"The Collaborative Science, Technology, and Applied Research (CSTAR) Program"

Title:

"Cooperative Research with the National Weather Service on Cool- and Warm-Season Precipitation Forecasting over the Northeastern United States"

University: University at Albany

Name of University Researchers Preparing Report: Lance F. Bosart and Daniel Keyser

NWS/AFWA/Navy Office: National Weather Service, Albany, New York

Name of NWS/AFWA/Navy Researcher Preparing Report: Eugene P. Auciello

National Oceanic and Atmospheric Administration Award Number: NA07NWS4680001

Date: 30 November 2009

SECTION 1: Summary of Graduate Student Research Activities

(a) Distribution of Warm/Cool Season Precipitation Associated with 500 hPa Cutoff Cyclones (Matthew Scalora)

(Focal Points: Neil Stuart, National Weather Service, Albany, NY

Tom Wasula, National Weather Service, Albany, NY)

MS Thesis Seminar

3:00 pm

Monday June 29, 2009

Forecasting Distributions of Warm-Season Precipitation Associated with 500-hPa Cutoff Cyclones

Matthew A. Scalora, Lance F. Bosart, and Daniel Keyser

Department of Atmospheric and Environmental Sciences

University at Albany/SUNY, Albany, NY

The forecasting of heavy precipitation and severe weather associated with warm-season 500-hPa cutoff cyclones is a challenge over the northeastern United States (US). Numerical weather prediction models have difficulty predicting aspects of the evolution of cutoff cyclones, such as their deepening or filling rates and tracks. Precipitation distributions can also be a challenge to predict as forcing for ascent (e.g., vorticity or thermal advections) tends to be weaker and less widespread than in typical open-wave cyclones. The purpose of this research is to improve the skill in forecasting cutoff cyclones. The results of this research are intended to provide forecast methodologies and contribute to increased situational awareness concerning cutoff cyclones over the northeastern US during the warm season.

This study discusses findings from an in-depth review of 20 warm-season (June–September) cases of cutoff cyclones passing through the northeastern US. This task was accomplished using the 1.0° GFS analyses (2000–2006 cases) and 0.5° GFS analyses (2007–2008 cases). Common tropospheric fields and features, including low-level temperature and moisture, low-level jets, and upper-level jet streaks, were composited along with selected parameters used in warm-season precipitation forecasting. A total of 45 cutoff cyclone days, termed storm days, occurring in conjunction with the 20 cutoff cyclone cases over the 2000–2008 warm seasons were selected for examination. The 45 storm days were examined for evidence of distinctive synoptic-scale flow patterns in order to stratify the datasets based on the tilt of the 500-hPa trough and embedded cutoff, termed a cutoff–trough system. Schematic figures were derived from composites of various tropospheric fields and features for the storm days that fit into each cutoff–trough system tilt category. Five distinct patterns of lower-, middle-, and upper-level features were discovered based on 500-hPa cutoff/trough tilt.

A diagnostic analysis of the 23–25 July 2008 cutoff cyclone was also performed. Forecast challenges were posed by the presence of multiple precipitation modes, including convective lines/bow echoes, heavy-precipitation supercells, and stratiform rain regions. Severe weather tended to cluster in regions of cyclonic vorticity advection near surface boundaries in areas of strong low-level vertical wind shear. Widespread rainfall amounts of 7–9 cm and extensive flooding was associated with this severe weather in a very moist environment (precipitable water anomalies were 2–3 standard deviations above normal). Severe weather on 24 July, including an EF2 tornado, was associated with low-level positive equivalent potential temperature advection and an 850-hPa jet that was 4–5 standard deviations above normal.

SECTION 1: Summary of Graduate Student Research Activities

(b) High Wind/Winter Severe Convective Events (Jonas Asuma)

(Focal Points: John Quinlan, National Weather Service, Albany, NY
Tom Wasula, National Weather Service, Albany, NY
Hugh Johnson, National Weather Service, Albany, NY
Kevin Lipton, National Weather Service, Albany, NY
Warren Snyder, National Weather Service, Albany, NY)

Research Summary (1 May 2009 – 31 October 2009):

This CSTAR-III six-month report describes research that continued from spring 2009 and currently is in progress. The climatology and composite analyses derived from the storm reports from the SvrPlot2 program (Hart, 1993) was presented in a poster at the 25th Conference on Weather Analysis and Forecasting in Omaha, NE, on 1–5 June 2009. The poster was entitled "Cool-Season Severe Weather in the Northeast U.S." The composite analyses focused on the events that produced ≥ 50 reports. It was concluded that cool-season severe weather events are characterized by a cyclone north of the domain associated with anomalous moisture, high shear, marginal thermodynamic instability, and strong dynamical forcing.

During the summer, the spatial domain was expanded and the temporal domain was shortened to extend from 1993 through 2008 to correspond with the installation of the 88D radar systems. The spatial domains are shown in Figure 1. Stuart Hinson from NCDC provided the thunderstorm and high wind storm report dataset that extends from 15 October 1993 through 31 December 2008. Unfortunately, the dataset was missing the states of Virginia and New Jersey and needed to be added. The storm reports were stratified into events. An event was defined as any series of ≥ 2 reports that is separated by 12 h before and after the initial and final report, respectively. The events were then classified as pure gradient, pure convective, or hybrid if the series consisted of only gradient wind reports, only thunderstorm wind reports, or both respectively.

A climatology was constructed that highlights the hourly, annual, and monthly frequency of reports and the monthly and annual frequency of events. The spatial frequency of all high wind reports can be seen in Figure 1. The climatology also highlights the variability based upon event type. Report-relative composites were constructed for each event type. The grids for each event were centered on the location of the initial storm report that occurred in the Northeast domain. The composite was then centered on the centroid of the initial Northeast storm reports. The event climatology and composite analyses were orally presented at the Eleventh Northeast Region Operational Workshop in Albany, NY, on 4–5 November 2009. It was found that pure gradient and pure convective events are tied to the seasonal cycle of convection, suggesting pure gradient and pure convective events are dynamically and thermodynamically driven, respectively (Figure 2). It was also shown that hybrid events tend to accumulate more reports per event than pure convective and pure gradient events, indicating hybrid events are more impactful (Figure 3). From the composite analyses it was determined that the hybrid and pure convective composite cyclone tends to be located north of the initial Northeast storm report, while the pure gradient

composite cyclone tends to be located east of the initial Northeast report (Figure 4). The pure convective events tend to be the moistest and least stable while the pure gradient events tended to be the driest and most stable (Figures 4 and 5). The hybrid and pure gradient events tended to have more amplified upper level wave patterns compared to the pure convective events, which suggests the dynamics of hybrid and pure gradient events are typically more robust (Figure 5).

John and Tom met with Jonas on August 11, 2009 and went over some initial composite charts (surface, 850 hPa, 500 hPa and 300 hPa) and drew some preliminary conclusions as well as items that need to be analyzed in more detail. The main highlights of our meeting included: the need for further stratification of events based on the type of synoptic system (primary low, secondary low, tropical transition, Miller Type A, Miller Type B etc.) and how to best define the stratification (evolution of system from 3 days before to the time of the event); a discussion of looking at wind fields compared to climatology to produce wind anomaly charts; a discussion of the severe weather during the cool season being lee trough severe weather; and the stronger dynamics that occur in the cool season accounting for a higher number of events during the late night-early morning hours than during the warm season in the Northeast U.S. There has also been frequent email contact regarding the potential for such events this past fall.

One of the main problems encountered is normalizing the high wind report spatial distributions by the population distribution. The problem arises, because the resolution of the population distribution is different from that of the high wind report distribution. Figure 6 shows the distributions of population, all high wind reports, gradient wind reports, and thunderstorm wind reports. There definitely seems to be a bias toward highly populated areas, so normalizing the distribution would be a meaningful exercise.

This research was presented at the 25th Conference on Weather Analysis and Forecasting in Omaha, NE, on 1–5 June 2009 and the Eleventh Northeast Region Operational Workshop in Albany, NY, on 4–5 November 2009.

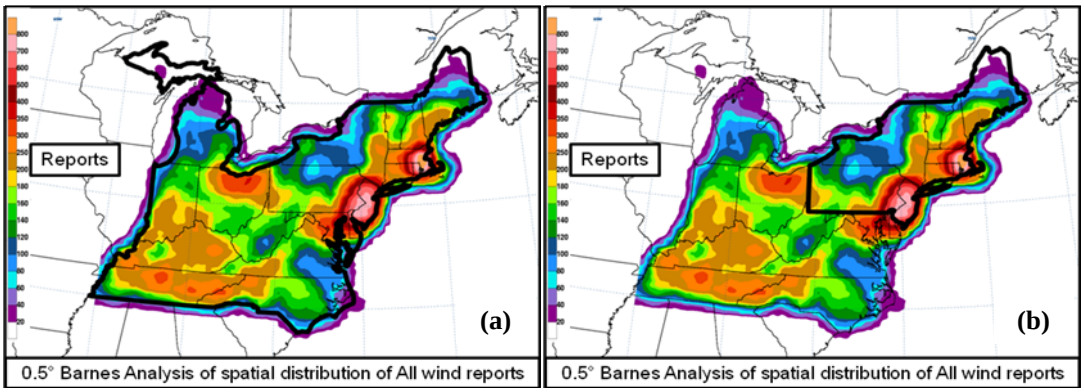


Fig. 1. Shows domains used in the climatology with (a) being termed the Greater Northeast and (b) the Northeast overlaid on the spatial frequency of all high wind reports.

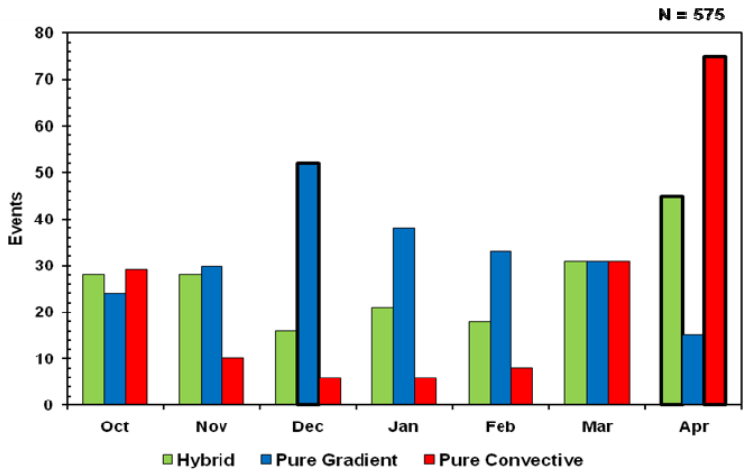


Fig. 2. Shows the monthly frequency of high wind events by event type.

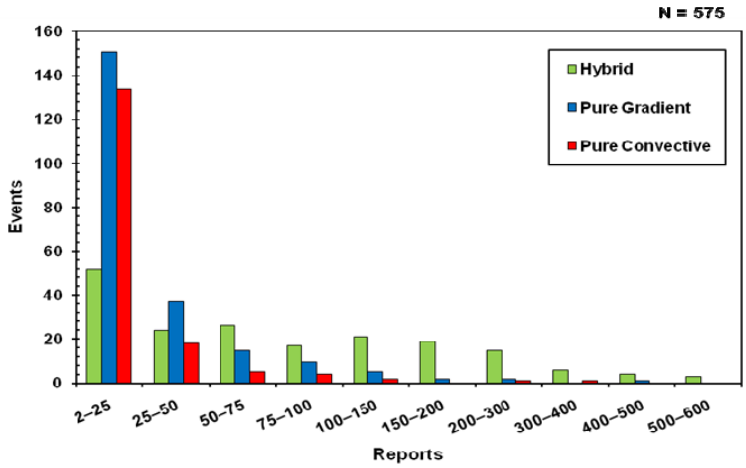


Fig. 3. Shows the distribution of events by the number of reports accumulated.

