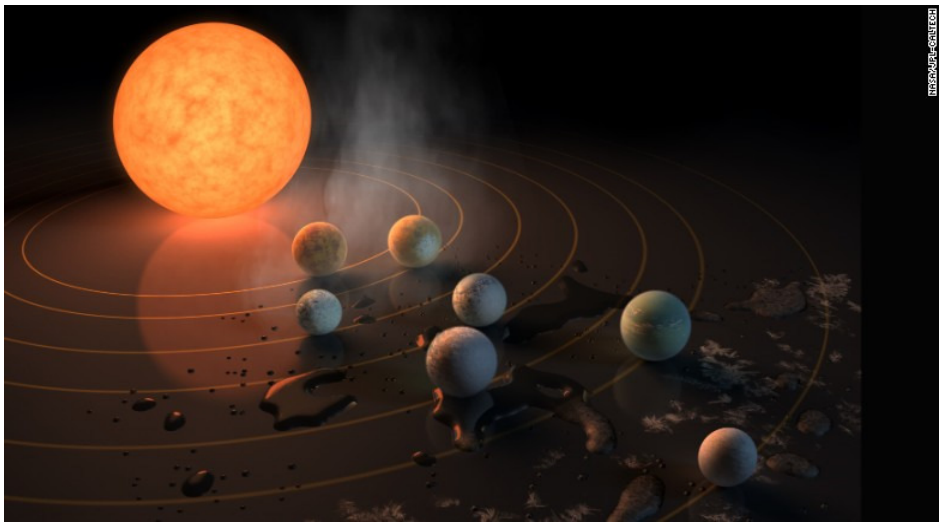
THE OBSERVER

The Newsletter of Central Valley Astronomers of Fresno March-April 2017

NASA and ESA Announce Seven Earth-like Planets Within 40 Light Years of Our Solar System



On February 21, 2017, NASA and ESA, the European Space Agency, jointly announced that a star known as TRAPPIST-1 had seven Earth-like planets circling it. The discovery also appeared in the science magazine *Nature* the same day. TRAPPIST-1 is a dwarf star approximately 40 light years from Earth. According to the announcement and article, all the planets are rocky, not gaseous, and some may have atmospheres. The TRAPPIST (Transiting Planets and Planetesimals Small Telescope) telescope is part of ESA's La Silla Observatory in Chile, was specifically designed to find exoplanets, and saw first light in 2010. It is named in honor of the Trappist order of monks.

Artist's image from NASA/JPL

"It is part of the nature of man to start with romance and build to reality."

-Ray Bradbury, referring to the American manned space program

In This Issue

Central Valley Astronomers of Fresno

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From the editor-

As written in the *What's New in Space* column, things have been happening very quickly in the last few weeks. After several years of the U.S. essentially playing a passive partner role in space travel and habitation, a dam has burst open(no intentional analogy to the recent rains and flooding in California). First, NASA is now considering plans to move up by almost three years the first manned mission of the Orion-Space Launch System manned launch, known as EM-1(for Exploratory Mission 1), to as early as 2019. Second, Elon Musk's Space–X announced that it will send two privately paying astronauts on a circumlunar mission in 2018, using its own Dragon spacecraft and Falcon heavy lift rocket. All of this(and maybe more soon) has come since the entrance of the Trump Administration in Washington, D.C. I do not care for some of Trump's political views or his personal style, but maybe he is the person that the space program finally needs. For the past eight years, NASA has seemingly been stumbling around and wringing its hands, wondering which way to go, and getting little help from the Obama Administration. I get the feeling that Obama really didn't care about the Orion-MPCV-SLS program, and probably wished that he could have cancelled it altogether, if he didn't face so much political backlash. However, according to sources, Trump has indicated his support for the program, wants to see the U.S. back in deep space as soon as possible, and has little patience for bureaucracies, delays, and excuses for not getting things done. If nothing else, maybe he can finally light a fire under the space program, bringing it up to speed(the Orion-MPCV-Ares-SLS program has been in the works for almost fifteen years, and, until a few weeks ago, did not expect a manned flight until-maybe-2022), carrying out the visionary goal of a return to the Moon and making solid plans for manned Mars missions. Which is what it should have been doing all the time.

