"Across the sea of space, the stars are other suns." Carl Sagan



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CONTENTS

Friendship Through Space

NASA Instrument Advanced
to Study the Atmospheres 1
Japan Creates First Artificial Crater
on Asteroid 1
Astrobees in the ISS 2
• NASA Selects Two New Space
Tech Research Institutes For
Smart Habitats 2
Photobioreactor: Oxygen
and a Source of Nutrition for
Astronauts 3
• First Likely 'quake' on Mars 3
As a star as



Next-Generation NASA Instrument Advanced to Study the Atmospheres of Uranus and Neptune

A NASA scientist and his team at the Goddard Space Flight Center in Greenbelt, Maryland, are taking advantage of those advances to mature a smaller, more capable net flux radiometer. This type of instrument tells scientists where heating and cooling occurs in a planet's atmosphere and defines the roles of solar and internal heat sources that contribute to atmospheric motions.

The next-generation radiometer is specifically being developed to study the atmospheres of Uranus or Neptune, but could be used on any target with an atmosphere. Scientists do know that both Uranus and Neptune host a slushy mantle of water, ammonia, and methane ices, while their atmospheres consist of molecular hydrogen, helium, and methane gas. However, differences exist in these cold outer Jovian worlds.



Japan Creates First Artificial Crater on Asteroid

Japanese scientists have succeeded in creating what they called the first-ever artificial crater (10 metres in diameter) on an asteroid, a step towards shedding light on how the solar system evolved, the country's space agency said Thursday.

The announcement comes after the Hayabusa2 probe fired an explosive device at the Ryugu asteroid early this month to blast a crater in the surface and scoop up material, aiming to reveal more about the origins of life on Earth.

Yuichi Tsuda, Hayabusa2 project manager at the Japanese space agency (JAXA), told reporters they confirmed the crater from images captured by the probe located 1,700 metres (5,500 feet) from the asteroid's surface.





Robot Astrobees Honey and Bumble Report for Duty on the ISS

Terry Fong, Chief Roboticist at NASA Ames, expects that the robots might start work as early as next week, after initial tests on Tuesday. Once astronauts have verified that the Astrobees made the trip to space intact, they'll start their long testing period, which will last through most of 2019. Fong points out that while the robots have been tested extensively on the ground, it's hard to replicate zerogravity on Earth. The robots are meant to be autonomous, so astronauts and ground control will have to let the robots learn their way around the station and see if they can maneuver as intended.

The Astrobees are shaped like cubes, a foot to a side. Each robot uses an electric fan for propulsion in the microgravity environment of the space station, and has six cameras that it uses both to navigate and to construct a 3D map of the ISS. Ground control can also guide the Astrobees, using them as eyes and ears to observe experiments, so astronauts don't waste time as glorified camera people. The robots will hopefully also serve as little helpers aboard the ISS, moving cargo or performing simple experiments. One of their first tasks will be to take inventory, saving astronauts from some mindless grunt work. The Astrobees will use an RFID scanner, like those at grocery store check-outs, to scan items on the station. As long as items are tagged, the robots should have no problem taking stock. But such simple tasks are only the beginning. Astronomy.com



NASA Selects Two New Space Tech Research Institutes For Smart Habitats

As exploration missions venture beyond low-Earth orbit and to the Moon - and eventually Mars -NASA must consider automated technologies to keep habitats operational even when they are not occupied by astronauts. To help achieve this, NASA has selected two new Space Technology Research Institutes (STRIs) to advance space habitat designs using resilient and autonomous systems.

The selected proposals create two multi-disciplinary, universityled research institutes to develop technologies critical to a sustainable human presence on the Moon and Mars. The smart habitat, or SmartHab, research will complement other NASA projects to help mature the mission architecture needed to meet challenging exploration goals.

"Partnering with universities lets us tap into new expertise, foster innovative ideas, as well as expand the research and development talent base for both aerospace and broader applications," said Jim Reuter, acting associate administrator of NASA's Space Technology Mission Directorate.

"We're excited to work with these two new STRIs to develop smart habitat technologies for exploration missions on the Moon and Mars." Each STRI will receive as much as \$15 million over a five-year period. The selected institutes are:

Habitats Optimized for Missions of Exploration (HOME)

The HOME institute's design approach for deep space habitats is one that relies not only on proven engineering and risk analysis, but also on emergent technologies to enable resilient, autonomous and self-maintained habitats for human explorers. The institute seeks to advance early-stage technologies related to autonomous systems, human and automation teaming, data science, machine learning, robotic maintenance, onboard manufacturing, and more.

Resilient ExtraTerrestrial Habitats institute (RETHi)

RETHi seeks to design and operate resilient deep space habitats that can adapt, absorb and rapidly recover from expected and unexpected disruptions. The institute plans to leverage expertise in civil infrastructure with advanced technology fields such as modular autonomous robotics and and hybrid simulation.

The new selections will join two institutes founded by NASA in 2017. The established STRIs have advanced biological engineering and cuttingedge methods for developing carbon nanotube-based, ultrastrong and lightweight aerospace structural material.