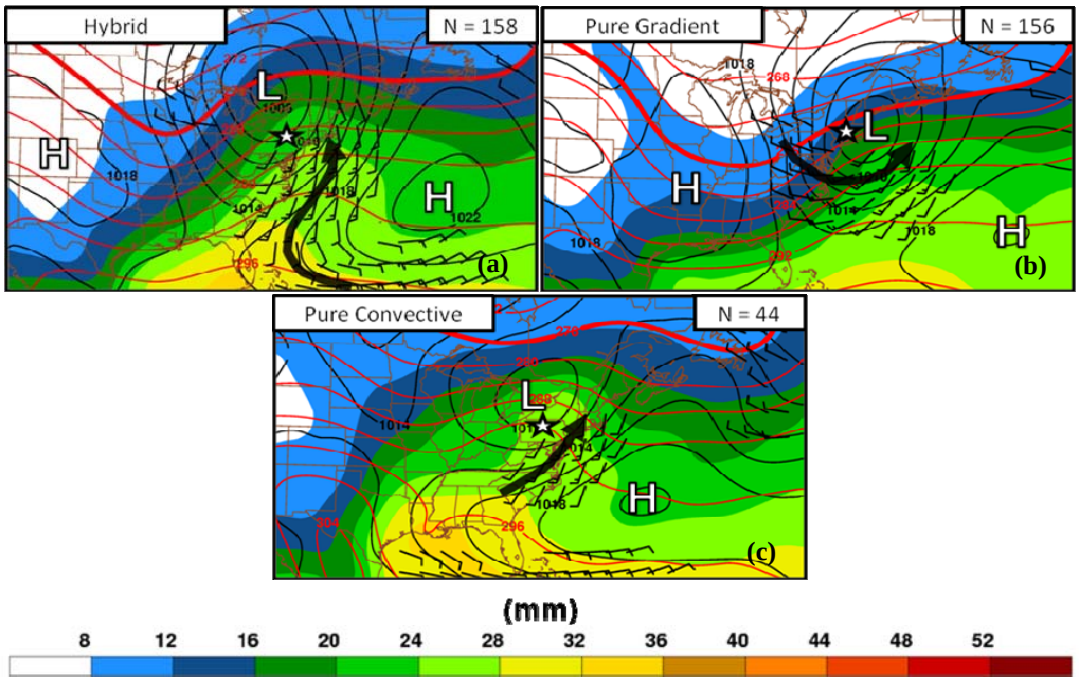


Fig. 4. Shows the composite initial NE report (star); MSLP (every 2 hPa, black); precipitable water (mm, shaded); 1000-hPa θ (every 4 K, red), total wind (≥10 kt, barbs) for the (a) hybrid, (b) pure gradient, and (c) pure convective events.

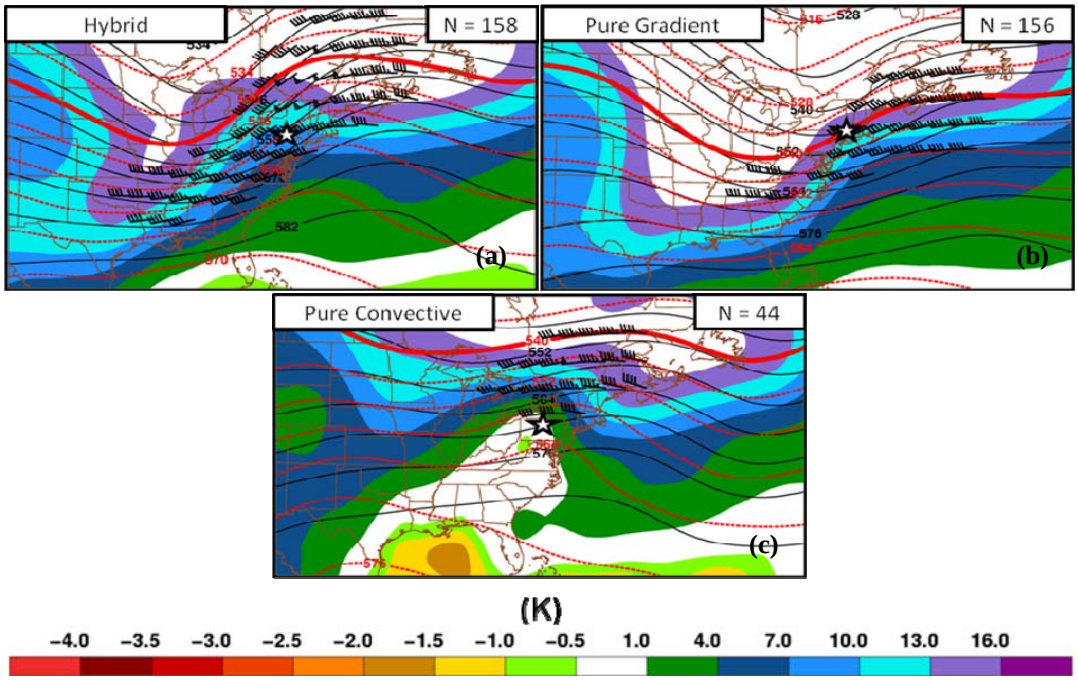


Fig. 5. Shows the composite initial NE report (star); 500-hPa Z (every 6 dam, black), lifted index (K, shaded); 1000–500-hPa thickness (every 6 dam, red) and wind shear (≥ 40 kt, barbs) for the (a) hybrid, (b) pure gradient, and (c) pure convective events.

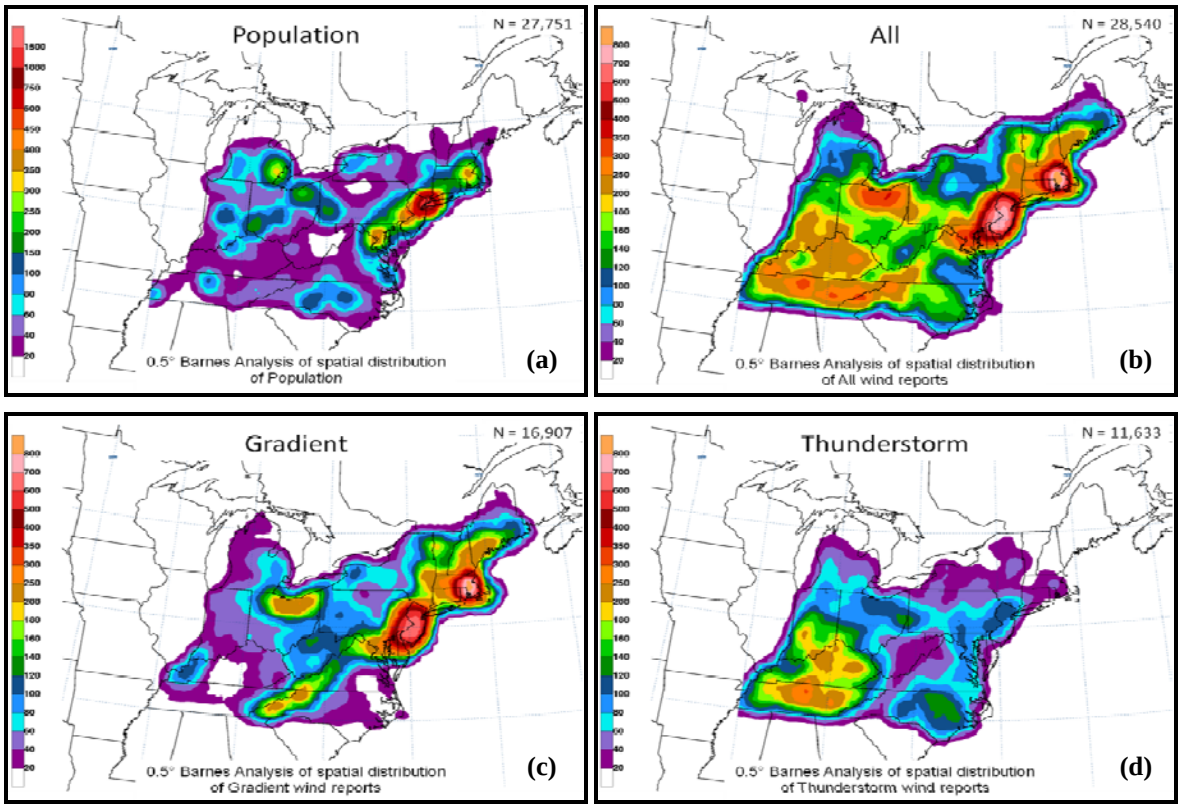


Fig. 6. Shows the distribution of (a) population, (b) all reports, (c) gradient reports, and (d) thunderstorm reports.

SECTION 1: Summary of Graduate Student Research Activities

(c) Predecessor Rain Events Associated with Landfalling Tropical Cyclones (Benjamin Moore)

(Focal Point: Michael Jurewicz, National Weather Service, Binghamton, NY)

Research Summary (1 May 2009 – 31 October 2009):

This report summarizes CSTAR research focused on predecessor rain events (PREs) in advance of landfalling tropical cyclones. This project is being conducted in collaboration with NWS focal point Michael Jurewicz (Binghamton, NY WFO) and is motivated by the need to both better understand and better forecast PREs. To accomplish this task the project sets out to 1) identify key physical mechanisms for PRE development, 2) establish preferential flow configurations within which PREs develop, and 3) determine processes accounting for spatial and temporal variability of PREs.

The first goal was addressed through a detailed case analysis of a high-impact PRE (>200 mm of rain) that occurred during 24-26 Sep 2005 over southern Minnesota associated with TC Rita (radar evolution shown in Fig. 1). Results suggest that the PRE developed in an environment of strong low-level warm air advection, frontogenesis, and high values of precipitable water (~50 mm) (Fig. 2a). Moisture flux from the TC was concentrated mostly at low-levels and is likely attributable to the strong southerly flow associated with an anticyclone downstream of Rita (Fig. 3).

Upper-level support for PRE development is suggested by its placement in the anticyclonic entrance region of a 200 hPa jet streak (Fig. 2b). As the PRE grew in intensity and spatial scale between 00Z and 12Z 25 Sep, this jet feature remained fixed poleward of the PRE and exhibited increases in both its magnitude and wind speed gradients. Since the PRE was characterized by a quasi-stationary band of heavy stratiform and convective precipitation (Fig. 1), it is likely that latent heating was linked with a vertical redistribution of potential vorticity (PV) and the steepening of isentropes at middle and upper levels of the troposphere in the vicinity of the PRE. The result of this was an increase in the meridional PV gradient in the PRE location, which was likely associated with the strengthening of the 200 hPa jet. This suggestion is reinforced though a calculation of the Lagrangian PV tendency at 200 hPa (Fig. 4), which indicates nonconservation of PV in the vicinity of the PRE associated with an enhanced PV gradient. The PRE then at its mature stage resulted from a complex interaction between low-level frontogenesis, strong poleward moisture transport from the TC, and a diabatically enhanced upper-level jet entrance circulation (Fig. 5).

The second and third goals of this research arise out of the need to identify mechanisms that account for variations in location relative to the TC, duration, and spatial extent. The first attempt to address these issues involved stratifying PREs occurring 1988−2008 by the geographic location in which their parent TCs made landfall, with a category for Central/Western Gulf TCs and a category for Eastern U.S. PREs. TC-relative composite analysis produced good results but difficulties became apparent due to the variability in the synoptic patterns within each category.

A much more dynamically oriented stratification scheme based upon TC recurvature was then employed for the 1988-2008 PRE database. In this scheme, PREs were stratified into either a pre-recurvature category or a post-recurvature category according to whether the TC had yet recurved at the time of PRE initiation. TC-relative compositing results (Fig. 6) indicate that for both categories PREs tend to develop in the anticyclonic entrance region of an upper-level jet in the vicinity of warm air advection and frontogenesis at low-levels. These key features, however were located much closer to the TC for the post-recurvature category, consistent with TC having been pick up by a progressive trough. Frontogenetical forcing results as the TC circulation impinges upon on a low-level baroclinic zone forming a warm frontal structure (Fig. 6c). For the pre-recurvature category, the parent TC is embedded within a broad ridge, and the upper-level jet and low-level baroclinic zone are displaced well poleward (Fig. 6f). Additionally, an important mechanism for the transport of moisture to the region of the PRE is suggested to be a strong low-level anticyclone downstream of the TC. While this compositing exercise suggests two distinct scenarios favorable for PRE development, future work will classify PREs based upon their synoptic environments in order to develop conceptual models that can ultimately be implemented in operational forecasting.

