# University of Tennessee scientist helps NASA mission that could determine building blocks of life

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The plot has the makings of a summer blockbuster: An asteroid on a potential collision course with our planet holds the power to destroy life on Earth but also holds clues to what seeded it with the ingredients for life. One of the people seeking to recover its precious planetary science clues, while at the same time learning enough to prevent any collision with Earth, is the University of Tennessee, Knoxville's own Josh Emery.

Emery, an assistant professor in the earth and planetary sciences department, is helping NASA lead a sample-return mission to the unnamed asteroid, 1999 RQ36. The $800 million mission is coined OSIRIS-REx, which stands for Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer.

Scheduled for launch in 2016, the mission will return the first pristine samples ever taken from the special type of asteroid holding clues to the origin of the solar system and suspected organic molecules that could be the building blocks for life on Earth.

"The asteroid's organic materials, and the detailed analyses that we will perform on Earth will tell us a lot about how life began and whether it could get started anywhere else," said Emery.

"We will also look for water since 'wet' asteroids may be the most likely contributors of water—another necessary ingredient for life—to the

earth."

In addition, the mission will investigate an object potentially hazardous to humanity. RQ36, a third of a mile in diameter in size, has a 1-in-1,800 chance of hitting Earth in 2170, and a 1-in-1,000 chance in 2182. However, this probability could grow due to a phenomenon called the Yarkovsky effect, which causes asteroids to accelerate slightly when they absorb sunlight and then re-emit it as heat. Studying the asteroid's size, mass, orbit, and thermal properties will help the scientists better predict the risk as well as outline a strategy if needed.

To collect samples, mission scientists will use a three-meter-long arm to shoot nitrogen into the asteroid and collect the dirt or gravel that is stirred up as a result. Emery likens the sampling procedure to "a very gentle kiss."

The team of scientists have four instruments that will work together to collect the samples; map the topography, shape, and composition; measure the heat emitted by the asteroid's surface to determine the thermal properties and gravitational field; and measure its mass distribution.

The spacecraft is scheduled to arrive at the asteroid by 2020 and bring samples back to Earth in 2023.

The mission is led by Professor Michael Drake of the University of Arizona, and the team includes researchers from the University of Arizona, NASA Goddard Space Flight Center, Lockheed Martin, Arizona State University, KinetX, the Canadian Space Agency, NASA Johnson Space Center, NASA Ames Research Center, and NASA Langley Research Center, along with science team members from across academia.