Northwest Kansas students to benefit from STEM grant

The Dane G. Hansen Foundation has awarded the Cosmosphere $100,000 per year for five years to provide unique STEM educational opportunities to Northwest Kansas students. Programs supported by the grant will serve students in grades K-12 in rural schools in the following counties: Cheyenne, Cloud, Decatur, Ellis, Ellsworth, Gove, Graham, Jewell, Lincoln, Logan, Mitchell, Norton, Osborne, Ottawa, Phillips, Rawlins, Republic, Rooks, Russell, Saline, Sheridan, Sherman, Smith, Thomas, Trego and Wallace.

“The Cosmosphere has been an outstanding partner,” said Betsy Wearing, the Coordinator of Programs, Communications and New Initiatives for the Dane G. Hansen Foundation. “Students and educators are so excited with the STEM activities and lessons the Cosmosphere staff is bringing into the schools.”

The depths of the oceans have space connections?

MANHATTAN — So what does research in the Earth’s ocean depths have to do with other planets?

The connection is hydrothermal vents—cracks in the earth’s surface which spew geothermally heated water.

Aida Farough, a teaching assistant professor of geology at K-State returned in January from weeks off the California coast studying those formations. As part of a National Science Foundation-funded research cruise with the University-National Oceanographic Laboratory System, she was one of 11 early career U.S. scientists selected for the cruise to investigate underwater volcanic, hydrothermal and biological activity.

During her time on the U.S. research vessel Atlantis, Farough dove to the bottom of the ocean — a depth of 2,500 meters, or about 1.5 miles — in Human Occupied Vehicle Alvin. Alvin was involved in the 1986 exploration of the wreckage of the Titanic. There she used instruments to measure heat from hydrothermal systems, where material from inside the Earth is released into the ocean in the form of hot, black water. The temperatures of hydrothermal fluid reach up to 680 degrees Fahrenheit and the heat supports nearby ocean life, such as crabs and tube worms. Hydrothermal vents may have been present on early Earth and could provide key insights into...
AAKF helps foster STEM

Jodi Spindler talks about wind energy with students at the Kansas State Historical Society Kansas Day event. Photo: courtesy KSHS

At the 2019 SWE Engineering Expo in Wichita, AAK volunteers help kids make comets out of ribbons and foil and learn about them. Photo credits: Doug Stice

The RoboMasters LEGO Team at the SWE Engineering Expo is taking our state motto with them to the upcoming LEGO Land Invitational in California. Photo: Laura Wilson

AExperiment Nick Hague will be working with during his ISS Expeditions 59/60 duration has a Kansas connection.

The project "Tetanus Antibody Response by B cells in Space (TARBIS)" is being co-investigated by Dr. Stephen Chapes, Kansas State University Department of Biology, along with Dr. Michael Pecault, Loma Linda University.

Spaceflight is known to have a dramatic influence on immune response, but there is little research on its effect following an actual challenge to the body’s immune system. TARBIS examines the effects of spaceflight on the function of antibody production and immune memory. Using a mouse model makes this possible, as the mouse immune system closely parallels that of humans.

Farough was also one of 34 International Ocean Discovery Program scientists to study mineral resources near Brothers volcano, which is the most hydrothermally active volcano in the Kermadec Arc in the Pacific Ocean northeast of New Zealand.

Her research deals with three things — water, rocks and heat — and the interactions among them. She is primarily interested in fluid flow and heat transfer in seafloor hydrothermal systems.

She was also one of 166 scientists working on the Oman Drilling Project which spent two weeks on Japan’s drilling vessel, called Chikyu, to analyze cores drilled from the ancient seafloor in the deserts of Oman.

Back in Kansas, Farough is further analyzing the rock samples and data she collected at sea. This includes evaluating the samples’ physical properties, such as permeability, density and porosity.

Farough said, "Oceans have so much to offer to us, including unknown and unlimited amounts of energy and mineral resources."
Kansas amateur astronomers learning to track Near Earth Objects

By Janelle Burgardt and Carolyn Kaberline

A group of amateur astronomers in northeast Kansas is beginning work to track potential dangers from the skies.

Members of NEKAAL (Northeast Kansas Amateur Astronomers League) are learning to track NEOs—Near Earth Objects—that have the potential to impact the earth. They are being taught by amateur astronomer Gary Hug, who has been tracking NEOs for many years.

Observations are made using the 0.7 meter Tombaugh telescope located at Farpoint Observatory in Eskridge, Kansas.

A NEO is an asteroid or comet that comes within 1.3 Astronomical Units (about 120 million miles) of Earth at any point in its orbit. An object doesn’t have to actually strike the earth to cause damage. The Tunguska event over Siberia in 1908 and the asteroid that streaked through the sky of Chelyabinsk, Russia in 2013 caused some damage when they exploded above ground. Their estimated size was 25-50 meters across.

Sixty-five million years ago a very large asteroid (5-10 miles in diameter) impacted the earth. The impact and its subsequent damage are believed to be the main cause of worldwide extinctions, including the dinosaurs.

The procedure for hunting and tracking NEOs is the same as that used to find asteroids and comets: by observing their motion against stationary background stars.

The amount of time required for detection is determined by the object’s size and distance. It usually takes at least 20 minutes to detect motion.

Observation data is maintained by the Minor Planet Center at Harvard University. A branch of the International Astronomical Union, the MPC’s database holds information on thousands of small solar system bodies. If the detected object hasn’t yet been cataloged, it’s important to send the data on observations to the MPC promptly. Multiple observations, reported by astronomers worldwide, are then used to determine the object’s orbit.

