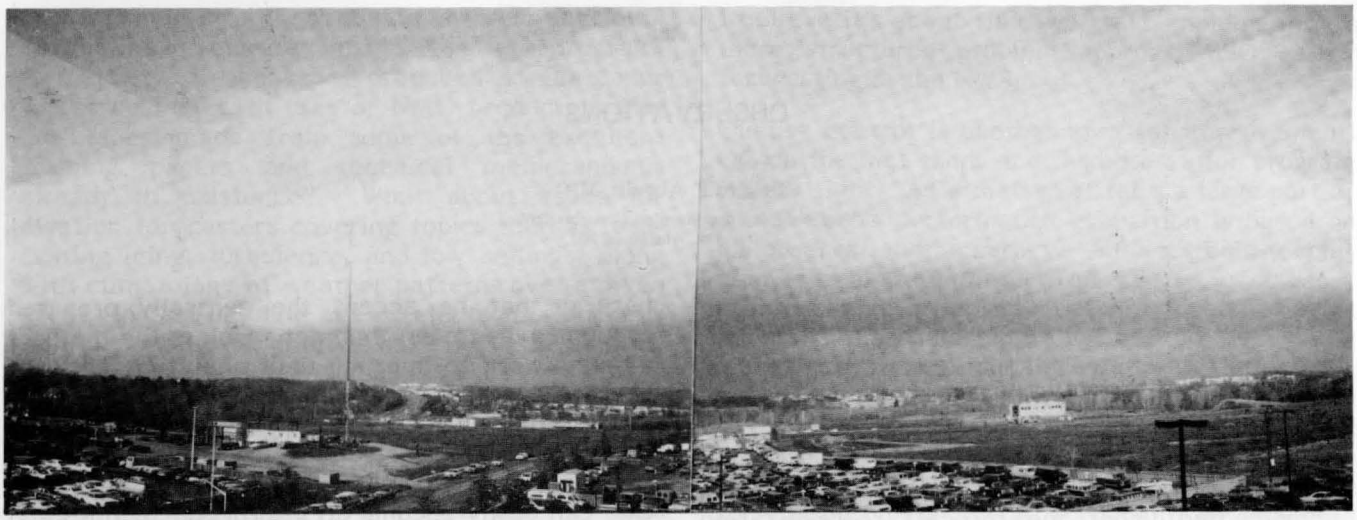

A ROLL CLOUD IN WASHINGTON

This photograph was taken looking northwest from the World Weather Building, Camp Springs, MD at 1150 EST, 3 December 1977. A strong cold front was approaching from the northwest which was accompanied by this roll cloud, a feature more typically associated with mid-west summertime squall lines. The front passed Washington National Airport at 1154 EST. Winds shifted from 220°, 14 kts to 280°, 12 kts at that time and continued about the same until 1500 EST. There was only a sprinkle of rain associated with the dark cloud area. By 1700 EST winds were northwest at 26 kts gusting to 42 kts, dying down around midnight. Temperatures remained near 46°F until the wind strength increased and then fell rapidly to below freezing at 1900 EST.

Synoptically, Washington, D.C. was still well north of the warm front, but the cold air was very shallow with the steeper slope of the warm front in Northern Pennsylvania, as indicated by the isobaric curvature. The strong winds associated with the influx of cold air were unable to reach ground level until the colder air aloft achieved a temperature cold enough for adiabatic instability with the relatively cold air trapped near the ground. The acoustic sounder, an experimental system to measure wind speed and direction located at Dulles International Airport, VA which is being tested by the FAA, showed the wind speed to increase gradually from the surface, measuring 30 kts at 1600 feet one hour after the frontal passage. The wind direction was within 10° of 290° up to the 1600 ft. level. No inversion was indicated by the wind direction or speed.

Pictures and data collected by the staff of NWS Forecast Office, Washington, D.C.