"I think we are at the dawn of a new era in commercial space exploration." *Elon Musk*

March 2018 Volume 11, Issue 6

ASTRO NEWSLETTER

Global Friendship Through Space Education

Contents

Elon Musk's Tesla Roadster leaves Earth with 'Easter Eggs' 1
Oppy takes a selfie 2
NASA is planning to sample return from Mars 2
How does space change the human body? 2
Jupiter's great red spot could disappear within 20 Years.....3
No camera has ever taken a picture from this far from Earth 3
Astronomy picture of the day 4

'A Car in Deep Space': Elon Musk's Tesla Roadster Leaves Earth With 'Easter Eggs'

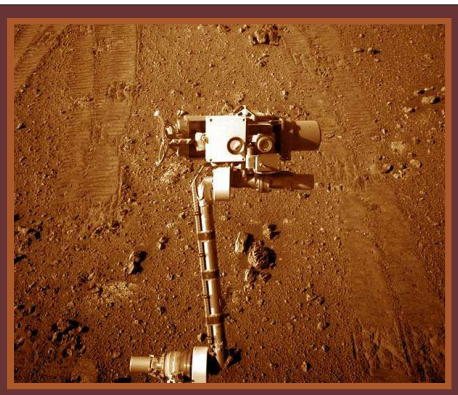
The 230-foot-tall (70 meter) rocket lifted off on the thrust generated by 27 engines from Pad 39A at NASA's Kennedy Space Center in Florida at 3:45 p.m. EST (2045 GMT) Tuesday. As it climbed toward space, the Falcon Heavy survived Max Q, the point of maximum dynamic air pressure, and its two side boosters separated from the center core successfully, something SpaceX had never tried in flight before.

The boosters, each a modified Falcon 9 first stage that had flown before, touched down within seconds of each other at SpaceX's landing zones at Cape Canaveral Air Force Station. The center core, which was intended to land on an ocean-based droneship, instead hit the water hard and exploded, the only blemish on an almost perfect first flight.

The Falcon Heavy, now the most powerful operational rocket in the world, not only reached space, but also demonstrated -with a second firing of its second stage engine- the booster's ability to put a satellite directly into geosynchronous orbit.

And then the second stage engine lit again, putting the Roadster and its Starman passenger on what was expected to be a precessing Earth-Mars elliptical orbit, but, according to an update from Musk on Twitter, "exceeded Mars orbit and kept going to the Asteroid Belt." For the next few million, if not billion years or so, the Starman -named in tribute to the late David Bowie- will travel through the inner solar system.

www.space.com



Oppy Takes A Selfie To Mark Sol 5000

The Sun will rise on NASA's solar-powered Mars rover Opportunity for the 5,000th time on Feb. 17th, sending rays of energy to a golf-cart-size robotic field geologist that continues to provide revelations about the Red Planet.

The prime mission was planned to last 90 sols. NASA did not expect the rover to survive through a Martian winter. Opportunity has worked actively right through the lowest-energy months of its eighth Martian winter. From the rover's perspective on the inside slope of the western rim of Endeavour Crater, the milestone sunrise will appear over the basin's eastern rim, about 14 miles (22 kilometers) away.

Opportunity trekked to increasingly larger craters to look deeper into Mars and father back into Martian history, reaching Endeavour Crater in 2011. Researchers are now using the rover to investigate the processes that shaped Perseverance Valley.

www.marsdaily.com

NASA Mars exploration efforts turn to planning sample return

Mars 2020, the only other Mars spacecraft in development, accounts for $348 million of the $601.5 million in the request. The project is set to undergo a system integration review the week of Feb. 26, said Jim Watzin, director of the Mars Exploration Program at NASA Headquarters, at a Feb. 20 meeting of the Mars Exploration Program Analysis Group (MEPAG). That review keeps the mission on schedule for a July 2020 launch. Mars 2020 is designed to cache Martian rock and regolith samples for later return to Earth. The agency, though, has yet to formally start development of the missions that would follow Mars 2020 to retrieve the samples from the Martian surface and return them to Earth.

www.spacenews.com

How does space change the human body?

