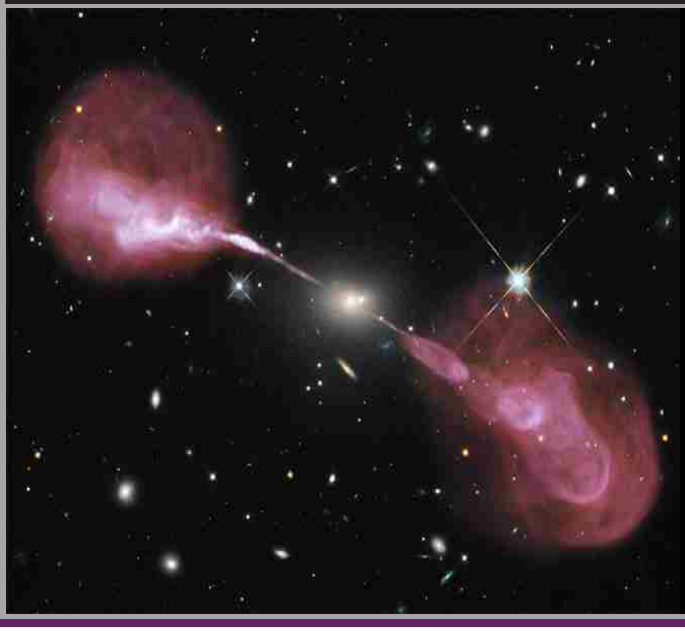
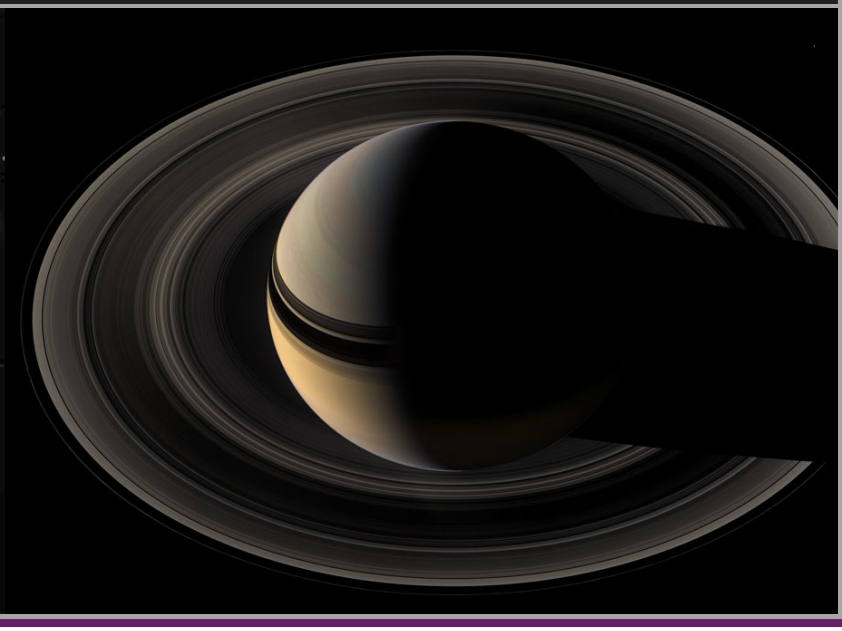
July, 2019

The Observer

Santa Monica Amateur Astronomy Club

In This Issue:	Speaker: Dr. Duane Bindschadler
How Astronomy Helped the Allies Win D-Day	A Solution to Insight's Problem
Space Radiation May No Longer be a Problem	Happenings and More!





Upcoming Events

July 13: Griffith Park Star Party	August 1-3: Julian Starfest
July 13-24: Griffith Park All Space Considered Apollo 11 Event	August 2-4: White Mountain field trip and star party
July 14, 2015: New Horizons visits Pluto, the US becomes the first nation in the world to visit all nine planets (counting Pluto as the planet that is)	August 9 Von Karman Lecture: Small Worlds, Big Science 8:00-10:00: Caltech Stargazing Lecture
July 20, 1969: Neil Armstrong and Buzz Aldrin become the first humans to step on the Moon	August 9: Santa Monica Amateur Astronomy Club August Meeting
July 25 7:50-8:50: Griffith Park Sunset Walk and Talk Hike	August 20, 1977: Voyager 2 launches
July 29, 1958: NASA is established	August 31: Mt. Pinos Club Star Party

Our Next Speaker

At this Friday's meeting, Dr. Duane Bindschadler will be our speaker. He is the Deputy Missions Operations Systems Engineer for the 2023 Europa Clipper mission, and will be talking to us about this planned mission.

Dr. Bindschadler graduated with a PhD in Geological Sciences from Brown University in 1990, and has since worked as a Manager on the Galileo mission, a system engineer, a science coordinator, and several other positions at JPL.

The plan for the Europa Clipper mission is to put a craft in orbit of Jupiter's large and icy moon, Europa. This largely under-explored satellite could have a vast ocean, and, possibly, life. In addition to studying Europa's geology and composition, the Clipper will look for signs of this ocean, scout out a landing spot for a future Europa lander, and research the icy moon's habitability. The mission will also complement the European Space Agency's Jupiter Icy Moons Explorer, which will briefly study Europa, Callisto, but extensively study Ganymede.

Don't miss out on a lecture on this fascinating topic!

