

http://legacy.moonsociety.org/moonbasesim/
http://legacy.moonsociety.org/moonbasesim/moonbasesim.html

Our report listed major and minor defects in the design and maintenance of the Mars Society's facility, that should be addressed in designing a first human outpost on Mars or on the Moon.

After Moon Miners' Manifesto #301

Outbound: to the Moon, Mars, and Beyond

After issue #301 of MMM was published, Peter Kokh introduced a new publication, **Outbound: to the Moon, Mars, and Beyond.** ***√ with no set schedule and √ no set number of pages***. Outbound has ***√ no print version, only an online version,*** *putting much less pressure on Kokh*, now 82 (as of 12/11/2019.

And recently, Outbound began serving as a publication outlet for Mars Society members in SE Wisconsin, not enough (only 2 members) to launch a separate chapter. ##

And a set of Books (below)

A Pioneers Guide to Living on the Moon
published by Amazon in **2018**

A Pioneers Gide to Living on Mars
to be published by Amazon **summer 2020**

A Pioneer's Guide to the Rest of the Solar System
(a collection of articles from 30 years of past issues of
Moon Miners Manifesto)
Finally, a book about **"the Omniverse"**
(As vast as our universe is, it can only be one of ***an infinite number of universes***)
Tentative title (what makes everything tick) "**The Omega Factor**" (tentative title)

This “book” is currently an uncounted number of 3x4 inch index cards, and actually is the first book I started to write way back in August 1961 after an “eureka moment” one night while I was then living in London, England, age 23 (now 82). I have yet to compose a list of articles. But as book 3, above, will only be a collection of articles already written, I hope to turn my attention to “The Omega Factor” later this year (2020) or early next year (2021), starting with a brief outline (which may well become longer as I write.) #

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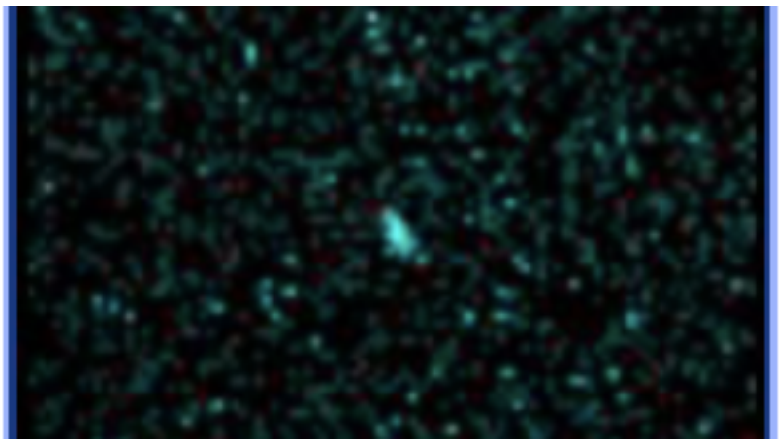


NASA's iconic 'Pale Blue Dot' photo of Earth from space just got a 21st-century makeover

https://www.space.com/pale-blue-dot-earth-space-photo-remastered.html

The first ever "portrait" of the solar system taken by NASA's Voyager 1 spacecraft on Feb. 14, 1990, when the probe was about 4 billion miles (6.4 billion kilometers) from Earth.

About 15% of larger asteroids turn out, on closer inspection, to be “binary” says NASA

https://www.jpl.nasa.gov/news/news.php?feature=7187

New observations by three of the world's largest radio telescopes have revealed that an asteroid discovered last year is actually two objects, each about 3,000 feet (900 meters) in size, orbiting each other.

Near-Earth asteroid 2017 YE5 was discovered with observations provided by the Cadi Ayyad University Morocco Oukaimeden Sky Survey on Dec. 21, 2017, but no details about the asteroid's physical properties were known until the end of June. **This is only the fourth "equal mass" binary near-Earth asteroid ever detected, consisting of two objects nearly identical in size, orbiting each other.**

The new observations provide the most detailed images ever obtained of this type of binary asteroid.

On June 21, the asteroid 2017 YE5 made its closest approach to Earth for at least the next 170 years, coming to within 3.7 million miles (6 million kilometers) of Earth, or **about 16 times the distance between Earth and the Moon**. On June 24, the scientists teamed up with researchers at the Green Bank Observatory (GBO) in West Virginia and used the two observatories together in a bi-static radar configuration (in which Arecibo transmits the radar signal and Green Bank receives the return signal). Together, they were able to confirm that 2017 YE5 consists of two separated objects. By June 26, both Goldstone and Arecibo had independently confirmed the asteroid's binary nature.

The two objects revolve around each other once every 20 to 24 hours. The two objects are larger than their combined optical brightness originally suggested, indicating that the two rocks do not reflect as much sunlight as a typical rocky asteroid. 2017 YE5 is likely as dark as charcoal.

Contact binaries, in which two similarly sized objects are in contact, *are thought to make up 15 % of near-Earth asteroids larger than 650 feet (200 meters) in size, and rotating togehter*

Go to the online page below to watch these two asteroids orbiting each other.

https://www.jpl.nasa.gov/news/news.php?feature=7187

Why this "companionship" is so common, has yet to be explained. The cubic size of these objects and their average distance from one another, combined with their size, will give us their mass, and suggest their makeup, and possibly their source.

