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The Summer Student Volunteer Program at NWS WFO Baltimore/Washington

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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.

ADDITIONAL RECENT PROJECTS & STUDIES

- A climatology of seasonal variability in flight categories (K. LaBelle & R. Smith, 2006)
- Area-specific Flash Flood Warnings (A. Hennecke, S. Rogowski & S. Allen, 2006)
- Coastal flood events along the Chesapeake Bay and Potomac River (B. Green & S. Rogowski, 2008)
- Analysis of 4 July 2006 Washington DC severe thunderstorm (E. Thompson, S.A. Rogowski, S. Zubrick & S. Listemaa, 2008)
- Methodology and assessment of marine Small Craft Advisories (M. Brooks, B. Peloquin & S. Zubrick, 2009)
- Impacts in the Washington DC metro area resulting from the convective wintertime event of 26 January 2011 (M. Cohen, H. Sheffield & S. Zubrick, 2011)
- An investigation of null-event severe convective watches (L. Picard, M. Kramar, G. Schoor, S. Zubrick & A. Dean, 2011)

ANTICIPATING TORNADIC ENVIRONMENTS

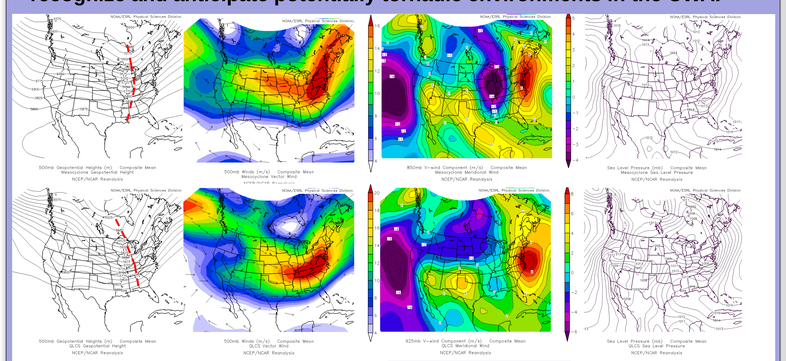
KYLE OLMSTEAD (2010), MATTHEW KRAMAR (mentor)

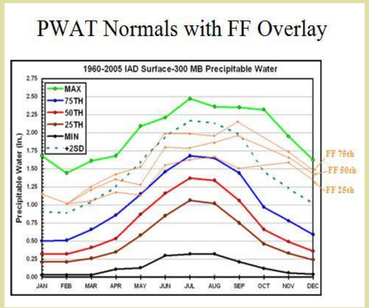
Synoptic patterns associated with tornado days were examined in the WFO LWX County Warning Area (CWA). Composite plots were made of several synoptic fields for days with mesocyclonic tornadoes and for days with non-mesocyclonic tornadoes.

It was determined that mesocyclonic tornado days featured a relatively less-amplified, positively- to neutrally-tilted 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-tilted shortwave trough in the Ohio Valley, surface low pressure over Michigan with a negatively-tilted 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 tornadic environments in the CWA.





FLASH FLOOD CLIMATOLOGY

NICHOLAS WERNER (2009)
STEPHEN KONARIK & JARED KLEIN (mentors)

Data on flash flood events for January 2001–May 2009 in the WFO LWX CWA were analyzed to reveal spatial and temporal characteristics of flash floods. Atmospheric soundings were analyzed for all flash flood events. Composite analyses of the representative soundings helped identify and qualify key meteorological parameters associated with historical flash floods that occurred in the LWX CWA.

This study showed that during the cool season (October to March), precipitable water values (PWATs) associated with flash flood events in the LWX CWA tend to be greater than what would be expected using a normal +2SD curve. But during the warm season (May to September) and especially in the summer (June to August), PWATs less than the normal +2SD curve are observed during flash flood events.

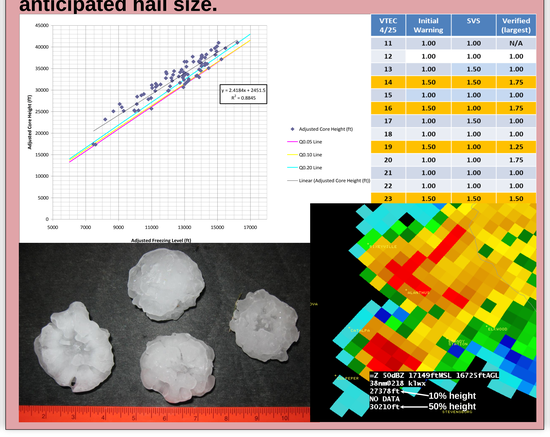
Storm-relative winds during flash flood events generally were light (<10 m/s) out of the west or southwest. A majority of flash flood cases occurred in an environment with moderate (10-20 m/s) southwesterly 0-6 km mean winds.

THE NWS CHANGE IN SEVERE HAIL CRITERION

JEFFREY WATERS (2009), MATTHEW KRAMAR (mentor)

In 2009, the NWS definition of severe hail was changed to hail greater than one inch diameter. A methodology adapted from Donavon 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 inform of what to expect once it does.