

"Tiny" Satellite Built by SSU and Morehead State University Students is now in Orbit

A very small satellite built by a team of Sonoma State University (SSU) and Morehead State University (MSU) students has been successfully launched into outer space to measure the magnetic field of the earth.

Called T-LogoQube, the one-pound satellite measuring 5 cm x 5 cm x 15 cm, was carried by a Russian DNEPR-1 rocket as it thundered into orbit on Nov. 21 from Dombrovsky Cosmodrome at Yasnny, Russia. It carried an Italian micro-satellite called Unisat-5 which actually released the student-made satellite into space. It was the first such launch for SSU and breaks new ground for the University's physics and astronomy department allowing it to do space-based measurements with its own satellite.

T-LogoQube is measuring the Earth's magnetic field in order to determine the satellite's pointing direction. It uses on-board magnetic torque coils to control its orientation and crosses Sonoma County at noon and midnight every 24 hours.

The satellite transmits magnetic field and other data to ground stations at Dr. Garrett Jernigan's Little H-Bar Ranch in Petaluma, Calif. and the Space Science Center in Morehead, Kentucky. Jernigan is one of the mentors for the project along with MSU professor Bob Twiggs.

The first data packets were received and decoded using the Little H-Bar Ranch ground system on Nov. 23. Commands were successfully sent back to T-LogoQube the next day from the radio transmitter at the ranch.

T-LogoQube was built by about a dozen undergraduate students from SSU's Department of Physics and Astronomy (led by Chair Lynn Cominsky) and MSU's Department of Earth and Space Science in Kentucky (led by Chair Ben Malphrus). The Space Science Center at MSU conducts ground systems operations for and is partially supported by Kentucky Space, directed by Kris Kimel.

Physics major Kevin Zack was the lead student on the entire project, while Sean McNeil and Will Roche led the MSU effort. Zack won the American Physical Society Far West's section Steven Chu Award for Undergraduate Research for his talk about the satellite at the sectional meeting held at SSU in early November.

Other SSU physics students involved in the project are Ben Cunningham, Hunter Mills and Lauryn Loudermilk. SSU equipment technician Steve Anderson also provided important support in establishing an earlier testing facility in Darwin Hall on the SSU campus.

At SSU, this project was supported by Professor Cominsky's NASA Education and Public Outreach group, and by a recent award through the SSU Provost's undergraduate research fund.

After being tested at MSU's Space Science Center, Professor Malphrus took the T-LogoQube to Italy where Sean McNeil installed it into the Unisat-5. Malphrus then accompanied Unisat-5 to Russia for the launch.

The Nov. 21 launch was the first to deploy PocketQubes, the smallest class of satellites ever operated in orbit. T-LogoCube is one of four PocketQubes launched from Unisat-5. PocketQubes are smaller versions of CubeSats: the PocketQube concept was originated by MSU Prof. Bob Twiggs. Both CubeSats and PocketQubes provide excellent educational opportunities for students as they are relatively inexpensive to build.

Prior to launch, T-LogoQube was known by several other names: "Eagle-1", "BeakerSat-2" and "MagPocketQube." It was renamed after launch, a common tradition for successfully operating satellites. The "T" in T-LogoQube stands for "tiny".

The "Logo" in T-LogoQube refers to the Logo programming language, which has been used for the first time on orbit. Logo software development was contributed by Brian Silverman, president of the Playful Invention Company (PICO). His brother Barry Silverman of Disus Inc. also made significant contributions to the ground system.