NWS Interactions:

Mike Jurewicz and I have been in contact mainly through email over the past 6 months. He has been an outstanding resource for both identifying cases for the 1988-2008 PRE database and in defining the operational forecasting issues related to PREs. We have had various discussions regarding the dynamics governing PREs and how they vary from event to event. One of the key issues is that of the mechanisms which can lead to upper-level jet streak enhancement in the environment of the PRE and moreover how to anticipate them in a forecast setting. Diabatically induced anticyclonic outflow from the TC and potentially the PRE can have significant impacts on the location and magnitude of the jet. Additionally however, the advective aspect associated with the propagation of a shortwave trough is equally important for maintaining the jet streak. Identifying and discussing issues such as this have been fundamental as we work towards understanding the intricacies of PREs.

Mike, Lance Bosart, and I had the pleasure of attending and presenting at the Inland Impacts of Tropical Cyclones Conference 10-11 June in Atlanta. There we had the unique opportunity to present our work on PREs from three complementary perspectives at a conference focused on understanding, anticipating, and mitigating the impacts of TCs. Venues such as this are fundamental for communicating and disseminating the results of this research to the operational forecasting community.

Additionally, we have discussed the possibility of writing an operationally oriented paper in which relevant characteristics of PREs and forecasting strategies would be laid out. This will be a crucial part of the process by which this research is translated into operations.

Publications and Workshop Submissions:

The work conducted on the Rita (2005) PRE was presented in poster form at the Weather Analysis and Forecasting Conference, held 1−5 June 2009 in Omaha, NE, and was presented orally at the Inland Impacts of Tropical Cyclone's Conference, held 10−11 June 2009 in Atlanta. Preliminary results of the compositing component of this research were presented at the 11th Northeast Regional Operational Workshop, held 4-5 November 2009 in Albany.

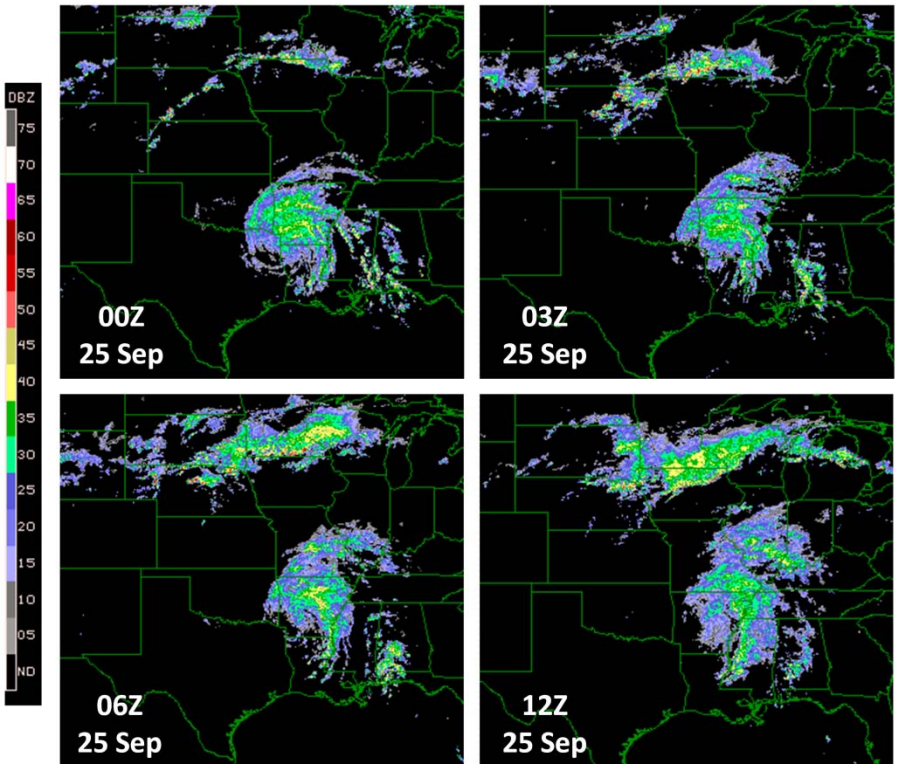


Figure 1 WSR-88D radar reflectivity mosaics for 00Z, 03Z, 06Z and 12Z 25 Sep 2005. Images obtained from NCAR Case Selection Archive (http://locust.mmm.ucar.edu/case-selection/)

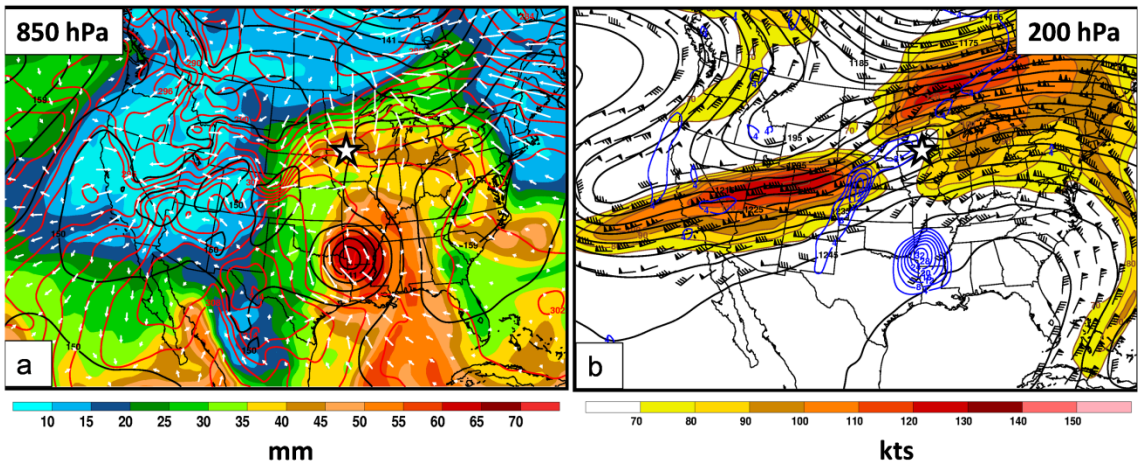


Figure 2 Synoptic environment at 06Z 25 Sep 2005 from the 1° GFS final analysis for the PRE associated with TC Rita: a)850 hPa geopotential height (contoured in black every 3 dam), Q-vectors (10^{-11} K m^{-1} s^{-1}), potential temperature (contoured in red every 2 K), total column precipitable water (shaded, mm). b) 200 hPa heights (contoured in black every 5 dam), winds (barbs ≥50 kt), wind speed (shaded, kt); 850 hPa relative vorticity (contoured in blue every 2 x10^{-5} s^{-1} for values greater than 4 x10^{-5} s^{-1}). The location of the PRE is denoted with a star.

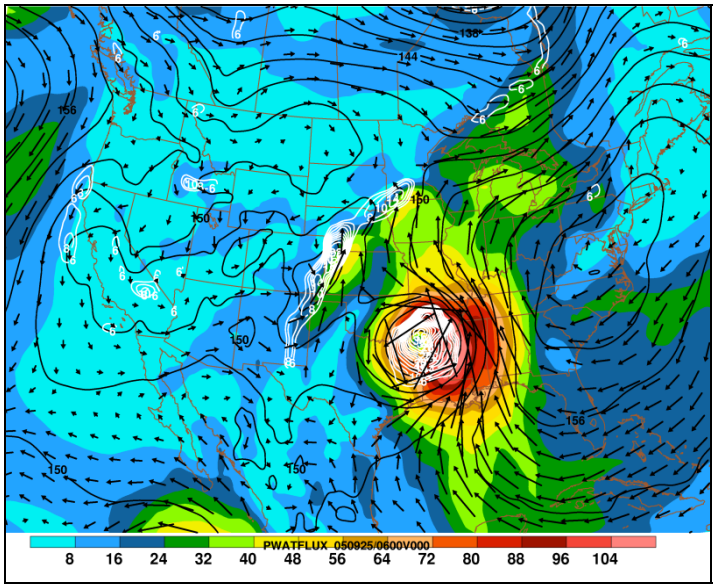


Figure 3 Vertically integrated moisture flux from 1000 hPa to 700 hPa [shaded, mm (m s^{-1})], vertically integrated moisture flux vectors [mm (m s^{-1})], 850 hPa height (contoured in black every 2 dam), 850 hPa relative vorticity (contoured in white every 2 x10^{-5} s^{-1} for values greater than 4 x10^{-5} s^{-1}) for 06Z 25 Sep, calculated from 1° GFS final analysis.

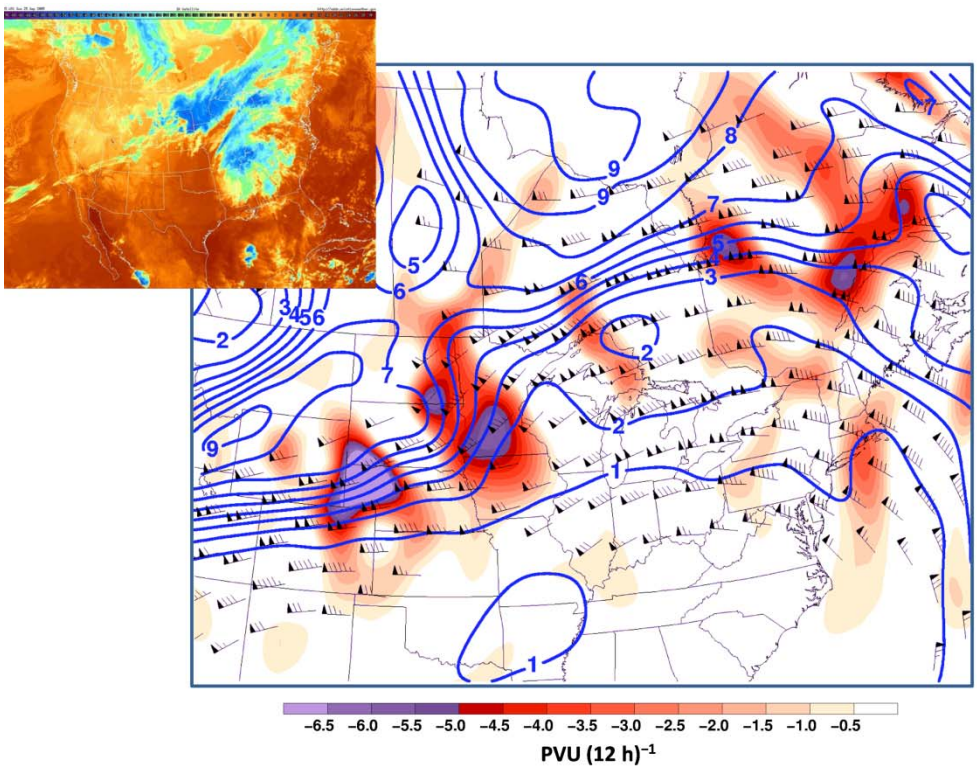


Figure 4 200 hPa Lagrangian PV tendency [shaded, PVU (12 h)$^{-1}$], PV (contoured in blue every 1 PVU), winds (barbs >50 kt) for 12Z 25 Sep, generated from the 1° GFS final analysis. Infrared satellite image inset shows locations of deep convection associated with the PRE and Rita.

