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UT space center to help run NASA mission

Engineers, graduate students to control mapping satellites whose data will aid studies of climate

By Dick Stanley
American-Statesman Staff
Wednesday, March 13, 2002

University of Texas engineers will get a long-awaited chance to be mission control when twin NASA research satellites are launched Saturday to aid weather forecasting and studies of El Niño and global warming.

A control center in the Microelectronics and Computer Technology Corp. building in Northwest Austin, operated by engineers and graduate students of UT's Center for Space Research, will supervise the flights of the satellites after their launch on a rocket from Plesetsk, Russia.

"We control the satellites, but the day-to-day operations will be carried out in Germany, just south of Munich," said UT space center Director Byron Tapley. "We would only get involved if things are not normal; then we'd get in and decide what needs to be done."

Space work is an old story at the UT space center, where callers on hold are entertained with the theme music of the 1968 movie "2001: A Space Odyssey." The center's researchers and graduate students have long collaborated with the National Aeronautics and Space Administration on verifying the orbits of a fleet of Earth-studying satellites such as TOPEX/Poseidon, whose data forecast El Niño and La Niña weather phenomena.

In the center's involvement with the new project, Tapley, a professor of aerospace engineering, will be the first non-NASA employee to direct a NASA mission. The \$150 million effort by American and German researchers -- called GRACE for Gravity Recovery and Climate Experiment -- is expected to improve other satellite studies of global warming and weather forecasting by compiling the most accurate map available of Earth's gravitational field.

The varying shape and strength of the field that is generated by the planet's iron core is influenced by Earth's daily rotation and such surface features as oceans, mountains and valleys. The field affects the orbits of spacecraft taking minute measurements of the planet's surface.

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The identical GRACE satellites are designed to help map the gravity field by flying in tandem about 300 miles high in an orbit that takes them over the North and South poles. As they race around the globe 16 times a day, they will use microwave ranging systems to constantly measure the distance between themselves as each speeds up and slows down in response to the field's varying intensity.

"They will be approximately 137 miles apart," Tapley said. "We will be able to measure the distance (between them) with a precision better than 10 microns. That's like measuring the distance between Bastrop and Houston to within the width of one-tenth of a human hair."

The measurements are expected to produce new maps of Earth's gravitational field with at least 100 times better detail.

Although the mission is intended to run only five years, Tapley said it might go on far longer.

"The experience has been that if you get these things on orbit," he said, "they tend to last a long time."

The GRACE satellites will transmit data each day to the German center, which will send it electronically to NASA's Jet Propulsion Laboratory in Pasadena, Calif. At 12- to 15-day intervals, the data will be sent along to UT's space center, where researchers will use it to draw new maps of the gravity field.

"We will do a very intensive processing of the data, which requires the largest computers available at UT," said Srinivas Bettadpur, the project's chief engineer. "We've been working for the last six years to get ready for this day."

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