

Black on Black on Black: OSIRIS-REx Graphic Designer Melds Science and Art in 'Stunning' Illustrations

University Communications
July 2018

As you read this, a space probe that's as big as a Cat Tran and has solar panels for ears is hurtling through deep space, currently more than four light-minutes away from Earth. The robotic explorer, NASA's **OSIRIS-REx spacecraft** [1], is equipped with the latest technology to explore a tiny world millions of miles from Earth.

Taking selfies is not its strong suit.

Thanks to the talents and skills of **Heather Roper**, a University of Arizona alumna and graphic designer who tells the spacecraft's story through images and illustrations, we get to take part in the spacecraft's adventures on its way to its destination, a near-Earth asteroid about the size of Pusch Ridge in the Santa Catalina Mountains named Bennu.

Tasked with exploring the space rock first from afar, then up close, and eventually scooping up a sample of pristine material thought to be left over from the birth of our solar system, the OSIRIS-REx mission is led by the UA's **Lunar and Planetary Laboratory** [2].

Roper began working for the OSIRIS-REx mission as an undergraduate in the UA's **College of Fine Arts** [3]. After graduating in 2015 with a Bachelor of Fine Arts with an emphasis in visual communications, Roper was hired as a full-time graphic designer. She has since produced hundreds of pieces for the mission, including infographics, animations, posters, technical illustrations, complex visual representations of detailed mission-planning data, and even space-themed Valentine's Day cards, breathing life into abstract technical specifications and scientific concepts with visuals that capture the imagination while staying true to the science.

"Every project that comes across my desk is exciting, because I'm taking the technical details of the mission and turning them into something creative," Roper says. "Each project is a new challenge, and even though the subject is always the mission, I try to find new ways of rendering it."

"What makes Heather so good at what she does is her ability to produce graphics that are not just eye-catching, but that are also technically accurate," says **Erin Morton**, OSIRIS-REx communications lead who, together with the mission's social media lead, **Christine Hoekenga**, collaborates with Roper on mission projects. "When she shows the sun hitting the solar panels, you know that that's exactly how it would look if you saw the spacecraft in space."

Roper was involved in the mission from an early stage. While the spacecraft was coming together at Lockheed Martin's facility in Denver, she got together with the spacecraft engineers to learn as much as possible about its components.

"I asked them all kinds of questions," Roper says. "What color the solar panels would be, as well as the how the instruments, the insulation coverings, the sample return capsule, and all the other components would look. Some of them changed quite a bit between the initial design phase and the final construction."

Her favorite project, she says, is coming up with the mission's annual commemorative milestone poster. Last year's edition shows the spacecraft during a slingshot around Earth, using the Earth's gravity to propel the spacecraft at a shallow angle above the ecliptic plane and send it on a trajectory to catch up with Bennu on its orbit around the sun.

Roper wanted to create a visually intriguing graphic that at the same time would pass muster with any one of the mission's spaceflight engineers. To accomplish this, she consulted with a half dozen experts, including the mission's principal investigator, **Dante Lauretta**, to make sure she had a thorough understanding of where the spacecraft would be during this maneuver, and its positioning.

Based on her research, Roper created an illustration that catches the moment when OSIRIS-REx zooms over Australia, minutes after it dived under the Earth to cross Antarctica and embarked on its new course toward the asteroid.

Frequently, she can be seen in the hallways of the mission's headquarters at the Michael J. Drake Building, talking with scientists and engineers, drawing spacecraft trajectories in the air and moving models around. There have been times when she has found herself sitting at her desk, shining her phone's flashlight on a 3D model of asteroid Bennu, in order to see how sunlight would hit the asteroid.

"It's important to figure out things like, 'If the spacecraft were here, and the sun was over there, what would the shadows look like on Bennu's surface?'" she says.

In addition to the part of Roper's work that is geared toward communicating the mission to the public, she is involved in numerous mission-critical projects.

"You can give her an Excel spreadsheet with just columns and columns of mission planning data," Morton says. "And she will use that to create visually accessible representations of complex spacecraft activities and maneuvers that our mission team members rely on when planning each step of our asteroid sampling mission."

Roper's work is not without its frustrations and challenges, of course.

"We have an asteroid that's black, a dark spacecraft, and space, which is black as well," she says. "So, a lot of what I do is to find creative ways to render black on black on black."

Drawing on her experience in origami and paper craft, Roper produced a sheet of card stock that, with a little patience, scissors and glue, folds into a faithful model of the OSIRIS-REx spacecraft.

"Because I have to become so familiar with the spacecraft's features, I get to learn many cool things about the engineering behind it," Roper says. "For example, how the reaction wheels work to maneuver the spacecraft while in flight."

"Working with Heather is really the fun part of my job," says Morton. "In our production

meetings, Christine and I brainstorm what we want to convey, describing in words how we envision the message graphically. And then Heather comes back a day later with a sketch that perfectly contains all the elements that we described ? and it looks stunning to boot."

Source URL: <https://uaatwork.arizona.edu/lqp/black-black-black-osiris-rex-graphic-designer-melds-science-and-art-stunning-illustrations>

Links

[1] <https://www.asteroidmission.org/>

[2] <https://www.lpl.arizona.edu/>

[3] <https://cfa.arizona.edu/>