

One probes high, the other low,

John Harlander, who investigates matter in the upper atmosphere; and Marco Restani, whose wildlife investigations have taken him to the land down under, are the College of Science and Engineering's Faculty Research Award recipients for 2005 and 2006 respectively.

SHIMMERing achievement orbits Earth

The family of spatial heterodyne imagers for mesospheric radicals, designed by John Harlander and known as SHIMMER, now has a member orbiting Earth.

Launched March 8, 2007, aboard an Atlas V vehicle, SHIMMER's satellite separated successfully from that vehicle and was put into its orbit. During the first week, the satellite itself was being powered up and tested. Subsequently, the SHIMMER instrument was powered up. It sent its first data to Earth March 17.

"I'm happy to report that SHIMMER seems to be working well," said Harlander, a Physics Astronomy, and Engineering Science professor and the College of Science and Engineering's 2005 Faculty Research Award recipient. Harlander flew to Orlando, Fla., to observe the launch at the Kennedy Space Center in early March.



This photo was taken in 2001 at Kennedy Space Center during testing of the SHIMMER instrument that was eventually flown on the Space Shuttle. The scientists were to do an alignment check and to measure the properties of the window the SHIMMER looked through. From left: John Harlander, Bob Conway, Ronen Feldman, John Moser, Charles Brown, Christoph Englert and Joel Cardon. All except Harlander were with the Naval Research Lab in Washington, D.C.

By late March, SHIMMER was in transition from testing its subsystems to its mission: the routine gathering of data to measure hydroxyl (OH) emissions within the mesosphere. The extremely sensitive instrument provides data about particles of matter in space by measuring the light that is emitted, absorbed or scattered by them.

"OH plays a critical role in ozone chemistry throughout the atmosphere and participates in the only known ozone-destroying chemical process in the upper atmosphere," Harlander said.

OH observations also provide an indirect measure of water vapor and temperature over a broad altitude range. Recent but limited measurements of OH in the middle atmosphere have uncovered several unexpected and important clues to the chemical and dynamic processes occurring there, Harlander said, adding that the SHIMMER observations should add significantly to the body of global OH measurements.

Referred to as "a second generation" instrument, this SHIMMER features a monolithic UV interferometer — a robust single piece of glass formed by joining all the optical components with fused silica spacers. Extremely sensitive to very faint sources of light and also very forgiving of alignment errors, it is ideal for multiple-payload rockets because of its small size.

The instrument is also highly tolerant of harsh environments. Although SHIMMER's satellite orbits the warm and often moist tropics and subtropics, the atmosphere at 30 to 50 miles above the ground is very dry and cold, with temperatures dipping to -193°F .

SHIMMER was designed collaboratively with the US Naval Research Laboratory in Washington, D.C., and the University of Wisconsin, with funding from NASA and the National Science Foundation (NSF).

SHIMMER's predecessors have seen plenty of action. The first generation, proof-of-concept SHIMMER instrument accomplished its mission aboard the Atlantis Space Shuttle in October 2002. Other SHIMMER family members have been attached to large telescopes at national observatories and launched aboard sounding rockets.

This SHIMMER's rocket, the STPSat-1, was originally to be launched in October 2006, but was rescheduled several times.

but both take honors

Harlander said that launching a rocket that carries multiple payloads is an extremely complex undertaking and thus not unlikely to experience delays.

For more information on Harlander and his research, please go online to <http://www.stcloudstate.edu/ardc/facawards/Harlander.asp>

Aerial technology aids conservation project

Raptors, otherwise known as birds of prey, are a favorite focus of Marco Restani, a wildlife ecologist and faculty member of the Department of Biological Sciences. But smaller birds, such as sparrows and warblers, also count.

And therein lies a major challenge: how to count them — since counting them is fundamental to any conservation effort on their behalf.

“It’s a very labor-intensive process on the ground,” Restani said, explaining the process of mapping out an area and posting human birdwatchers at intervals and then extrapolating the data gathered and adjusting it for the intervals in between.

But the bird-counting process at Camp Ripley, a 53,000-acre area Restani helps to manage, may get off the ground this spring via an aerial mapping technology called LIDAR.

Like radar, which is now a word but was originally an acronym for radio detection and ranging, LIDAR is an acronym for light detection and ranging or laser light detection and ranging.

With shorter wavelengths than radar, LIDAR systems mounted on aircraft can detect every nuance in the target terrain. It can also produce flora images so detailed, species can be differentiated and identified. This data, then, can be used to make a vegetation map which can be used to predict spatial distribution of birds based on previously collected bird-count data.

Restani said LIDAR vendors are currently being asked to submit bids for a target terrain that includes Camp Ripley, which is located approximately 50 miles north of St. Cloud. Maintained by the Minnesota Army National Guard, Camp Ripley is used year round for military training.

For more than 15 years, the Guard and St. Cloud State University have collaborated on a number of conservation and remediation projects on Camp Ripley. In fact, the collaboration was cited as one of the Guard’s award-winning accomplish-



Marco Restani attaches a radio tag to a juvenile burrowing owl to track post-fledgling survivorship. These owls nest in black-tailed prairie dog colonies on the Little Missouri National Grasslands in western North Dakota. The 2004 tagging was part of a master’s degree research project by Morgan Davies, one of Restani’s graduate students.

ments when its natural resources conservation team received a Secretary of Defense Environmental Award last year.

“In conservation, we try to have human use be sustainable,” Restani said. “That’s what wildlife management is all about.”

Managing the wildlife on Camp Ripley is a unique challenge, since its human use includes military vehicle traffic on land and through water and air; the annual tramping of about a half million soldiers’ boots; the frequent explosions of ordnances; the almost daily discharge of firearms; the digging of holes of various sizes; and the cutting of trees and branches for shelter, camouflage or fuel.

How this use impacts the small-bird populations on Camp Ripley will be revealed over time and many bird-counting sessions. But Restani is excited about the LIDAR scan.

“Obtaining funds to conduct ecological research is difficult in today’s fiscally competitive environment, and applied use of LIDAR will greatly improve efficiency in data collection and subsequent wildlife conservation,” he said.

Restani’s list of small birds on Camp Ripley includes the ovenbird, least and great-crowned flycatchers, common yellowthroat, American redstart, red-eyed vireo, eastern wood-pewee, chip-ping sparrow, and yellow and chestnut-sided warblers.

For more information on Restani and his research, please go online to <http://www.stcloudstate.edu/ardc/facawards/06Restani.asp>.