How Astronomy Helped the Allies Secure a Victory on D-Day

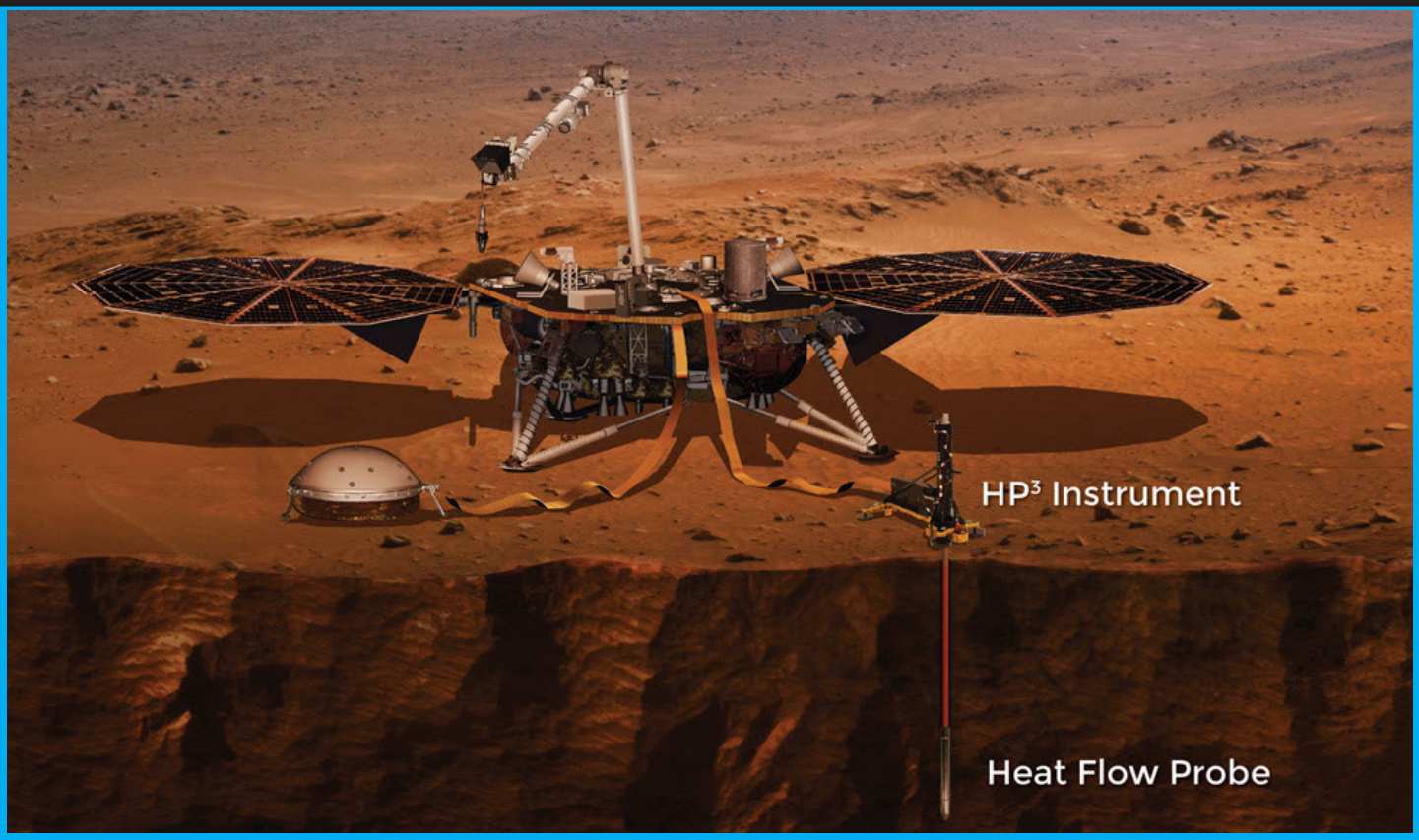
June 6th was the 75th anniversary of D-Day. Many people know that, as it was plastered all over the Internet, newspapers, and TV. But did you know that astronomical prediction played a big part in this key WWII allied victory?

First off, the landing of troops at Normandy had to be at low tide, so that the boats could see the mines, spikes, and other obstacles on the beach, which were covered in water at high tide. Next, the tide had to start rising as demolition parties began to remove the obstacles, to make for easy additional landings or retreats. This tide pattern also had to line up with the sunrise, and such an occurrence only happens during a full or new moon.

Secondly, it had to be a full moon so that paratroopers and bombers could see their inland targets, and deploy before sunrise to minimize the chances of being spotted. Also, it had to rise early enough for the troops to conquer two key bridges: the Canal Bridge and the Orne River Bridge before sunrise.

Put all together, the soonest time with the correct astronomical conditions was June 5, 6, and 7.

New Hope for Insight Lander's "Mole"



It has been over two months since the failure of the HP3 instrument on the Mars Insight lander failed, devastating the science community and putting 830 million taxpayer dollars at risk. But JPL engineers might finally be heading towards a solution that would put Insight on the right track for business.

The problem occurred with an instrument known as the "Mole," which is basically a self-driving nail built to bore itself and vital instruments into the ground. When it failed, everyone thought that the spacecraft would not be able to perform the geological studies it was meant to, but Engineers at JPL and the German space agency, who designed the probe assembly, are already hard at work trying to solve this puzzle. Now, it seems they will be making a move.

To fix the issue, the engineers first had to find what the problem is. They came up with two possibilities.

1. There is a small chance that the Mole is stuck on a rock, although the craft was landed in a spot preselected to be free of obstructions
2. The other, more likely problem is that the sand is too soft, not providing enough friction for the Mole to burrow itself, causing it to bounce back with the recoil of each blow from the hammer.

