EDITORIAL

On 27–28 March 1994, 30 tornadoes from 14 storms swept over Alabama, Georgia, and the Carolinas, resulting in 42 deaths, 300 injuries, and over $100,000,000 dollars in damage. This became known as the “Palm Sunday 1994 Tornado Outbreak.” The extent of the devastation drew attention to the fact that the Southeast is visited by severe and sometimes tornadic storms nearly as often as anywhere in the country.

Contained within this volume are four special papers that describe and diagnose the devastating Palm Sunday 1994 Tornado Outbreak. A fifth paper by Kulie and Lin provides a corollary analysis of a different southeastern United States tornadic outbreak. Using a numerical cloud model, the authors of this paper simulated a multicell storm that developed into a supercell thunderstorm that possessed many of the characteristics of the observed storm. They show that it is the interactions between cells that is responsible for the eventual supercell development.

The other four papers focus on different aspects of the synoptic and mesoscale environment in which these storms were created and grew to be so violent.

The evolution of the environment leading up to the development of the storms is detailed by Langmaid and Riordan in “Surface Mesoscale Processes during the 1994 Palm Sunday Tornado Outbreak.” This paper examines the role that the previous night’s rainfall had in focusing the convection (through differential solar heating the following day) and in helping to maintain the convection once it occurred.

In “Mesoscale Dynamics in the Palm Sunday Tornado Outbreak,” Koch et al. present a case that the storm’s development was consistent with asymmetric inertial instability theory. Ultimately, it is shown that lifting resulting from a confluence of interactions between gravity waves, conditional symmetric instability, asymmetric inertial instability, and frontogenesis explains the development and propagation of this complex system. All the while, influences from jetlets far removed from the storms at least modulated the development.

“The Numerical Simulation of an Unbalanced Jetlet and Its Role in the Palm Sunday 1994 Tornado Outbreak in Alabama and Georgia” by Kaplan et al. uses a mesoscale numerical model to develop a paradigm for supercell outbreaks in the southeastern United States. The result is a five-stage paradigm that describes the role of the jetlet in the developing outbreak and ascribes new importance to the role of the subtropical jet in critical environmental evolution.

The role was further explored in “Jetlet Formation from Diabatic Forcing with Applications to the 1994 Palm Sunday Tornado Outbreak” by Hamilton et al. In this paper, the role of diabatic forcing in jetlet formation is examined in a way that helps interpret the more complex analysis provided by the more comprehensive model results.

It is hoped that this collection can be put in context with other analyses leading to a more complete and accurate picture of how the environment can configure itself for these important violent acts of nature. Our emerging understanding is central to our best hope of improving our predictive skill.

Peter Sawin Ray
Chief Editor