

Student-built satellite scheduled for launch

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(PhysOrg.com) -- A 6.5-pound satellite is scheduled to become the first stand-alone spacecraft built by Michigan students to go into orbit and perform a science mission.

The Radio Aurora Explorer (RAX) is slated for launch Nov. 19 from Kodiak, Alaska. Its primary mission is to study how plasma instabilities in the highest layers of the atmosphere disrupt communication and navigation signals between Earth and orbiting satellites.

Working with scientists, [students](#) will use the data from RAX to build models that can forecast when these anomalies will occur. This will enable [satellite](#) operators to plan communications and operations around these disruptions.

"People rely on satellites on a daily basis for weather information, communications systems and defense. If the operators can't get their commands up, then the satellites can't perform their intended functions," said Matt Bennett, RAX team leader.

"The [space weather](#) anomalies that RAX will study are called magnetic field-aligned plasma irregularities," Bennett said. "When these irregularities occur, signals from the ground are scattered and the satellite doesn't receive them. They can form anywhere around the globe, but are a major problem at northern latitudes where we see other space weather phenomena such as the Aurora Borealis, or the Northern Lights."

Bennett, who graduated in May with a master's in space systems engineering and now works at the NASA Jet Propulsion Laboratory, led a team of approximately 20 students from across the College of Engineering who designed, built and tested RAX. After launch, these students will take charge of spacecraft operations while it is in orbit. They will send commands, conduct science experiments, study the performance of spacecraft components, and analyze the science data collected by a network of communication stations on the ground.

"I'm incredibly impressed with these students," said team adviser James Cutler, an assistant professor in the departments of Aerospace Engineering and Atmospheric, Oceanic and Space Sciences. "They're passionate. They're excited. They're, in many ways, inspirational."

RAX is a three-unit CubeSat, which is three times the length of a standard CubeSat. CubeSats are approximately four inches per side. They are designed to fit inside a standard pod mechanism that can be attached to launch vehicles when there is spare mass and volume for other satellites to share the launch.

"There is a growing interest in CubeSats, especially for student projects, as they offer relatively inexpensive and simple access to space," Cutler said.

The students involved in this project range from undergraduate to graduate students from the Aerospace Engineering, Electrical Engineering and Computer Science, and Atmospheric, Oceanic and Space Sciences departments. Many of these students are also part of the Student Space Systems Fabrication Lab, or S3FL, an organization dedicated to providing students with practical space systems design and fabrication experience.

While this will be the first stand-alone spacecraft built by students to go

into orbit, it is part of a long history of space research at U-M. University of Michigan researchers have built or are involved with instruments currently aboard spacecraft on 14 missions across the solar system. And a host of other additional suborbital remote sensing and mass spectrometry [spacecraft](#) and satellite projects are underway through the [Space](#) Physics Research Laboratory.

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