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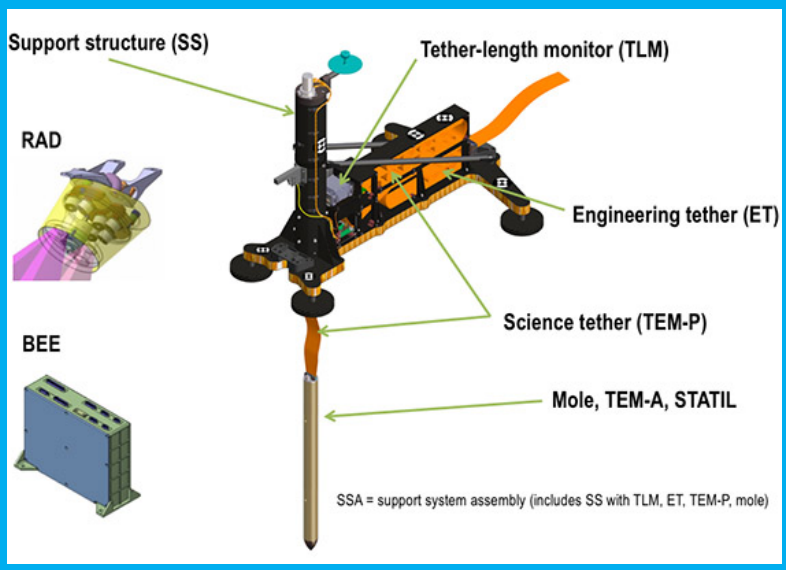
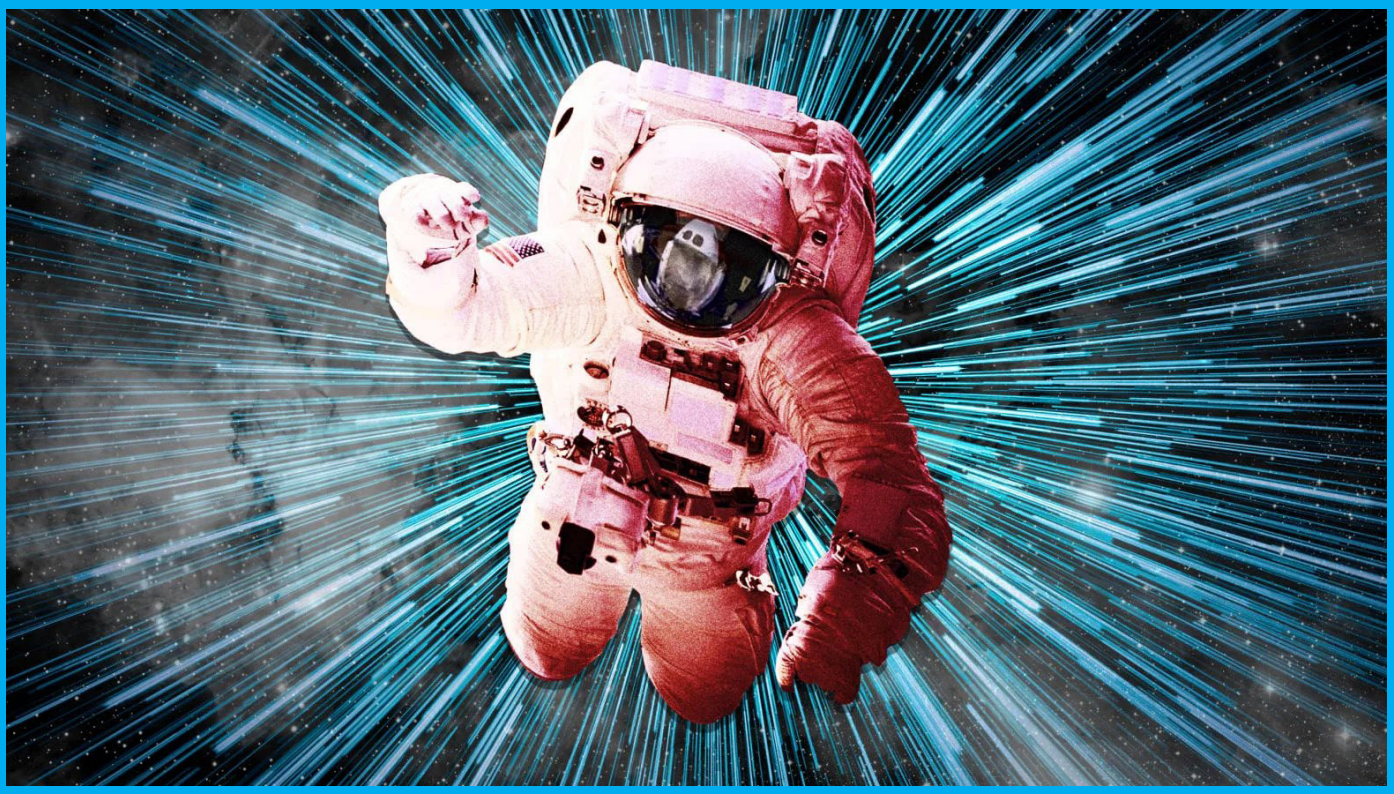
The engineers decided to use Insight's robotic arm to carefully lift off the Mole's Support Structure, a structural component used when the instrument was deployed. Then, they will have a clear view of and unobstructed access to the Mole.

If it is indeed a rock, experts say the Mole may never dig again. However, if it is a lack of friction, Insight will press its arm against the ground next to the Mole, hoping that the extra pressure allows the Mole to burrow itself and get going.



Space Radiation May Not be a Problem for Future Manned Missions to Space

A recent study, published in Nature Scientific Reports, shows that ionizing radiation experienced during space travel may not have to keep dreams of spaceflight at bay. The recent statistical study, which compared the effects of ionizing radiation to the cause of death of an astronaut, found no significant indication that radiation received while a person was in space affected their mortality.