It is most likely that the two objects show the same face to each other, which, if close enough, might be bridged *(by a cable)* somehow. Another question is how similar the two bodies in their makeup. Did the two bodies "find one another" or were they once one body which somehow broke in two.

Would this be an advantage for future human uses?

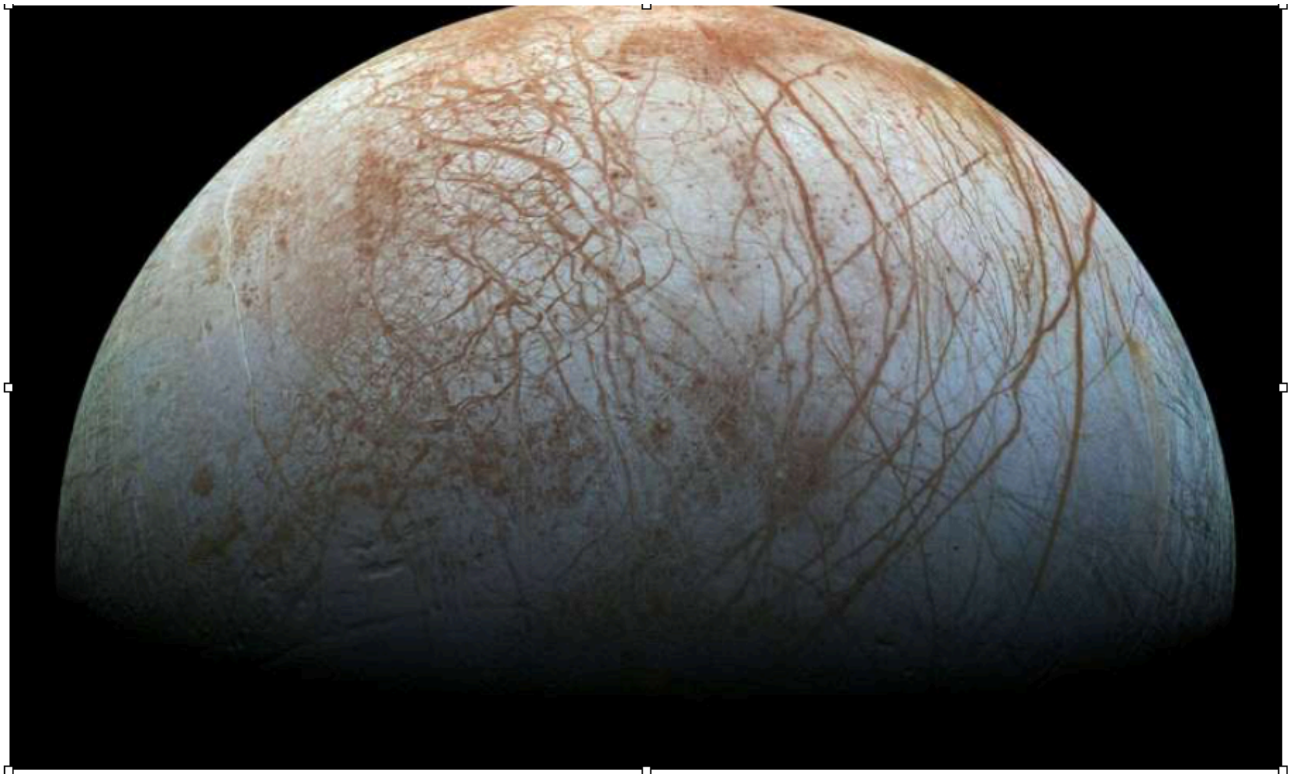
That's up to the ingenuity of those interested and capable of reaching them and setting up shop somehow. *One idea might be a prison on one, the homes for prison employees on the other.*

Outbound welcomes your suggestions, and if we get a number of suggestions, we will print them in a future issue of Outbound, along with your names, and your email address, *with your permission.*

Send your thoughts and ideas to kokhmmm@aol.com under the heading "binary asteroids." ##

'Racing certainty' that there is life on Europa, (below)

says leading British space scientist at Liverpool Hope University



What follows is our shortened version of the original at
https://phys.org/news/2020-02-certainty-life-europa-mars-uk.html

It's 'almost a racing certainty' there's alien life on Jupiter's moon Europa—and Mars could be hiding primitive microorganisms, too. That's the view of leading **British space scientist Professor Monica Grady**, who says the notion of undiscovered life in our galaxy isn't nearly as far-fetched as we might expect.

Grady, a Professor of Planetary and Space Science, says **the frigid seas beneath Europa's ice sheets could harbor 'octopus' (many limbed) like creatures**.

From Europa back to Mars

Meanwhile **the deep caverns and caves found on Mars may also hide subterranean life-forms—as they offer shelter from intense solar radiation while also potentially boasting remnants of ice.**

Professor Grady, now ***Chancellor at Liverpool Hope University (in NW England)***, where she's just been installed as Chancellor, says "When it comes to the prospects of life beyond Earth, "***it's almost a racing certainty that there's life beneath the ice on Europa."***

"Elsewhere, if there's going to be life on Mars, it's going to be under the surface of the planet. There you're protected from solar radiation. And that means there's the possibility of ice remaining in the pores of the rocks, which could act as a source of water. "***If there is some life on Mars, it's likely to be very small—bacteria."***

"***But I think we've got a better chance of having slightly higher forms of life on Europa, perhaps similar to the intelligence of an octopus."*** *(Moon-sized)* Europa, one of Jupiter's 79 known moons, is covered by a layer of many-cracked ice up to 15 miles deep—and there's likely liquid water beneath where life could dwell. The ice acts as a protective barrier against both solar radiation and asteroid impact.

