

## ATDD 2016 Review Video Transcription

- C. Bruce Baker: Welcome to the Atmospheric Turbulence and Diffusion Division here in Oak Ridge, Tennessee. Our primary interest is climate variability, boundary layer observations, and chemical modeling and measurements. One of the more interesting things that we've been doing is working with small, unmanned aerial vehicles, our UAVs, to explore the lower 1 kilometer of the atmosphere. We're also involved in scientific campaigns which include understanding the formation of severe weather in the Southeast, urban airflow, and also the transport and exchange of nitrogen and sulfur and other chemical compounds in the atmosphere. We're also the stewards for NOAA's climate observing system, which includes the testing, the design, the installing, and maintenance of stations in all 50 states, and we've been doing that for over a decade. Our division partners with the private sector, academia, and many other groups within NOAA.
- Narrator: ATDD's planetary boundary layer, or PBL research program, explores the lowest part of the atmosphere, roughly from the earth's surface to a couple hundred meters. The surface layer helps to regulate the exchange of energy between the earth's surface and the atmosphere. It also happens to be the layer in which we live in. ATDD's surface layer research has ranged from the deserts of Kuwait to the complex urban metropolis of Washington, D.C.
- Temple: Several of us in the lab are working with understanding the processes that lead to and help to enhance the development of thunderstorms, so to this end, we've done quite some work with putting up several meteorological towers in Alabama, and this information, the data that we're getting from this, from these instruments, is being used in conjunction with state-of-the-art, high-resolution models of the atmosphere to help better understand some of the physical processes and ultimately leading to improved forecasts of thunderstorms.
- Edward: Airborne research programs at ATDD are expanding into the future with small, unmanned aerial systems, and here we have examples of these 2 systems. One is the Coyote, and the other's the Octocopter, the S1000.
- Narrator: ATDD's DJI S1000 Octocopter has flown in several convective initiation studies. Octocopter flights are also made locally at the Knox County Radio Controlled Model Flying Field near ATDD to check out instruments, and to verify their performance. As part of the VORTEX-SE Field Campaign, the ATDD Octocopter was featured on The Weather Channel's Weather Underground with Mike Bettes, and Dr. Greg Forbes in February of 2016.

Mike: Dr. Lee, this is really ... I mean, the taxpayers literally own a drone. This is cool stuff. How does a drone help us understand the atmosphere?

Temple: What a drone does is we affix measurements, we can make measurements of temperature, humidity, which affix to this drone using this small device, we just ...

Mike: That's just a tiny little thing ...

Temple: Just a tiny little device.

Mike: ... that you just Velcro right onto it.

Temple: Velcros onto the drone, and then we have a controller, we have a pilot that stays on the ground and flies this from the land's surface up to a height of about 400 feet.

Narrator: ATDD is also developing instruments to make measurements in extreme environments, in a joint effort with AOML and OMAO, to measure fluxes of heat and momentum in the lowest levels of hurricanes. Atmospheric chemistry and deposition is one of the major research areas for the division.

LaToya: We conduct measurement studies of ammonia and other forms of reactive nitrogen to understand how these pollutants travel through the air and how they affect ecosystems and communities.

Narrator: The data and information that ATDD collects is essential, and their products are used by the scientific community, and by policymakers, to understand the impacts of current environmental policies and consider future mitigation strategies.

Rick: ATDD also does computational simulation research in air quality and atmospheric chemistry, including process modeling of surface-atmosphere exchange, and large-scale, 3-dimensional simulation of ozone and particulate matter in the lower atmosphere.

Narrator: This research helps to improve scientific understanding of how air pollution forms, and leads to more accurate air quality forecasts, as produced by the National Weather Service.

Grant: The United States Climate Reference Network has 117 stations in the lower 48 states, 2 in Hawaii, and 18 of 29 planned in Alaska.

Narrator: These systems ensure a quality and continuity of data by employing triple redundancy, in the measurements of

precipitation, temperature, and soil moisture.

John: The experience we have gained designing and testing precipitation measurement systems for the U.S. Climate Reference Network has earned ARL a leading role in the World Meteorological Organization's Solid Precipitation Intercomparison Experiment.

Narrator: In addition to land-based measurements, satellite measurements are also used to measure the earth's climate. ATDD is helping calibrate and validate satellite measurements using its climate networks, and also manned and unmanned aircraft. While much of ATDD's climate research is focused on accurately quantifying climate change, the ATDD Surface Energy Balance Network helps measure the effects of climate change. ATDD scientists visit schools, mentor students, and serve as judges at local science fairs. Educational outreach helps build awareness of NOAA's science, service, and stewardship.

C. Bruce Baker: We've explored ATDD's research and how it affects people, animals, and plants, so what do we do with our knowledge? How do we put our research to practical use? We share with industry, communities, public officials, other scientists, and environmentalists, to enable them to make informed decisions that benefit the earth and her people. With our research, we make a difference in the lives of people.

Video Producer: Let's hear it one more time.

Male: That wasn't good?

Male: Thanks for visiting ATDD.

Group: Bye!