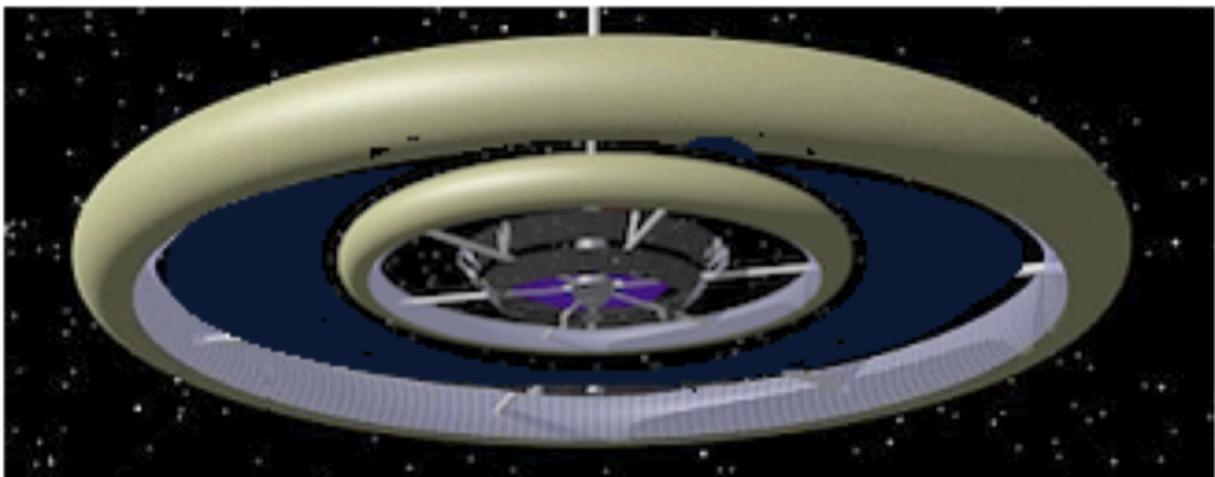




## OUTBOUND #11 DECEMBER 11, 2019

*The editor's 81<sup>st</sup> birthday*



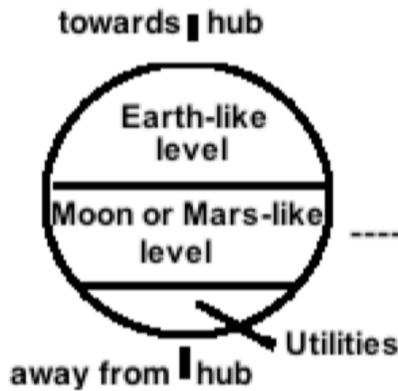
**Double torus** (inner Moon torus and outer Mars torus) in Earth Orbit (both rings rotate together, with distance from the center providing different artificial gravities)

The Purpose a **Moon/Mars Double Torus Space Hotel** is to ✓ Attract tourists; but ✓ more importantly to attract *possible settler recruits* for either the Moon or Mars. Some well-heeled tourists may want to get the experience of being on the Moon or Mars, but might not be serious about settling either world.

**No “analog’ facility on Earth can produce Lunar or Martian gravity.** For some the analog experience will be enough. But others, toying with the idea of applying to be a settler, we’ll have provided a more realistic setting on each torus lower level. Staying there will not only tell them whether or not they can handle the Moon’s 1/6th or

Mars' 3/8ths gravity "indefinitely" but whether they can handle the "moondust" covered homes and black star-studded skies of the Moon and its low gravity, or the Mars dust covered homes and salmon-colored skies of Mars, its higher, but still low gravity and its ambient low temperatures and seasons twice as long as Earth's, as the case may be.

The tourists may have enough after a few days or a week or so - the price keeps adding up. But serious settler-wannabe's or applicants will get a much better indication whether or not they have the right stuff, or if they had been just kidding themselves. It will be desirable, and worth the cost, to have them stay a few months. This will allow them to make friends with others with "the right stuff" - mutual encouragement.



