

*[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 #28, March, 2020*

## **The “Doomsday Clock” edges closer to midnight!**

**<https://www.nbcnews.com/science/environment/scientists-move-doomsday-clock-closer-midnight-n1121176?cid=recommended>**

**“The Bulletin adjusted the clock to reflect looming threats from  
nuclear weapons and accelerated global warming.**

The clock is now set at 100 seconds to midnight, the closest it has ever been to symbolic doom and the first time the hands have been within the two-minute mark.

"We are now expressing how close the world is to catastrophe in seconds — not hours, or even minutes," Rachel Bronson, the Bulletin's president and CEO, said in a statement. "We now face a true emergency — an absolutely unacceptable state of world affairs that has eliminated any margin for error or further delay."

““We have normalized a very dangerous world in terms of **the risks of nuclear warfare and climate change**.” The Bulletin placed much of the blame on world leaders who have eroded international arms agreements and both denigrated and denied the science of global warming. ##

Not good news! *We need to hold our leaders (and a President who is in denial) and Congress accountable.* PK

*[In these highly politically charged times, we do not intentionally bring up political issues, other than those that support or reduce space programs relevant to our human future in our Solar System.]*

<https://www.space.com/mars-water-ice-map.html>

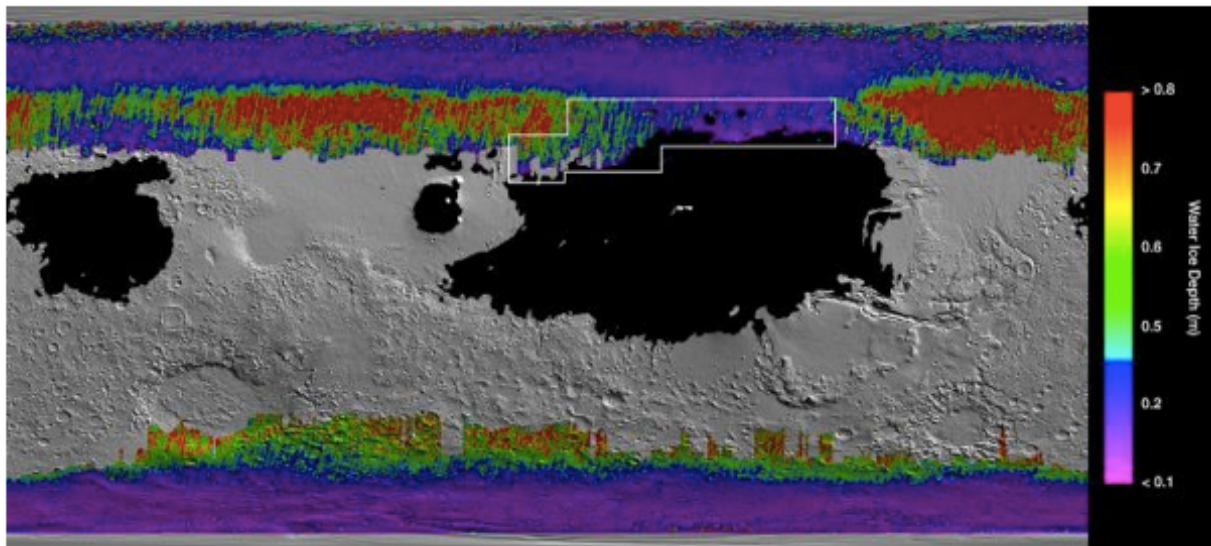
### *NASA's 'Treasure Map' of Water Ice on Mars*

#### *Showing one place Where Humans Should Land and Settle*

*The annotated area in this animation of Mars is where NASA spacecraft have found near-surface water ice that would be easy for astronauts to dig up.*

*NASA's wish to follow the [water on Mars](#) just got a helping hand. Scientists have released a new global map showing water ice that is as little as 1 inch (2.5 centimeters) below the Red Planet's surface.*

*The new map [below] is based on data from two long-running spacecraft: NASA's [Mars Reconnaissance Orbiter](#) and [Mars Odyssey](#). Each spacecraft used heat-sensitive instruments to find the ice, because buried ice changes the temperature of the surface. To be sure that it was ice they were seeing, the scientists cross-referenced their work with other data — like ice seen in radar instruments and Mars Odyssey's gamma-ray spectrometer, which is optimized for spotting water ice deposits.*



*The area found to have water is the area “boxed” in a light color near top of picture.*

*The surface of Mars is a desert; water is scarce. That's because liquid water evaporates quickly in the thin atmosphere of the Red Planet. There have been reports of [briny water](#) flowing on crater walls, but some scientists say [those streams are more](#)*

*likely dry dust flows. Notably, there is plenty of water ice locked up in the Martian polar caps. But this wouldn't be a viable solution for a lengthy mission because it would get too cold and dark at the poles for a good part of the year.*

*Water did flow on Mars' surface in the ancient past, but that was because the atmosphere was much thicker back then. The leading theory is that the sun's particles gradually eroded the Martian atmosphere over the eons, until the atmosphere was so thin that it could not support running water any more, any where.*

*A paper based on the research was published Tuesday (December 10, 2019) in the journal Geophysical Research Letters.*

### ***Mars May Have Lots of Water Deep Underground***

[\*https://www.space.com/mars-deep-groundwater-recurring-slope-lineae.html\*](https://www.space.com/mars-deep-groundwater-recurring-slope-lineae.html)

*Gigantic Ice Slab Found on Mars Just Below the Planet's Surface*

[\*https://www.space.com/30502-mars-giant-ice-sheet-discovery-mro.html#asa\*](https://www.space.com/30502-mars-giant-ice-sheet-discovery-mro.html#asa)