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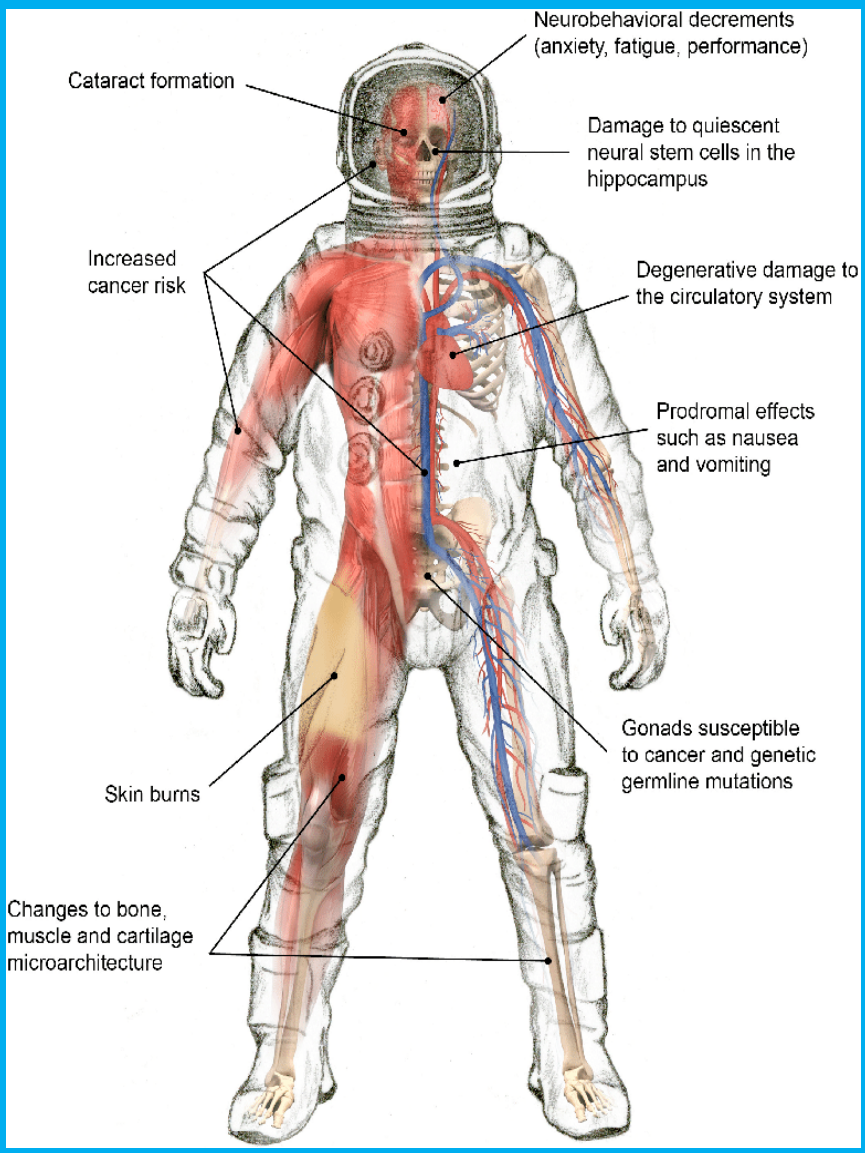
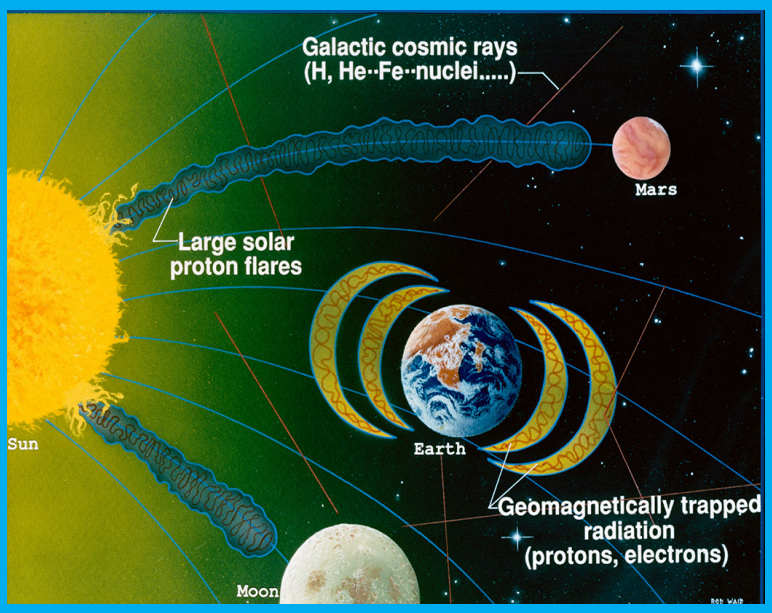
The researchers studied all 418 Astronauts and Cosmonauts, particularly 89 of them that have passed away. Among astronauts, the most common cause of death was external (ei. Car crashes, spacecraft failures) at 38%. After that, cancer was at 30% and then cardiovascular disease and other natural causes, both at 15%. Among Cosmonauts, cardiovascular disease accounted for 50%, Cancer for 28%, and external causes only 17%.

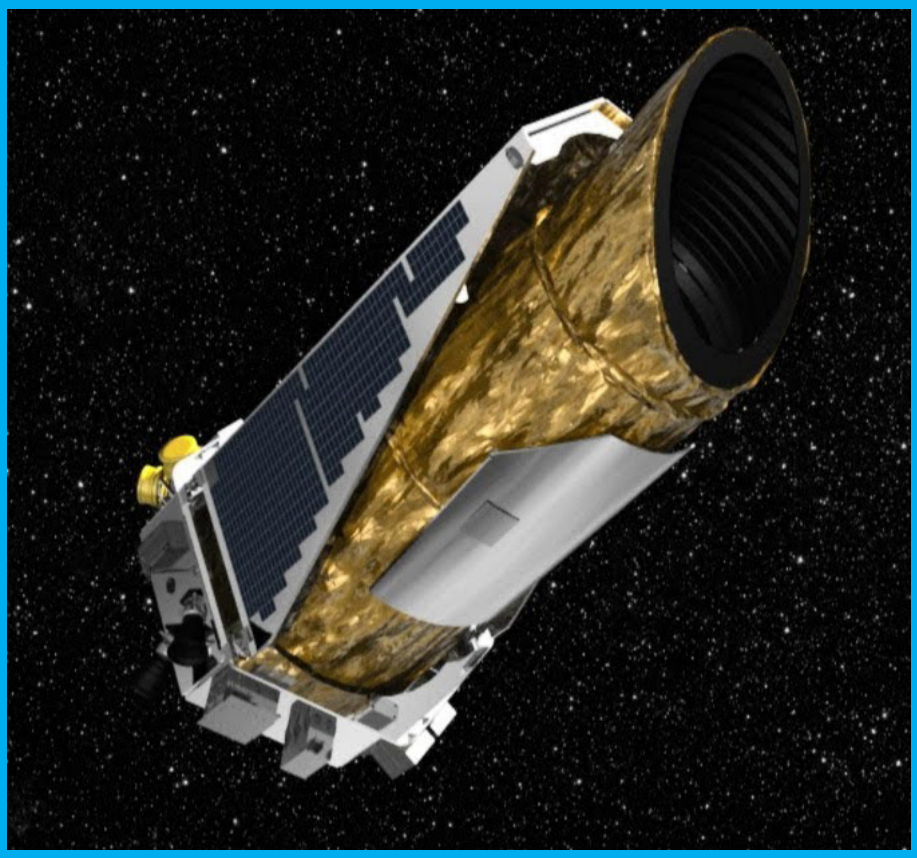


Of particular interest to the researchers were the spacefaring victims of cancer and cardiovascular disease, as exposure to ionizing radiation has been shown as a factor in the development of these diseases. "If two potentially life-threatening processes (of disease, or lifestyle)," the researchers state, "share a common underlying cause, deaths due to those causes cannot be statistically independent events."

After thorough statistical investigation, the researchers found no statistically significant relationship between the two afflictions. This suggests that ionizing radiation may not be a major cause for concern when it comes to future spaceflight missions. This isn't a perfect study, as the population of astronauts and cosmonauts are quite small, and the population of dead ones are even smaller. Longer missions could also have a greater negative effect that went undetected in this study. Multitudes of other factors could also have skewed the results, but this evidence may begin to relieve the aerospace community of one of the many hurdles that arise when you're trying to get a human to live in space.