Meanwhile, the prospect of hydrothermal vents on Europa's ocean floor—as well sodium chloride in Europa's salty water—also boost the prospects of life.

As for what's beyond the Milky Way, Professor Grady says the environmental conditions that led to life on Earth are 'highly likely' to be replicated elsewhere.

The expert, resident at the Open University and who's also worked with the European Space Agency (ESA), adds: **"Our solar system is not a particularly special planetary system." ##**

<u>Editor</u>: We have long felt that since Europa is a kind of moon that is likely to orbit gas giant planets, no matter how bright or type of the sun they orbit, even around the smallest dimmest star (<u>Black Dwarfs</u>) , that <u>this kind of life is far more common than the kinds of life we find on our home planet Earth</u>.

And with this in mind, missions to Europa, that explore what lies under its multi-fractured ice crust, should be <u>"Mission #1"</u> (after Mars) in "our must

list." This can start with a landing mission, equipped to chemically analyze the possible organic compounds, and maybe even small life forms, in the color streaks found everywhere on Europa, pole to pole.

No NASA (or other space agency) mission could be more important. PK

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How to get the *most* to the Moon (& to Mars) for the *least amount of rocket power,* *preventing fragile items from breakage by stuffing with needed soft items*

√ **Soft items:** clothing, bedding, pillows, towels, curtains etc.
√ **Hard non-fragile items:** silverware, metal drinking cups and plates (aluminum would be lightest)
√ **Hard Fragile items:** ***dishes & drinking glasses and coffee cups***, could be stuffed with desired items: sugar, salt & pepper and other condiments, *then protected from one another with soft items*, such as rolled up clothing & or bedding to keep fragile items from **Note:** The idea is to get the most to the Moon (or to Mars) √ with the least total weight, √ in the least amount of space, without anything breaking
√ **Note:** drinking glasses & cups could be made of metal, as could dinner plates and iirc, for the same or lower weight

NOTE: ***If*** our suggested Dual Torus was built and placed in Earth orbit, with Moon level gravity in the inner torus,, and Mars level gravity in the outer torus, they could be furnished with lightweight unbreakable items as suggested above.

It would be far better to catch our mistakes in Earth orbit, than not until after pioneers reach Mars!

Your comments & suggestions are welcome!
Send to > kokhmmm@aol.com

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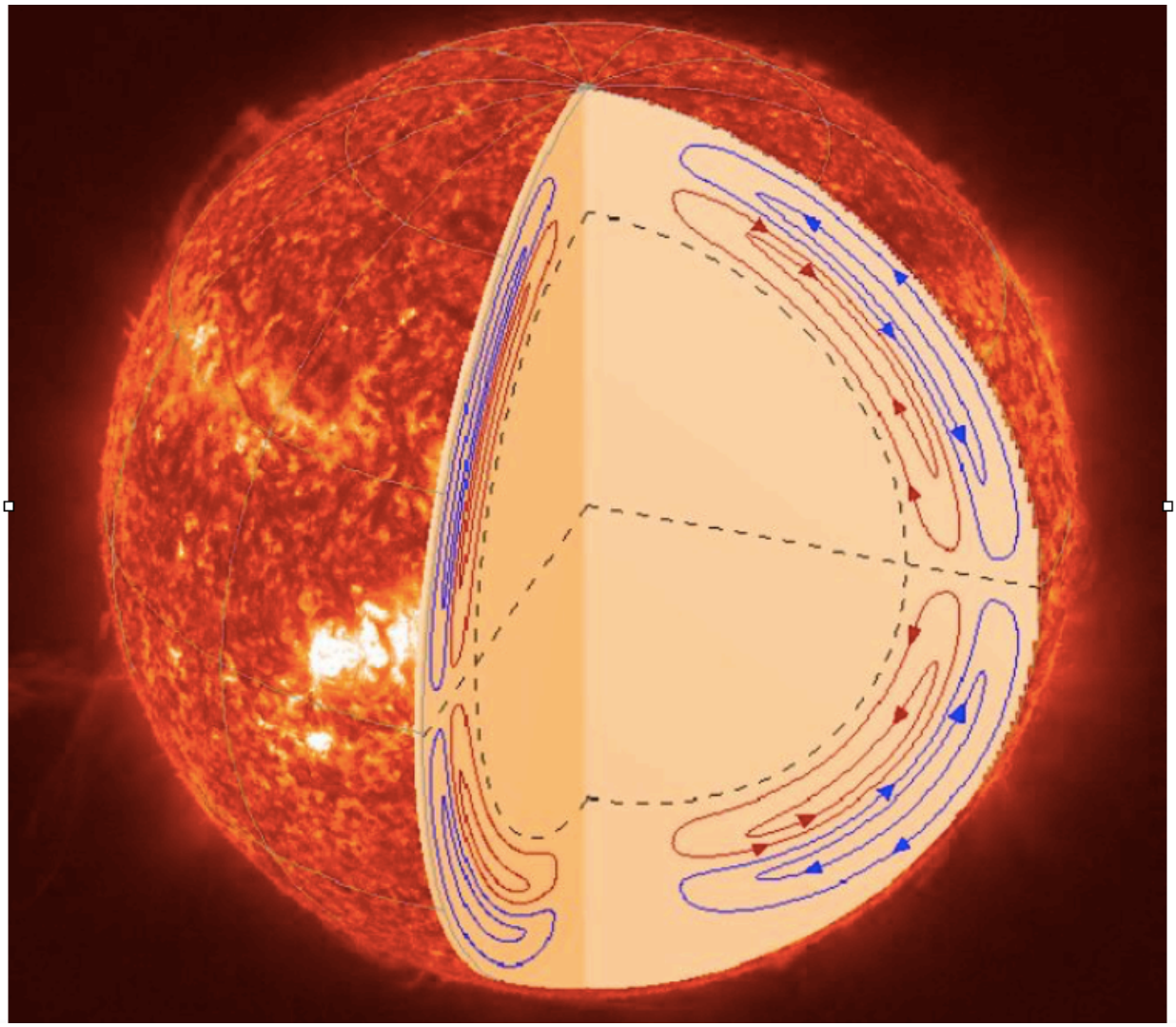