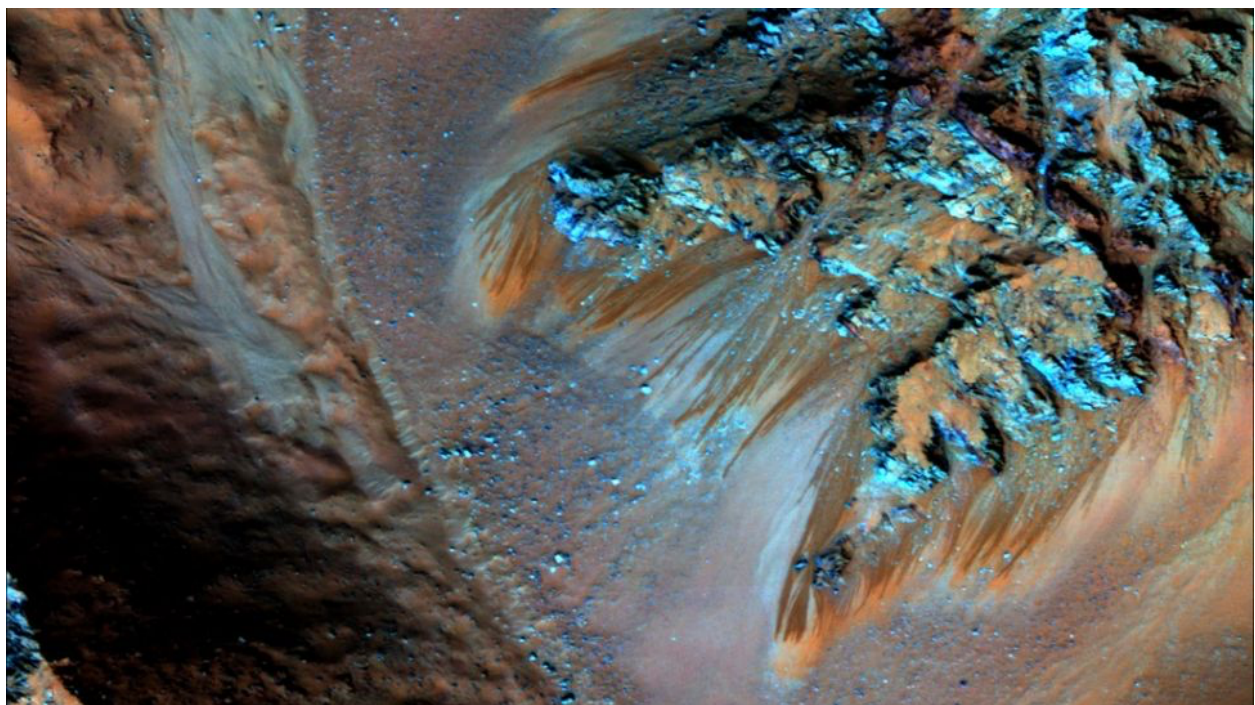
*Mars Mystery: How Was Ancient Red Planet Warm Enough for Liquid Water?*

[\*https://www.space.com/35595-ancient-mars-atmosphere-liquid-water-mystery.html\*](https://www.space.com/35595-ancient-mars-atmosphere-liquid-water-mystery.html)

*With data in hand, the research team located at least one promising landing spot for future astronaut missions: a big zone in the northern hemisphere's **Arcadia Planitia** (NNW of Olympus Mons). This area has a lot of water ice close to the surface and is in the ideal location for a **human Mars mission**, because it is in a temperate, midlatitude region with sunlight, the research team wrote in a new study describing the findings.*

*Related:*

[\*Where's All the Water on Mars? Scientists \(and Future Astronauts\) Need to Know \(pssst! and so do future settlers!\)\*](#)





*Small amounts of transient water have formed transient features on the surface of Mars, like these streaks in Hale crater (above).*

*(Image: © NASA/JPL-Caltech/University of Arizona)*

<https://www.space.com/42786-where-is-water-on-mars.html>

WASHINGTON — "Water, water everywhere, but a drop to drink" epitomized terrestrial seafaring exploration. Precisely the same problem may haunt any future Mars explorers.

There is plenty of *water on Mars*, but it's *frozen, locked in water-rich minerals, tucked away below the surface* — or a combination of those challenges, which is why we still don't know where it all is. That's a problem for those working in the NASA's project to evaluate potential human base sites on the Red Planet. This problem could help bring *scientists, would-be explorers* (and *would-be settlers*) together.

Two Important factors: (1) humans rely on water to survive, (2) it can be split into hydrogen and oxygen, *(and wasted, in our opinion)* as rocket fuel to carry people and cargo back to Earth.