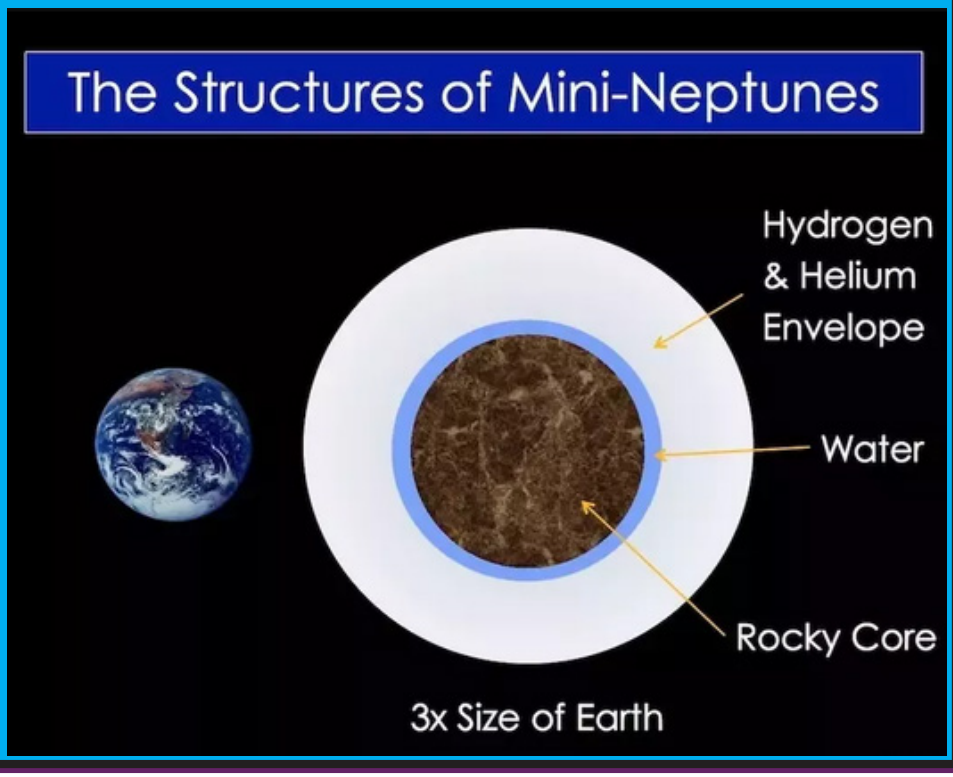


Scientists Take First Picture of the Atmosphere of an Interstellar Planet



Using the Kepler Space Telescope, astronomers have found thousands of interstellar planets. With all of these discoveries, astronomers realized something peculiar -- our Solar System is special. The most common type of planet in the known Universe is one our system doesn't have. Called "sub-Neptunes" or "super-Earths," they lie in the size range gap our system has between our gas giants and terrestrial planets.

About a week ago, we got our first glimpse into one of these mysterious planets. The Hubble and Spitzer space telescopes looked at one called GJ 3470 to reveal its atmospheric gases. What they found was a surprisingly light atmosphere, built almost entirely out of hydrogen and helium, reminiscent of the makeup of a star rather than a planet.



GJ 3470 b is unlike any planet we have explored. It is 12.6 times more massive than the Earth, but still far less than Neptune, which is 17 times Earth's mass. It also takes only three days to circle its star; a dim red dwarf much cooler than our own Sun.

It is speculated that super-Earths and sub-Neptunes cover a wide range of planet types, from incredibly large rocky

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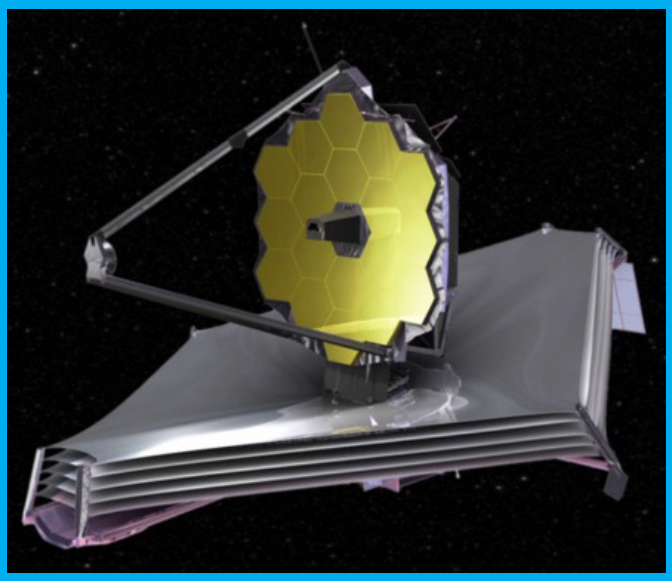
worlds to small gas planets, possibly even ice or water planets. Unlike Earth's relatively shallow atmosphere made of more massive gases like oxygen and nitrogen, these planets most likely have deep atmospheres of lighter gases like hydrogen and helium. GJ 3470 revealed that super Earths may get most of their mass from their atmospheres, with rocky components only slightly larger than the Earth.