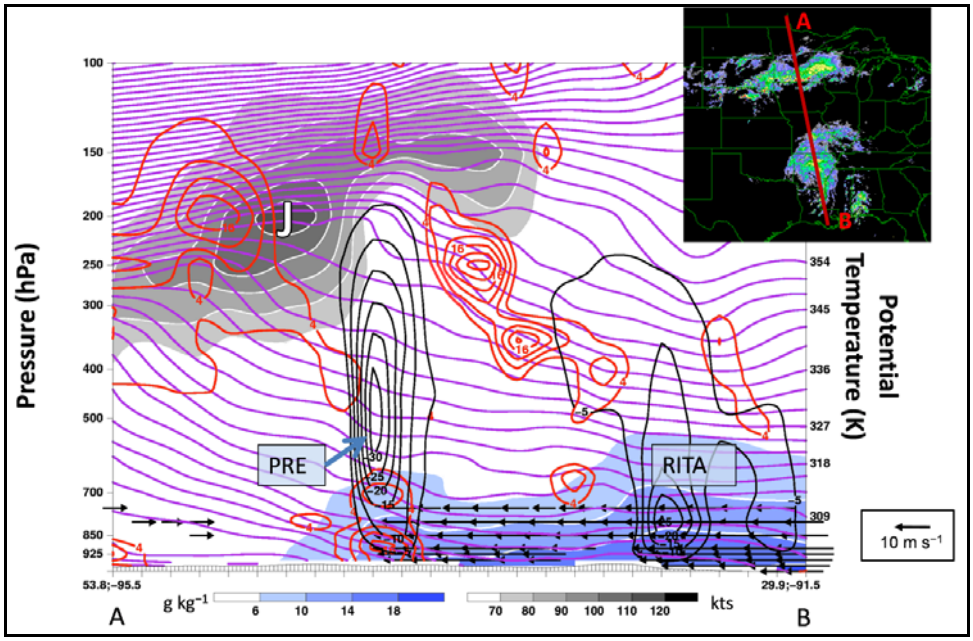


Figure 5 N-S cross section through the PRE and TC Rita at 06Z 25 Sep generated from the 1° GFS final analysis shows potential temperature (contoured in purple every 3 K), upward vertical velocity (contoured in black every 5 μb s^{-1} for values less than −5 μb s^{-1}), wind speed (gray scale shading, kt), mixing ratio (blue shading, g kg^{-1}), Petterssen frontogenesis [contoured in red ever 4 x10^{-1} K $(100km)^{-1}(3h)^{-1}$ for values greater than 4 x10^{-1} K $(100km)^{-1}(3h)^{-1}$], horizontal flow vectors in the plane of the cross section below 700 hPa. The radar image inset in the upper right indicates the plane of the cross section.

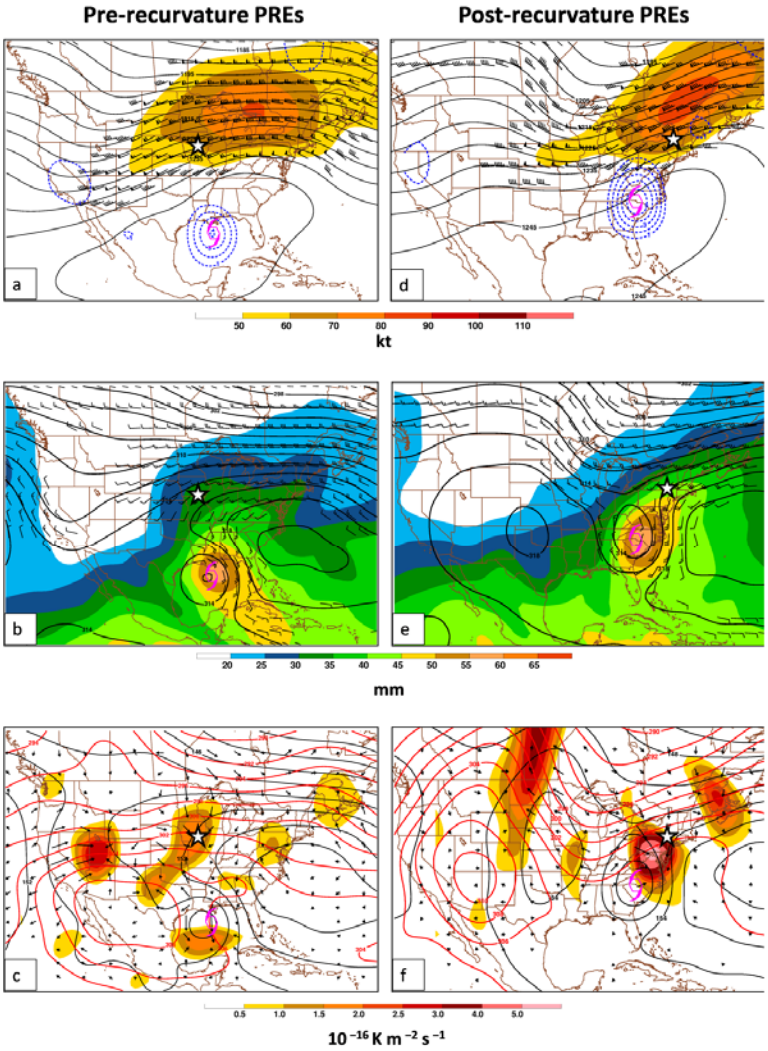


Figure 6 TC-relative composites for the post-recurvature (right) and pre-recurvature (left) categories constructed with the 2.5° NCEP–NCAR reanalysis data. a), d) 200 hPa heights (contoured in black every 5 dam), winds (barbs ≥40 kt), wind speed (shaded, kt); 850 hPa relative vorticity (contoured in blue every 2 x10^{-5} s^{-1} for values greater than 4 x10^{-5} s^{-1}). b), e) Total column precipitable water (shaded, mm), 700 hPa geopotential height (contoured in black every 3 dam), 850-500 hPa layer averaged wind (barbs, ≥10 kt). The white arrows are representative streamlines for the 500-850 hPa layer averaged flow. c), f) 850 hPa geopotential height (contoured in black every 3 dam), potential temperature (contoured in red every 2 K), Q-vector convergence (shaded, 10^{-16} K m^{-2} s^{-1}), Q-vectors (10^{-11} K m^{-1} s^{-1}). The location of TC is indicated with the magenta TC symbol, and the PRE location is denoted by the star.

SECTION 1: Summary of Graduate Student Research Activities

(d) Precipitation Distributions Associated with Cool-Season 500 hPa Cutoffs (Melissa Payer)

(Focal Points: Neil Stuart, National Weather Service, Albany, NY

Tom Wasula, National Weather Service, Albany, NY)

Research Summary (1 May 2009 – 31 October 2009):

This CSTAR-III six-month report describes research that started in spring 2009 and is currently in progress. The objectives of this research are to determine how synoptic and mesoscale features affect precipitation distributions through several case studies of cool-season (1 October–30 April) 500 hPa cutoffs using 6-h 1.0° GFS analyses and to eventually identify key signatures differentiating between various precipitation distributions. Staying true to past research, cutoffs were defined as a 30-m geopotential height rise in all directions at 500 hPa for at least three consecutive analyses (i.e., over a 24-h period).

A total of 170 cutoff events (384 days) were identified in the Northeast region for the five winters of 2004/05 through 2008/09. On average, there were 34 cutoff events per winter with the 2005/06 and 2008/09 winters being the most active with 36 and 37 cutoff events, respectively (Figure 1). Monthly variability of cutoff events indicates that the spring and fall transition months were the most active with 7.6 and 5.8 cutoff events on average in April and October, respectively (Figure 2). In comparison, the minimum occurred in January with an average of 3.6 cutoff events. Precipitation distributions were determined from 6-h National Precipitation Verification Unit (NPVU) QPE data. Of the 384 days where a cutoff was present in the region, 42.7% (164) received heavy precipitation, defined as at least 25 mm of precipitation or greater in the precipitation domain (New England, New York, Pennsylvania, and New Jersey) during a 24-h period from 1200 UTC to 1200 UTC.

Case studies were chosen for cutoffs that were associated with difficult-to-forecast precipitation distributions as well as cutoffs that had varying precipitation distributions throughout their lifetime in the region. For each case, standardized anomalies of fields such as precipitable water (PW) and 850 hPa winds were created from the 1.0° GFS analyses with respect to climatologies created from 2.5° NCEP–NCAR reanalysis data. Two very different cases associated with difficult-to-forecast precipitation distributions have been examined in depth up to this point: 8–9 March 2008 and 2–3 February 2009.

The 8–9 March 2008 case was a fast-moving cutoff that was associated with widespread flooding and some icing reported in the Adirondacks (Figure 3). Model forecasts confined the heavy precipitation ($\geq$25 mm) to coastal regions; however widespread heavy precipitation was observed throughout much of the Northeast. Precipitation forecast issues were primarily due to the considerable variability that numerical models exhibited in forecasting the cutoff 3–8 days prior to the onset of the event with uncertainty in the timing, track, and intensity of the surface cyclone. The 2-day NPVU QPE indicates that there were three main regions of heavy precipitation: east of Lake Ontario (due to lake effect), in eastern New York and western New England, and over Cape Cod and Maine (Figure 4). A conceptualized overview of the synoptic

features that contributed to heavy precipitation for this case is shown in Figure 5. The north-south elongated band of heavy precipitation in eastern New York and western New England was collocated with strong cyclonic absolute vorticity advection and favorable QG forcing for ascent associated with Q-vector convergence. The heavy precipitation over Cape Cod and Maine was mainly due to strong frontogenesis ahead of a developing warm front. In addition, dual jet streaks at 250 hPa provided favorable upper-level forcing for ascent over the entire region. The surface cyclone associated with this cutoff underwent rapid cyclogenesis over New York State at the time of maximum precipitation. Southerly flow west of the cyclone advected Atlantic moisture into the region, contributing to PWAT values of 20–40 mm. Standardized anomalies indicate that the PWAT in the region was between +2 and +5 standard deviations above normal.

The 2–3 February 2009 cutoff was considered a precipitation forecast bust for the Northeast since heavy precipitation ($\geq$25 mm) was forecast to occur but most locations in the region received less than 5 mm. Forecast errors were mainly due to large disagreement between numerical models in the speed and track of the surface cyclone. The cutoff was slow-moving and stalled over the Great Lakes, remaining west of the Northeast region for the duration of its lifetime (Figure 6). The 2-day NPVU QPE indicates that the precipitation with this cutoff was confined to coastal regions, with Cape Cod and Maine receiving the most precipitation (10-15 mm) (Figure 7). A conceptualized overview of the synoptic features that contributed to heavy precipitation for this case is shown in Figure 5. The primary reason heavy precipitation did not occur in the Northeast associated with this event was due a phase error caused by the surface cyclone developing farther east than expected. As with the March 2008 cutoff, upper-level dual jet streaks were observed for this case but were located farther east so that the favorable forcing for ascent associated with the exit and entrance regions of the jet streaks was primarily located over coastal Maine. The low-level jet to the east of the surface cyclone was also located too far offshore to advect moisture into the region and consequently PWAT values along the coast were 15 mm or less, corresponding to only +0.5 to +1.0 standard deviations above normal.

NWS Interactions:

Neil Stuart and Tom Wasula from the National Weather Service in Albany, NY, have been in contact throughout the last six months through emails. They were provided updates of case studies that were being worked on and asked for any input on the events from an operational perspective. Various NWS Albany personnel, including Neil Stuart and Tom Wasula, provided feedback on 1 May 2009 at the Spring CSTAR Meeting during a discussion of this research up to that point.

Publications and Workshop Submissions:

The results from this project have been presented at NROW XI in Albany, NY on 4–5 November 2009. This research will also be presented at the 35th Annual Northeastern Storm Conference in Saratoga Springs, NY on 5–7 March 2010. No formal publications have been produced yet. An M.S. thesis based on this research will be written starting in spring 2010 with completion expected by summer 2010.

