

# MOUNTAINS

## ‘Raingers’ aid understanding of rainfall



**Word from the Smokies**  
Frances Figart  
Columnist

Students who apply to the UNC Asheville are often attracted by the region’s plethora of hiking trails. Those who end up working as field research assistants with Professor Douglas Miller may find themselves taxed to the limit by the requirement of strenuous hiking in and around Great Smoky Mountains National Park.

“During my first hike up to Mount Sterling, we encountered below freezing temperatures,” said Meredith Avison, who will graduate from UNC Asheville’s Atmospheric Science program in December. “I was the coldest I have ever been, and I will never forget the relief of hand warmers the other field researcher brought along. Still, it was worth it for the amazing views of frozen rhododendrons up the mountain slope and the eerie silence of the freezing forest.”

Avison, who plans to apply to graduate schools in Germany with meteorology and climatology programs, is one of a long line of Mountain Raingers. And, no, “rainger” is not misspelled. One of Miller’s students, Wes Groetsema, suggested the moniker during a naming contest Miller hosted on social media. It’s a perfect choice because these field researchers study rain.

Miller specializes in atmospheric science — the study of physical processes impacting the atmosphere — and in hydrology — the science of water and how it cycles in its different phases through a region. He came to Asheville from Monterey, California, where he was involved in some post-doctoral work that sparked an interest in rain gauges as tools for understanding the atmosphere and predicting weather events.

For more than a decade, Miller has been collaborating with world-renowned hydrologist Dr. Ana Barros of Duke University on a study involving rain gauges. Barros was the Principal Investigator of a project that started in 2004 when Hurricanes Frances and Ivan resulted in significant flooding and a washout of one of the lanes of Interstate 40 just inside the North Carolina border. The amount of rainfall occurring in the mountains during those events surprised many meteorologists and led to a study by NASA to use satellites to better estimate rainfall in the Smokies region. A rain gauge network — partially located in Great Smoky Mountains National Park — was installed as part of



Mountain Rainger Samuel Peterson calibrates the rain gauge with a column of water. PHOTO PROVIDED

this study.

“The goal of the project is twofold,” said Miller. “First, provide ‘ground truth’ of rainfall in the mountains of the Pigeon River Basin in Haywood County for improving satellite-based rainfall estimates. And second, improve our understanding of the basic physical processes contributing to precipitation production in the mountains.”

Miller’s system, known as the Duke Great Smoky Mountains Rain Gauge Network (Duke GSMRGN), consists of 32 rain gauges, 12 of which are located inside the park. Samuel Peterson, a senior in the Atmospheric Science program at UNCA, has been involved with the project for several semesters.

“I have now been on more than a few hikes for the project with Dr. Miller,” he said. “They have helped me understand how real-world data can be applied to research projects in multiple ways. We use the GSMRGN data for student research and Duke uses the same data for their large project.”

Back in 2007 and 2008, Dr. Miller and his first Raingers hiked to find clearings for rain gauge locations in a seemingly continuous canopy of trees. On public land, they had to submit an application to install each rain gauge so the national

park or forest could verify that they would not be damaging rare vegetation or an historical site. On private property they had to get permission from the landowners, who Miller says have all been incredibly supportive of the project.

“Our rain gauges are located at high elevations — above 3,400 feet — and are supplemented by lower-elevation rain gauges from other organizations and institutions,” said Miller. “Utilizing both sets of observations can create a clearer picture of how rainfall occurs at all elevations of the park.”

During certain special observation periods, Dr. Barros brought extra instrumentation at low-elevation locations to help the researchers understand how higher-level clouds sometimes “seed” lower-level clouds, improving the precipitation efficiency of the lower clouds and resulting in more rainfall. Miller said this is a common occurrence for creating rain in the Great Smoky Mountains.

Miller has documented the Mountain Raingers successes in a chapter included in “America’s Largest Classroom: What We Learn from Our National Parks” (University of California Press). “Students found that they gained an appreciation for making observations in

the ‘not-so-friendly’ confines of the complex and steep terrain of the southern Appalachian Mountains,” Miller wrote. “The rapid weather fluctuations forced them to make wise real-time decisions about adjusting the plan-of-the-day.”

Peterson will be graduating in spring of 2022 and hopes to pursue work with satellites and remote sensing, possibly at the National Centers for Environmental Information in Asheville or the National Environmental Satellite, Data, and Information Service. He says he has enjoyed learning practical hands-on skills like calibration and maintenance of equipment and the handling and organization of data.

“You learn about this in class but following through with it in a real project — and all the hiccups that entails — gives you a better preparation for these situations in a professional setting.”

Frances Figart is the editor of Smokies Life magazine and the Creative Services Director for the 28,000-member Great Smoky Mountains Association, an educational nonprofit partner of Great Smoky Mountains National Park. Learn more at [smokiesinformation.org](http://smokiesinformation.org) and reach the author at [frances@gsmasoc.org](mailto:frances@gsmasoc.org).

## NC, Tennessee highway patrol to increase presence on Tail of the Dragon

**Clarissa Donnelly-DeRoven**  
Asheville Citizen Times  
USA TODAY NETWORK

For 11-miles, U.S. 129 winds and twists more than 300 times through the mountains of Eastern Tennessee and Western North Carolina. The area, known as the Tail of the Dragon, is full of natural beauty and attracts motorcycle riders from all over the country.

But it can also be treacherous. According to Tennessee’s Integrated Traffic Analysis Network, in 2018, there were 83 traffic crashes on the Tail of the Dragon, 75% of which involved a motorcycle. Three of those motorcyclists died. The numbers for 2019 aren’t much bet-

ter: 93 crashes, 67% involving motorcycle drivers. Four people died, three of whom were motorcyclists.

In North Carolina, there were 10 crashes in 2019 on the Tail of the Dragon. Nobody died, but six of the 10 crashes were of motorcyclists.

On May 27, six highway safety departments and local law enforcement agencies from Tennessee and North Carolina partnered for an educational campaign. Their aim is to lower the number of crashes, injuries, and fatalities on the Tail of the Dragon, especially as Memorial Day weekend brings more travelers to the area.

The campaign reminds drivers “to slow down, buckle up and be alert,” ac-

ording to a press release from the North Carolina Department of Transportation.

Authorities are encouraging motorcyclists to wear boots and jackets to prevent road rash, reflective gear so other drivers can see them, and helmets to lower the risk of death or traumatic brain injuries.

According to Saferoads.org, helmets lower the risk of motorcyclists dying in a crash by 42%. The organization also says motorcycle riders who don’t wear helmets are three times more likely to suffer a traumatic brain injury in the event of a crash.

From May 27 through June 6, Tennessee and North Carolina highway pa-



Motorcyclists cruise a portion of U.S. 129 near Robbinsville, known as the Tail of the Dragon, in this 2010 photo. CITIZEN TIMES FILE PHOTO

tro officers also plan to increase enforcement of seat belt laws on the 11-mile strip.

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