The curious but not seriously considering pioneering the Moon or Mars, can experience what the different gravities are like, while staying *in normal hotel rooms on the top level of either or both toruses.*

On the simulated Lunar or Martian levels, their facilities will be covered with moonlike or marslike dust with periscopic windows as in the table top exhibit above. ***In both rings, Living Walls (Green Walls) the whole inner circumference of both toruses will provide a significant and reassuring touch of Earth.***

#### **Realism in athletic and sport activities**

Outfitting of the lower level lunar and/or Martian homesteads can be made more realistic by ***outfitting them with furnishings and other things that could be made locally on Moon or Mars by the first settlers.*** For example, in the lunar torus lower level as well as in the outer Mars torus, ***many objects could be made of cast or carved basalt, crude glass, etc,*** plus items salvaged from the ships that brought them there.

Note: **The gravity difference** will be more realistic for actions in place, like lifting things you would never attempt to lift on Earth: an automobile engine, a barrel of water, a stack of bricks.

***In directional actions as in most sports, one would experience an "English" from the torus' spin that would not mimic what we would feel in similar activities on Moon or Mars.*** This considered, organized activities would need to be carefully chosen.

## Outlooks

But the *“lunar” or “Martian” skies could be pretty convincing, as could be the ambient temperatures. And, of course, very low air pressure in the Mars torus, and next to none in the Moon torus.* These things can be reproduced convincingly enough. *You would need your spacesuits to go “outlooks” - i.e outside your “homes” whether on the simulated Moon or simulated Mars levels. But adjacent “homes” could be linked with a pressurized walkway all around the torus, perhaps with Living Walls on the outward wall (to help maintain orientation (which way back to your suite.)*

“Outlook” activities need to be chosen carefully. Those in the more “realistic” levels will be expecting much more, and their activity directors will be challenging them accordingly.

### Financing:

√ Those whose curiosity is limited to the simulated Martian and/or Lunar gravities, will have to pay their own way for a stay in the upper floor of either torus.

√ Those seriously considering settling on either world may have the greater part of the bill paid for by the Settlements on either world who need more settlers, but *it will pay to weed out those enthusiasts who, self-tested in the torus, realize that “this isn’t for me.”*

**Those who can handle the gravity of Mars may not be able to adjust to the climate.**

**Utah might look like Mars but Mars’ climate is akin to Antarctica’s Dry Valleys!**

It would also be wise for those choosing the more realistic lower levels with the desire to see if they could handle the real frontiers, to go to analog facilities here on Earth that were designed to mimic the lunar and Martian skies and surroundings and activities.

Serious would-be Martian Settlers might well to volunteer for *a 6 month stay* in a Mars Society analog. Facilities, either on Devon Island in Canada’s far north, or better yet, in suggested facilities in one of Antarctica’s Dry Valleys, where the temperatures through the seasons best match those that settlers will have to adjust to, on Mars.

### Why this expensive Moon/Mars double torus?

The cost of subsidizing hopeful settlers this way will be much less than giving them a ticket all the way to the Moon, or to Mars, only to have to send them back home again, after any of them belatedly realize that “this isn’t for me.”

*Those who handled their stay on either the Lunar or Mars level, may ask to stay for another term (a month?) at half price to be sure about their decisions.*

This neat facility in Earth Orbit will pay for itself in this way, by filtering out those who don’t have “the right stuff” and the “determination.” And in the process, would-be Lunar or Martian settlers could be more sure of their decision to leave their home world - Earth - behind. ##