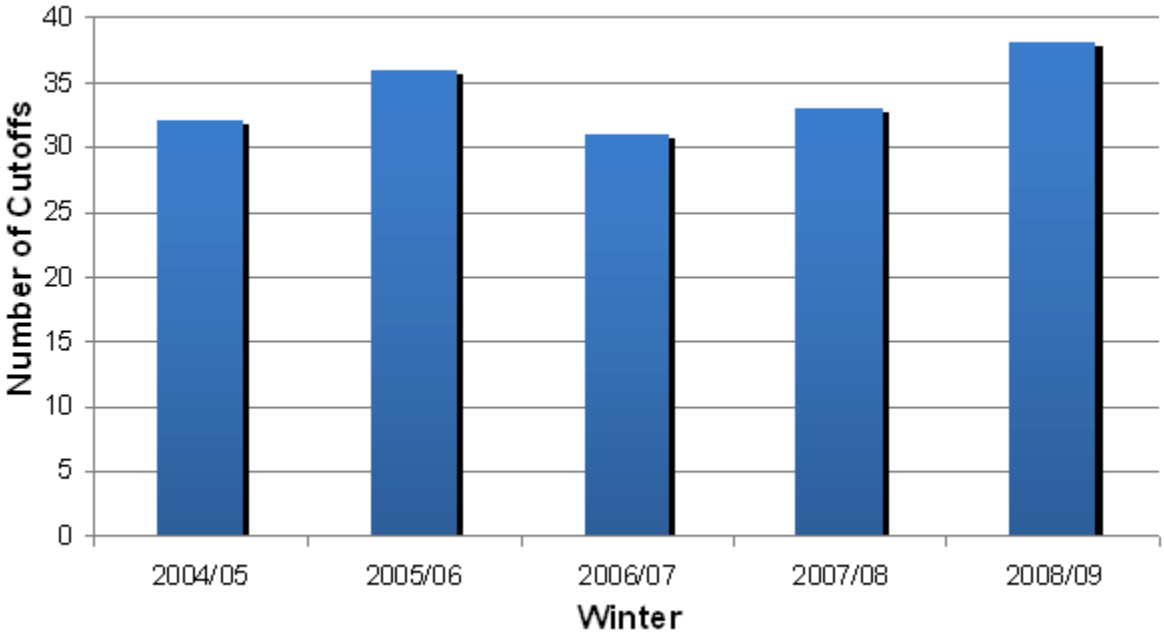


Figure 1: Interannual variability of cool-season cutoff events for 2004/08–2008/09.

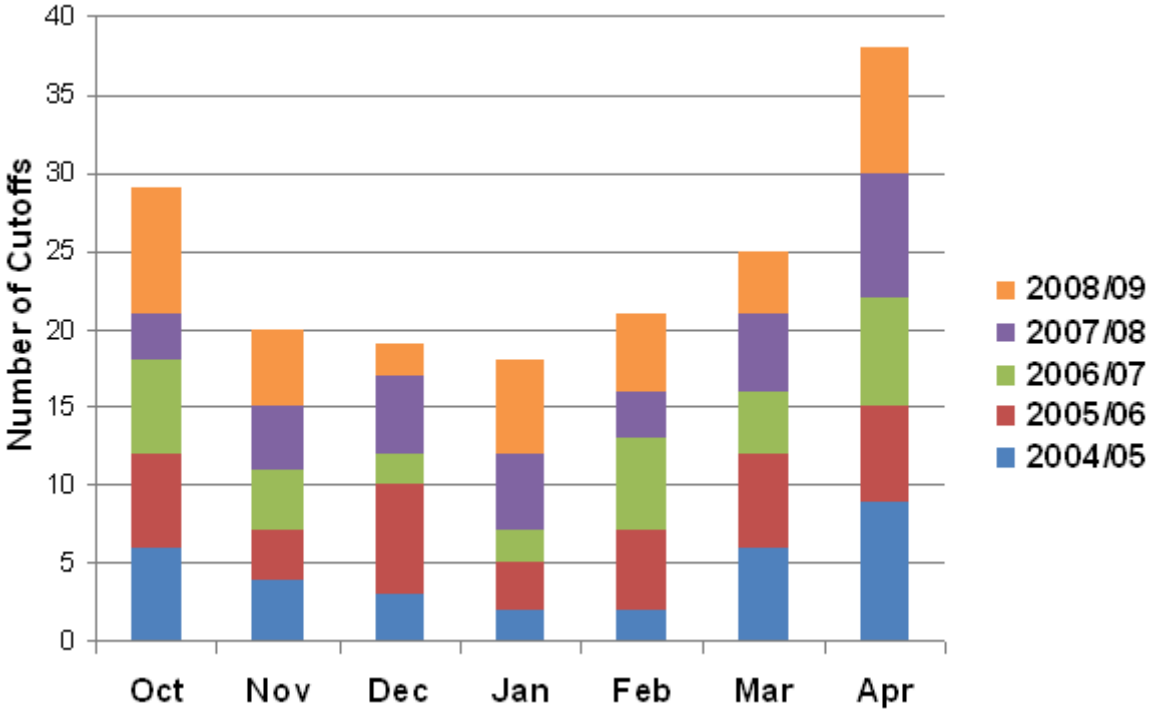


Figure 2: Monthly variability of cool-season cutoff events for 2004/05–2008/09.

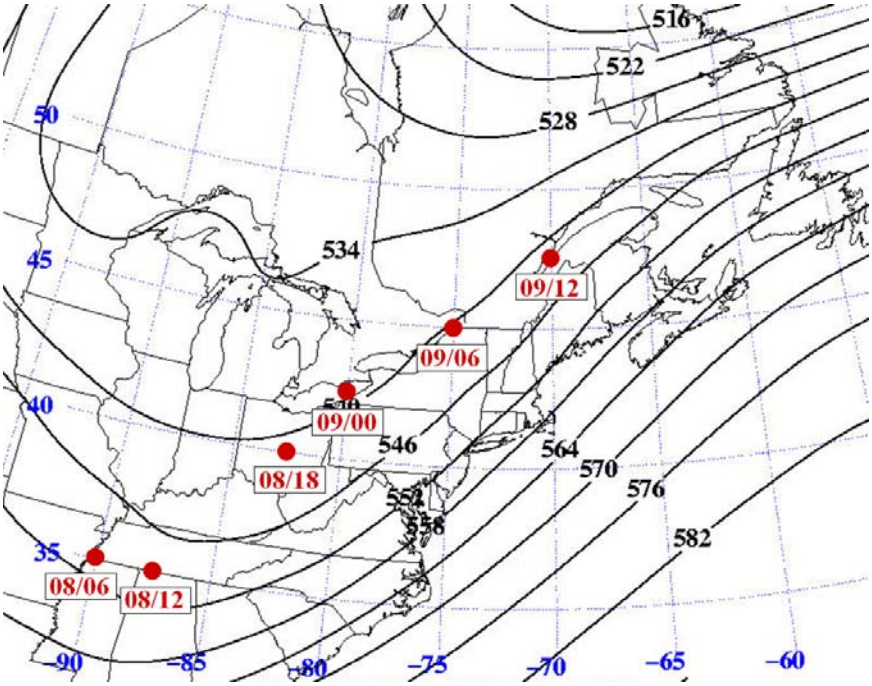


Figure 3: 500 hPa mean geopotential heights (dam, black contours) and 6-h position of the cutoff (red circles) for 0600 UTC 8 March 2008 through 1200 UTC 9 March 2008.

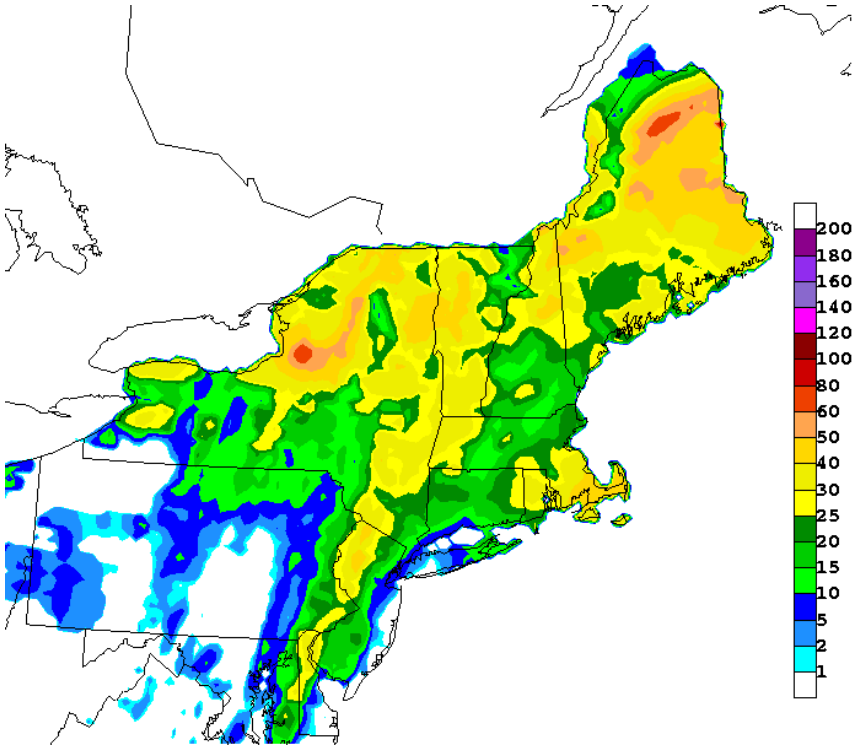


Figure 4: 2-day NPVU QPE for 8–9 March 2008 ending at 1200 UTC on 10 March 2008.

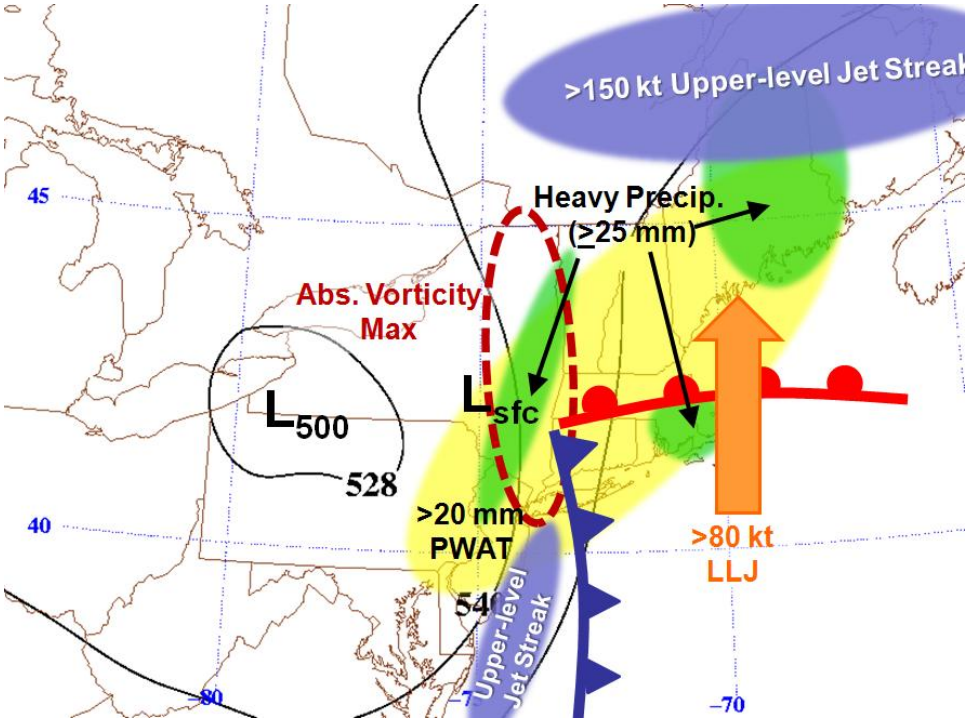


Figure 5: Conceptualized overview of the 8–9 March 2008 cutoff at the time of maximum precipitation (0000 UTC 9 March 2008).