Must Reading: The Sun (above) does much more than provide sunshine on Earth

Ten brilliant discoveries by NASA's Solar Dynamics Observatory in its 1st decade
https://www.space.com/nasa-solar-dynamics-observatory-10-discoveries.html

1. Solar flares 2. Solar tornadoes 3. Giant waves 4. Comets 5. Global circulation 6. Coronal mass ejections 7. Coronal dimming 8. Almost an entire solar cycle 9. Polar coronal holes 10. Spontaneous magnetic reconnection ##

NASA is considering missions to Venus and **to 2 outer solar system moons (Jupiter's Io and Saturn's Triton)** as the next in its **Discovery line of planetary science missions**.

NASA announced Feb. 13, 2020 that it has selected **four finalists in the next round of the Discovery program** from an unspecified number of proposals submitted last summer. **Each of the mission proposals will receive $3 million for what are known as Phase A concept studies to be completed in nine months.**

NASA will select up to two of the missions for development in 2021. "These selected missions have the potential to transform our understanding of some of the solar system's most active and complex worlds." (said Thomas Zurbuchen, associate administrator for science at NASA, in an agency statement about the selections.)

Two of the finalists would go to Venus, a planet last visited by NASA with a dedicated mission by the Magellan orbiter in the early 1990s.
√ **The Deep Atmosphere Venus Investigation of Noble gases, Chemistry, and Imaging** Plus, or **DAVINCI+**, mission includes √ **an orbiter** and √ **a probe** that would descend through the planet's dense atmosphere to measure its composition.

Venus Emissivity, Radio Science, InSAR, Topography, and Spectroscopy, or "VERITAS", is **a Venus orbiter that would map the surface using a synthetic aperture radar and also link infrared emissions from the surface to geological features**.

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The other 2 proposed missions seek to study moons in the outer solar system.

> **Io Volcano Observer (IVO) would perform a series of close flybys of Io, the innermost of Jupiter's four large moons (Ganymede, Callisto, Europa, Io) the latter the most volcanically active body in the solar system**, to monitor its intensive volcanic activity.
>**Trident** would make **a single close flyby of Triton**, Neptune's largest moon, which has **plumes erupting from its surface that could be linked to a subsurface ocean.**

"Discovery" is NASA's **line of relatively low-cost planetary science missions, less expensive than New Frontiers or flagship-class spacecraft.** Missions selected in this round of the Discovery program would have ***a cost cap, excluding launch and operations, of $500 million.*** Those missions would launch in one of two windows, one from January 2025 through December 2026 and the other from July 2028 through December 2029.

EDITOR: ***The mysteries of Jupiter's moon Europa, with an ocean below a thick ice crust is INFINETLY more mysterious and important than the volcanoes of IO.***

It is likely that if there is life on Europa, "Europas" (or "Europids") will be far more common in our universe than "Terras" ("Earths".) So boooo! to NASA, for making the wrong selection!

And we DO need to explore Titan, but from on its surface, with submarines and other craft, not just from above. But one "GOOD" mission would be better than 2 "so so" ones. And somehow, we should find a way to fly them sooner!

MONEY IS IMPORTANT

But it comes in 2nd to "Discovering and Understanding"
worlds with "Life" vastly different than that on our beloved EARTH.

Our rating of NASA's suggestions: on a rate from 1 (lowest) to 10 (highest) is a 5, plus with a big boo! PK