*“Daddy, why does our Moon house have all this moon dust piled on top of it?”*

*“Honey, on the Moon, houses have to wear space suits, too!”*

*“Daddy, why is Mars sky bright, but we must still wear pressure suits?”*

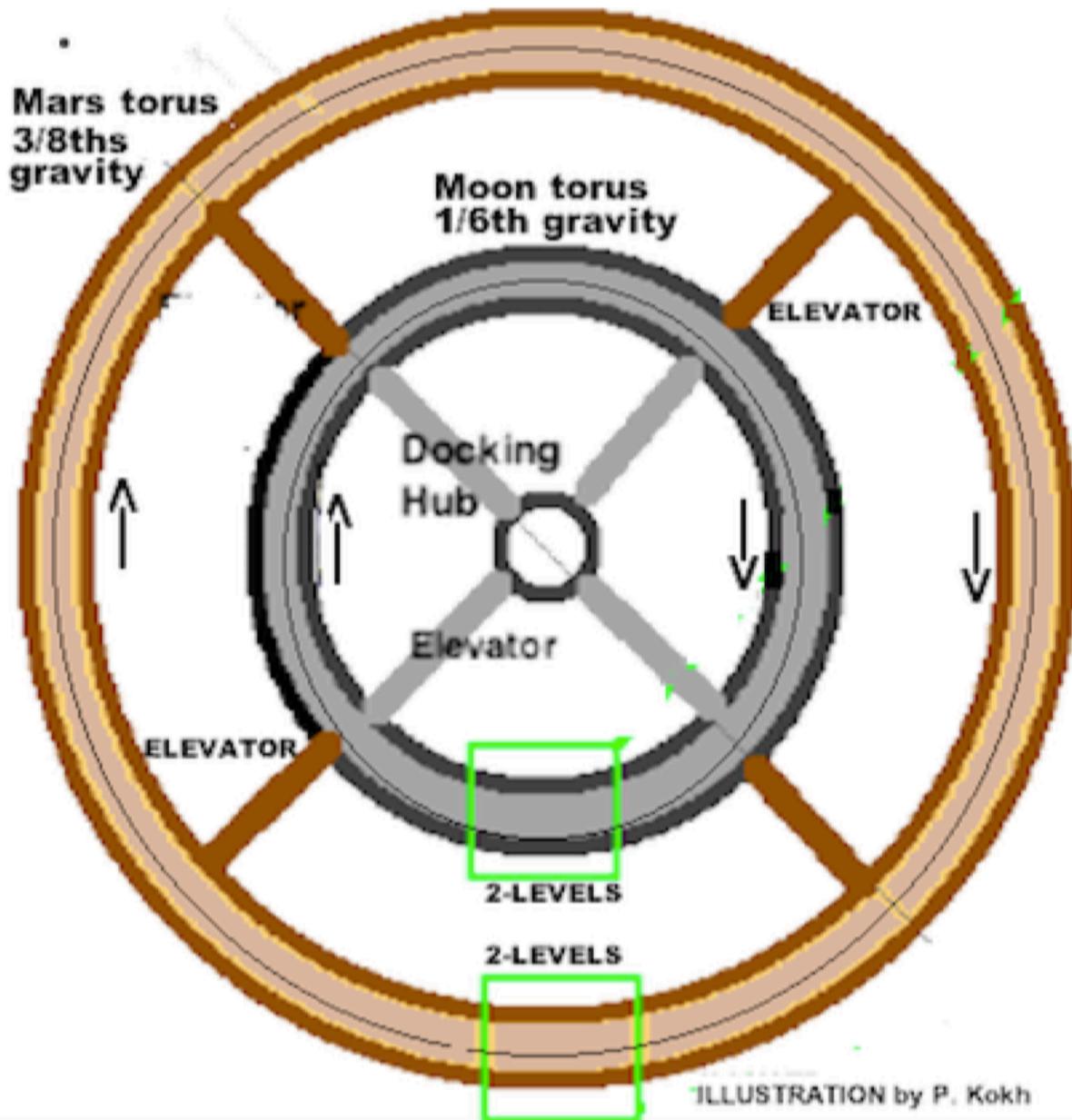
*“Junior, because this is not the right kind of air and also its too thin.”*