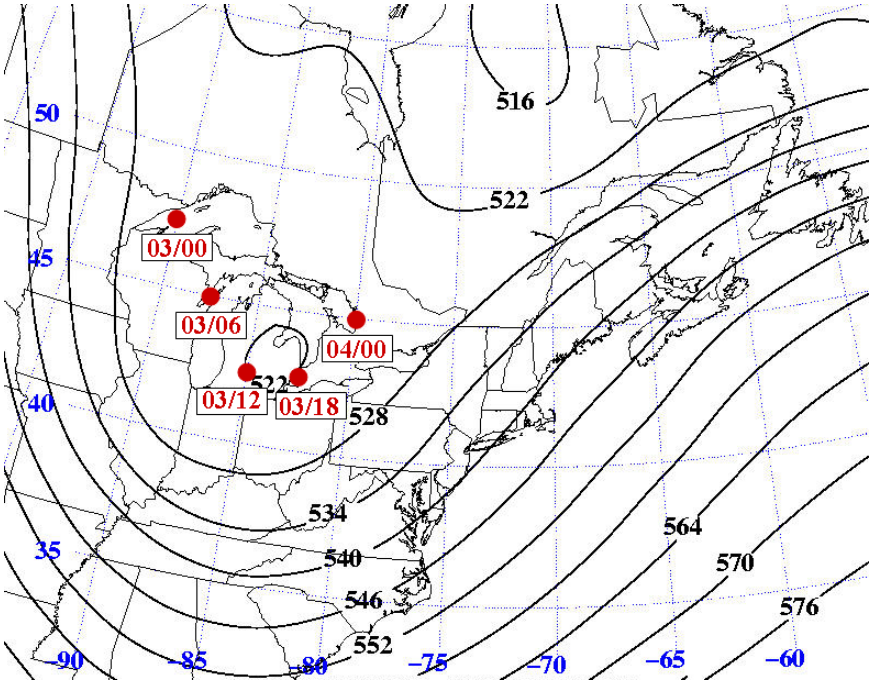


Figure 6: 500 hPa mean geopotential heights (dam, black contours) and 6-h position of the cutoff (red circles) for 0000 UTC 3 February 2009 through 0000 UTC 4 February 2009.

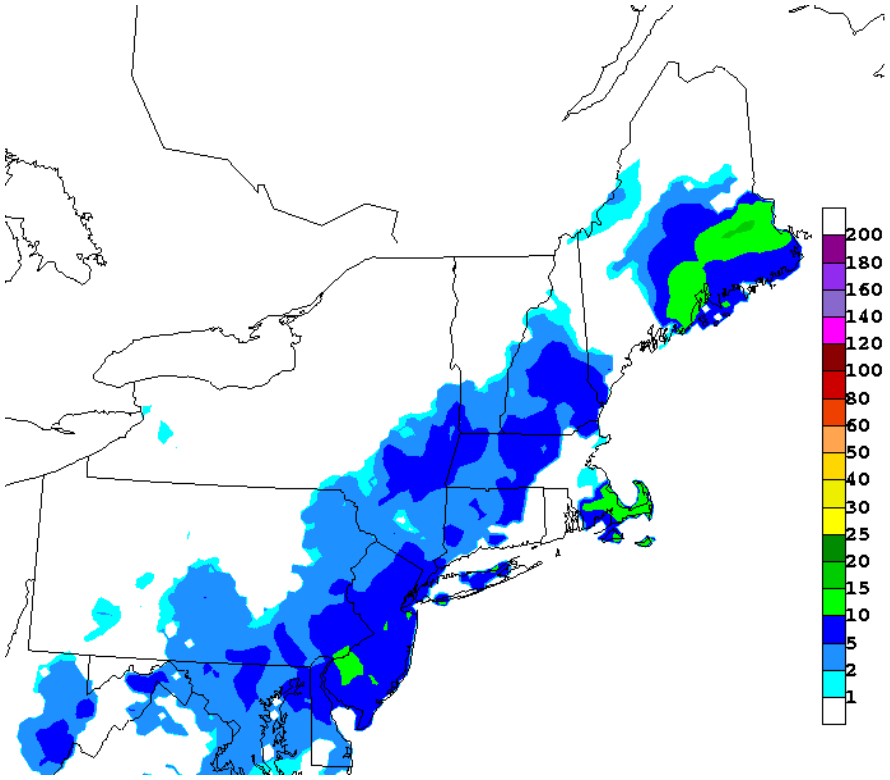


Figure 7: 2-day NPVU QPE for 2–3 February 2009 ending at 1200 UTC on 4 February 2009.

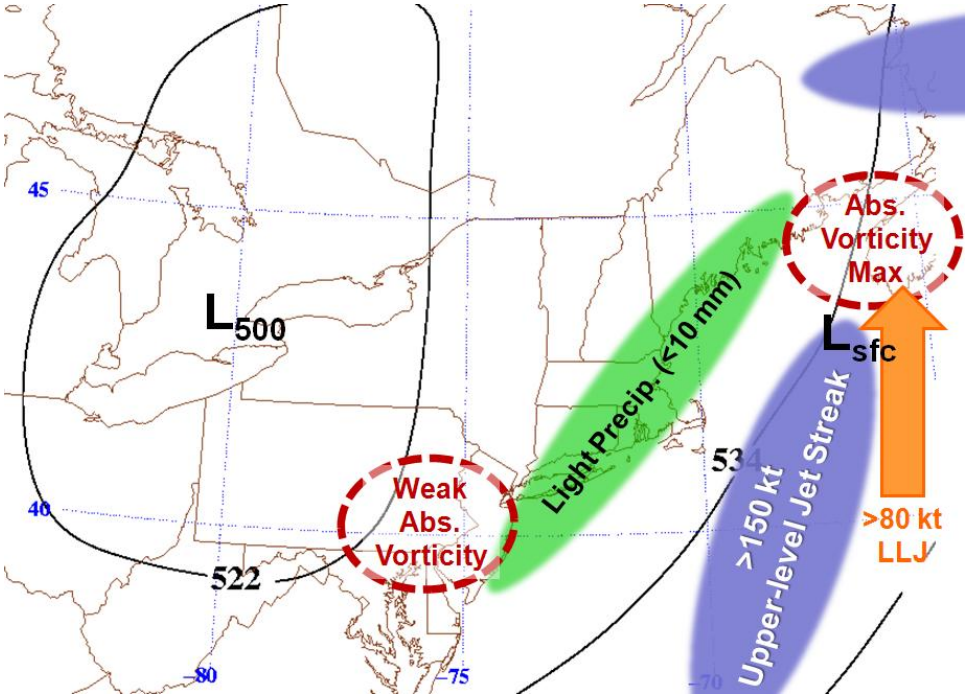


Figure 8: Conceptualized overview of the 2–3 February 2009 cutoff at the time of maximum precipitation (0000 UTC 4 February 2009).

SECTION 2: Cumulative CSTAR Project Publications

a) Theses completed:

Groenert, D., 2002: Large-scale circulation anomaly indices in relation to cool-season precipitation events in the Northeastern United States. Master of Science Thesis, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 144 pp.

Novak, D., 2002: A climatological and composite study of cold season banded precipitation in the Northeast United States. Master of Science Thesis, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 182 pp.

Smith, B. A., 2003: Cutoff cyclones: A global and regional climatology and two case studies. Master of Science Thesis, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 165 pp.

DeLuca, D., 2004: The distribution of precipitation over the northeast accompanying landfalling and transitioning tropical cyclones. Master of Science Thesis, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 178 pp.

Fracasso, A., 2004: Case studies of cold season 500 hPa cutoff cyclone precipitation distribution. Master of Science Thesis, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 121 pp.

Najuch, J. S., 2004: Case studies of warm season cutoff cyclone precipitation distribution. Master of Science Thesis, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 108 pp.

Archambault, H., 2005: Cool-season regime transition and its impact on precipitation in the northeastern United States. Master of Science Thesis, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 163 pp.

Wasula, A. C., 2005: A comprehensive study of cool season tornadoes in the southeast United States. Ph.D. Dissertation, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 222 pp.

Wagner, K. R., 2006: Cool-season moderate precipitation events in the Northeastern United States. Master of Science Thesis, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 134 pp.

Greenstein, M. D., 2006: Mesoscale structure of precipitation regions in northeast winter storms. Master of Science Thesis, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 128 pp.

Cote, M. R., 2007: Predecessor rain events in advance of tropical cyclones. Master of Science Thesis, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 200 pp.

Klein, J. R., 2007: Mesoscale precipitation structures accompanying landfalling and transitioning tropical cyclones in the Northeast United States. Master of Science Thesis, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 155 pp.

Wilson, P. H., 2008: Warm-season lake-/sea-breeze severe weather in the Northeast. Master of Science Thesis, Department of Earth and Atmospheric Sciences, University at Albany/SUNY, Albany, NY, 115 pp.

Scalora, M. A., 2009: Forecasting distributions of warm-season precipitation associated with 500-hPa cutoff cyclones. Master of Science Thesis, Department of Atmospheric and Environmental Sciences, University at Albany/SUNY, Albany, NY, 186 pp.

b) Preprints:

Groenert, D., L. F. Bosart, D. Keyser, and R. H. Grumm, 2002: Large-scale circulation anomaly indices in relation to cool-season precipitation events in the northeastern United States. Preprints, 19th Conference on Weather Analysis and Forecasting, American Meteorological Society, 12-16 August 2002, San Antonio, TX, pp 168–171.

Grumm, R. H., N. W. Junker, R. Hart, and L. F. Bosart, 2002: Can possible heavy rainfall events be identified by comparing various parameters to the climatological norms? Preprints, 19th Conference on Weather Analysis and Forecasting, American Meteorological Society, 12-16 August 2002, San Antonio, TX, pp 160–163.

Junker, N. W., R. Hart, R. H. Grumm, and L. F. Bosart, 2002: Establishing a 10 Year climatology of 101.6 mm (4 inch) rainfall days, Part I. Preprints, 19th Conference on Weather Analysis and Forecasting, American Meteorological Society, 12-16 August 2002, San Antonio, TX, pp 156–159.

Novak, D. R., and R. S. Horwood, 2002: Analysis of mesoscale banded features in the 5–6 February 2001 New England snowstorm. Preprints, 19th Conference on Weather Analysis and Forecasting, American Meteorological Society, 12-16 August 2002, San Antonio, TX, pp J103–J105.

Novak, D. R., L. F. Bosart, D. Keyser, and J. S. Waldstreicher, 2002: A climatological and composite study of cold season banded precipitation in the northeast United States. Preprints, 19th Conference on Weather Analysis and Forecasting, American Meteorological Society, 12-16 August 2002, San Antonio, TX, pp 164–167.

Novak, M. J., L. F. Bosart, D. Keyser, T. A. Wasula, and K. D. LaPenta, 2002: Climatology of warm season 500 hPa cutoff cyclones and a case study diagnosis of 14-17 July 2000. Preprints, 19th Conference on Weather Analysis and Forecasting, American Meteorological Society, 12-16 August 2002, San Antonio, TX, pp 68–71.

Smith, B. A., L. F. Bosart, D. Keyser, and D. St. Jean, 2002: A global 500 hPa cutoff cyclone climatology: 1953-1999. Preprints, 19th Conference on Weather Analysis and Forecasting, American Meteorological Society, 12-16 August 2002, San Antonio, TX, pp 74–77.

Wasula, A. C., L. F. Bosart, R. Schneider, S. J. Weiss, and R. H. Johns, 2003: Mesoscale aspects of the rapid intensification of a tornadic squall line across central Florida: 22-23 February 1998. Preprint CD-ROM, 10th Conference on Mesoscale Processes, American Meteorological Society, 23-27 June 2003, Portland, OR.

Bosart, L. F., W. Drag, and A. C. Wasula, 2003: The unusually intense coastal front passage of 17-18 April 2002 in eastern New England. Preprints, Fifth Conference on Coastal Atmospheric and Oceanic Prediction and Processes, American Meteorological Society, 6-12 August 2003, Seattle, WA, pp 169–174.

Novak, D. R., J. S. Waldstreicher, L. F. Bosart, and D. Keyser, 2003: An observational study of cold season mesoscale band formation in the Northeast United States. Preprints, 31st Conference on Radar Meteorology, American Meteorological Society, 6-12 August 2003, Seattle, WA, pp 969–972.

Archambault, H. M., L. F. Bosart, D. Keyser, and R. Grumm, 2004: Large scale regime transition and its relationship to significant cool season precipitation events in the Northeast. Preprint CD-ROM, 20th Conference on Weather Analysis and Forecasting, 11-15 January 2004, Seattle, WA.

DeLuca, D. P., L. F. Bosart, D. Keyser, and D. R. Vallee, 2004: The distribution of precipitation over the Northeast accompanying landfalling and transitioning tropical cyclones. Preprint CD-ROM, 20th Conference on Weather Analysis and Forecasting, 11-15 January 2004, Seattle, WA.

Fracasso, A. R., 2004: Cold season 500 hPa cutoff cyclone precipitation distribution and a case study. Preprint CD-ROM, 20th Conference on Weather Analysis and Forecasting, 11-15 January 2004, Seattle, WA.

