

High-flying students take science to the limits

By Eileen Hawley

HIGH OVER THE GULF OF MEXICO, a lone aircraft cruises at 32,000 feet. The pilot aims its nose toward the waters below, descending 10,000 feet before once again pulling out and climbing higher in the skies. On board, the passengers routinely tend to experiments and investigations, and take some time to enjoy the moment.

Enjoy the moment? Yes, because the plane is NASA 931 and the passengers are students, journalists, flight surgeons and test directors participating in this year's Reduced Gravity Student Flight Program. The program, now in its third consecutive year, is funded by NASA and administered by the Texas Space Grant Consortium (TSGC).

As the specially-modified KC-135A aircraft flies a roller-coaster-like profile over the Gulf of Mexico, these passengers are reaping the rewards of a semester spent designing, developing and preparing experiments they are now testing in the reduced gravity environment on board the KC-135A.

"This year's program was just outstanding," said Lucia Brimer, assistant project director (TSGC) for the Reduced Gravity Student Flight Program. "The caliber of students, experiments and support from JSC personnel led to a very successful program and rewarding experience for everyone involved. The students' excitement and enthusiasm for just being at NASA and getting to participate in this extraordinary program was evident every time you looked at them."

For three weeks in March, Ellington Field was home to more than 200 students and journalists representing 44 college and university teams from throughout the United States. Housed in Hangar 990, the students assembled their experiments, planned their flight strategy, and trained for their highly-coveted seats on board NASA 931.



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University of Wisconsin student experiences hypoxia in altitude chamber.



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Students conduct a final rehearsal of procedures and equipment in the days before flight. In this experiment, the headset features a built-in computer and heads-up display which may one day replace the wrist-mounted checklists used by astronauts during space walks.

To prepare for the flights, students spent one full day in classroom sessions learning how their bodies might react during the flight. Classroom time was a requirement before the students entered the "altitude chamber" to get a preview of flight operations. Under the guidance of Mike Fox, supervisor of the Manned Test Group, the prospective flyers filed into the chamber, oxygen masks in hand. Much like a simulation when astronauts train for space flight, the students experienced a series of malfunctions and challenges. At a simulated altitude of 25,000 feet, the students removed their oxygen masks and experienced hypoxia, a reduced flow of oxygen to the brain—always under the watchful eyes of Fox and his experienced crew. At the conclusion of the run, the students file out of the chamber, weary but victorious.

"The students really enjoy the chamber run and the total experience of being at JSC and flying on the KC-135," said Donn Sickorez, JSC's university affairs officer. "But this is serious business and they know that. We need them to be able to respond to directions and understand safety protocols on the aircraft to ensure their flight is both safe and successful."



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Donn Sickorez, JSC's university affairs officer, talks with students from Rose-Hulman Institute of Technology about their experiment.



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Anticipation showing on her face, one of the flyers boards the KC-135.

Back at Ellington Field, the tests and quizzes continue. Aviation safety officers, aircraft pilots, test directors and educational specialists review the experiments with the student teams. They closely inspect the experiments chosen for flight to ensure they meet all required safety criteria, checking for exposed bolts, sharp edges or flammable material. They quiz students on operation of the experiment during flight and their responsibilities as passengers on board.

During pre-flight "pilot's briefings," Reduced Gravity Test Directors John Yaniec and Judy Rickard convey expectations, rules and requirements in no uncertain terms. They take the job seriously. Passenger and aircraft safety is their primary concern.

Finally, with lectures, classrooms and test reviews behind them, it's time to fly for the students and journalists involved in the program. While flight surgeons have always been available before and after the flights, this year at the suggestion of JSC's Dr. Chuck LaPinta, they climbed on board every flight along with students and journalists. Their presence was well received.

"Dr. LaPinta ministered to our misery, dispensing hard candy to ease dry throats and mask bad taste," said reporter Diedtra Henderson who accompanied University of Washington students. "The comforting squeeze he gave my shoulder was worth a million dollars."

As the KC-135 rolled down the runway for take-off, team members who weren't flying gathered in front of a conference room television set to watch their classmates make history. Live television from the KC-135 lets them see the action real-time.

Laughter and cheers erupted as they saw their friends floating about the plane, followed by groans as someone reached for that little white bag stuffed in a flight suit pocket.

Journalists representing hometowns, major networks and national newspapers documented the students' preparations and the flights, joining them on board. USA Today's Tim Friend covered students from nearby Lamar University and their experiment into the dynamics of tethered satellites. CNN's Miles O'Brien joined undergraduates from the University of Idaho as they studied the responses of composite structures in microgravity.

The KC-135's reputation as a stomach-churner is legendary, but is also part of its allure. One reporter noted a final action item as he walked toward the hangar at Ellington Field: "Begin planning how to fly again." ■



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News Anchor Pam Martin of WSB-TV in Atlanta observes a demonstration of the mechanics of tethered satellites in microgravity.