**Short courses of the following topics  
on Moon ring in double torus in Earth orbit  
- One each day with select replays**

**Courses before leaving for the Moon**  
**Courses en Route to the Moon**  
**Selenology: highlands, basins, craters, rilles, lava tubes**  
**Equipment already on the Moon**  
**Equipment to be brought along on next flights**  
**Equipment in the design/or construction stage**  
**Container Factories**  
**Home designs and Features**  
**Living Walls etc.**  
**Settlement layouts**  
**Basalt: carved, cast, fiber**  
**Water/ice reserves**  
**Maps of the Moon by Mooniest type**  
**Moon sports**  
**Moon vehicles, trains, bus coaches etc.**

**Short courses of the following topics  
on Mars ring in double torus in Earth orbit  
- One each day with select replays**

**Courses before leaving for Mars**  
**Courses en Route to Mars**  
**Aerology: volcanoes, basins, Valles**  
**Equipment already on Mars**  
**Equipment to be brought along on next flights**  
**Equipment in the design/or construction stage**  
**Container Factories**  
**Home designs and Features**  
**Living Walls etc.**  
**Settlement layout**  
**Basalt: carved, cast, fiber**  
**Redhousing**  
**Exploring Mars for water reservoirs**  
**Maps of Mars by Marsdust type**  
**Mars sports**  
**Mars vehicles, trains, dirigibles & seaplanes, coaches etc.**  
**Phobos & Deimos**



**At what level above the Earth would we want to put such a double torus facility?**

High enough so that damage from space debris is not likely, but perhaps below GEO-Synchronous orbit so that it can be seen from anywhere on Earth over time.

Those who pass **the Mars gravity test**, and who are seriously considering applying to relocate from Earth to Mars, **there should be a second test: spending a few months in a “Mars-like station” in one of Antarctica’s Dry Valleys, where the high and low temperatures are a close match to those on Mars, the blue skies notwithstanding.**

Mars is more than a rust-colored surface, but not the Hawaii of the Solar System. “The McMurdo Dry Valleys are 3 glacier-free valleys in Antarctica, within Victoria Land west of McMurdo Sound. They experience extremely low humidity. Surrounding mountains prevent the flow of ice from nearby glaciers.”\_Scientists consider the Dry Valleys to be the closest of any Earth environment to what Mars is like.

[https://en.wikipedia.org/wiki/McMurdo\\_Dry\\_Valleys](https://en.wikipedia.org/wiki/McMurdo_Dry_Valleys) ##





## Hawaii Supreme Court rules in favor of giant telescope

By **Science News Staff** October 30, 2018

The Supreme Court of the State of Hawaii has cleared the way for astronomers to build one of the world's largest telescopes atop the Mauna Kea volcano. In a **4-1 ruling**, the justices rejected an effort by groups representing native Hawaiians to block a **2017 decision by state regulators to issue a permit to build the Thirty Meter Telescope (TMT)**. But telescope backers will still need to decide whether to move forward with the project, which is **expected to cost more than \$1 billion**.

This ruling ends years of controversy and legal wrangling over the TMT. Some native Hawaiian groups objected to the project, saying it would mar a mountaintop they consider sacred. In 2015, protestors blocked roads to the site, **preventing the start of construction**. Legal action by opponents then forced state officials to reconsider a key permit for the project, but last year the telescope's backers, which include the University of Hawaii (UH), again secured permission to move ahead. Today's 73-page ruling upholds that decision.

