The Effects of Surface Features on the Convective Field Pattern in South Florida as a Function of Synoptic Flow Regimes

David O. Blanchard
Raul E. Lopez
NOAA/Office of Weather Research and Modification
Boulder, Colorado

Reviewers Abstract

The most consistent convective features over south Florida in the summer are the sea-breeze lines. There are, however, large day-to-day variations in the intensity, time of formation, and motion of these lines. These day-to-day variations also occur in the convective fields associated with Lake Okeechobee and the water conservation areas of south Florida. These variations are inherently related to the synoptic-scale flow in combination with the regional-scale circulations introduced by the different terrain characteristics. This paper will address the variations in the convective field pattern induced by surface features as a function of different synoptic flow regimes.

The convective patterns were examined using radar data collected in 1975and 1978 during the Florida Area Cumulus Experiment (FACE). One- and three-hour averages of radar echo intensity were used to determine the principal spatial patterns and areal distribution of convection. The synoptic and regional scale flow characteristics corresponding to each of the different convective patterns were studied using available data, including satellite imagery, wind field maps for constant pressure surfaces and the boundary layer, and surface pressure charts. The patterns are explained in terms of the interaction of the synoptic and regional flow with surface features such as Lake Okeechobee, the water conservation areas, the wetlands and glades, and the coastal configuration.

A number of identifiable relationships are observed, including 1) earlier development of sea-breeze convection on the coast in which the low-level synoptic flow works in conjunction with the sea-breeze circulation, 2) interaction of the east coast sea breeze with the lake breeze results in echoes that are usually long-lived and of moderate tos trong intensity, 3) when the east coast sea breeze moves over the conservation areas the convection weakens, but later re-intensifies as the sea-breeze line moves past the conservation areas, and 4) the merger of the east coast and west coast sea-breeze lines generate a "Y" shape pattern with the arms of the "Y" directed to the north and on either side of Lake Okeechobee. <p>

Short Abstract

The most consistent convective features over south Florida in the summer are the sea-breeze lines. There are, however, large day-to-day variations in the intensity, time of formation, and motion of these lines. These day-to-day variations also occur in the convective fields associated with Lake Okeechobee and the water conservation areas of south Florida. Radar data are used to determine the principal spatial patterns and areal distribution of convection. Standard meteorological data are used to classify the synoptic- and regional-scale flow characteristics. The convective patterns are explained in terms of the interaction of the synoptic and regional flow with surface features such as Lake Okeechobee, the water conservation areas, and the coastal configuration of the peninsula.