

GEO165 Meteorology

Lab #4

Stability:

The Super Outbreak of Tornadoes April 3-4, 1974

The greatest outbreak of tornadoes that ever occurred in the United States took place on April 3-4, 1974 when 148 tornadoes touched down in the eastern U.S. less than 24 hours.

You can find a map of the tornadoes here:

http://www.shorstmeyer.com/tornadoes/1974map_big.html

and you can find some statistics here:

http://www.shorstmeyer.com/tornadoes/1974_stats.html

In all there were 6 - F5 tornadoes in this massive outbreak including Brandenburg, Kk, Saylor Park, OH and Xenia, OH. There were 23 - F4 tornadoes and 35 - F3 for a total of 63 significant tornadoes in one 24-hour period.

I. Purpose of Lab #4

This is a "put it all together" exercise and from the number of maps, charts and Stüve diagrams it seems like a great deal of work. But most of this will be done in class with my guidance and will go quickly. Our goal is to see how jet streaks, static stability and weather systems combine to create severe weather.

II. Documents

1. Lab4Surface.pdf - surface maps from 12z, 18z, 21z 3Apr74 and 00z and 12z 4Apr74
2. Lab4_500mb.pdf - 500mb charts from 12z 3Apr74 and 00z and 12z 4Apr74
3. Lab4Soundings.pdf - Soundings from Nashville, TN, Jackson, MS, Dayton, OH and Huntington, WV.
4. Lab4Questions.pdf

III. Surface Maps

We will find and plot the fronts and trace the position of the 60°F isodrosotherm (dew point temperature line) to determine the role of moisture **advection** and frontal lifting in this outbreak.

IV. 500mb Charts

These are near the bottom the level where the jet stream is found and we will apply the 4-quadrant model of the jet streak to see where dynamic lifting is taking place.

V. Plotted Soundings

The stations, JAN, BNA, DAY and HTS are very close to being the boundaries of the severe weather, except to the north. We will determine the stability change by calculating the Showalter Index for each sounding.

We will cover how this is done and how to determine if the atmosphere is absolutely stable, absolutely unstable or conditionally unstable.

VI. Questions - you know what to do with these. - Coming Soon

VII. In Class

Specific procedures will be detailed in class and we will step through the lab as a group.