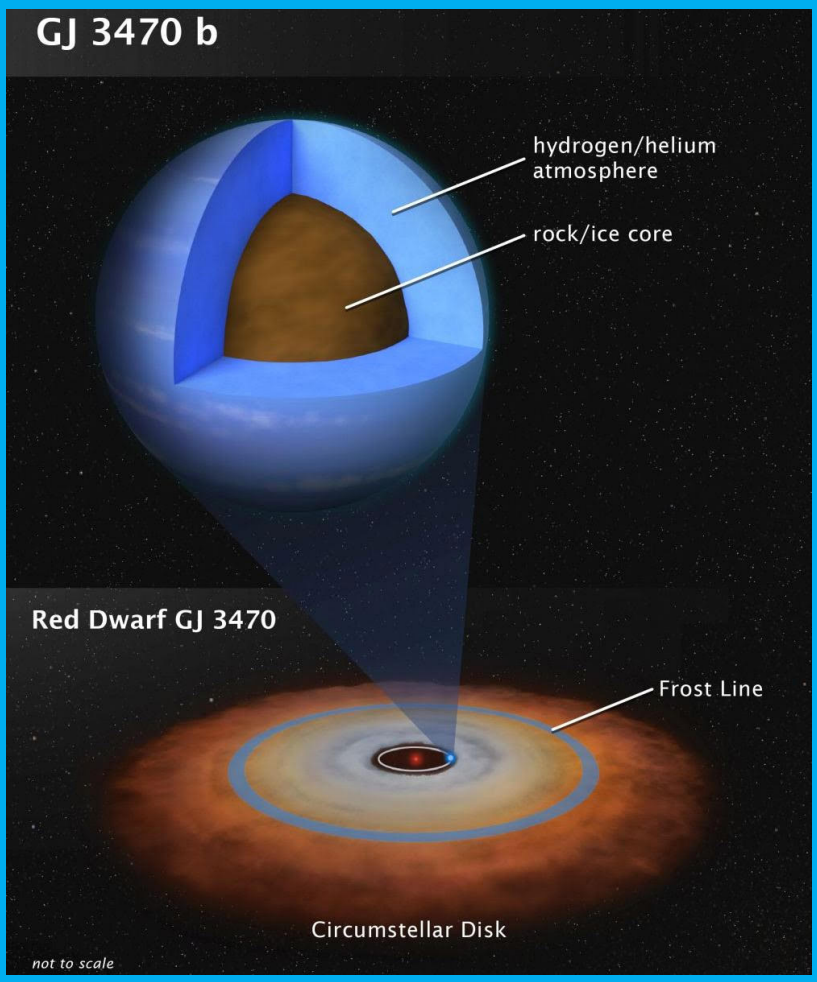


"We expected an atmosphere strongly enriched in heavier elements like oxygen and carbon which are forming abundant water vapor and methane gas, similar to what we see on Neptune," said Björn Benneke, the lead researcher, in a press release. "Instead, we found an atmosphere that is so poor in heavy elements that its composition resembles the hydrogen- and helium-rich composition of the Sun."

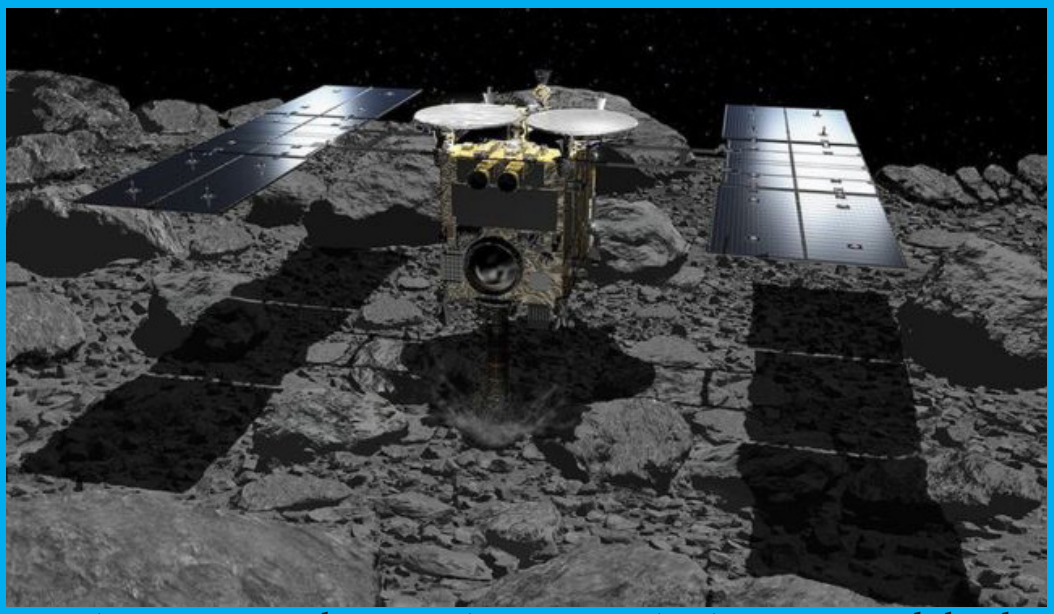
This makes astronomers second-guess how they think such a planet might form. Usually, when astronomers see a planet orbiting so close to its star, they assume it actually formed farther away, in a quieter zone of the solar system. That would have kept it away from the heat and stellar wind of a young star that blows very light elements like hydrogen and helium away before they could stick in a planet's gravity. After the planet formed, gravitational interactions or drag from gas particles could send it spiraling inward, where astronomers might spy it on a closer orbit.

But in this case, the simple atmosphere makes astronomers think that perhaps GJ 3470 b formed quite close to its star, inside a boundary called the frost line where heavier materials like oxygen and carbon reside. There, the planet could have formed its solid, rocky core, but picked up only light gases for its atmosphere.

Although the Spitzer Space Telescope is retiring, NASA's upcoming James Webb Space Telescope will be able to see even more detail. Located only 100 light-years away, and so close to its host star, GJ 3470 b should be a prime candidate for JWST follow-up work.



Japan Gives a Thumbs-Up for First Space Extraction Mission in History



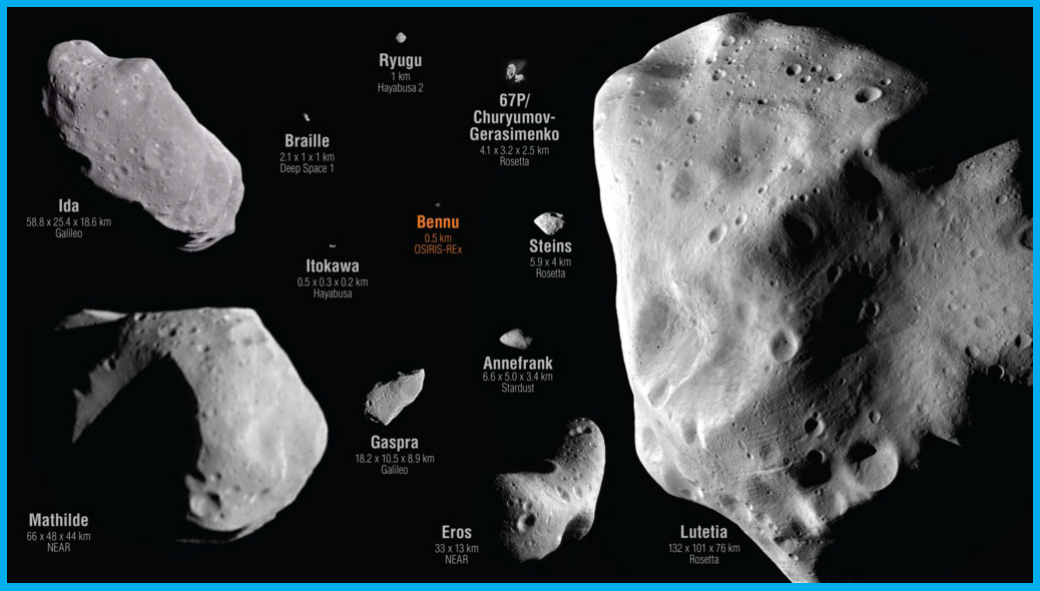
Ground control teams in Japan have approved plans for the Hayabusa 2 spacecraft to briefly land on asteroid Ryugu for the second time on July 11, aiming for a targeted touch-and-go to gather material exposed by an explosive impactor released by the robot explorer earlier this year.