Larry Parmeter-

CVA Observer Editor

Number of exoplanets found as of February 2017-3,583 (Including the seven orbiting TRAPPIST-1)

How many more are out there-tens of thousands? Hundreds of thousands?

Profiles in Astronomy

Tobias Mayer

1723-1762

Mayer was born in Wurttemburg, Germany, and raised in nearby Esslingen. His family was very poor and could not afford an education for him, so he taught himself, becoming especially proficient in mathematics. His math expertise was so advanced that he became a teacher of mathematics and published two papers on geometry while still in his teens. This recognition gained him a position at J.B. Homonn's famous mapmaking institute in Nurenberg, where he worked for several years, making numerous innovations in cartography, and gaining an outstanding scientific reputation. In 1751, he became a professor of economics and mathematics at the University of Gottingen, and in 1754 was appointed the director of the Gottingen Observatory, where he stayed until his death.

Mayer's main astronomical interest was the Moon. In 1750, he published the first major study of the librations of the moon in relationship to other bodies, especially the Earth. He also produced the first accurate map of the Moon, which was published after his death in 1775. His major work on the Moon came in 1752, when he calculated and published the first accurate lunar tables(phases and motions of the moon relative to Earth). He later submitted them to the British government and to the Royal Observatory at Greenwich, where, in conjunction with the Observatory's own lunar and solar observations, they provided the first accurate way to determine longitude at sea. He also developed a way to determine longitude through calculating the distance to the moon during its monthly cycle.

Mayer distinguished himself in several other areas of astronomy, most of which were not published until after his death. He devised a way to calculate lunar and solar eclipses, compiled a catalogue of 998 stars in the zodiac, calculated the proper motions of over 80 stars, and also studied the influence of Jupiter and the Earth on the motion of Mars. He as well worked on the influence of terrestrial magnetism.

Tragically, Mayer died at age 39; his achievements may have become even more substantial had he lived longer. His son Johann Mayer was also a scientist who continued some of his father's work. A crater on the Moon and an asteroid are named after him.

Source-Wikipedia

A Bit of Enlightenment from the Future-Past

In the original *Star Trek* television series from the 1960s, an episode entitled "Mirror, Mirror" has some of the Enterprise crew flung by a force field into a parallel universe where it is a pirate ship and the crew ruthless buccaneers. Captain Kirk, Dr. McCoy, and several crewmembers change places with their counterparts on the pirate vessel. Eventually, the energy field reverses itself and the crews are restored to their own realities. In the epilogue, Dr. McCoy asks Mr. Spock if identifying the pirate Kirk and his crew was difficult.

"Not at all. I could tell right away, Doctor."

"How was that, Mr. Spock?"

"It was quite easy. A civilized man can always act like a barbarian, but a barbarian can never act like a civilized man."

"Are you a civilized man, then, Mr. Spock?"

"No, Doctor. I am a barbarian. But someday I hope to be civilized."

CVA Members Speak

This issue's question-"How did you become interested in astronomy and space sciences?"

"I got a telescope when I was ten years old for Christmas." Warren Maguire

"My best friend was interested." Garrett Wimer

"Husband's passion, I decided I didn't want to be a telescope widow. Can't beat them, join them." Debi Lusk

"I became interested by having a fascination with science around age six." Nicholas Hernandez

"Bought a scope when I was 65; I always liked astronomy..." Clarence Noell

"When I was in elementary school I lived in rural Selma. We had dark skies and I was fascinated to see what was up there." Dan del Campo

"As a young boy I was a voracious reader of fiction, especially adventure stories, and I discovered science fiction, space adventures that challenged and inspired my imagination..." Lynn Kliewer

"I started out in science in a completely different field, vertebrate paleontology. I switched fields, into astronomy, when I turned five. I'm glad I did, since the field work in paleontology is digging in dirt, whereas in astronomy it's staying up all night, which I discovered I was very good at as a teenager." Fred Ringwald