Scott and Mark Kelly are identical twin brothers. Though that alone does not make them unique, what does is the fact that they are also both astronauts. In order to take advantage of the Kellys' unique situation, NASA scientists decided to conduct a detailed study on the twins, aimed at unraveling how nature versus nurture plays out in space.

As part of NASA's Twins Study, researchers collected biological samples from each of the Kellys before sending Scott to the International Space Station for a year starting in March 2016. Meanwhile, his brother Mark, who retired as an astronaut in 2011, remained on Earth to serve as the control subject. By analyzing how each twins' biological markers evolved during the mission, the researchers learned a great deal about how the human body reacts — both physically and mentally — to extended periods of spaceflight.

The NASA Twins Study is made up of ten distinct research projects, which all focus on different aspects of the human body. And last month, after nearly two years of study, the ten separate research teams confirmed their preliminary findings (which were initially released in 2017), as well as presented details on their postflight follow-up results.

Later this year, the findings for each of the various projects will be integrated together and released as one summary paper, which will be followed by several companion papers focusing on the individual studies. In the meantime, here is a summary of the most recent findings for each of the research projects that were carried out as part of the Twins Study.

10 main results of Twin Study;

- Telomeres get longer during spaceflight.
- Decreased body mass and increased folate in orbit.
- Mentally fit in space, foggy back on Earth.
- Flu vaccine stimulates immune system, even in space.
- Inflammation increases while in space.
- Space affects the microbiome.
- Spaceflight can trigger gene mutations.
- Living in space changes how genes are expressed.
- Artery walls thicken while in space.
- Proteins that regulate fluids increase while in space.

www.astronomy.com

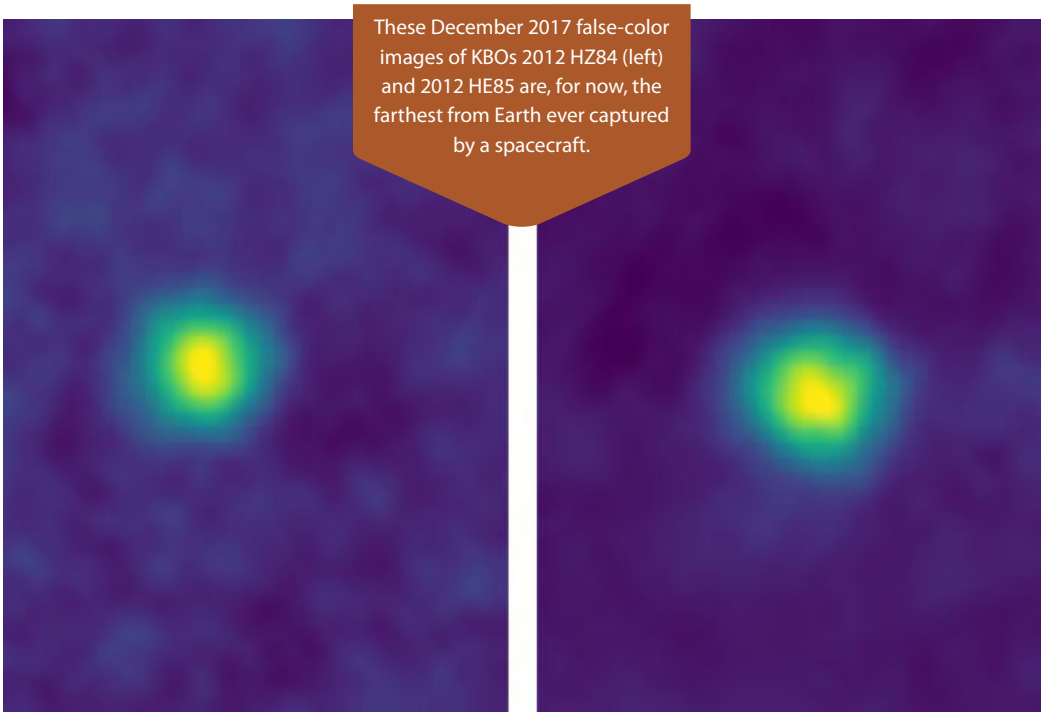
Former astronaut Mark Kelly (left) poses with his identical twin brother, astronaut Scott Kelly (right).

