INTRODUCTION

Each summer since 2005, the National Weather Service (NWS) Baltimore/Washington Forecast Office (WFO LWX) has hosted one or more university undergraduate student volunteers. Students undergo a thorough interview process to assess their academic history, research interests and career goals. As part of the WFO LWX Student Volunteer Program, the selected students are paired with mentor forecasters to conduct a research project focused on problems of operational forecasting relevance. The research results later are presented at national conferences and infused into local operations with great benefit. Of the 19 students that have participated since 2005 (approximately three per year), at least four have gone on to a career in NWS or NOAA.

The program recently has fostered collaboration among WFO LWX and the Storm Prediction Center (SPC), the Hydrometeorological Prediction Center (HPC), county government officials and universities. In addition to research experience, the students gain exposure to routine and hazardous weather forecasting operations at the WFO (as the program spans a large portion of the Mid-Atlantic peak severe weather season).

This poster highlights some of the recent research efforts conducted by WFO LWX summer students and their mentors.

ANTICIPATING TORNADOIC ENVIRONMENTS

KYLE OLMSTEAD (2010), MATTHEW KRAMAR (mentor)

Synoptic patterns associated with tornado days were examined in the WFO LWX County Warning Area (CWA). Composite plots were made of several synoptic fields for days with mesocyclonic tornadoes and for days with non-mesocyclonic tornadoes.

It was determined that mesocyclonic tornado days featured a relatively less-amplified, positively- to neutrally-titled mid-level shortwave trough in the Ohio Valley, surface low pressure centered in western Pennsylvania, a broad warm sector over the region and a mid-level jet over the Mid-Atlantic region such that the right entrance region of the jet ageostrophically enhanced vertical motion.

Tornado days that favored a QLCS mode were characterized by a relatively deeper and more amplified, negatively-titled shortwave trough in the Ohio Valley, surface low pressure over Michigan with a negatively-titled surface trough moving through the forecast area and a strong mid-level jet passing just to the south of the CWA such that vertical motion was enhanced ageostrophically in the left exit region of the jet.

These composite patterns have since been used quite successfully to recognize and anticipate potentially tornadoic environments in the CWA.

THE NWS CHANGE IN SEVERE HAIL CRITERION

JEFFREY WATERS (2009), MATTHEW KRAMAR (mentor)

In 2008, the NWS definition of severe hail was changed to hail greater than one inch diameter. A methodology adapted from Donavan and Jungbluth (2007) was pursued to evaluate for the Mid-Atlantic region the relationship between the height of the environmental freezing level and the height of the 50 dBz core in a thunderstorm.

Results yielded a strong correlation. Quantile regression techniques applied to the data provided guidance to forecasters on the 10% and 50% expected core heights. An interactive tool was developed as a radar display overlay in AWIPS to make these values available to the warning meteorologist in real time using hourly LAPs (Local Analysis & Prediction System) freezing level analyses. Office performance with hailstorms has been outstanding, including improved accuracy in anticipated hail size.

UPSLOPE SNOW SHOWERS

JOE WEGMAN (2008), BRIAN LASORSA (mentor)

For many years the mountainous region of the Allegheny Front presented a particularly difficult snow-forecasting challenge to forecasters, since the area is sparsely populated and has few observing sites, the nearest weather radar beam overshoots the often shallow convection, and the wintertime meteorology of the Allegheny Front was not well understood.

Mechanisms by which these lake-effect or upslope snow showers are generated were examined. Factors such as inversion height and strength, wind direction and speed and depth of the snow growth layer were investigated. The results of this research were distilled into a checklist to aid forecasters in distinguishing between events likely to produce warning- and advisory-level snowfall.

Mountain zone forecast breaks were developed locally to give forecasters greater specificity when dealing with upslope snow situations. WFO LWX forecasters now have a greater understanding of the winter weather of the Allegheny Front, enabling them to provide emergency managers more time to prepare before snow begins and better information of what to expect once it does.