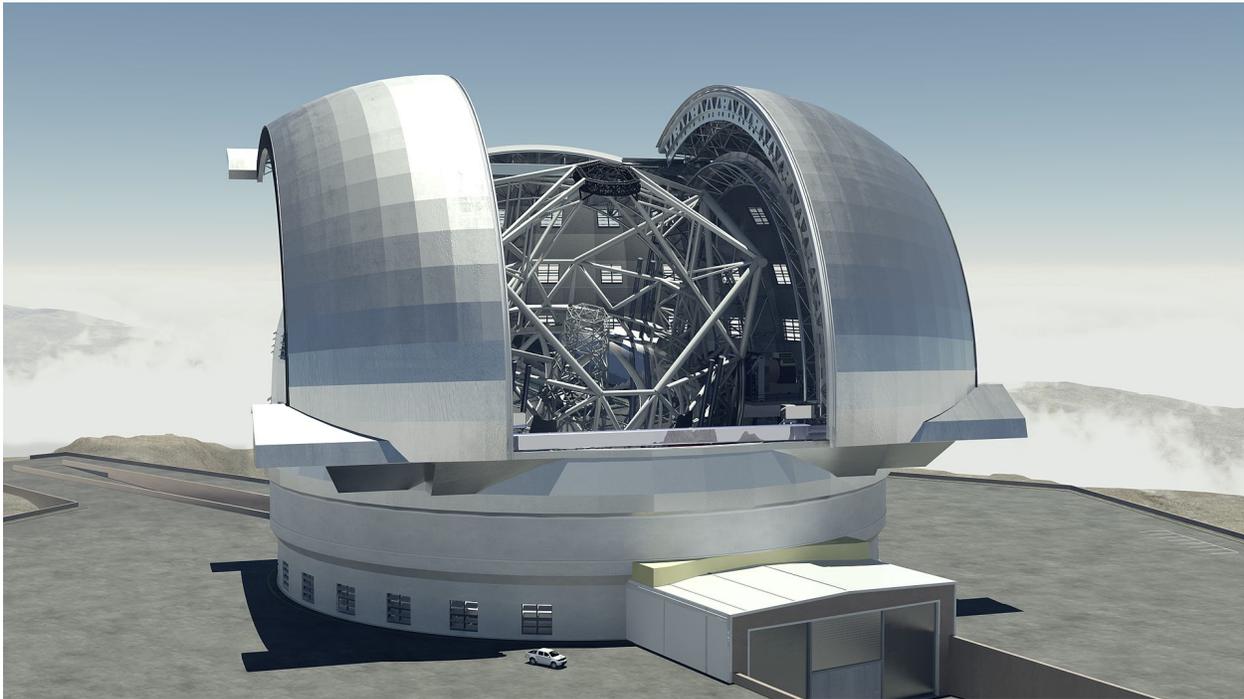
Thirty meters is **98 feet+ = 1181 inches. Wow!**

Compare that to your backyard amateur telescope!

[This writer once had a 13" Dobsonian, of little use under urban skies.] ##



## An even larger telescope is being built in South America



*note size of car ^ above!*

The **Extremely Large Telescope (ELT)** is an astronomical observatory and the world's largest optical/near-infrared extremely large telescope **now under construction**. Part of the European Southern Observatory (ESO) agency, it is **located on top of Cerro Armazones in the Atacama Desert of northern Chile**, (a mountain located in the [Sierra Vicuña Mackenna](#) of the [Chilean Coast Range](#), approximately 130 km (81 mi) southeast of [Antofagasta](#), the major port city of northern Chile.)

The design consists of a reflecting telescope with a **39.3 meters (130 ft=1560 in)** diameter segmented primary mirror and a 4.2 m (14 ft) diameter secondary mirror, and will be supported by adaptive optics, eight laser guide star units and multiple large science instruments.<sup>[1]</sup>

**The observatory aims to gather 100 million times more light than the human eye, 13 times more light than the largest optical telescopes existing in 2014, and it will be able to correct for atmospheric distortion.**

**It has around 256 times the light gathering area of the Hubble Space Telescope and, according to the ELT's specifications, would provide images 16 times sharper than those from Hubble.**<sup>[2]</sup>