Jupiter's Great Red Spot Could Disappear Within 20 Years

The iconic Great Red Spot of Jupiter may disappear in the next 20 years, according to a researcher at NASA's Jet Propulsion Laboratory (JPL) in California.
The massive storm — larger than Earth itself — was first spotted in 1830, and observations from the 1600s also revealed a giant spot on Jupiter's surface that may have been the same storm system. This suggests Jupiter's Great Red Spot (GRS) has been raging for centuries.
In a recent story, Business Insider spoke with Glenn Orton, a lead Juno mission team member and planetary scientist at NASA Jet Propulsion Laboratory (JPL), about the giant storm's fate.

According to Orton, the storm's vortex has maintained strength because of Jupiter's 300-400 mph (483-640 km/h) jetstreams, but like any storm, it won't go on forever. In the late 1800s, the storm was perhaps as wide as 30 degrees longitude, Orton said. That works out to more than 35,000 miles — four times the diameter of Earth. When the nuclear-powered spacecraft Voyager 2 flew by Jupiter in 1979, however, the storm had shrunk to a bit more twice the width of our own planet.
Data on Jupiter's crimson-colored spot reveals that this shrinking is still occurring. As of April 3, 2017, the GRS spanned the width of 10,159 miles (16,350 kilometers), less than 1.3 times Earth's diameter.The longest storm on Earth lasted 31 days, but Jupiter can sustain longer storms because the gas planet has tens of thousands of miles of atmosphere, and spins much faster than Earth.

www.space.com



These December 2017 false-color images of KBOs 2012 HZ84 (left) and 2012 HE85 are, for now, the farthest from Earth ever captured by a spacecraft.

No Camera Has Ever Taken A Picture From This Far From Earth

In July of 2015, the New Horizons mission made history by being the first spacecraft to rendezvous with Pluto. In the course of conducting its flyby, the probe gathered volumes of data about Pluto's surface, composition, atmosphere and system of moons. It also provided breathtaking images of Pluto's "heart", its frozen plains, mountain chains, and it's mysterious "bladed terrain".

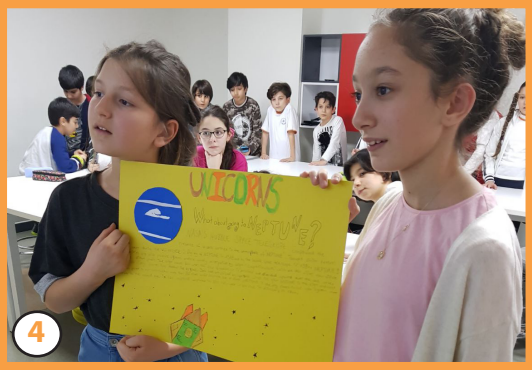
Since that time, New Horizons has carried on to the Kuiper Belt for the sake of conducting more historic encounters. In preparation for these, the probe also established new records when it used its Long Range Reconnaissance Imager (LORRI) to take a series of long-distance pictures. These images, which have since been released to the public, have set the new record for the most distant images ever taken. At present, the New Horizons probe is at a distance of 6.12 billion km (3.79 billion mi) from Earth. This means that images taken at this point are at a distance of 40.9 Astronomical Units (AUs), or the equivalent of about 41 times the distance between Earth and the Sun. This it slightly farther than the "Pale Blue Dot" image of Earth, which was snapped by the Voyager 1 mission when it was at a distance of 6.06 billion km (3.75 billion mi; 40.5 AU) from Earth. As one of only five spacecraft to travel beyond the Outer Planets, New Horizons has set a number of other distance records as well. These include the most-distant course-correction maneuver, which took place on Dec. 9th, 2017, and guided the spacecraft towards its planned flyby with the KBO 2014 MU69. This event, which will happen on Jan. 1st, 2019, will be the farthest planetary encounter in history.