The more observations that are made, the better the orbit can be defined, so follow-up of recently discovered objects are critical to determining whether the object is potentially hazardous.

Downlink to astronaut Hague available May 10

On the morning of May 10, 400 Hoxie School District students will be watching Kansas astronaut Nick Hague on the ISS. As will students in the Peabody School district.

While select students from those schools and their questions will travel to the Cosmosphere that day for a downlink with the ISS, the ensuing interview will also be seen in Hoxie and Peabody. (Hague attended grade school in Peabody and high school in Hoxie.)

But they’re not the only ones to have that opportunity—any one can. The interview will be aired publicly on NASA TV and can be seen online or through some cable channels.

As a prelude to the interview, a presentation by Cosmosphere Director of Education Brad Nuest will be live-streamed on the topic “Living in Space.” This is tentatively scheduled to be on Facebook.

After the Hague interview, there will be another live-streamed interview from the Cosmosphere, a Q and A with Kansas astronaut Steve Hawley.

Final details are being worked out now. NASA will confirm the downlink time on May 2. And the Cosmosphere will also announce the live-stream platform for their presentations. For more info, contact Carla Stanfield at carlas@cosmo.org

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"[The nice thing about] this five-year grant is that it allows for cohesive, long-term planning [with our schools] where we can build each year on the last year’s program," according to Kain.

Any educator in these counties can inquire about possible outreach programs served by this grant. Contact Helene Kain at helenek@cosmo.org or call 620.665.9319.
This “Interstellar R&D” thirty-fifth feature in the Ad Astra Kansas News these past 18 years continues an enterprise to research and gather information on important developments preparatory to humanity’s greater adventure—voyaging to the stars. Now, at the millennium’s turn, is an appropriate time for grand vision and forward thinking, and there are strong signs of a renaissance in interstellar travel thought and activity. This feature and newsletter, thus, now set forth to develop a national / international / global clearing center and storehouse of knowledge and know-how for travel to the stars: Ad Astra—Galactically, Steve Durst

Observation

Observation from the Moon, Rotation of the Earth, and Earth Axial Precession

The IAU Commission on Rotation of the Earth highlights the major importance for astronomy and for the International Astronomical Union of increasingly precise values for Earth axial rotation. Long-duration, high-resolution observation of Earth meteorology, magnetosphere and rotation can produce enhanced, unique and highly valuable data across a wide spectrum of interests and applications. From solar weather, to navigation accuracy, to commerce, aerospace, defense, as well as astrophysics and precession information needs would contribute to increasingly precise values and expressions for the Rotation of the Earth. Observation from the Moon, including interferometry and VLBI, provides a new entire world for perspectives on the infinite universe.

Observations from the Moon by a lunar observatory of Earth axial precession, called “Earth’s 3rd Motion” by Copernicus, and of the resulting precession of the equinoxes, may more accurately determine the amount of shift of constellation boundaries since Eugene Delporte delineated the IAU-designated 88 constellations in 1928 along strict lines of declination and right ascension as they existed at epoch 1875.0. This higher rotation / precession accuracy may help better determine the apparent arrival of the Sun on the ecliptic in the constellation of Aquarius at the time of the March equinox, which is now calculated at about 2597 AD using the IAU 1928 / current map. As constellation boundaries are the result ultimately of arbitrary human choice, as psychologist / anthropologist Carl Jung noted in 1940 when first referencing the Aquarius equinox epoch, the updating of the Aquarius-Pisces constellation boundary might place the arrival of the Sun in constellation Aquarius in 2000 AD, to great advantage for the IAU, Astronomy and Humanity.

Communication

In October 2018, Parker Solar Probe (PSP) became the closest object to reach the outer corona of the Sun; it is now almost as close as Mercury is to the Sun. PSP is the size of a small car, shaped as a light-bulb and travels at 343,000 km per hour. It is the only spacecraft, after Voyager 2, to carry Faraday Cup instruments for testing atmosphere in space and interstellar regions. The first Faraday Cup tests were done at MIT in 1961. PSP is protected from extreme temperatures of about 1,370 °C (2,500 °F) by a 4.5 inch carbon-composite shield. PSP collects and sends data about solar winds, the chemistry of the wind particles, their energy, and magnetic fields. The Faraday Cups on PSP and Voyager 2 will be measuring data from opposite ends of the solar system, from as close to the Sun as is possible to as far away as the local interstellar medium. This data will assist in understanding space and interstellar weather.

Transportation

Astronaut Mae Jemison’s 100 Starship project aims to help make Interstellar Travel possible over the next 100 years. Astronaut Jemison advocates teaching science, space technology, astronomy; her 100-Year Starship project features Voyager 2, the first pluto-nium-powered spaceship to cross to interstellar space in December 2018. Voyager 2 launched in 1977 and as it passed the Sun, NASA scientists were able to estimate the size of our heliosphere, the bubble of gases emanating outward from the Sun; data showed that our heliosphere pushes against interstellar winds of the Milky Way. As Voyager 2 reached 18 billion miles away from Earth, it was learned that at greater distances, solar wind diminishes and is overtaken by magnetic fields of interstellar region; the number of galactic cosmic rays from outside our solar system increased as well. Astronaut Jemison may talk about Interstellar Travel at ILOA Galaxy Forum NY at the American Museum of Natural History in Fall, 2019.