Junker, N. W., R. H. Grumm, R. Hart, and L. F. Bosart, 2004: A climatological study of 100 mm or greater days in northern California. Preprint CD-ROM, 20th Conference on Weather Analysis and Forecasting, 11-15 January 2004, Seattle, WA.

Najuch, J. S., L. F. Bosart, D. Keyser, T. Wasula, and K. D. LaPenta, 2004: Case studies of warm season cutoff cyclone precipitation distribution. Preprint CD-ROM, 20th Conference on Weather Analysis and Forecasting, 11-15 January 2004, Seattle, WA.

Novak, D. R., J. S. Waldstreicher, L. F. Bosart, and D. Keyser, 2004: A forecast strategy for anticipating cold season mesoscale band formation within developing extratropical cyclones. Preprint CD-ROM, 20th Conference on Weather Analysis and Forecasting, 11-15 January 2004, Seattle, WA.

St. Jean, D. P., P. A. Sisson, L. F. Bosart, D. Keyser, and B. Smith, 2004: Characteristics of upslope snowfall events in Northern New York State and Northern Vermont: Diagnostics and model simulations of several Northwest-flow cases. Preprint CD-ROM, 20th Conference on Weather Analysis and Forecasting, 11-15 January 2004, Seattle, WA.

Wasula, T. A., A. C. Wasula, and L. F. Bosart, 2004: A multi-scale analysis of the end of the millennium snowstorm. Preprint CD-ROM, 20th Conference on Weather Analysis and Forecasting, 11-15 January 2004, Seattle, WA.

Wasula, A. C., L. F. Bosart, R Schneider, S. J. Weiss, and R. H. Johns, 2004: Cool season tornadoes in the southeast United States: A climatological and case study perspective. Preprint CD-ROM, 20th Conference on Weather Analysis and Forecasting, 11-15 January 2004, Seattle, WA.

Bosart, L. F., K. LaPenta, A. Seimon, M. Dickinson, and T. J. Galarneau, Jr., 2004: Terrain-influenced tornadogenesis in the northeastern United States. Preprint CD-ROM, 11th Conference on Mountain Meteorology, 21-25 June 2004, Bartlett, NH.

Sisson, P. A., D. St. Jean, E. Evenson, W. E. Murray, S. F. Hogan, L. F. Bosart, D. Keyser, and B. Smith, 2004: Applying local research to National Weather Service operations: Forecasting heavy mountain snowfalls in Vermont and Northern New York. Preprint CD-ROM, 11th Conference on Mountain Meteorology, 21-25 June 2004, Bartlett, NH.

Bosart, L. F., K. D. LaPenta, A. Seimon, and M. J. Dickinson, 2004: Terrain-influenced tornadogenesis in the northeastern United States: An examination of the 29 May 1995 Great Barrington, Massachusetts, Tornado. Preprint CD-ROM, 22nd Conference on Severe Local Storms, 4-8 October 2004, Hyannis, MA.

LaPenta, K. D., L. F. Bosart, T. J. Galarneau, Jr., and M. J. Dickinson, 2004: A multiscale examination of the 31 May 1998 Mechanicville, New York, Tornado. Preprint CD-ROM, 22nd Conference on Severe Local Storms, 4-8 October 2004, Hyannis, MA.

Novak, D., and A. Aiyyer, 2004: The 2004 April fool's New England flooding event: Analysis of three heavy precipitation episodes associated with a slow moving cutoff cyclone. Preprint CD-ROM, 22nd Conference on Severe Local Storms, 4-8 October 2004, Hyannis, MA.

Seimon A., and L. F. Bosart, 2004: An observationally based hypothesis for significant tornadogenesis in mountain environments. Preprint CD-ROM, 22nd Conference on Severe Local Storms, 4-8 October 2004, Hyannis, MA.

Wasula, A. C., L. F. Bosart, R Schneider, S. J. Weiss, R. H. Johns, G. S. Manikin, and P. Welch, 2004: The structure and climatology of boundary layer winds in the southeast United States and its relationship to nocturnal tornado episodes. Preprint CD-ROM, 22nd Conference on Severe Local Storms, 4-8 October 2004, Hyannis, MA.

Archambault, H. M., D. Keyser, L. F. Bosart, and A. Aiyyer, 2004: Cool-season regime transition and its impact on precipitation in the northeast United States. Preprint, The First THORPEX International Science Symposium, 6-10 December, Montréal, Québec, Canada.

Wasula, T. A., P. H. Wilson, L. F. Bosart, D. Keyser, and R. L. Tracey, 2008: A comparison of two lake breeze severe events with a threat checklist application. Preprint CD-ROM, 24th Conference on Severe Local Storms, 27-31 October 2008, Savannah, GA.

Wasula, T. A., N. A. Stuart, and A. C. Wasula, 2008: The 17 February 2006 severe weather and high wind event across Eastern New York and New England. Preprint CD-ROM, 24th Conference on Severe Local Storms, 27-31 October 2008, Savannah, GA.

c) PI and/or student presentations:

Bosart, L. F., 2001: Scientific and operational lessons from the 25 Jan ‘00 and 30 Dec ‘00 snowstorms. Oral presentation at the 26th Annual Northeastern Storm Conference, 9-11 March 2001, Saratoga Springs, NY.

Bosart, L. F., 2001: An overview of derechos and their environments. Oral presentation at the CSTAR Conference and Albany Weather Forecasting Office Spring Meeting, 25-26 April 2001, Albany, NY.

Bosart, L. F., 2001: Death by 1000 Cuts? Oral presentation at the Third Northeast Regional Operational Workshop, 6-7 November 2001, Albany, NY.

Groenert, D., L. F. Bosart, D. Keyser, and R. Grumm, 2001: Large-scale circulation anomaly indices in relation to cool-season precipitation events in the northeastern United States. Oral presentation at the Third Northeast Regional Operational Workshop, 6-7 November 2001, Albany, NY.

Novak, D., L. F. Bosart, D. Keyser, and J. Waldstreicher, 2001: A climatology of cold season banded precipitation in the northeast United States. Oral presentation at the Third Northeast Regional Operational Workshop, 6-7 November 2001, Albany, NY.

Smith, B. A., L. F. Bosart, D. Keyser, and D. St. Jean, 2001: A climatology of 500 hPa cutoff cyclones. Oral presentation at the Third Northeast Regional Operational Workshop, 6-7 November 2001, Albany, NY.

Bosart, L. F., 2002: Dynamic tropopause and PV maps: A user's guide. Oral presentation at the 27th Annual Northeastern Storm Conference, 8-10 March 2002, Saratoga Springs, NY.

Groenert, D., L. F. Bosart, and D. Keyser, 2002: Large-scale circulation anomaly indices in relation to cool-season precipitation events in the northeastern United States. Oral presentation at the 27th Annual Northeastern Storm Conference, 8-10 March 2002, Saratoga Springs, NY.

Novak, D., L. F. Bosart, D. Keyser, and J. Waldstreicher 2002: A climatological and composite study of cold season banded precipitation in the northeast United States. Oral presentation at the 27th Annual Northeastern Storm Conference, 8-10 March 2002, Saratoga Springs, NY.

Bosart, L. F., 2002: Mesoscale boundaries, organized deep convection and forecast derailments. Oral presentation at the Northeast Regional Operational Workshop, 5 November 2002, Albany, NY.

Novak, D., J. Waldstreicher, L. F. Bosart, and D. Keyser, 2002: Anticipating mesoscale band formation in winter storms. Oral presentation at the Northeast Regional Operational Workshop, 5 November 2002, Albany, NY.

Novak, M. J., L. F. Bosart, D. Keyser, T. A. Wasula, and K. D. LaPenta, 2002: A climatology of warm season 500 hPa cutoff cyclones and case study. Oral presentation at the Northeast Regional Operational Workshop, 5 November 2002, Albany, NY.

Smith, B. A., L. F. Bosart, D. Keyser, and D. St. Jean, 2002: Cutoff cyclones: A global and regional climatology (1948–2001) and two case studies. Oral presentation at the Northeast Regional Operational Workshop, 5 November 2002, Albany, NY.

Atallah, E. H., and L. F. Bosart, 2003: Tropical cyclone extratropical transition evolutions: Forecast vs. observed. Oral presentation at the 28th Annual Northeastern Storm Conference, 7-9 March 2003, Saratoga Springs, NY.

Atallah, E. H., A. Aiyyer, and L. F. Bosart, 2003: Teleconnections, 1000-500 hPa thickness and storm tracks in the Northern Hemisphere. Oral presentation at the 28th Annual Northeastern Storm Conference, 7-9 March 2003, Saratoga Springs, NY.

Brewster, J., and M. Evans, 2003: Forecasting the Christmas Day 2002 Snowstorm using modernized National Weather Service tools, training and technology. Oral presentation at the 28th Annual Northeastern Storm Conference, 7-9 March 2003, Saratoga Springs, NY.

Bosart, L. F., and M. J. Dickinson, 2003: The double transition of Hurricane Michael (2000): Baroclinic to tropical to baroclinic. Oral presentation at the 28th Annual Northeastern Storm Conference, 7-9 March 2003, Saratoga Springs, NY.

Novak, M. J., A. Aiyyer, L. F. Bosart, D. Keyser, T. A. Wasula, and K. D. LaPenta, 2003: Climatology of warm season 500 hPa cutoff cyclones and case study diagnosis of 14–17 July 2000. Oral presentation at the 28th Annual Northeastern Storm Conference, 7-9 March 2003, Saratoga Springs, NY.

Smith, B. A., L. F. Bosart, D. Keyser, and D. St. Jean, 2003: Cutoff cyclones: A global and regional climatology (1948–2001) and two case studies. Oral presentation at the 28th Annual Northeastern Storm Conference, 7-9 March 2003, Saratoga Springs, NY.

Archambault, H. M., 2003: Large-scale regime transition and its relationship to significant cool season precipitation events in the Northeast. Oral presentation at the NWS/UAlbany/NCSU CSTAR Workshop, 9-10 July 2003, Silver Spring, MD.

DeLuca, D. P., L. F. Bosart, D. Keyser, and D. Vallee, 2003: The distribution of precipitation over the Northeast accompanying landfalling and transitioning tropical cyclones. Oral presentation at the NWS/UAlbany/NCSU CSTAR Workshop, 9-10 July 2003, Silver Spring, MD.

Fracasso, A., A. Aiyyer, L. F. Bosart, D. Keyser, and M. Evans, 2003: Case studies of cold season cutoff cyclone precipitation distribution. Oral presentation at the NWS/UAlbany/NCSU CSTAR Workshop, 9-10 July 2003, Silver Spring, MD.

Najuch, J. S., A. Aiyyer, L. F. Bosart, D. Keyser, T. A. Wasula, and K. D. LaPenta, 2003: Case studies of warm season cutoff cyclone precipitation distribution. Oral presentation at the NWS/UAlbany/NCSU CSTAR Workshop, 9-10 July 2003, Silver Spring, MD.

Novak, M. J., A. Aiyyer, L. F. Bosart, D. Keyser, T. A. Wasula, and K. D. LaPenta, 2003: Climatology of warm season 500 hPa cutoff cyclones and case study. Oral presentation at the NWS/UAlbany/NCSU CSTAR Workshop, 9-10 July 2003, Silver Spring, MD.

Novak, D., J. Waldstreicher, L. F. Bosart, and D. Keyser, 2003: Anticipating mesoscale band formation in Winter storms using radar and model guidance. Invited speaker at the 28th Annual National Weather Association Meeting, 18-23 October 2003, Jacksonville, FL.

Archambault, H. M., L. F. Bosart, D. Keyser, and R. Grumm, 2003: Large-scale regime transition and its relationship to significant cool season precipitation events in the Northeast. Oral presentation at the Northeast Regional Operational Workshop, Albany, NY, 4-5 November 2003.

Bosart, L. F., W. Drag, and A. C. Wasula, 2003: The unusually intense coastal front passage of 17-18 April 2002 in Eastern New England. Oral presentation at the Northeast Regional Operational Workshop, Albany, NY, 4-5 November 2003.