The project was originally called the **European Extremely Large Telescope (E-ELT)**, but the name was shortened to **ELT** in 2017. #

## What's cooking for further exploration of Venus?

**Venus Exploration Analysis Group: VEXAG:** <https://www.lpi.usra.edu/vexag/>  
 Goals, Objectives and Investigations for Venus Exploration: 2016  
 Roadmap for Venus Exploration: 2014.      Venus Technology Plan: 2014  
 Venus Bridge Summary Report - April 20, 2018  
 VEXAG Venus Bridge Study Briefing to Thomas Zurbuchen - April 20, 2018  
 Aerial Platforms for the Scientific Exploration of Venus - October 2018  
**2019 International Venus Conference - --June 3 (Fri-Mon), 2019**  
 The 74th Fujihara Seminar : "Akatsuki" Novel Development of Venus Science  
 Hilton Niseko Village, Hokkaido, Japan  
 Access to Akatsuki data <http://atmos.nmsu.edu/Venus/akatsuki.html>

### Guiding Documents

[Goals, Objectives and Investigations for Venus Exploration: 2016](https://www.lpi.usra.edu/vexag/reports/GOI-Space-Physics-Update-0816.pdf)  
<https://www.lpi.usra.edu/vexag/reports/GOI-Space-Physics-Update-0816.pdf>  
[Roadmap for Venus Exploration: 2014](https://www.lpi.usra.edu/vexag/reports/Roadmap-140617.pdf)  
<https://www.lpi.usra.edu/vexag/reports/Roadmap-140617.pdf>  
[Venus Technology Plan: 2014](https://www.lpi.usra.edu/vexag/reports/Venus-Technology-Plan-140617.pdf)  
<https://www.lpi.usra.edu/vexag/reports/Venus-Technology-Plan-140617.pdf>  
[Venus Bridge Summary Report - April 20, 2018](https://www.lpi.usra.edu/vexag/reports/Venus_Bridge_Summary_Report.pdf)  
[https://www.lpi.usra.edu/vexag/reports/Venus\\_Bridge\\_Summary\\_Report.pdf](https://www.lpi.usra.edu/vexag/reports/Venus_Bridge_Summary_Report.pdf)  
[VEXAG Venus Bridge Study Briefing to Thomas Zurbuchen - April 20, 2018](https://www.lpi.usra.edu/vexag/reports/Venus_Bridge_Summary_Slides.pdf)  
[https://www.lpi.usra.edu/vexag/reports/Venus\\_Bridge\\_Summary\\_Slides.pdf](https://www.lpi.usra.edu/vexag/reports/Venus_Bridge_Summary_Slides.pdf)  
[Aerial Platforms for the Scientific Exploration of Venus - October 2018](https://www.lpi.usra.edu/vexag/reports/Venus_Aerial_Platforms_Final_Report_Summary_Report_10_25_2018.pdf)  
[https://www.lpi.usra.edu/vexag/reports/](https://www.lpi.usra.edu/vexag/reports/Venus_Aerial_Platforms_Final_Report_Summary_Report_10_25_2018.pdf)  
[Venus\\_Aerial\\_Platforms\\_Final\\_Report\\_Summary\\_Report\\_10\\_25\\_2018.pdf](https://www.lpi.usra.edu/vexag/reports/Venus_Aerial_Platforms_Final_Report_Summary_Report_10_25_2018.pdf)

Our Paper on “**Transforming Venus into a Livable Planet**”

**Rehabilitating Venus as a Human Destination © 1992, 1998, 2000**

**[http://strabo.moonsociety.org/mmm/whitepapers/venus\\_rehabpaper.htm](http://strabo.moonsociety.org/mmm/whitepapers/venus_rehabpaper.htm)**