*(The best plan is for people go to Mars to stay! - ✓ there is nothing that can be made on Mars that would be needed - or welcome - on Earth or on the Moon except samples and discarded instruments no longer needed on Mars for museums on Earth and/or the Moon.*

*✓ MOST IMPORTANTLY, Staying on Mars allows designing the spacecraft bringing settlers to Mars to be disassembled, then reassembled as "neighborhoods" in new settlements. PK*

*(That "rubric" will also apply to ships and their "passengers" bound for the moons of gas giant planets beyond Mars: Jupiter, Saturn, Uranus, Neptune.)*

*Further, scientists want to study Martian ice in hopes of learning more about the planet's climate history and potential past habitability: and with that, clues to successful settlement. #*

***That sub-surface Blind Spot soil layer within 33 ft. (11 m.) of the surface***

*Both groups are stymied by an important blind spot in current instruments, which means they can't understand what's happening just below the surface, less than 33 feet (10 meters) down. That's a particularly important region of the subsurface because it's the most accessible, for humans and robots alike, as well as for foundations of settlement homes.*

*[Inventing an instrument that can scan the top 11 meters (c. 33 ft.) of Mars' surface may be the most essential key to successfully settling Mars, by building settlements in the best terrain, including drainage, strong solid foundations, and more.]*



*Discussed but not yet an official target for a future mission to fill in that blank terrain, is the need deploy an instrument called “synthetic aperture radar” — commonly used in Earth science to study the impacts of natural disasters, among other uses — into orbit around Mars, an idea that has been discussed, but is not yet an official target for a future mission. This is information that we need to have before we dare to send off to Mars the first “one way” shipload of human settlers!##*

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### *Sending fragile things to the Moon and Mars*

*One way is to surround them with buffering materials that are also needed and helpful at the destination. Cloths (towels, for example), grains, etc. If you have other suggestions, send them my way to [kokhmmm@aol.com](mailto:kokhmmm@aol.com) title “useful fillers.”#*

**The nearest “Earthlike” planet  
beyond our Solar System has been found  
Our nearest neighbor star, Proxima Centauri,  
has a temperate terrestrial “i.e. Earthlike” planet  
<https://advances.sciencemag.org/content/6/3/eaax7467>**

*We detected in radial velocities evidence of a possible second planet with minimum mass  $m_c \sin i_c = 5.8 \pm 1.9 M_{\oplus}$  and orbital period of  $P_c = 5.21$  years. The analysis of photometric data and spectroscopic activity diagnostics does not explain the signal in terms of a stellar activity cycle, but follow-up is required in the coming years for confirming its planetary origin.*

*We show that ✓ the existence of the planet can be ascertained, and ✓ its true mass can be determined with high accuracy, by combining Gaia astrometry and radial velocities.*

*✓ Proxima C could become a prime target for follow-up and characterization with next-generation direct imaging instrumentation due to the large maximum angular separation of ~1 arc second from the parent star.*

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*Note: Proxima Centauri is a distant companion to Alpha Centauri which consists of two stars similar to our Sun “Copernica\*.”*

*[\* I suggest that we name our Sun after the person who first showed that Earth orbits the Sun, rather than the Sun orbits Earth, the common belief up to that time.*

That person was Copernicus: [https://en.wikipedia.org/wiki/Nicolaus\\_Copernicus](https://en.wikipedia.org/wiki/Nicolaus_Copernicus)

The term “the Sun” is not a name, but a kind of object. “Our sun” has gone through thousands of years without a name. I suggest the feminine version because that better suggests its role as our “sun” providing heat and energy to our civilization.

A parallel to the current situation is to say “My daddy’s name is “Daddy, stupid!”

## **Why I capitalize “the Moon”**

**Because it is THE (more properly pronounced thee) Moon meaning “the one and only”)**

That we find natural satellites around other planets, and classify them as “moons” is a lot like finding planets around other suns and calling them “earths” and then decapitalize our own planet as “earth”. Or calling other stars “suns” if they have planets.

I have suggested that we give our own “Sun” the name “Copernicus” after the person who first realized that the Sun does not orbit around Earth, and that just the opposite, our Earth orbits around the “Sun.”

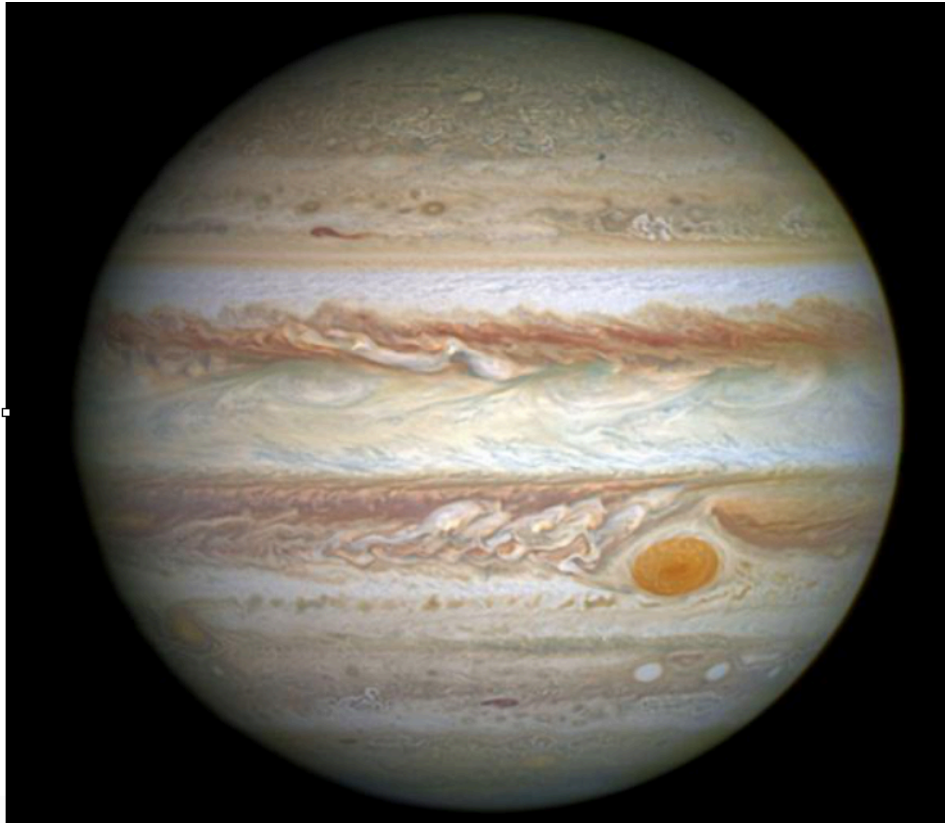
That we use the word “the” in “the Sun” indicates that we should decapitalize.