Officials from the Japan Aerospace Exploration Agency, or JAXA, announced the decision on June 27 after weeks of surveys, practice approaches and deliberations to ensure the Hayabusa 2 spacecraft can safely touch down at the rugged site, which is strewn with boulders and rocks that could pose hazards to the probe.

The objective of this touch-and-go landing is to collect a second set of samples from the carbon-rich asteroid for return to Earth.

Hayabusa 2 is in the final leg of a nearly 18-month exploration campaign at asteroid Ryugu before firing its ion thrusters late this year for the return trip to Earth. So far, the mission has accomplished a pinpoint landing and takeoff from the asteroid, deployed three daughter probes to hop around Ryugu's surface, and carved a new crater on the asteroid after dropping an explosive charge.

One more landing and the release of the mission's final mobile surface scout are planned for the coming weeks.



Hayabusa 2 gathered a first batch of samples from Ryugu's surface in February after executing a pinpoint touchdown on a different part of the 900-metre (0.5 mile) wide asteroid.

The robot explorer's sampling mechanism works by firing a metal bullet into the asteroid once the probe's sampler horn,

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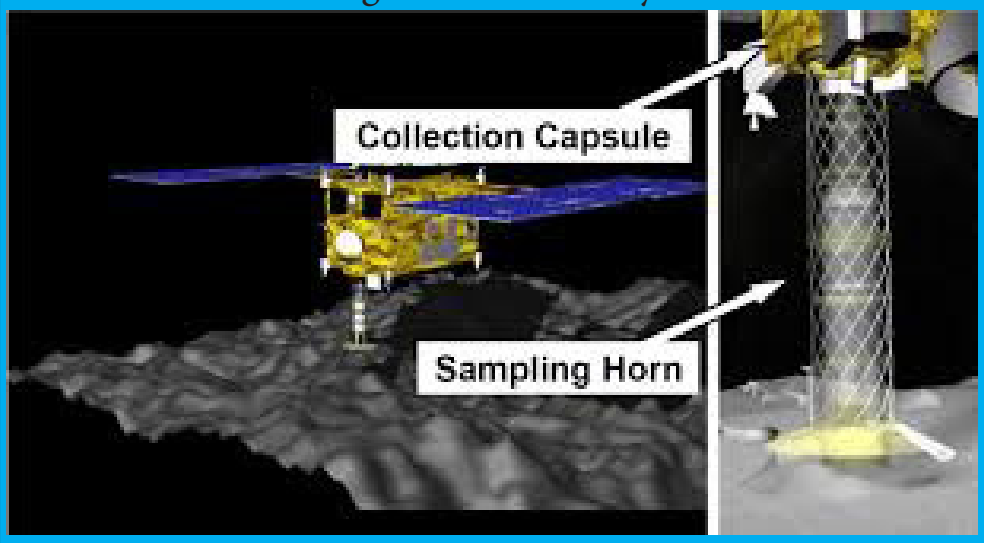
which extends from one side of the spacecraft, contacts the surface. The projectile is designed to blast away rock and dust on the asteroid's surface, then direct the material through the sampler horn into a collection chamber inside the Hayabusa 2 spacecraft.



While there is no direct way to measure how much sample Hayabusa 2 collected in February, scientists said telemetry data broadcast back to Earth suggested the sampling system worked as designed.

In early April, Hayabusa 2 released the Small Carry-On Impactor, an explosive device that drove a copper mass into the asteroid to create a new crater, uncovering rocks that were buried underneath Ryugu's surface, perhaps for billions of years.

Scientists will target the July 11 landing a short distance from the fresh crater, where they believe material ejected by the impact fell. The new samples may include pristine subsurface specimens that have escaped radiation and other asteroid weathering affects from sunlight and extreme temperature swings.

A second successful sampling attempt would make Hayabusa 2 the first mission to collect a subsurface specimen from an asteroid for return to Earth.

Assuming the touch-and-go snags a sample that was exposed by the mission's explosive impactor, scientists expect the material will contain information from the early formation of the Solar System 4.6 billion years ago, such as organic molecules that became the building blocks for life.

"Subsurface materials are particularly valuable for sensitive organics," scientists wrote in a mission update last month.

Engineers designed Hayabusa 2 to collect samples from up to three locations on the asteroid, but mission managers have ruled out gathering a third sample. The mission only needed one sample to meet minimum success criteria.

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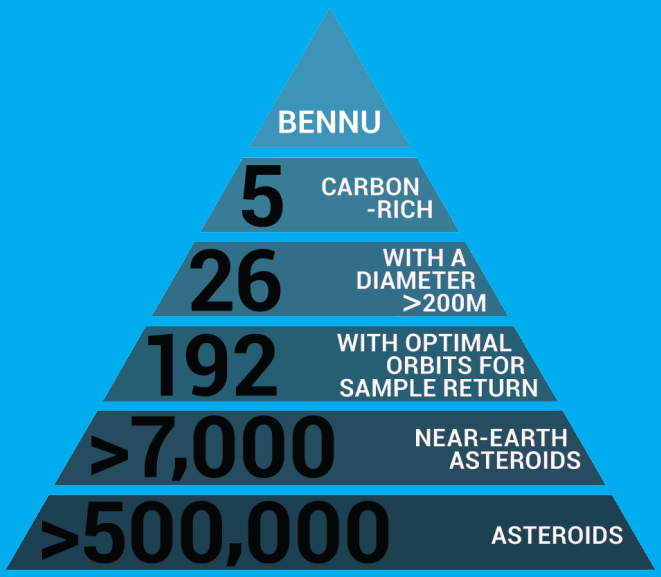
During preparations for the second sampling attempt, Hayabusa 2 dropped a target marker onto the asteroid on May 30 to help the spacecraft guide itself toward the landing zone. The probe also took high-resolution images of the area to help scientists decide if they should press ahead with another touchdown.

