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Doppler Radar Analysis of Coastal Marine Atmospheric Boundary Layer Structure during a Cold Air Outbreak

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Abstract: This study documents and interprets the spatial and temporal variation of Marine Atmospheric Boundary Layer (MABL) structure during the latter stages of a Cold Air Outbreak (CAO) along the Outer Banks of North Carolina, 8 March 1986, Genesis of Atlantic Lows Experiment (GALE). Two C-band pulsed Doppler radars, one at Ocracoke and the other at Cape Hatteras, were used to collect reflectivity and radial velocity data in the **chaff**-filled MABL. The single Doppler analysis technique known as Velocity Azimuth Display, henceforth VAD (Browning and Wexler, 1968), was used to attain numerical values for a variety of kinematic properties. Time-height plots of horizontal wind spread, vertical velocity, horizontal divergence and deformation were constructed to depict the temporal variation of the MABL. Horizontal wind speed and direction versus altitude were plotted for each VAD analysis in order that anomalies in the MABL wind profiles may be identified and explained. The VAD analysis radius was varied between 5 and 15 kilometers so that spatial distribution of the wind field could also be observed. **Chaff** was dispersed by aircraft at a distance equivalent to 40 minutes travel distance upwind from the radar network. (R.H.)

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