Okay, let’s have it your way, and here are some results:

We live in the “united states”, and I know people in “the philippines” and lived in “the united kingdom” for a year and a half, and I went on a trip in 1981 to “the soviet union” to see a total eclipse of the sun in Siberia. (slam dunk!)

I do not oppose using Roman or Greek word for the Moon, “Luna” or “Selene” as an option *but that just avoids the issue.*

We say Earth, but since we have found other “earths” does not mean that we should decapitalize our own home world, as “earth” (or “terra” in Latin )



**What is Jupiter's "Great Red Spot"      ^      According to Wikipedia, The Great Red Spot is a persistent high-pressure region in the atmosphere of Jupiter, producing an anticyclonic storm, the largest in the Solar System, 22 °S of Jupiter's equator. It has been continuously observed since 1830, 2 centuries!**

**BUT! Why in heavens name have we not seen similar storms elsewhere on Jupiter???? or on Saturn?? or on Uranus?? or on Neptune??**

**No answers? No answers because it was a wrong interpretation of what we see. Not only "wrong" but one that makes no sense and is repeated by "experts" as "gospel".**

**Our thesis**

**A few centuries ago, an unusually large icy comet crashed into this area of Jupiter, and it created the turbulent storm that we see and that is slowly getting smaller and smaller as Jupiter slows it down.**

**"Comets are cosmic snowballs of frozen gases, rock and dust that orbit the Sun. When frozen, they can be the size of a small town (or bigger!). When a comet's orbit brings it close to the Sun, it heats up and spews dust and gases into a giant glowing head larger than most planets. The dust and gases form a tail that stretches away from the Sun for millions of miles. There are likely billions of comets orbiting our Sun in the Kuiper Belt and even more distant Oort Cloud."**

**<https://solarsystem.nasa.gov/asteroids-comets-and-meteors/comets/overview/>**



**“Conversations” Earth to Ship and Ship to Earth**  
**as well as between Ship to Mars and Mars to Ship**  
**An easy way to avoid waiting up to a half hour or more for replies**  
**and a way to make the speed of light irrelevant!**

**Two-way Conversations, Ship to/from Earth, Ship to/from Mars**  
Even with distances increasing back to Earth, and decreasing to Mars (or vice versa),  
**you will not have to wait for a response “IF”**  
**✓ you talk for as long as it takes your message to Mars at the speed of light, and**  
**✓ then listen for as long as it takes the response message to get to your ship,**  
**while at the same time the party you are talking to does the same.**

**In this approach, no one is “waiting many minutes for a response!” Both talk,**  
**answering questions of the other, then both listen to the answers of the other. Then both talk**  
**again, and both listen again, until “hanging up.”**  
**✓ The closer to each other are the correspondents, the shorter the message and response time**  
**in both directions.**  
**✓ The further each parties are from each other, the longer will be the message and response**  
**time for each parties.**  
**✓ Both parties are talking at the same time, and listening to each other at the same time.**  
**✓ No one is waiting for the other’s message, not at least in the Inner Solar**  
**System limits**

**It gets harder , probably with “intermissions” Earth to Jupiter**  
**and between either and ships en route**  
**“Intermissions could be filled with music or films”**  
**then to & from Saturn, Neptune, Uranus, Pluto-Charon**  
**“Intermissions on longer flights,**  
**Chimes when an hour apart at speed of light**

### **How to make good use of the long trip time:**

- ✓ **Studying Mars, its surface and its resources:** what we know and what we do not know
- ✓ **Tossing out Earth calendars and start living on Mars seasons:**  
(our “Mars Pulse” Calendar *rather than*. Zubrins’s Mars Calendar)
- ✓ **Studying the variety of Living Walls & Vertical Gardens,**
- ✓ **how to design them: ✓ what plants to use, ✓ what plants grow where, ✓ how to**  
**“plant” them, and ✓ how to keep them green and productive (in the case of fruit or**  
**vegetable bearing plants.)**
- ✓ **Classes on what we can make out of basalt (cast, carved, and fiber)**

✓ *Classes on what we can make out of Bamboo*

✓ *Classes on the Container Factories* ✓ *already on Mars,* ✓ *or on this ship,* and ✓ *others to come in other ships*

## **Space Ships that travel one-way from Earth/Moon to Mars**

Space ships carrying settlers to Mars will be on a one way trip, *every part of the ship “co-designed” for new use on Mars, as part of a “neighborhood” in a Mars settlement.* ✓ *No ships will travel from Mars “back to Earth” except for “visitors” or “tourists” at great cost,* (large enough for the Settlement to make a profit to pay for incoming freight from Earth)

✓ **Ship Passenger Cabins** will have been designed to serve as their occupants’ homes on Mars for the settlers who lived in them en route: what they might be like, ✓ windows, ✓ furnishings, ✓ additions as the family grows, and/or to support ✓ home-“cottage industries.”

## ***Solar Orbiter:***

*The US-European mission to explore the sun's poles in photos*

<https://www.nasa.gov/feature/goddard/2020/how-esa-nasa-solar-orbiter-beats-the-heat-shield-sun>

*You can appreciate the size of this probe by the person in a white suit in the left hand lower corner of the photo above*

[www.nasa.gov/feature/goddard/2020/new-mission-will-take-first-peek-at-sun-s-poles](https://www.nasa.gov/feature/goddard/2020/new-mission-will-take-first-peek-at-sun-s-poles)

When Solar Orbiter launches on its journey to the Sun, there’s one key piece of engineering making this ESA-NASA mission possible: the heat shield.