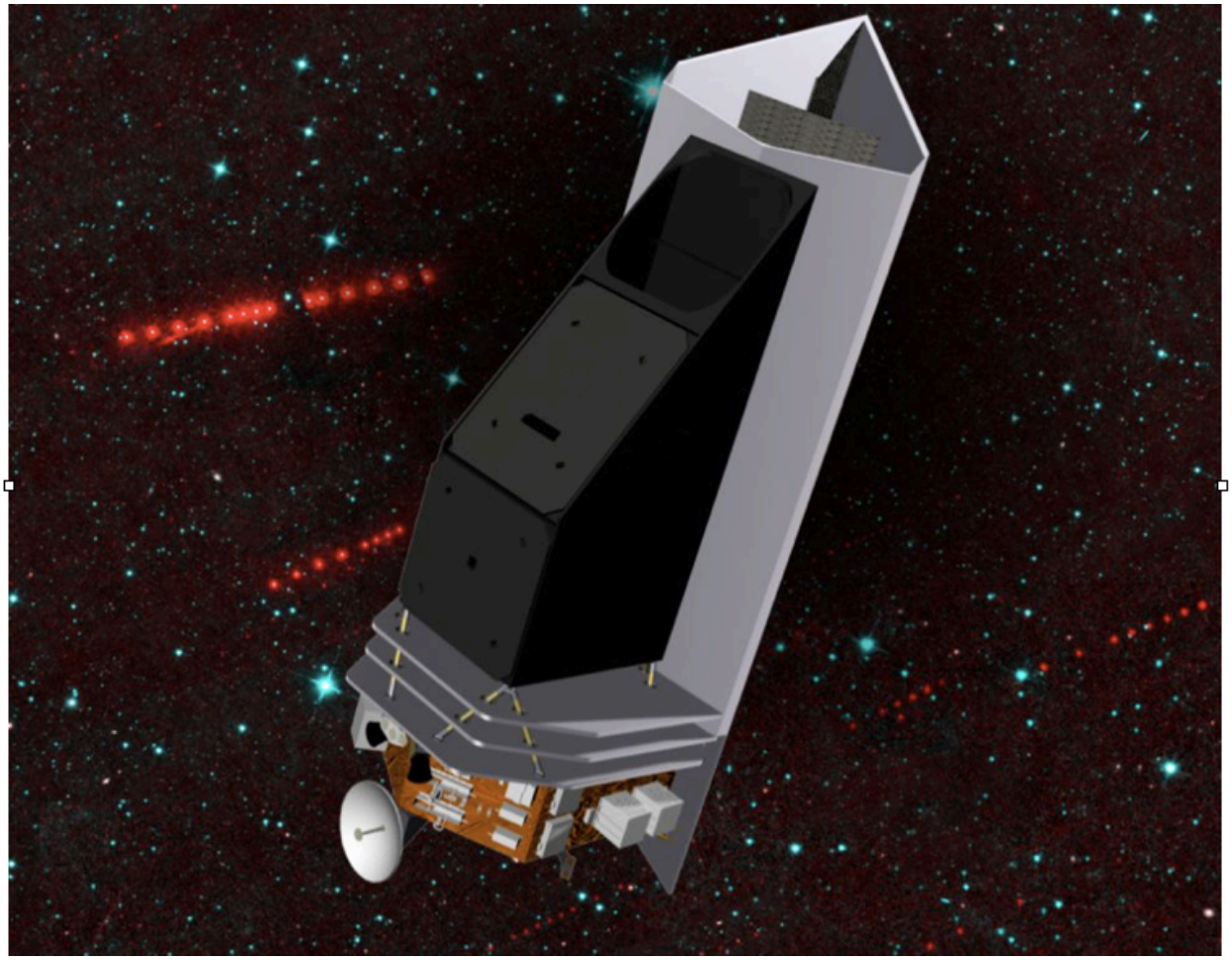
Near-Earth Asteroids in the News

See the **dramatic increase in near-Earth asteroids**
https://www.space.com/41260-near-earth-asteroid-detection-video-nasa.html

NASA wants a new space telescope dedicated to protecting us all from dangerous asteroids
https://www.space.com/nasa-to-build-near-earth-asteroid-hunter-telescope.html

(Above) ~~Huge~~ **(sizable) asteroid explorer "Apophis"** flies by Earth on Friday the 13th in 2029. A lucky day for scientists

Apophis will be **1,100 feet (340 meters) across** and will pass within 19,000 miles (31,000 km) of Earth's surface.)



https://www.space.com/asteroid-apophis-2029-flyby-planetary-defense.html

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If we are to call natural satellites around other planets "moons"
Then we should call other planets "earths"

And for heavens' sake, ***our*** **Moon should be capitalized because it is a name of a specific body.** We do not call other planets "earths" so we should not call other natural satellites "moons" - Let's find another word like "natural satellites," or "**co-planets**" or "**orbiters**."

Or let's have a contest for a suitable term.

We may have to invent one!
And if we have a contest, let's stick with the winning term.
Let the Astronomical Association be the judge, that way everyone will use the new term.

Another Option is to call our Moon, "Luna."

(the Roman/Latin word for the Moon) or "Selene" (the classical Greek word)

And then we will be free to call other natural satellites around other planets "moons!"

Too bad I didn't do that in my first book: "A Pioneer's Guide to Living on Luna"

(Maybe, if there is a reprint!)

But that's not how English Speaking people refer to *THE* Moon.-PK

The SPACE TOURISM INDUSTRY is on the Rise

Dennis Tito, the first private citizen to pay for a ride to space

https://www.forbes.com/sites/jimclash/2017/03/27/wilshire-associates-founder-**dennis-tito**-reflects-on-his-rare-spaceflight/#6b18885d64f7

The space tourism industry garners much deserved attention in launching next generation enterprise offerings.

Axiom Space is developing the world's first private space station.

Blue Origin and **Virgin Galactic** are planing to offer passenger flights.

SpaceX and **Boeing** are testing manned capsules for orbital flight

And **McDonalds** will pay half the ticket cost for every 100 thousandth customer in the door (***or so we wish!***)

Space Perspective will fly passengers to the edge of space in their luxury gondola attached to a space-safe balloon. And **Space Adventures** holds fast to its mission to open the space frontier to private citizens, which it successfully realized with its client, **Dennis Toto**, the first space tourist. Even NASA has decided to get in on the action, announcing it will board private space travelers.

