

Bodies Beyond Belief • Partners with Oak Ridge

Tennessee

ALUMNUS FALL 2002

THE Fight
Against
Fat



Five UT students—Joseph Tipton, Jeremy Smith, Dave Garth, George Hatcher, and Brian Babis—pose with the NASA crew in front of the KC-135 aircraft.



Aerospace engineering students take a wild ride



Weight

It's called the Vomit Comet, and aspiring young astronauts line up for rides.

For the second year in a row, a UT team was shaken *and* stirred in a KC-135, all in the name of science.

UT is one of 54 colleges and universities participating in NASA's Reduced Gravity Student Flight Opportunities Program, which allows engineering undergraduate students to successfully propose, design, fabricate, fly, and evaluate a reduced-gravity experiment of their choice. The program mixes the wild ride with scientific research, hands-on experimental design, test operations, and outreach activities.

"This is part of our senior design course in aerospace engineering," says Dr. Larry Taylor, head of UT's Planetary Geosciences Institute and UT director of the Tennessee Space Grant Consortium. Dr. Masood Parang, professor of mechanical and aerospace engineering, was the team's faculty advisor.

Teams present proposals to the program and, if accepted, are invited for a week of intensive training.

"They then have to work out all the engineering on their experiments and make a formal presentation," Taylor says. "They're expected to do professional work."

The KC-135 aircraft generates 30 seconds of weightless flight at a time, and students encounter

Project leader Joseph Tipton (left) and team member Jeremy Smith (right) float in zero gravity aboard the "Vomit Comet" in Houston on March 28, 2002.

Weightless in Houston

weightlessness 40 times per flight. During these 40 intervals, they conduct their experiments.

Zero gravity is reached as the plane flies over a parabolic flight trajectory, which is sort of like a roller-coaster ride in the sky. It's the free fall of the plane that produces zero gravity inside the cabin. The four-engine Boeing KC-135 is similar to the commercial Boeing 707 aircraft but has been modified by NASA to support parabolic flights.

In March, the UT team consisting of Joseph Tipton, Jeremy Smith, George Hatcher, Dave Garth, and Brian Babis headed to Ellington Field in Houston, where they continued last year's experiment in fluid dynamics. Smith, Babis, and Tipton were members of UT's first team last year.

The experiment, called MAMMOTH Flow ("Making a Mixing Measurement of Two-phase Flow"), tested different methods for increasing heat transfer for two-phase flow in microgravity conditions.

"They have taken the experiments that we do in fluid dynamics on earth to a different dimension," Taylor says. "Space is zero-gravity. Experiments will have a different set of properties, depending on the gravity in the situation.



Randy Warren (left) and Nathan Fowler (right) were members of NASA's Reduced Gravity Student Flight Opportunities team in 2001.

"I was an astronaut for a few precious moments."
—Joseph Tipton

They were testing a theory and developing a modification for the theory."

Garth, a mechanical engineering major, told the *UT Daily Beacon* that it was "exciting to finally put the information we have worked so hard to learn in the classroom to practical use."

This trip was a dream come true for the students. Hatcher, an aerospace engineering major, has wanted to be an astronaut since he was three years old.

"For the foreseeable future, this is as close as I'll come to experiencing the joys and fascinations of living in space," Tipton, team leader and an aerospace engineering major, says. "In my mind, I was an astronaut for a few precious moments, and I intend to cherish that."

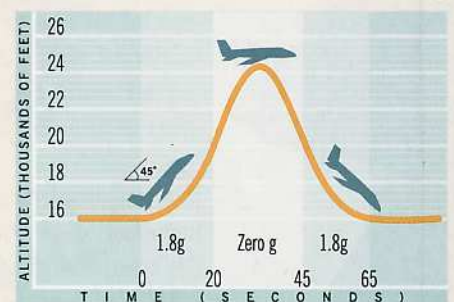
Several organizations made the experience possible for the students. They include UT-Battelle, the Tennessee Space Grant Consortium, Bertlecamp Automation Inc., and PCB Piezotronics.

The program is a unique avenue to engage student-investigators in hands-on research.

"You can do all the experiments in the world on the surface of the earth, but what it's like in zero gravity is hard to predict," says Taylor.

"I try to foster their enthusiasm because these are the types of people we want to see go on and do great things."

—S. Yvonne Loveday



Zero gravity is reached as the plane flies over a parabolic flight trajectory. It's the free fall of the plane that produces zero gravity inside the cabin. Trajectory graphic based on diagram from European Space Agency, <http://www.estec.esa.nl/outreach/parabolic/>.