Seeking a view of the Sun’s north and south poles, Solar Orbiter will journey out of the ecliptic plane — the belt of space, roughly in line with the Sun’s equator, through which the planets orbit. Slingshot repeatedly past Venus in order to draw near the Sun and climb higher above the ecliptic, the spacecraft bounds from the Sun and back toward the orbit of Earth throughout its mission.

“Although Solar Orbiter goes quite close to the Sun, it also goes quite far away” In the dark of space, Solar Orbiter faces temperatures of minus 300 degrees Fahrenheit. At closest approach, 26 million miles from the Sun, it will encounter intense heat and radiation. But Solar Orbiter’s 324-pound heat shield reflects and guides heat away from the spacecraft and can withstand up to 970 F.

**The heat shield is built like a 10-foot-by-8-foot sandwich.** The front layer — wafer-thin sheets of titanium foil — strongly reflects heat. A honeycomb-patterned aluminum base, covered in more foil insulation, forms the inner slice closest to the spacecraft and provides support.

**Star-shaped titanium brackets** keep the layers in place, like a toothpick tasked to hold bread together, but notably, this sandwich is missing its filling. The nearly 10-inch



gap in the shield funnels heat out to space. A smaller, second gap lies between the inner slice and the spacecraft.

Overall, the shield is 15 inches thick. It also has several eyes: peepholes for five of the spacecraft's

remote sensing instruments to peer through. Solar Orbiter's heat shield is coated with a thin, black layer of calcium phosphate, a charcoal-like powder like pigments used in cave paintings thousands of years ago.##

<https://www.nasa.gov/content/solar-orbiter-instruments>





## **Will persons born on the Moon or Mars grow taller than those born and raised on Earth?**

We might assume that gravity levels will have an effect on growth, but here on Earth we have humans that are rather small, but also in small numbers. And with the introduction of basketball, there is some favoring of 7 footers over us 6 and 5 footers. But that “favoring” most likely has little effect on average height of the general population.

My guess is that there will be no effect on the percentage of taller persons, unless future settlers begin to favor taller mates. And that is a possibility. On the other hand, that would mean taller doors, higher ceilings, etc. and the extra cost of that might be a \

### **There are those who “*must have*” pets, and those that could “*care less.*”**

Pets, especially those who are more responsive and for who make their human sponsors most happy, such as most dogs, and some cats, etc., (but also chirping birds and small monkeys) *earn their keep by helping keep up human owners’ spirits high*) and should be a must factor for human settlers on the Moon and Mars.

Yes, there are those who could care less.

Here we are not talking about birds. Birds in a cage may help if they have musical chirps, but they are not as responsive. Dogs especially, create a 2-way bond with those who feed them, pet them, take them for a walk, etc.

Yet some space fans have would ban all non-humans. *That’s their problem.*

Yes, on the Moon and Mars, you can’t take your dog on a walk outside, not outside the air-pressurized walkways, of course, and when you do take them for a walk in pressurized walkways, you must pick up their bowel droppings.

Cats can be more independent, if - and there shouldn’t be - they can frequently enough find any left over foods not properly preserved.

There are those who would adamantly forbid pets of any kind on the Moon and Mars, but that should be their problem. On the contrary, I would forbid anti-pet persons from applying for settler lists. Pet lovers may make better human friends and lovers.

Birds, especially those who have a niche in fertilizing desired plants, and thus keeping the air in passageways fresh, and as a result, keeping human spirits high, will also have a place in settlements on the Moon and Mars.

When one’s spirits are low for whatever reason, a pet dog or cat can lift them up.

There are some animals who will notice by smell of something that could be harmful to settlers. They should be welcome too.

Yes, there are those “humans only” persons who might want to take part in opening up human frontiers on the Moon and Mars. But unless they have some rare skill that is badly needed, it might be best to turn down those “humans only” applicants.##

## Windows for traveling to and from Mars

Unlike the Moon, which always stays in orbit around Earth, and can be reached at any time, Mars orbit around the Sun takes almost 2 Earth years. Also, Mars' orbit around the Sun is much more elliptical than Earth's. *As a result, trips to Mars (with the same rocket) take more months in some opportunities and less months in other opportunities.*

Once we proceed to settle Mars, volunteers will go to Mars *at all opportunities*. More powerful “nuclear” powered ships will cut the travel time to and from Mars at all opportunities, and if necessary, in between. *These ships will be powered by Uranium 233, processed from Thorium mined in the lunar “highlands” below Mare Frigoris and above Mare Imbrium.*

These long and longer journeys will be opportunities for volunteer settlers to learn much more about Mars and in greater detail through educational courses, as well as to learn more useful “hands on abilities,” adding to the talents they may already have, that will render these settlers more skilled and useful once they arrive on Mars.

[http://www.jpl.nasa.gov/edu/images/activities/launch\\_window\\_miss.gif](http://www.jpl.nasa.gov/edu/images/activities/launch_window_miss.gif)

[moving image of transfer orbits between Earth and Mars]

✓ Flight “coasting” duration will vary considerably: *longer voyages will provide more time for science courses (geology or “areaology” in a wide range of hands-on topics to make the recruits more useful upon arrival.*



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## NASA's "Artemis" Program

[<https://www.space.com/artemis-program.html>]

**An interesting note:** It was "The Artemis Society" that at a convention in Las Vegas Nevada (which I, Peter Kokh, chaired) that *the original Artemis Society* became "The Moon Society."