What's New in Space

Space-X Announces Privately Funded Moon Mission In 2018

On February 27, Space-X head Elon Musk announced that his company will send two privately paying crewmembers on a circumlunar flight in 2018, using the newly developed Dragon 2 spacecraft and the Falcon heavy lift booster rocket. Musk said that the two had approached Space-X some time ago, offering to pay for a seven to eight day flight to the Moon and back. The names of the two were not announced, and Space-X said that their participation is still contingent on physical fitness and mental health tests, mission training, and spacecraft knowledge. This comes on the heels of NASA announcing that the first manned flight, also a lunar mission, of the Orion-MPCV-Space Launch System may be moved up to 2019(see story below).

Trump Meets with Musk for Possible Lunar and Mars Missions

According to the *Washington Post*, President Donald Trump has met at least twice with Space X head Elon Musk; sources say that they discussed possible manned missions to the Moon and Mars sometime in the near future, probably in the 2020s. Musk has already announced that he wants to colonize Mars using huge spaceships that can carry up to 100 people at a time; in the same context, reliable sources say that Trump is very much in favor of a "JFK Moment," possibly announcing later this year that the U.S. will return to the Moon, and then use that as a jumping off point to go to Mars. Trump and Musk do not agree on political issues, but it is said that Trump greatly admires Musk, seeing him as a visionary with big bold ideas, and viewing him as a way to renew what he describes as American "spirit." For his part, Musk is said to share Trump's space ideas, and piggyback on them for his own manned Mars flights. Space experts say that if Musk is to carry out his Mars vision, he will need some form of government assistance, and partnering with a president who supports his space vision makes sense.

NASA Now Considering Manned Orion-MPCV-SLS Moon Mission in 2019

NASA interim chief administrator Robert Lightfoot announced on February 13 that the space agency is considering a two person manned Orion-Multipurpose Crew Vehicle-Space Launch System mission as early as 2019, one which would orbit the Moon for two to three days before returning to Earth. Although it was not expressed directly, the new approach mirrors the Trump administration's philosophy of getting the U.S. back into deep space as soon as possible. Previously, the space agency's plans were to have an unmanned Orion-SLS Moon mission in late 2018, and delay manned missions of the Orion-MPCV-SLS until at least 2022 or 2023. Critics claim that the SLS and Orion will be used without any previous space flight testing, but supporters say that the first Space Shuttle

mission in 1981 also used a previously untested space vehicle and booster system. Critics also say that the Orion-MPCV spacecraft is not yet ready for manned flight, that crucial systems such as life support still need to be installed and tested(After almost fifteen years, this still hasn't been done?-editor's comment) Nevertheless, NASA is planning to move ahead with the possibility of a 2019 launch.

Another Space Pioneer Passes into the Heavens

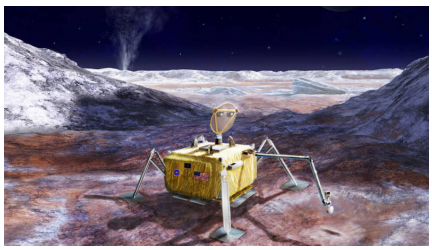
Eugene Cernan 1934-2017

Eugene Cernan, the "Last Man on the Moon," died on January 16 at a Houston Hospital. He was 82. A NASA news release said only that he had had ongoing health issues and died peacefully with his family at his side.