*We strongly suggest that you read the Articles Below in the Sequence they are given (R>L, T>B) and use the links below to revisit specific sections.*

|  |  |  |
|--|--|--|
| <a href="#">Aerostat "Xities" over Venus (below)</a> | <a href="#">Venus: Balloons &amp; Aerobots</a>     | <a href="#">Touring Venus from Above</a> |
| <a href="#">Visits to Venus enroute to Mars</a>      | <a href="#">"Subnubilar" Industries Over Venus</a> | <a href="#">Geomorphing Venus</a>        |
| <a href="#">Venus Geomorphed</a>                     | <a href="#">High Sky Aircraft for Venus</a>        | <a href="#">The "Friday File"</a>        |

**A simple way to have “No lag conversations” between Earth↔Mars.  
[This also works between ships en route from one world to the other.]**

((This pattern can be simulated to and from the double torus Moon/Mars space hotel in Earth orbit described above.))

The minimum distance between Earth and Mars is about

**54.6 million kilometers (33.9 million miles) / 258 seconds = 6+ minutes time lag**

The farthest apart they can be is about

**401 million kilometers (250 million miles) / 1258 seconds = 20 minutes time lag**

**Ship>Mars & Earth>Ship, at closest**, talk 6 minutes, then listen 6 minutes, then talk etc.  
**Ship>Mars and Earth>Ship, at furthest**, talk 20 minutes, then listen 20 minutes.

**(While you are talking, the other party is also. So when you stop talking (and the other party does also) you can listen to what the other party has said while you were talking, and they can listen to what you had just said, etc.)**

So at both ends, those involved are either talking or listening and **there are no silence periods** except, momentary, before and after conversations at either end.

Yes, this arrangement will apply to Earth to Jupiter (Callisto, Europa) bound ship etc (but with much longer conversations) .

**This “scheduled conversation” can also be simulated in Mars Torus of the Double Torus Moon/Mars facility in Earth Orbit. (6-20 minutes) (*Conversations between Moon and Earth have just one and a half seconds lag - inconsequential.*)**

=====

**Bringing the Best of Earth into Lunar and Martian Homes**

In settlements on the Moon and Mars, we can get more plants, whether just greenery, or fruit and vegetable plants in **Vertical Hanging Gardens & Living Walls**