NASA's Artemis program is an effort to place astronauts on the lunar surface and develop *an ongoing presence there*. The program's name is derived from **Artemis**, the Greek goddess of the Moon and **twin sister to Apollo**, whose namesake program first brought crews to our natural satellite 50 years ago.

[This may be *a clue of NASA's determination to return to the Moon to stay! But beware: Congress is fickle, and unless this program becomes self-expanding, and self-financing, Congress and NASA may once again close up shop.*]

*One way or another, Lunar Settlements have to find a way to finance themselves, and thus able to continue to exist irregardless of fickle politics. And that is the path I endeavored to blaze in my book,*

**A Pioneer's Guide to Living on the Moon**

by Peter Kokh \$19.95 from Amazon. (over 700 pages)

**(A Pioneer's Guide to Living on Mars** (also from Amazon) should be available sometime this summer 2020.

*To be followed by book 3, (A Pioneer's Guide to the Rest of the Solar System) - a compendium of articles previously published in issues of Moon Miners' Manifesto. Included are in order, ✓ the larger asteroids, ✓ Jupiter (and Europa), ✓ Saturn (and Titan, the most intriguing moon in the solar system, and Iapetus), ✓ Uranus and its moons, ✓ Neptune and Tritan, ✓ the Pluto-Charon binary planet system, then back towards the Sun: ✓ Mercury, which because of its very short trip around the Sun, could become the Grand Central Station for the entire Solar System. And the biggest challenge of all: ✓ Venus, and a plan that over time, we might make it livable. ##*

*The biggest challenge here is my age, now 82. (A doctor told me when I was 16 that my heart was wired wrong, I had "Right Bundle Branch Block" and at the very best, I might live to see my 60th birthday (December 11, 1997) and I feel as healthy today, 22 plus years later, as I did when I was in my teens. But who knows?*

*One of my secrets: **I don't put off to tomorrow what I can do today!** My "**work (writing) day**" is **closer to 16 hours than it is to just 8 hours.** ##*

*And then? **Yes, there is one more book coming, if I am still alive to write it.** It is based on an "eureka moment" when I had been in London, UK, for over a year, at the age of 23. **There has to be an infinite number of universes!** And "God" is Omega (not Alpha) pulling us into our future, not pushing us. (So I use the word "Godh.")*



## The “Doomsday Clock” edges closer to midnight!

<https://www.nbcnews.com/science/environment/scientists-move-doomsday-clock-closer-midnight-n1121176?cid=recommended>

**“The Bulletin adjusted the clock to reflect looming threats from nuclear weapons and accelerated global warming.**

The clock is now set at 100 seconds to midnight, the closest it has ever been to symbolic doom and the first time the hands have been within the two-minute mark.

"We are now expressing how close the world is to catastrophe in seconds — not hours, or even minutes," Rachel Bronson, the Bulletin's president and CEO, said in a statement. "We now face a true emergency — an absolutely unacceptable state of world affairs that has eliminated any margin for error or further delay."

““We have normalized a very dangerous world in terms of **the risks of nuclear warfare and climate change.**” The Bulletin placed much of the blame on world leaders who have eroded international arms agreements and both denigrated and denied the science of global warming. ##

Not good news! *We need to hold our leaders (and a President who is in denial) and Congress accountable.* PK

## **The World’s Weirdest Bridge and why China is passing the United States in technologies, architectures, and other areas**



<https://weather.com/photos/places/news/2014-08-18-weirdest-bridges-world-photos-20140730>

The center arch strengthens this “Lucky Knot” Bridge, in Changsha, China  
**Below:** Beijing-Shanghai **high speed train** link the two megacities 1,318 km (819 mi) away in just 4.5 hours. China has the world's largest **high speed rail** (HSR) network with a length totaling over 35,000 km (21,750 mi). The world's longest High Speed Railway line, **Beijing > Hong Kong High Speed Railway**, extends 2,440 km. (and look how long this train is!)



An encouraging example of the maxim that there is always another way to doing anything! *[except when outdated legal restrictions interfere]*  
**NOTE:** When it comes to High Speed Railroad, Europe is also way ahead of North America. Get used to it: Congressional politics of both parties are forcing us to be trailing at the rear.

**As we build settlements on the Moon, Mars, some of the larger moons of the outer gassy planets, and possibly Mercury, we need to keep this in mind.**

**If we don't, it will be China that opens the Solar System to mankind.**

**NOTE:** The United States *had been* the primary source of engineering advances. Take a look at China's Freeway interchanges and ultra-fast trains, and you will realize that that position is now securely in China's hat.

**Why? Because we have too many restraining regulations that in many cases, our engineers & adventures & *those who benefit from keeping things as they are*, with their/our hands tied behind their/our backs.**



**In effect, China is a half-century ahead of us - something we thought would be impossible — in many ways. Our enemy is a galaxy of restrictions that need to be reviewed, but haven't been because of those who have a financial interest in these restrictions remaining in place. Wake up, America (and Congress and politicians of both parties!)**

## **Back to Space**

**As things (i.e. Congressional politics) are, it is quite possible that it will be China who first sends humans to Mars. They may be behind us, but at the rate China's industrial expertise continues to grow, its surpassing us in Space is just a matter of time.**

**Consider now that we are left in the dust by other countries landing probes on the far side of the Moon, including China, India, and *Israel!*. ##**

**Those flights will be the first step of the agency's ambitious Artemis program to land humans on the Moon in 2024. The first mission, by Orbit Beyond, will launch in September 2020. The other two will launch in the summer of 2021.**

**Singapore, an independent City State in SE Asia  
seeks to become a Space Hub as well.  
above a “city state” enterprise hub of surrounding nations below**







## Global Space and Technology Convention 2020 (in February 5th to 7th, 2020) hosted by Singapore

Space technology professionals, academics and enthusiasts converged on Singapore for **GSTC 2020**. 800 participants representing 300 companies are expected to hear 61 speakers supported by 30+ sponsors. **Singapore Space and Technology Association**, led by president Jonathan Hung, has hosted GSTC for over a decade with the intention of *leveraging Singapore into a ‘strategic space hub status... leading the way into an era of galactic discovery’*.

