Mesoscale Investigations, Modeling, & Operational Weather:
The Kean University Student & Faculty Educational Research Collective

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The occurrence of mesoscale weather variations is of interest across New Jersey and in the immediate vicinity of the Northern Mid-Atlantic region of the United States given its high population density as well as a wide diversity of land use, physiographic features, and the wide range of impacts from both hazardous weather and "routine" conditions (e.g., local wind circulations). It is a region which encompasses a wide variety of urban and non-urban ecosystems that are impacted by the weather conditions. In an attempt to ascertain the characteristics and behaviors of these while educating students and the public community, efforts are underway at Kean University to involve faculty and students in local studies through targeted investigations and modeling of specific features and phenomena. During the past three years, students have performed investigations of characteristics and behaviors of cool season severe weather; winter season fog; spatial patterns of the air quality index in various weather regimes; October tropical cyclones; the rain-snow line; the sea breeze; and most recently summer season convective initiation and lightning patterns. These efforts have also incorporated the use of numerical weather prediction (WRF), GIS applications, and multiple technologies. Throughout the process, students have also actively collaborated with one another in professional development experiences through the Kean University Student Chapter of the AMS/NWA and Kean University programs (e.g., Epsilon Corps, CAMS, and others).

The intent has been to examine, from an operational perspective, the types of data and analyses that would best assist a forecaster in the spatial and temporal specification of the resultant sensible weather conditions and to determine how these vary with time as a function of local effects (e.g., physiography), mesoscale features, and the prevailing synoptic scale flow. Students have accessed large and diverse data in real-time, as well as from archived sets, to portray weather conditions and their variations with time from case to case. Specific locations within the state of New Jersey have also been selected so as to consider direct versus regional impacts. Composite analyses and numerical modeling, as well as the use of standard software programs and applications, have been prepared in an effort to assess the relative importance of select parameters and identify characteristics and behaviors pertinent to each investigation (e.g., initiation, distribution, evolution, movement, and coverage of convection). Initial results have provided information relevant to the identification of the family of local factors and their modes of behavior that are useful in operational applications. They have also provided students with opportunities to present at national conferences and to develop public and K-12 outreach including the use of the Kean University television and radio stations on campus and further development of the Keancast website (http://hurri.kean.edu/~keancast/).