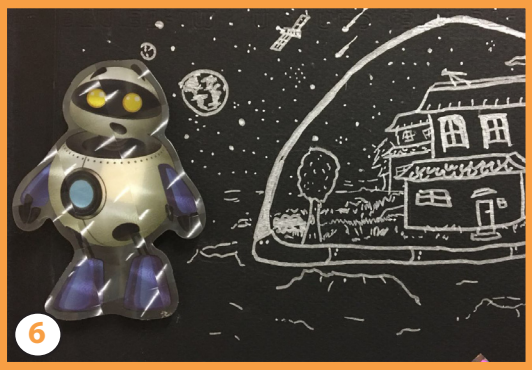
The spacecraft is also conducting nearly continuous measurements of the Kuiper Belt itself to learn more about its plasma, dust and neutral-gas environment. These efforts could reveal much about the formation and evolution of the Solar System, and are setting records that are not likely to be broken for many more decades!

www.universetoday.com

SCHOOLS IN ACTION

Our educational programs continue to prosper. It is excellent to see our students' hard work in creating great projects. We are more than happy to assist them in developing their ideas. This partnership has no end, as it is essential to help children create the future for us all.



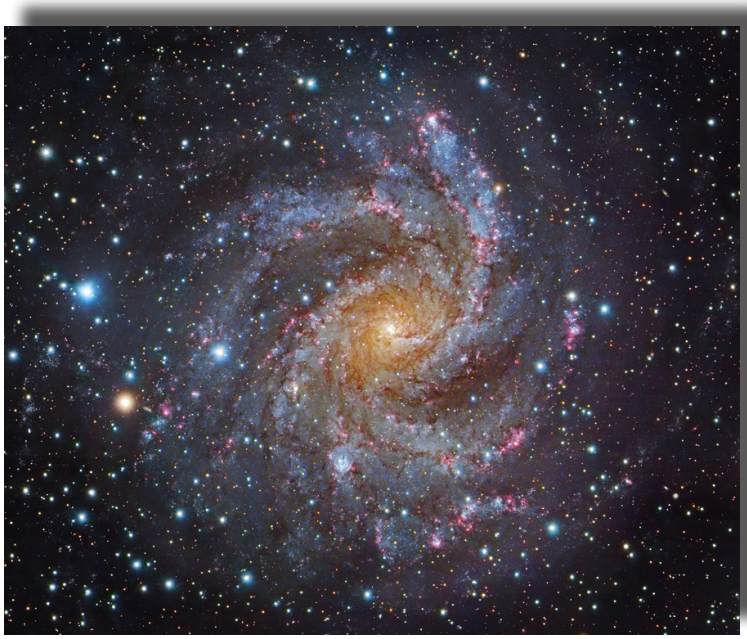


1- Erkan Ulu Schools, ISTANBUL 2- İstek Schools, IZMIR 3- Yane Sandanski, Gotse Delchev BULGARIA
4- Yönder Maltepe Schools, ISTANBUL 5- Final Schools, SAMSUN 6- Ekin Schools, IZMIR

Astronomy Picture of the Day

Facing NGC 6946

From our vantage point in the Milky Way Galaxy, we see NGC 6946 face-on. The big, beautiful spiral galaxy is located just 20 million light-years away, behind a veil of foreground dust and stars in the high and far-off constellation of Cepheus. From the core outward, the galaxy's colors change from the yellowish light of old stars in the center to young blue star clusters and reddish star forming regions along the loose, fragmented spiral arms. NGC 6946 is also bright in infrared light and rich in gas and dust, exhibiting a high star birth and death rate. In fact, since the early 20th century at least nine supernovae, the death explosions of massive stars, were discovered in NGC 6946. Nearly 40,000 light-years across, NGC 6946 is also known as the Fireworks Galaxy. This remarkable portrait of NGC 6946 is a composite that includes image data from the 8.2 meter Subaru Telescope on Mauna Kea.



apod.nasa.gov