**A small Nation but the Major Hub for larger nations & making the most of it!**

The formal convention opening was preceded on Wednesday, **February 5** with a day of **workshops on space technology topics**:

- ✓ **Responsible and Sustainable Space Investment**,
- ✓ **United Kingdom** (Great Britain & Northern Ireland)-**Singapore Space Partnerships**,
- ✓ **Blockchain in Space & Satellite Quantum Key Distribution**, a *light-based encryption technology*

**Workshops** was led by ✓ *Secure World Foundation*, ✓ *UK Space Agency*, *SpaceChain*, and ✓ *Centre For Quantum Technologies of National Univ. of Singapore*  
**Asia Regional Symposium 2020**, with theme *Advancing Smart Nation with Satellite Positioning*, -with GSTC – *satellite communications being a major socioeconomic driver of SEA space enterprise; a hub for Moon-focused enterprises.*

Looking forward, *Lunar Commercial Communications* will complement and, in some regards, supplant terrestrial and orbital communication insofar as *Moon-Earth communication* will expand the physical sphere of human activity 1000-fold when *actualized*. ##

### ***“LOCATION, LOCATION, LOCATION”***

*Editor: An example of how a small nation can have great effects. Israel is another. Indeed, “New Singapore” might be a great name for a key “hub city” on the Moon, and/or on Mars. ##*

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**NASA unveils 16 payloads that private lunar landers will take to the Moon**

<https://www.space.com/nasa-private-moon-lander-science-experiments.html>

***The experiments are scheduled to fly in July 2021***

***The innovation, the technology, the leading edge, in many cases, is coming from the private sector.*** NASA is certainly leaning into the push for commercial spaceflight. Just last week, the space agency unveiled 16 scientific experiments and technology demonstrations that will hitch a ride to the Moon aboard landers built by two private companies: Astrobotic of Pittsburgh and Intuitive Machines LLC of Houston. The two landers are slated to launch in July 2021 on United Launch Alliance's Vulcan Centaur rocket and Space X's Falcon 9, respectively. ##

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### **NASA’s “Artemis” Program**

***[<https://www.space.com/artemis-program.html>]***

***An interesting note: It was “The Artemis Society” that at a convention in Las Vegas, Nevada (which I, Peter Kokh, chaired) that the original Artemis Society became “The Moon Society.”***

**NASA's Artemis program** is an effort to **place astronauts on the lunar surface and develop *an ongoing presence there***. The program's name is derived from **Artemis**, the Greek goddess of the Moon and **twin sister to Apollo**, whose namesake program first brought crews to our natural satellite 50 years ago.

***[This may be a clue of NASA’s determination to return to the Moon to stay! But beware: Congress is fickle, and unless this program becomes self-expanding, and self-financing, Congress and NASA may once again close up shop.]***

***One way or another, Lunar Settlements have to find a way to finance themselves, and thus able to continue to exist irregardless of fickle politics. And that is the path I endeavored to blaze in my book,***

***A Pioneer’s Guide to Living on the Moon \$19.95 from Amazon. (over 700 pages)***

***(A Pioneer’s Guide to Living on Mars (also from Amazon) this summer 2020.***

***To be followed by book 3, (A Pioneer’s Guide to the Rest of the Solar System) - a compendium of articles previously published in issues of Moon Miners’ Manifesto. Included are in order, ✓ the larger asteroids, ✓ Jupiter (and Europa), ✓ Saturn (and Titan, the most intriguing moon in the solar system, and Iapetus), ✓ Uranus and its moons, ✓ Neptune and Tritan, ✓ the Pluto-Charon binary planet system, then back***

*towards the Sun: ✓ **Mercury, which because of its very short trip around the Sun, could become the Grand Central Station for the entire Solar System. And the biggest challenge of all: ✓ Venus, and a plan that over time, we might make it livable. ##***

*The biggest challenge here is my age, now 82. (A doctor told me when I was 16 that my heart was wired wrong, I had “Right Bundle Branch Block” and at the very best, I might live to see my 60th birthday (December 11, 1997) and I feel as healthy today, 22 plus years later, as I did when I was in my teens. But who knows?*

*One of my secrets: **I don’t put off to tomorrow what I can do today! My “work (writing) day” is closer to 16 hours than it is to just 8 hours. ##***

*And then? **Yes, there is one more book coming, if I am still alive to write it. It is based on an “eureka moment” when I had been in London, UK, for over a year, at the age of 23. There has to be an infinite number of universes! And “God” is Omega (not Alpha) pulling us into our future, not pushing us. (So I use the word “Godh.”)***

*Right now, this book, “The Omega Factor,” is on hundreds of 3x4 inch index cards, and in my brain. I need to switch writing soon about Solar System and switch to topics about the “Omniverse.” #Note: many physicists have come to believe in the “Omniverse.” ##*

### **SpaceX held a “Starship career day” to ramp up its Mars colonization effort**

<https://www.space.com/spacex-starship-career-day-elon-musk.html>

And the company wants to launch a **Starship** 12 miles up by September. February 9, 2020: The company held a **Starship career day** Feb. 6th at **its facility near the South Texas village of Boca Chica**, where the big spaceship is coming together.