BILLIONS in Dollars Funding Allocated

Other high growth areas in space tourism include **Earth-based space themed experiences**, such as **Zero Gravity aircraft flights**. The conference examined the numerous VR simulations at science centers and space museums around the world, new space-themed TV shows and movies, IMAX projects, touring exhibits, Mars/future-themed theme parks, immersive pop-ups, attractions, resorts and experimental activations being green-lit and developed by studios, agencies, and brands.

Rocketing Toward Stratospheric Value

The space tours industry garners much deserved attention in launching next generation private enterprise offerings. **Axiom Space** is developing **the world's**

first private space station. Blue Origin and Virgin Galactic are proceeding with plans got offer passenger flights. SpaceX and Boeing are testing manned capsules for orbital flights.

Join our speakers & supporters - the industry insiders making it all happen. *##*

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(Peter's pet peeve) **It's "the Moon", not "the moon"**
and dump in trash pickup trucks with the "m"oon dictionaries
It is stupid to believe that we should not capitalize the name of Earth's companion because its name begins with "the"
If we should refer to the Moon as the moon, because there are more than one, although around other planets.
Then we would have to refer to the most important world in **the** known **universe** as **the earth**
And then we should refer to **the** hague and **the** netherlands, and **the** united states instead of the Hague,
the Netherlands, and the United States.
and so on. ***It's time to grow up guys!***
and stop paying attention to the self-appointed English Scholars

Luna, Hellas, Chandra

If we should change the name to Luna (the ancient Roman Latin word for the Moon) that's fine for me. As would be Hellas, the ancient Greek word for for the Moon and Chandra literally means the "Moon" in Sanskrit, Hindi and other languages in India.
Once there is a government of some kind covering the entire Moon, "small letter" fanatics will have to concede.

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Significant NASA budget increases to fund the Artemis program

[Artemis (Greek: Ἄρτεμις Artemis in the ancient Greek religion & myth, the goddess of the hunt, wilderness, wild animals, chastity, & the Moon.]

[**NASA's Artemis program** is an ongoing **crewed spaceflight program** carried out predominately by NASA, U.S. commercial spaceflight companies, and international partners such as the European Space Agency, - Wikipedia]

February 10, 2020 - The White House is proposing to increase NASA's budget by more than two and a half billion dollars in fiscal year 2021, providing substantially increased funding for the Artemis program while seeking once again to cancel several science and education programs. The budget proposal, released by the Office of Management and Budget Feb. 10, requests $25.246 billion for NASA in the 2021 fiscal year that starts Oct. 1. That is a 12% increase from the $22.629 billion that Congress appropriated for NASA for fiscal year 2020.

"This is a 21st century budget worthy of 21st century space exploration, and one of our strongest budgets in NASA history. If the president's support for NASA wasn't clear before, it should be obvious now."" NASA Administrator Jim Bridenstine said in a "State of NASA" speech at the Stennis Space Center.

"A major beneficiary of that additional funding is NASA's Artemis program, which seeks to return humans to the moon by 2024. **The budget requests more.**

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The unknown female mathematician who helped discover Pluto

https://www.space.com/human-computer-elizabeth-williams-pluto-discovery.html

Elizabeth Langdon Williams (1879-1981), who worked for astronomer Percival Lowell, who first theorized the existence of a ninth planet. Lowell died before his successor, Tombaugh, finally spotted the elusive **Pluto**, but both men relied on calculations that Williams made.

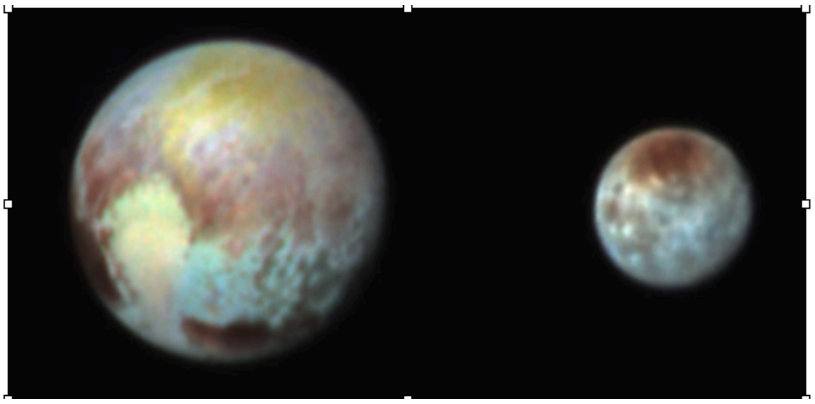
Ninety years ago this Feb. 18th, astronomer Clyde Tombaugh gathered the data that proved the existence of what would eventually be dubbed "Pluto." — but it wouldn't have been possible, astronomers have since realized, without the calculations of a mathematician whom history has forgotten.

That mathematician was Elizabeth Williams, who worked for astronomer Percival Lowell, who first theorized the existence of a ninth planet. Lowell died before his successor,Tombaugh, finally spotted the elusive Pluto, but both men relied on calculations that Williams made. But the math got lost in the discovery it enabled, and so did Williams.

Charon was **discovered** in 1978 when sharp-eyed astronomer James Christy noticed images of **Pluto** were strangely elongated. The blob seemed to move around **Pluto**. ... Additional images confirmed he had **discovered** the first known **moon** of **Pluto**.