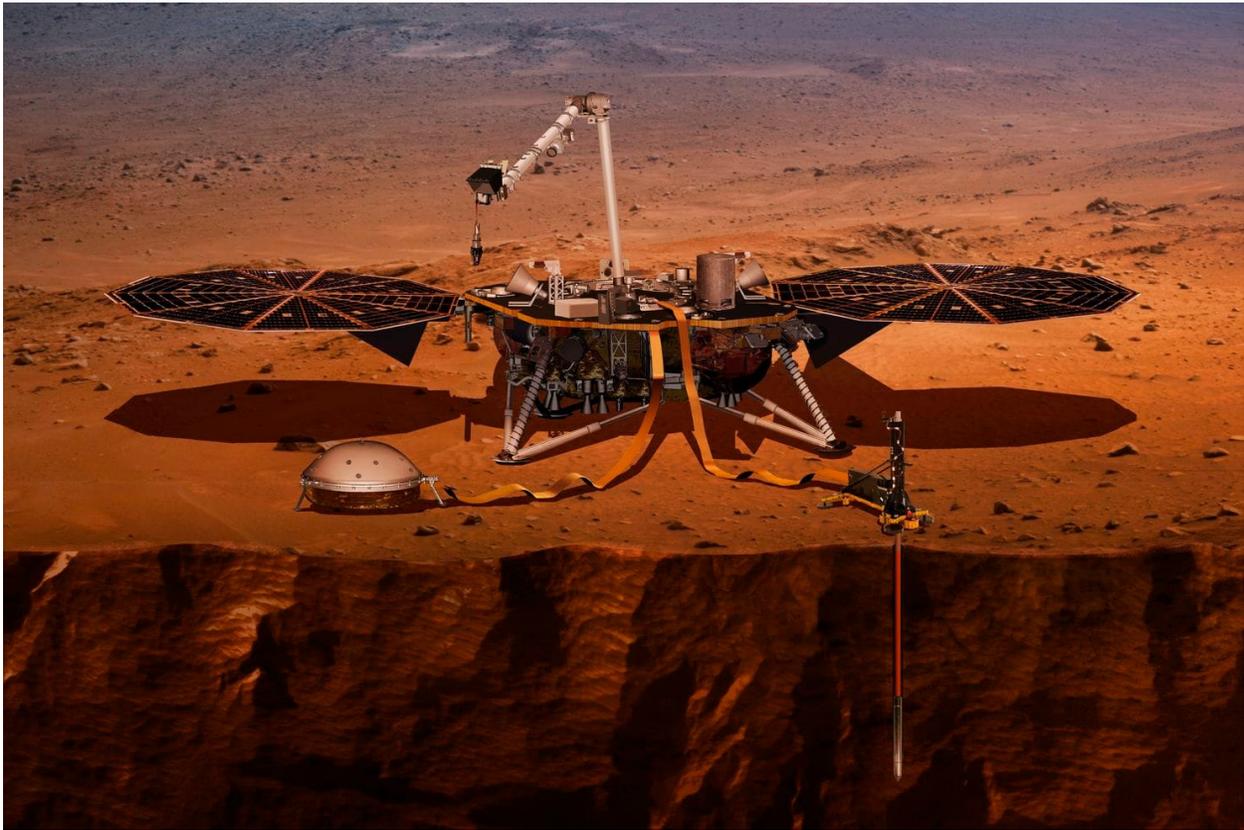
[https://www.amazon.com/gp/product/B07BQY81NN?ref=em\\_lp\\_6\\_ti&ref\\_=pe\\_1248350\\_367386900](https://www.amazon.com/gp/product/B07BQY81NN?ref=em_lp_6_ti&ref_=pe_1248350_367386900)

**Get in the Mood:** here on Earth, you can purchase these vertical vegetable gardens and put them along your north (south=facing) fence without giving up much lawn space. For more options (without fruit or vegetables), **Google “Green Walls: images” and/or “Living Walls: images”**

Inside settler homes, **Living Walls** (c. 6ft/2m high) can serve as room dividers, while keeping the air fresh, and helping make you feel “at home” (as on Earth.) **Living Walls** will keep the air fresh all along pressurized “Middoors” tubes connecting settler homes, and also in schools, factory lunch rooms, etc.

In Settlement farms, **Living Walls** will yield more fruit and vegetables per acre than ground-based farms, as sunlight (or artificial, during nightspan) can be directed from an angle that feeds the plants in the walls. ##

**Hooray! The Insight Probe has landed safely on Mars and deployed its instruments**



✓ <https://www.washingtonpost.com/science/2018/11/25/this-mars-explorer-will-probe-planets-history-if-it-can-land-one-piece/?>

✓ <https://www.jpl.nasa.gov/news/news.php?feature=7296>

**Monday, November 26, 2018:** Early in its history, Mars may have looked a lot like Earth. Magnetization in ancient rocks suggest it had a global magnetic field like Earth's, powered by a churning mantle and metallic core. The field would have protected the planet from radiation, allowing it to hold on to an atmosphere much thicker than the one that exists today. This in turn likely enabled liquid water to pool on Mars' surface; images from satellites reveal the outlines of long-gone lakes, deltas and river-carved canyons.

*But the last 3 billion years have been a slow-motion disaster for the Red Planet. The dynamo died; the magnetic field faltered; the water evaporated; and more than half of the atmosphere was stripped away by solar winds.*

***The InSight mission was designed to find out why.***

***The objective is to determine what Mars is made of and how it has changed since it formed more than 4 billion years ago. The results could help resolve the mystery of how the Red Planet became the dry and desolate world we see today, and what future human pioneers will be up against. ##***