"This was mainly for staffing up 4 production shifts for 24/7 operations, but engineers, supervisors & support personnel are certainly needed too. A super hardcore work ethic, talent for building things, common sense & trustworthiness are required, the rest we can train," SpaceX founder and CEO Elon Musk said, February 4th, 2020.

Musk stressed that Starship production is already humming along. "Going max hardcore on design/production **Starship** here in Boca. It's awesome!"

**Starship** is a 165-foot-tall (50 meters) spacecraft that SpaceX is building to take people to and from Mars, the moon and other distant destinations. The ship will launch off Earth atop a huge rocket called Super Heavy; both of these vehicles will be reusable. (Starship is powerful enough to get itself off the Moon and Mars, both of whose gravitational clutches are much weaker than Earth's.)

The only version of **Starship** to get off the ground to date is a single-engine prototype called **Starhopper**, which made a few brief test flights last year before being retired. But that could change soon; SpaceX has filed paperwork with the U.S. Federal

Communications Commission to launch a 12-mile-high (20 kilometers) test flight with Starship between March and September of this year.

Things will move quickly after that, if all goes according to SpaceX's plan. Company representatives have said that the first operational **Starship** missions, which will likely loft commercial communications satellites, could launch as early as 2021.

And **SpaceX** has one crewed **Starship** mission on the docket already: **Japanese billionaire Yusaiu Maezawa has booked the vehicle on an around-the-Moon flight, with a targeted launch date of 2023.**

*Hmmm? How can i lose enough weight in next 3 years to sneak aboard without being noticed? I'm lean already! Shucks!*

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### **The good part of being aboard a spaceship if and when it crashes**

Nobody will have to pay to bury your body or even your ashes! *LOL!*

*And you wouldn't have suffered for more than a second or two, LOL!*

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**Pluto's famous heart powers icy winds on the dwarf planet**



The binary Pluto-Charons larger partner, Pluto's famous heart-shaped feature, which NASA's New Horizons spacecraft discovered during its epic July 2015 flyby, **drives atmospheric circulation patterns on Pluto, a new study suggests.**

Most of the action comes courtesy of the heart's left lobe, a 600-mile-wide (1,000 kilometers) nitrogen-ice plain called Sputnik Planitia. This exotic ice vaporizes during the day and condenses into ice again at night, causing nitrogen winds to blow, the researchers determined. (Pluto's atmosphere is dominated by nitrogen, like Earth's, though the dwarf planet's air is about 100,000 times thinner than the stuff we breathe.)

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This work revealed the likely presence of westerly winds — a high-altitude variety that races along at least 2.5 miles (4 kilometers) above the surface and a fast-moving type closer to the ground that follows Sputnik Planitia's western edge.

That edge is bounded by high cliffs, which appear to trap the near-surface winds inside the Sputnik Planitia basin for a spell before they can escape to the west. "It's very much the kind of thing that's due to the topography or specifics of the setting,"

New Horizons' Pluto flyby revealed that the dwarf planet is far more complex and diverse than anyone had thought, featuring towering water-ice mountains and weird "bladed" terrain in addition to the photogenic heart (whose official name, Tombaugh Regio, honors the discoverer of Pluto, Clyde Tombaugh).

"Sputnik Planitia may be as important for Pluto's climate as the ocean is for Earth's climate," Bertrand said. "If you remove Sputnik Planitia — if you remove the heart of Pluto — you won't have the same circulation."

**NOTE: Astronomer's have yet to realize that Charon is NOT Pluto's satellite, but, as both rotate around a common center of gravity, each keeping the same face turned towards the other, that Charon is not Pluto's moon, but both together, Pluto and Charon, are a "binary planet."**

**In all other cases of moons and their planets, the center of gravity is within the planet.** (Earth/Moon center of gravity is about a thousand miles below Earth's surface and travels around Earth to keep below the Moon, and this may be keeping that area molten which in turn sustains a radioactive shield high above Earth. PK

**Someday, a cable could connecting the center of Charon's face turned towards the center of Pluto's face turned towards the center of Charon's face, allowing people to go from one to the other.**

**When the face of one is fully sunlit, at high noon, the face of the other is dark, high midnight, save for artificial lights put there by settlers.**

When one is in “midnight” the face of the other is at high “noon,” a feature absolutely unique in our solar system. So why don’t astronomers stop patting themselves on the back given their total failure to realize something that is quite obvious.? ##

Pluto and Charon are not a planet and a moon, but together “**a binary planet!**” **And together**, they have 4 small “moons: “**Hydra, Nix, Styx, and Kerberos**”. **YET, PLUTO & CHARON ARE NOT LISTED AS A (BIBARY) PLANET “because they have not collected every body in their orbit.**

*Well Jupiter, our most massive planet, has hoarded asteroids in its orbit into collections at Jupiter’s L4 and L5 positions in its orbit. And Venus and Mercury have collected zero, zilch, nada, and are yet considered full planets. Something is wrong with the Astronomers Club. They apply to Pluto a requirement that mighty Jupiter itself has failed to meet.*

*And the failure of astronomers members-by-invitation-only to realize that Pluto-Charon is a binary planet and has collected some mini moons, then classifying Pluto (alone) as a minor planet. They are full of the sh— word! That includes any and all astronomy club elite*

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