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Photobioreactor: Oxygen and a Source of Nutrition for Astronauts



Photobioreactor: Oxygen and a Source of Nutrition for Astronauts

Since the Wright brothers first took to the skies of Kill Devil Hill, North Carolina, Dec. 17, 1903, first flights have been important milestones in the life of any vehicle designed for air travel. After all, it's one thing to design an aircraft and make it fly on paper-or computer. It is quite another to put all the pieces together and watch them get off the ground. In late January 2019, all the pieces making up the flight model (actual vehicle going to the Red Planet) of NASA's Mars Helicopter were put to the test.

Weighing in at no more than 4 pounds (1.8 kilograms), the helicopter is a technology demonstration project currently going through the rigorous verification process certifying it for Mars. The majority of the testing the flight model is going through had to do with demonstrating how it can operate on Mars, including how it performs at Mars-like temperatures. Can the helicopter survive-and function-in cold temperatures, including nights with temperatures as low as minus 130 degrees Fahrenheit (minus 90 degrees Celsius)?

All this testing is geared towards February 2021, when the helicopter will reach the surface of the Red Planet, firmly nestled under the belly of the Mars 2020 rover. A few months later, it will be deployed and test flights (up to 90 seconds long) will begin-the first from the surface of another world.

"Gearing up for that first flight on Mars, we have logged over 75 minutes of flying time with an engineering model, which was a close approximation of our helicopter," said MiMi Aung, project manager for the Mars Helicopter at NASA's Jet Propulsion Laboratory in Pasadena, California. "But this recent test of the flight model was the real deal. This is our helicopter bound for Mars. We needed to see that it worked as advertised." While flying helicopters is commonplace here on Earth, flying hundreds of millions of miles (kilometers) away in the thin Martian atmosphere is something else entirely. And creating the right conditions for testing here on Earth presents its own set of challenges.

"The Martian atmosphere is only about one percent the density of Earth's," said Aung. "Our test flights could have similar atmospheric density here on Earth-if you put your airfield 100,000 feet (30,480 meters) up. So you can't go somewhere and find that. You have to make it."

Aung and her Mars Helicopter team did just that in JPL's Space Simulator, a 25-foot-wide (7.62-meter-wide) vacuum chamber. First, the team created a vacuum that sucks out all the nitrogen, oxygen and other gases from the air inside the mammoth cylinder. In their place the team injected carbon dioxide, the chief ingredient of Mars' atmosphere.



InSight Lander Captures Audio of First Likely 'quake' on Mars

NASA's Mars InSight lander has measured and recorded for the first time ever a likely "marsquake."

The faint seismic signal, detected by the lander's Seismic Experiment for Interior Structure (SEIS) instrument, was recorded on April 6, the lander's 128th Martian day, or sol. This is the first recorded trembling that appears to have come from inside the planet, as opposed to being caused by forces above the surface, such as wind. Scientists still are examining the data to determine the exact cause of the signal. "InSight's first readings carry on the science that began with NASA's Apollo missions," said InSight Principal Investigator Bruce Banerdt of NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California. "We've been collecting background noise up until now, but this first event officially kicks off a new field: Martian seismology!"

The new seismic event was too small to provide solid data on the Martian interior, which is one of InSight's main objectives. The Martian surface is extremely quiet, allowing SEIS, InSight's specially designed seismometer, to pick up faint rumbles. In contrast, Earth's surface is quivering constantly from seismic noise created by oceans and weather. An event of this size in Southern California would be lost among dozens of tiny crackles that occur every day.

Marsdaily.com

EOD in Action

On Wednesday, April 17th, Velzys School in Panavezys, Lithuania has invited Space Camp Turkey's EOD Manager Mr. Tolga Yildirim to the EU-supported STEAM (Science Techology Engeneering Art Math) conference as a guest speaker.

During this conference, Mr. Yildirim shared how we apply STEAM in Space Camp Turkey's activities and programs with more than 100 teachers, school administrators from different branches, and representatives of the Ministry of Education.

Mr. Yildirim also visited the PSSP schools. In Velzys Gymnasium, he attended meetings with students and teachers and in Raguva Gymnasium, he shared information with students and teachers.









Astronomy Picture of the Day

The Galaxy, the Jet, and the Black Hole

Bright elliptical galaxy Messier 87 (M87) is home to the supermassive black hole captured by planet Earth's Event Horizon Telescope in the first ever image of a black hole. Giant of the Virgo galaxy cluster about 55 million light-years away, M87 is the large galaxy rendered in blue hues in this infrared image from the Spitzer Space telescope. Though M87 appears mostly featureless and cloud-like, the Spitzer image does record details of relativistic jets blasting from the galaxy's central region. Shown in the inset at top right, the jets themselves span thousands of light-years. The brighter jet seen on the right is approaching and close to our line of sight. Opposite, the shock created by the otherwise unseen receding jet lights up a fainter arc of material. Inset at bottom right, the historic black hole image is shown in context, at the center of giant galaxy and relativistic jets.



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