There is more to the story

And it wasn't until some writer noticed that the "center of gravity" between Pluto and Charon, was <u>not under</u> Pluto's crust, <u>as is the case with all other moons,</u>



<u>including Earth's</u> *<u>but in the space BETWEEN the pair</u>*, making Pluto-Charon a "binary planet."

And that writer is me, Peter Kokh (1937-20??)

Google "orbits of Pluto and Charon:"

"Pluto-Charon is our solar system's only known double planetary system. The same surfaces of **Charon** and **Pluto** always face each other, a phenomenon called ***"mutual tidal locking"***. **Charon** and **Pluto** orbit each other **every 6.4 Earth days.**"

"When **Pluto is** close to the Sun, its surface ices thaw, rise, and temporarily form a thin atmosphere. ... **Pluto's** very large moon, **Charon**, **is** almost half the size of **Pluto**. **Charon is** so big that the two **are** sometimes referred to as a **"double dwarf planet system."** The distance between them **is** 19,640 kilometers (12,200 miles).

Pluto (above left) always has the same face turned towards Charon (above right), and Charon always has the same face towards Pluto. This is **called "tidal locking."** There is no other known such planet-moon duet. **It should be possible to string a cable between the two, allowing tourists to visit Pluto when Charon is between the Sun and Pluto, and to visit Charon, when Pluto is between the Sun and Charon. etc.**

A town at the end of the cable on Charon might be named Williamston,
and a town at the end of the cable on Pluto Lowellton
after the discoverers of these two worlds ## PK
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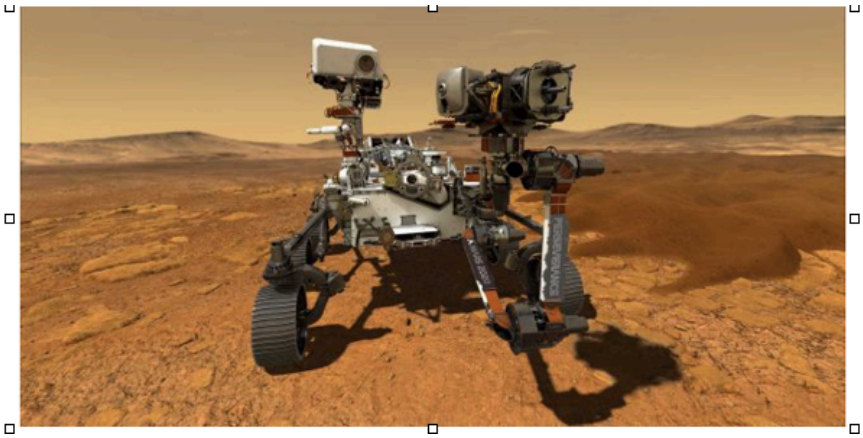
Meet **“Perseverance”** - NASA's **Mars 2020 rover** has a new name
https://www.space.com/nasa-mars-2020-rover-name-perseverance.html



NASA's next Mars rover — **a life-hunting, sample-caching robot scheduled to launch this summer** — is officially called **Perseverance**, as of March 5, 2020. ##
(Editor (Peter Kokh): **let’s hope Perseverance finds no life. Why do I say this? Because then there will be a loud cry to stop sending probes to Mars, let alone people, be they explorers or settlers, lest we endanger the life forms we had found)**

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China's new crew spacecraft looks like it could dock with the International Space Station

https://www.space.com/china-new-spacecraft-dock-space-station.html

NASA unveils plan for Artemis 'base camp' on the Moon after 2024

https://www.space.com/nasa-plans-artemis-moon-base-beyond-2024.html

NASA is forging ahead with its **Artemis program** to land humans on the Moon by 2024, but the agency has also just offered its first plan for what a U.S. lunar presence may look like after that milestone.

The new plan comes from a 13-page report submitted on April 2 to the National Space Council\, an advisory group to President Donald Trump chaired by Vice President Mike Pence. Much of the report, titled "NASA's Plan for Sustained Lunar Exploration and Development," summarizes the vision NASA has laid out for justifying and accomplishing the 2024 moon landing. But the report also looks farther out to focus on what a long-term presence on the Moon and in lunar orbit would permit the U.S. to accomplish.

"After 20 years of continuously living in low-Earth orbit, we're now ready for the next great challenge of space exploration — the development of a sustained presence on and around the Moon," NASA Administrator Jim Bridenstine said in a statemnet released with the report. "For years to come, Artemis will serve as our North Star as we continue to work toward even greater exploration of the moon, where we will demonstrate key elements needed for the first human mission to Mars.

Artemis Base Camp : The star of the report is what NASA has dubbed Artemis Base Camp, meant to be a long-term foothold for lunar exploration, perhaps in Shackleton Crater at the Moon's south pole. According to the document, Artemis Base Camp itself would be a lunar foundation surface habitat that could host four astronauts at the south pole for visits of perhaps a week.

In the long term, the facility would also require infrastructure for power, waste disposal and communications, as well as radiation shielding and a landing pad. The base could also be a site for testing new techniques for dealing with pesky lunar dust and the long, cold lunar nights, turning local materials into resources like water, and developing new power and construction technologies. ##

[In our opinion, this is the wrong place to start.

