# Investigation of Atmospheric Rivers Impacting the Pigeon River Basin of the Southern Appalachian Mountains

**Douglas Miller**, UNC Asheville, CPO #2450, One University Heights, Asheville, NC 28804 USA; dmiller@unca.edu; (828) 232-5158

**Lukas Stewart**, UNC Asheville, Asheville, NC USA

**David Hotz** and **Jessica Winton**, National Weather Service, Morristown, TN USA

**Ana Barros**, Duke University, Durham, NC USA

**John Forsythe**, Cooperative Institute for Research in the Atmosphere (CIRA), Colorado State University, Fort Collins, CO USA

**Arastoo Pour Biazar**, University of Alabama – Huntsville, Huntsville, AL USA

**Gary Wick**, NOAA – ESRL, Boulder, CO USA

Five years of rainfall observations at high elevation locations in the Pigeon River Basin of the southern Appalachian Mountains (1036 - 2003 m ASL) are used to generate a catalog of widespread and heavy precipitation events. Events are separated into extreme (upper-quartile) or significant (above-median) precipitation categories and model (GFS analyses) and satellite (GOES Sounder or blended) fields are examined to find systematic differences between the two categories. Integrated vapor transport (GFS analyses), GOES Sounder total precipitable water, and blended integrated water vapor fields indicate that atmospheric rivers (ARs) are associated with events of both precipitation categories. However, extreme events occur primarily due to the presence of a slow-moving high amplitude large-scale trough located upstream of the southern Appalachians and an associated strong low-level jet (AR) directed from the Gulf of Mexico or the Atlantic Ocean toward the mountains. The study is motivated, in part, to investigate how improved capabilities of the new GOES R may be exploited to forewarn and/or diagnose extreme precipitation events that can result in flooding near Knoxville, Tennessee.