Geophysical Research Abstracts
Vol. 17, EGU2015-14554, 2015
EGU General Assembly 2015

Observations and Modeling of Low Level Moisture Convergence Patterns in the Southern Appalachians during the Integrated Precipitation and Hydrology Experiment (IPHEx) Extended Observing Period

Anna M. Wilson and Ana P. Barros
Civil and Env Eng, Duke University, Durham, NC, United States (anna.m.wilson@duke.edu)

Accurate fields of precipitation accumulations and intensity at high spatial resolution in regions of complex terrain are largely unavailable. This is due to first, a lack of existing in situ observations, both because of the challenge in having high enough density in the instrument placement to represent the large spatial heterogeneity in rainfall patterns in these regions and because of the remote, harsh nature of the terrain that makes it difficult to install and maintain instrumentation and second, obstacles to remote sensing such as beam blockage and ground clutter that are caused by the complex orography. In this study we leverage observations from two sources: 1) a high-elevation, high-density tipping bucket rain gauge network that has been recording precipitation observations for over six years along ridgelines in the Pigeon River Basin, a small watershed in the Southern Appalachians, and 2) the 4-D database of observations collected in 2014 in support of the Global Precipitation Mission (GPM) during the first field campaign after the launch of the GPM satellite, the Integrated Precipitation and Hydrology Experiment (IPHEx), to learn about formation and maintenance mechanisms for fog and low cloud in this region and the resulting impact on the precipitation regime. The observations focused on here are those at the near surface, within 2 kilometers of the ground level. This presentation will focus on process-based modeling studies using the Advanced Research Weather and Forecasting Model conducted based upon observations made during this campaign. Case studies will be presented for real events simulated during the IPHEx campaign. These case studies occurred with different synoptic conditions, but include observational evidence of orographic enhancement. The case studies are simulated and analyzed in order to investigate how the topography modulates the regional, diurnal patterns of moisture convergence and fog and low cloud formation, as well as the mid latitude cyclones crossing the region. Enhancement due to pre existing low level moisture is shown to be significant regardless of the strength of the synoptic scale system for the case studies looked at here. Future work will explore in more detail using modeling the formation mechanisms of the near surface moisture.