Craters as far as 30° from the North or from the South pole of the Moon are partially filled with ice, easier to recover, according to the findings of Lunar Prospector. **Further, just to the south of 30° N**, lies **a thousand mile stretch of mare regolith, frozen lava, Mare Frigoirs**, which is **mostly basalt out of which so many things could be made on site instead of expen$ive $hipload after $hipload up from Earth.**

This is the heart of my recently published book "***A Pioneer's Guide to the Living on the Moon***" available from Amazon for $19.95

Water and Basalt (not just water) are the keys to opening the Moon, ***not just for exploration, but for settlement,*** and since we find both water and basalt on Mars,

what can be learned in* Mare Frigoris on the Moon will pave the way for the *successful opening of settlements on Mars.]

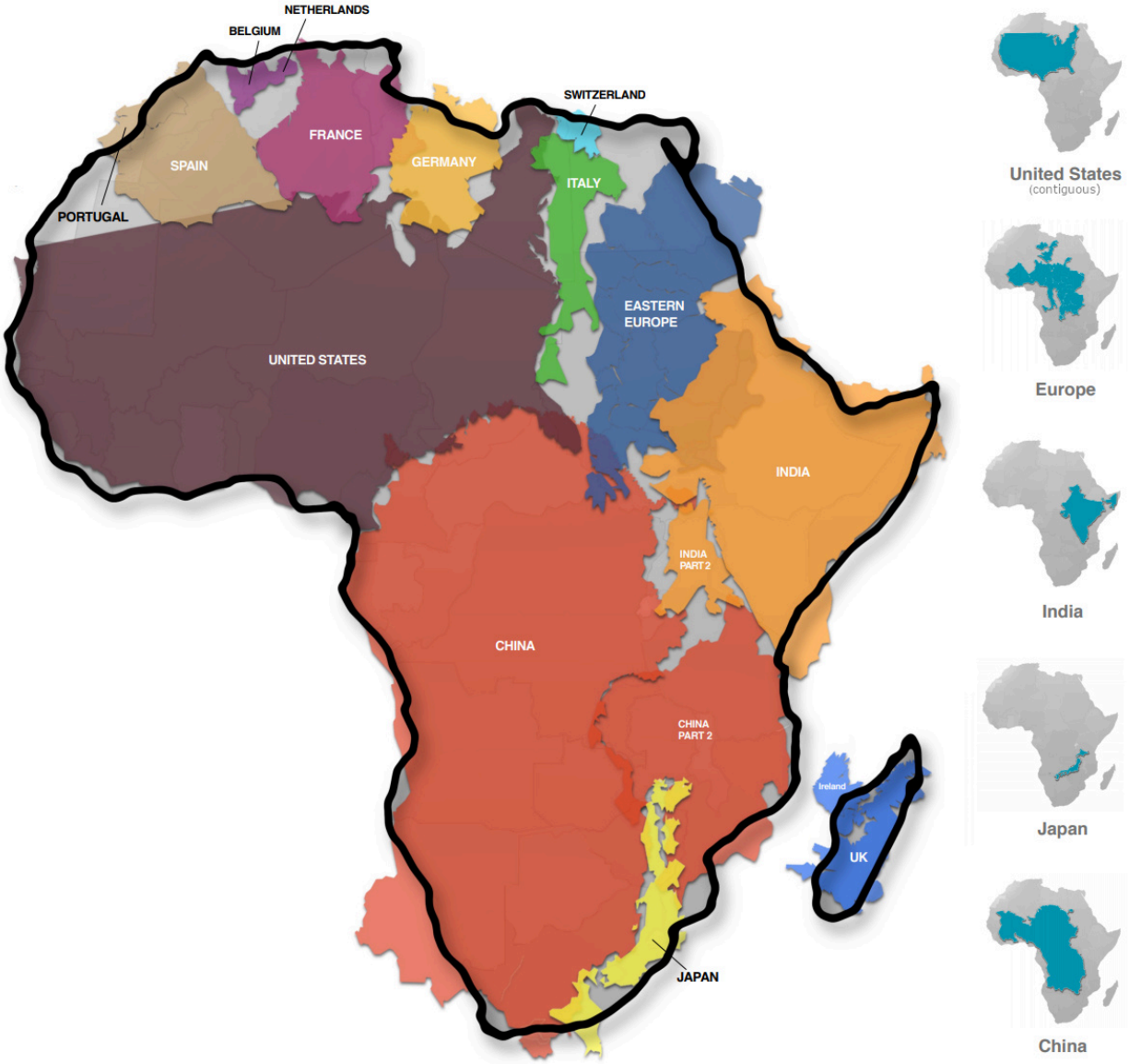
There is no basalt anywhere near the Moon's South Pole. and more important, **NASA is only interested in the hydrogen in water ice, not settlement.**

NASA NEEDS TO BE KICKED TO THE SIDE, REPLACED BY A NON-GOVERNMENT "<u>SETTLEMENT-AIMED</u>" <u>PIONEER-OPERATED</u> COMPANY.

***BASALT <u>AND</u> WATER, NOT JUST WATER & IGLOOS* - but billions of dollars worth of Pioneer' homes, furniture, furnishings, clothing, and much more#**

The Size of the Moon, A fresh "Africa" comparison

https://www.visualcapitalist.com/map-true-size-of-africa/



OR <u>CANADA + UNITED STATES + BRAZIL + CHINA ###</u>