Cernan was born and raised in Illinois and graduated from Purdue University with an engineering degree. Afterwards, he became a pilot in the Navy, and in 1964 was chosen as one of the third group of fourteen astronauts. His first space mission was aboard Gemini 9 in 1966, where he was noted for having to cut short an EVA because of exhaustion. In 1969, he was a crewmember of Apollo 10, which was the practice run for the first Moon landing, Apollo 11, three months later(originally Apollo 10 was supposed to be the first moon landing mission, but NASA changed the mission schedules following Apollo 7). Cernan and his commander Tom Stafford flew the Lunar Module to within 50,000 feet of the lunar surface, but did not land. Cernan finally got his chance as the commander of Apollo 17 in December 1972. His LM crewmate was originally scheduled to be Joe Engle, but NASA's scientists lobbied for a geologist to go on the last Moon mission, and Harrison Schmitt took Engle's place. Cernan and Schmitt spent three days on the lunar surface. As he explained in the documentary *The Last Man on the Moon*, before he climbed up the LM ladder for the last time, he traced his daughter's initials in the lunar surface. After the Moon landing program ended, Cernan realized that there would probably be no more opportunities for him to fly in space again; he left NASA in 1975 and became an oil company executive in Houston, where he lived for the rest of his life.

His death leaves only six of the twelve Americans who walked on the Moon still alive. They are Buzz Aldrin, John Young, Charles Duke, Harrison Schmitt, Alan Bean, and David Scott. Cernan's passing comes only six weeks after the death of another American space pioneer, John Glenn.

NASA Working on a Europa Drilling Mission



Sources inside NASA have said that the space agency is going full force on a mission to land an unmanned probe on Europe, one which will carry equipment to drill through the Jovian moon's icy crust all the way to a presumed ocean miles underneath it, which scientists strongly suspect harbors life forms. According to these sources, the mission will be a joint project between NASA and ESA, with a planned launch date of 2031. NASA is already planning a dual Europa mission, involving an orbiter and a lander, now scheduled to be launched in 2022, and ESA is planning an orbiter to study Calisto and Ganymede, scheduled for launch at about the same time.

From NASA's Space Place

Comet Campaign: Amateurs Wanted

By Marcus Woo

In a cosmic coincidence, three comets will soon be approaching Earth—and astronomers want you to help study them. This global campaign, which will begin at the end of January when the first comet is bright enough, will enlist amateur astronomers to help researchers continuously monitor how the comets change over time and, ultimately, learn what these ancient ice chunks reveal about the origins of the solar system.

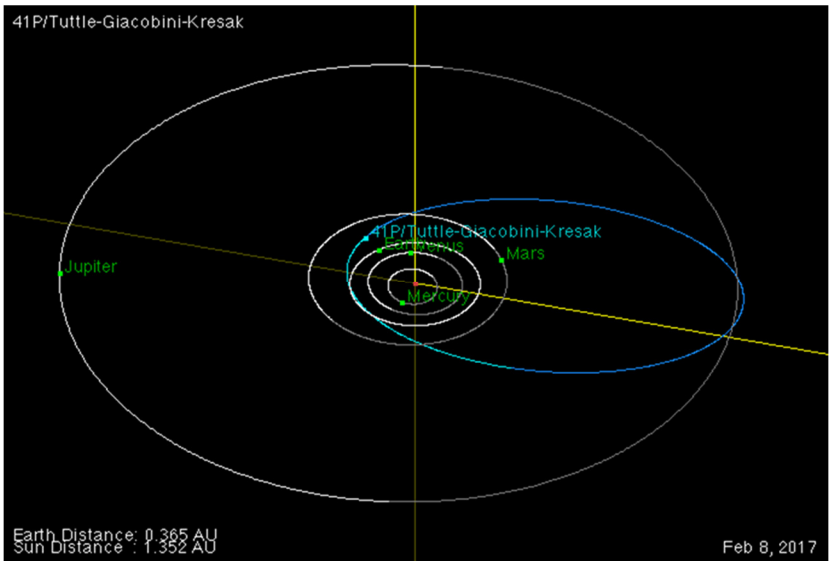
Over the last few years, spacecraft like NASA's Deep Impact/EPOXI or ESA's Rosetta (of which NASA played a part) discovered that comets are more dynamic than anyone realized. The missions found that dust and gas burst from a comet's nucleus every few days or weeks—fleeting phenomena that would have gone unnoticed if it weren't for the constant and nearby observations. But space missions are expensive, so for three upcoming cometary visits, researchers are instead recruiting the combined efforts of telescopes from around the world.