Officials mulled the scientific merit and safety risks of a second landing attempt, and the ground team ultimately elected to go ahead with the touchdown.

Hayabusa 2 had until this month to try for a second touchdown. Ryugu is nearing the point in its orbit closest to the Sun, and rising temperatures on the asteroid will prohibit the spacecraft from landing later this year, officials said.

While Hayabusa 2 explores Ryugu, NASA's OSIRIS-REx mission is surveying asteroid Bennu before moving in to collect a sample there in 2020 for return to scientists on Earth in 2023.

OSIRIS-REx is designed to bring home at least 60 grams (2.1 ounces) of samples from Bennu, significantly more than Hayabusa 2. But OSIRIS-REx is only expected to collect a single sample from one location on Bennu's surface.



Once the second sample collection is complete, Hayabusa 2 is expected to deploy the last of its four daughter probes to hop around the asteroid's surface.

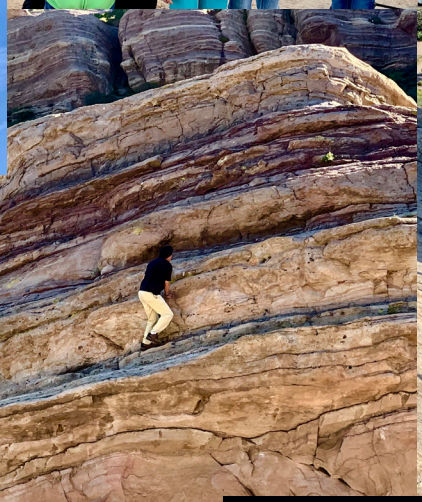
Hayabusa 2's return journey to Earth is scheduled begin in November or December, with re-entry of the mission's sample-carrying descent capsule set for late 2020 over Australia, where recovery teams will pick up the specimens for analysis in laboratories in Japan and the United States.

Vazquez Rocks Field Trip









Earthshine on a crescent Moon

July Newsletter

Community Page!

Santa Monica Amateur Astronomy Club

Please submit your writing or tell us what you want to read about:

editor.smaac@gmail.com

Jokes

Theoretical physicist Heisenberg is out for a drive when he is stopped for speeding. The policeman asks "Do you know how fast you were going?" Without hesitation Heisenberg answers "No, but I know where I am."

Tim Thompson was one of the Astronomy Club representatives at InovatED LA

Holmes and Dr Watson were going camping. They pitched their tent under the stars and went to sleep. Sometime in the middle of the night Holmes woke Watson up and said: Watson, look up at the stars, and tell me what you see?

Watson replied: I see millions and millions of stars.

Holmes said: nd what do you deduce from that?

Watson replied: Well, if there are millions of stars, and if even a few of those have planets, quite likely there are some planets like Earth out there. And if there are a few planets like earth out there, there might also be life.

And Holmes said: Watson, you idiot, it means that somebody stole our tent!!

- Why does a space rock taste better than an Earth rock?
- It's a little meteor.

This Newsletter was edited by Benny and Donny Szeghy

SMAAC at InovatED LA

WISRD
Wildwood Institute for STEM Research and Development

Every year, the WSRD Institute at Wildwood school spearheads the InovatED LA event, bringing together schools, STEM education organizations, and Tech Companies to inspire each other and the learning community. This year, the Astronomy club had the honor of participating. We reached out to many people and even got some new members.

innovatED.LA
Do Things Differently

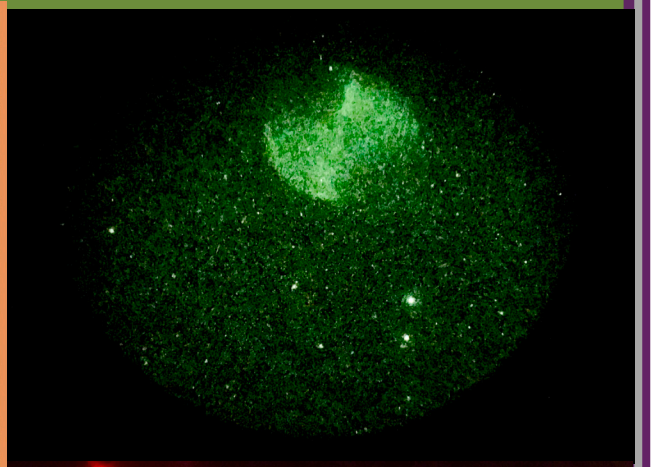
Recent Events and Celebrations

Thank You Jason for hosting the organizational meeting and barbecue!

Thank You Joe for being a tireless host!

Lets raise our glasses to marvelous friends and gatherings after the club meetings!

And here is to 4th of July-stars and the real stars we were able to snap a photo of with the same device.



Don and Lynne are among the few members who have been in the club the longest.

Astronomy Word Search

Research shows that puzzles improve memory, boost intelligence and help keep your brain young. You do not have to write anything down. Just try to figure this puzzle out with simple brain-eye coordination.

The answers to most of the questions are on the pages of the Newsletter. Have fun!

G	M	O	O	A	E	Y	E	O	J	L	W	T	P	E	U	O
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L	A	D	V	I	O	O	B	Y	C	S	J	R	D	P	A	N

1. Last name of the club president
2. What kind of scientist is our friend Mona?
3. Study of space
4. Empirical study of nature
5. 4th planet from the sun
6. Divergence from a central point
7. Beyond the solar system
8. Industry concerning Spaceflight
9. An assignment in space
10. Layer of gas above a planet
11. The rocks visited by the club
12. Destination of OSIRIS-REx
13. Spacecraft going to Bennu
14. Japanese Asteroid mission
15. Speeding theoretical physicist
16. Club Host
17. Which space program is celebrating its 50th?
18. The home-city of an Astronomy Club celebrating its 38th birthday in November