ORAU
BEYOND THE EYE:

ORAU atmospheric scientists help take unmanned aircraft to new heights in hurricane research

The first time ORAU atmospheric scientist Ron Dobosy, Ph.D., called hurricane hunter Joe Cione he was in flight inside Hurricane Michael.

Cione (picture below), a meteorologist with the National Oceanic and Atmospheric Administration (NOAA) Hurricane Research Division, and his team have a reputation for flying planes into dangerous storms, but Dobosy knew how they could get even closer.

Dobosy (pictured left, opposite page), now retired from ORAU/NOAA's Atmospheric Turbulence & Diffusion Division (ATDD), has found a hobby unlike those of most retirees. Rather than escaping on cruises or taking up bird watching, he helps Cione and other hurricane hunters launch unmanned aircraft into parts of a hurricane that no technology has been able to go before—the wall of the eye.

"The eye is the quiet place," said Dobosy. "But the boundary of the eye is where all the violence is and where the wind is the fastest."

That's where the unmanned aircraft known as Coyotes serve as a missing link for hurricane research.

"While in storms, manned aircraft fly at or above 10,000 feet for safety," explained ORAU atmospheric scientist Ed Dumas (pictured right, opposite page), who tested the instruments on the Coyotes before flight. "The Coyotes are the perfect compromise for the safety of the crew."

Launched midair from the hurricane hunters' planes into the eye of the storm, Coyotes are designed to intuitively fly into the strongest winds of the hurricane's rotation. With guidance from a parachute that opens immediately after the launch and motors that help the aircraft independently take off, it doesn't take long before the flying Coyote is traveling over 70 mph into the fury of the storm.

Photo credit: NOAA

Once snatched by the hurricane's force, the aircraft begins collecting data and transmitting information back to the hurricane hunters via radio signal, all while being carried almost 225 mph through the hurricane's violent winds.

"And it's a crazy ride," laughed Dobosy. "The aircraft flipped inverted, twice, its nose pointed straight up with the motor probably running full blast. It must have been fighting for its life."

After about 40 minutes of hurling through the storm's rotation, the Coyotes manage to begin a stair-step descent back towards the earth. During this descent, the aircraft uses GPS signals and other instrumentation to collect data on wind, turbulence, air temperature, humidity and infrared measurements of the ocean's surface temperature from different levels in the atmosphere.

"The goal is to improve two parts of the forecast—both the intensity of the hurricane and how the track of the hurricane is going to change over time," explained Dumas. "That's directly related to saving people's lives."

Thanks to the quick data transmission and expendability of Coyotes, Dobosy said the aircraft are answering questions about the intensity of hurricanes that have never been researched before. After more than 25 years as a fair-weather meteorologist, he finds the data that the Coyotes gather striking.

"We're the first ever to have a drone flying in this configuration and reporting data back fast enough that we can actually measure the wind turbulence," explained Dobosy.

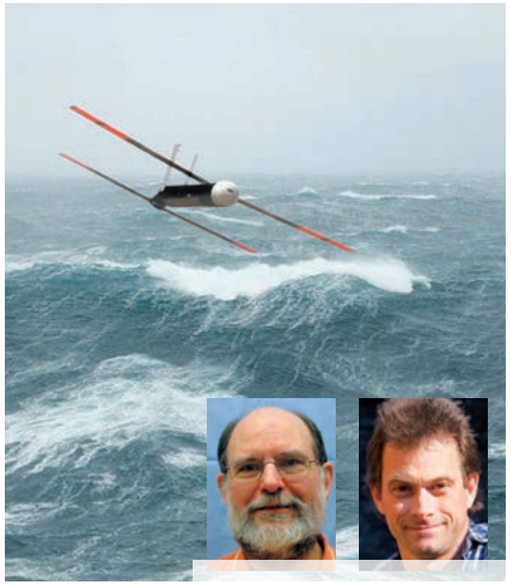
But, there is still much research to be done to improve hurricane forecasting.

"Upgrades are being made to the Coyote's instruments so that more accurate wind and gust measurements can be made," said Dumas. "This is key in understanding how hurricanes gain strength and change directions."

An unmanned aircraft pilot for nearly 40 years, Dumas has witnessed the need for aircraft, such as the Coyotes, in an array of weather research projects. He's been involved with aircraft flights that studied energy exchanges over forests in the Midwest and flights that helped make flying safer for hot air balloon pilots at a festival in Albuquerque, and he hopes to take the unmanned aircraft to Hawaii soon to research wind flow patterns over volcanoes.

"The advantage, of course, of an unmanned aircraft is we don't risk human life," added Dumas. Saving lives, both in air and on the ground, is arguably the greatest feat of the "Flying Coyote" research. Unfortunately, this means the Coyotes never survive a mission. "That's the whole point of these aircraft," said Dobosy. "Nobody could do what the Coyotes do and live to tell about it."

For Dobosy, as long as the Coyotes continue to ride the tailwinds of hurricanes, he says he will happily be in his wheelhouse crunching data, enjoying both his retirement and the extreme weather research he calls his hobby.



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—Ron Dobosy, Ph.D.
Retired ORAU atmospheric scientist