"This is a way that we hope can get the same sorts of observations: by harnessing the power of the masses from various amateurs," says Matthew Knight, an astronomer at the University of Maryland.

The observations may also help NASA scout out future destinations. The three targets are so-called Jupiter family comets, with relatively short periods just over five years—and orbits that are accessible to spacecraft. "The better understood a comet is," Knight says, "the better NASA can plan for a mission and figure out what the environment is going to be like, and what specifications the spacecraft will need to ensure that it will be successful."

The first comet to arrive is 41P/Tuttle-Giacobini-Kresak, whose prime window runs from the end of January to the end of July. Comet 45P/Honda-Mrkos-Pajdusakova will be most visible between mid-February and mid-March. The third target, comet 46P/Wirtanen won't arrive until 2018.

Still, the opportunity to observe three relatively bright comets within roughly 18 months is rare. "We're talking 20 or more years since we've had anything remotely resembling this," Knight says. "Telescope technology and our knowledge of comets are just totally different now than the last time any of these were good for observing."



For more information about how to participate in the campaign, visit http://www.psi.edu/41P45P46P.

Article and graphic courtesy of NASA's Space Place

Another in a continuing series on lesser known-but still important-observatories throughout the world

Vilnius University Astronomical Observatory

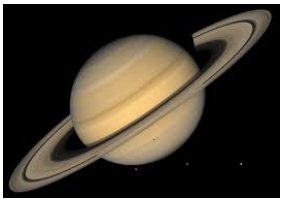
The Vilnius Observatory in Lithuania is one the oldest and best known in Europe. It was established in 1753 by Tomas Zebrowski, a Jesuit priest who taught at Vilnius University and had an interest in astronomy. In its early years it became famous throughout Europe for its studies of the planets, asteroids, and comets. In the 1800s, the observatory also became renowned for its solar research.

In 1876, a fire destroyed much of the original facility, and, due to lack of funds, it was closed until after World War I. In 1921, it reopened with new buildings and equipment funded by the Polish government, which then controlled Lithuania. The rebuilding was initiated and overseen by the well known Polish astronomer Wladyslaw Dziewulski, who also served as the observatory's director for several years after it reopened. During the 1920s and 30s, using two Zeiss astrographs and a .48 meter reflector, the observatory continued its tradition of planetary and solar studies. It was shut down during World War II, but reopened again after the war. By the 1960s, air and light pollution in Vilnius was such that the telescopes were moved to different areas of the Soviet Union, which then controlled Lithuania, and also to Moletai Observatory, about 40 miles north of Vilnius. After the fall of the Soviet Union and the reestablishment of Lithuania as an independent nation, the Moletai Observatory became the primary site for Vilnius's telescopes

Today, the Vilnius Observatory operates six telescopes: a 1.6 meter Ritchey-Chreiten reflector, a .63 meter Schmidt-Cassegrain reflector, and a .35 meter Maksutov reflector, all at Moletai; a .28 meter Schmidt-Cassegrain reflector and a .16 meter Zeiss astrograph at the Vilnius facility; and the .48 meter reflector, which is at the Samarkland Observatory in Uzbekistan, where it was moved to in 2005. The observatory is administered by the theoretical physics and astronomy department at Vilnius University, and in addition to its historical emphasis on planetary and solar science, it is also involved in cosmology and astrophysics. It has a permanent staff of about 20 scientists and assistants, and students from Vilnius and other universities rotate through the observing programs as part of their graduate studies and research.

Image-the .63 and .35 meter telescope buildings at Moletai
Source and image from Wikipedia and Vilnius University Observatory website

Astronomy Short(with this space-*real* short)



Saturn was known to the ancients, but they never saw it as other than a bright moving dot in the sky. It wasn't until 1610, when Galileo viewed it with his telescope that the rings were discovered. Even then, he thought that it had "ears" coming out of its surface, and also that it might be a triple planet. A few years later, though, Christiaan Huygens identified the structures as rings encircling the planet.