DeLuca, D. P., L. F. Bosart, D. Keyser, and D. R. Vallee, 2003: The distribution of precipitation over the northeast accompanying landfalling and transitioning tropical cyclones. Oral

presentation at the Northeast Regional Operational Workshop, Albany, NY, 4-5 November 2003.

Fracasso, A., L. F. Bosart, D. Keyser, and M. Evans, 2003: Cold season 500 hPa cutoff cyclone precipitation distribution and a case study. Oral presentation at the Northeast Regional Operational Workshop, Albany, NY, 4-5 November 2003.

LaPenta, K. D., 2003: The Eastern New York and Western New England F2 Tornado of 21 July. Oral presentation at the Northeast Regional Operational Workshop, Albany, NY, 4-5 November 2003.

Najuch, J. S., L. F. Bosart, D. Keyser, T. A. Wasula, and K. D. LaPenta, 2003: Case studies of warm season cutoff cyclone precipitation distribution. Oral presentation at the Northeast Regional Operational Workshop, Albany, NY, 4-5 November 2003.

Waldstreicher, J. S., 2003: Assessing the impact of collaborative research projects on NWS Warning performance. Oral presentation at the Northeast Regional Operational Workshop, Albany, NY, 4-5 November 2003.

Wasula, A. C., L. F. Bosart, R. Schneider, S. Weiss, and R. Johns, 2003: A study of cool season tornadoes in the Southeast United States. Oral presentation at the Northeast Regional Operational Workshop, Albany, NY, 4-5 November 2003.

Archambault, H. M., L. F. Bosart, and D. Keyser, 2004: Large-scale regime transition and its relationship to significant precipitation events in the Northeast. Oral presentation 29th Annual Northeastern Storm Conference, 12-14 March 2004, Saratoga Springs, NY.

Bosart, L. F., 2004: Coastal fronts, cold air damming, and fronts adjacent to higher terrain. Oral presentation 29th Annual Northeastern Storm Conference, 12-14 March 2004, Saratoga Springs, NY.

Cannon, J., 2004: Environmental flow regimes and heavy rainfall distribution associated with tropical cyclones in the northeast United States. Oral presentation 29th Annual Northeastern Storm Conference, 12-14 March 2004, Saratoga Springs, NY.

DeLuca, D. P., L. F. Bosart, D. Keyser, and D. R. Vallee, 2004: The distribution of precipitation over the Northeast accompanying landfalling and transitioning tropical cyclones. Oral presentation 29th Annual Northeastern Storm Conference, 12-14 March 2004, Saratoga Springs, NY.

Fracasso, A., L. F. Bosart, D. Keyser, and M. Evans, 2004: Cold season 500 hPa cutoff cyclone precipitation distribution and a case study. Oral presentation 29th Annual Northeastern Storm Conference, 12-14 March 2004, Saratoga Springs, NY.

Najuch, J. S., L. F. Bosart, D. Keyser, T. A. Wasula, and K. D. LaPenta, 2004: Case studies of warm season cutoff cyclone precipitation distribution. Oral presentation 29th Annual Northeastern Storm Conference, 12-14 March 2004, Saratoga Springs, NY.

Sisson, P. A., D. St. Jean, E. Evenson, W. E. Murray, S. F. Hogan, L. F. Bosart, D. Keyser, and B. Smith, 2004: Application of local research results to National Weather Service Operational Forecast Challenges – A success story forecasting heavy mountain snowfalls in Vermont and Northern New York. Oral presentation 29th Annual Northeastern Storm Conference, 12-14 March 2004, Saratoga Springs, NY.

Bosart, L. F., K. D. LaPenta, A. Seimon, and M. J. Dickinson, 2004: Terrain-influenced tornadogenesis in the northeastern United States: An examination of the 29 May 1995 Great Barrington, Massachusetts, Tornado. Oral presentation, 22nd Conference on Severe Local Storms, 4-8 October 2004, Hyannis, MA.

LaPenta, K. D., L. F. Bosart, T. J. Galarneau Jr., and M. J. Dickinson, 2004: A multiscale examination of the 31 May 1998 Mechanicville, New York, Tornado. Oral presentation, 22nd Conference on Severe Local Storms, 4-8 October 2004, Hyannis, MA.

Seimon A., and L. F. Bosart, 2004: An observationally based hypothesis for significant tornadogenesis in mountain environments. Oral presentation, 22nd Conference on Severe Local Storms, 4-8 October 2004, Hyannis, MA.

Wasula, A. C., L. F. Bosart, R Schneider, S. J. Weiss, R. H. Johns, G. S. Manikin, and P. Welch, 2004: The structure and climatology of boundary layer winds in the southeast United States and its relationship to nocturnal tornado episodes. Oral presentation, 22nd Conference on Severe Local Storms, 4-8 October 2004, Hyannis, MA.

Archambault, H. M., L. F. Bosart, D. Keyser, A. Aiyyer, and R. Grumm, 2004: Cool-season regime transition and its impact on precipitation in the northeast. Oral presentation at the Sixth Northeast Regional Operational Workshop (NROW), 2-3 November 2004, Albany, NY

Bosart, L. F., 2004: A long-lived intense continental-scale front: 28 February-4 March 1972. Oral presentation at the Sixth Northeast Regional Operational Workshop (NROW), 2-3 November 2004, Albany, NY.

Fracasso, A., L. F. Bosart, and D. Keyser, 2004: Cool season 500 hPa cutoff cyclones: Precipitation distribution and a case study. Oral presentation at the Sixth Northeast Regional Operational Workshop (NROW), 2-3 November 2004, Albany, NY.

Novak, D., B. Colle, and D. Keyser, 2004: High-resolution simulations of the 25 December 2002 banded snowstorm using Eta, MM5, and WRF. Oral presentation at the Sixth Northeast Regional Operational Workshop (NROW), 2-3 November 2004, Albany, NY.

Runyon, S. C., and L. F. Bosart, 2004: A statistical and synoptic climatological analysis of U.S. heat waves. Oral presentation at the Sixth Northeast Regional Operational Workshop (NROW), 2-3 November 2004, Albany, NY.

Wagner, K., L. F. Bosart, and D. Keyser, 2004: Cyclogenesis and upper-level jet streaks and their influence on the low-level Jet. Oral presentation at the Sixth Northeast Regional Operational Workshop (NROW), 2-3 November 2004, Albany, NY.

Wasula, A. C., L. F. Bosart, R. S. Schneider, S. Weiss, R. H. Johns, G. S. Manikin, and P. Welsh, 2004: The structure and climatology of boundary layer winds in the southeast United States and its relationship to nocturnal tornado episodes. Oral presentation at the Sixth Northeast Regional Operational Workshop (NROW), 2-3 November 2004, Albany, NY.

Bosart, L. F., W. Drag, and A. Wasula, 2004: Backdoor and sidedoor cold fronts: A continual forecast challenge. Invited presenter, 5th Southern New England Weather Conference, 6 November 2004, Brookline, MA.

Archambault, H. M., L. F. Bosart, D. Keyser, A. Aiyyer, and R. Grumm, 2005: Cool-season regime transition and its impact on precipitation in the northeast. Oral presentation at the 30th Annual Northeastern Storm Conference, 18-20 March 2005, Burlington, VT.

Runyon, S. C., and L. F. Bosart, 2005: A statistical analysis and synoptic climatology of heat waves over the United States. Oral presentation at the 30th Annual Northeastern Storm Conference, 18-20 March 2005, Burlington, VT.

Wagner, K., L. F. Bosart, and D. Keyser, 2005: Moderate precipitation events in the Northeastern United States. Oral presentation at the 30th Annual Northeastern Storm Conference, 18-20 March 2005, Burlington, VT.

Archambault, H. M., L. F. Bosart, D. Keyser, A. Aiyyer and R. H. Grumm, 2005: Cool-season regime transition and its impact on precipitation in the Northeast. Oral presentation, 21st Conference on Weather Analysis and Forecasting/17th Conference on Numerical Weather Prediction, American Meteorological Society, 1-5 August 2005, Washington, DC.

Greenstein, M. D., L. F. Bosart, D. Keyser, and D. J. Nicosia, 2005: Examining the role of mesoscale features in the structure and evolution of precipitation regions in northeast winter storms. Poster presentation, 21st Conference on Weather Analysis and

Forecasting/17th Conference on Numerical Weather Prediction, American Meteorological Society, 1-5 August 2005, Washington, DC.

Junker, N., R. Grumm, R. Hart, L. F. Bosart, K. M. Bell and F. J. Pereira, 2005: Forecasting extreme wintertime precipitation events in northern California. Oral presentation, 21st Conference on Weather Analysis and Forecasting/17th Conference on Numerical Weather Prediction, American Meteorological Society, 1-5 August 2005, Washington, DC.

Novak, D. R., B. A. Colle, and D. Keyser, 2005: High-resolution modeling of the 25 December 2002 Northeast U.S. banded snowstorm. Oral presentation, 21st Conference on Weather Analysis and Forecasting/17th Conference on Numerical Weather Prediction, American Meteorological Society, 1-5 August 2005, Washington, DC.

Runyon, S. C., and L. F. Bosart, 2005: A Statistical analysis and synoptic climatology of heat waves over the United States. Oral presentation, 21st Conference on Weather Analysis and Forecasting/17th Conference on Numerical Weather Prediction, American Meteorological Society, 1-5 August 2005, Washington, DC.

Wagner, K. R., L. F. Bosart, D. Keyser, and M. S. Evans, 2005: Cool-season moderate precipitation events in the Northeastern United States. Poster presentation, 21st Conference on Weather Analysis and Forecasting/17th Conference on Numerical Weather Prediction, American Meteorological Society, 1-5 August 2005, Washington, DC.

Archambault, H., L. F. Bosart, D. Keyser and R. Grumm, 2005: Cool-season regime transition and its impact on precipitation in the Northeast. Poster presentation, NOAA 30th Annual Climate Diagnostics and Prediction Workshop, 24-28 October 2005, University Park, PA.

Archambault, H., L. F. Bosart, D. Keyser and R. Grumm, 2005: Cool-season regime transition and its impact on precipitation in the Northeastern United States. Oral presentation, The 6th Southern New England Weather Conference, 5 November 2005, Brookline, MA.

Archambault, H., L. F. Bosart, D. Keyser and R. Grumm, 2005: Cool-season regime transition and its impact on precipitation in the Northeast. Oral presentation at the Seventh Northeast Regional Operational Workshop (NROW), 1-2 November 2005, Albany, NY.

Novak, D., B. Colle, and D. Keyser, 2005: An investigation of model-simulated band placement and evolution in the 25 December 2002 Northeast U.S. Banded Snowstorm. Oral presentation at the Seventh Northeast Regional Operational Workshop (NROW), 1-2 November 2005, Albany, NY.

Greenstein, M. D., L. F. Bosart, D. Keyser, and D. J. Nicosia, 2005: Examining the role of mesoscale features in the structure and evolution of precipitation regions in northeast winter storms. Oral presentation at the Seventh Northeast Regional Operational Workshop (NROW), 1-2 November 2005, Albany, NY.

Wagner, K., L. F. Bosart, D. Keyser, and M. S. Evans, 2005: Cool-season moderate precipitation events in the Northeastern United States. Oral presentation at the Seventh Northeast Regional Operational Workshop (NROW), 1-2 November 2005, Albany, NY.

Runyon, S. C., and L. F. Bosart, 2005: A statistical analysis and synoptic climatology of heat waves over the Northeast United States. Oral presentation at the Seventh Northeast Regional Operational Workshop (NROW), 1-2 November 2005, Albany, NY.

Wasula, A. C., 2005: A multiscale snalysis of the 23-24 November 2004 Southeast United States tornado outbreak. Oral presentation at the Seventh Northeast Regional Operational Workshop (NROW), 1-2 November 2005, Albany, NY.

Archambault, H., L. F. Bosart, D. Keyser, A. Aiyyer, and R. Grumm, 2006: Cool-season regime transition and its impact on precipitation in the Northeast. Oral presentation 31st Annual Northeastern Storm Conference, 10-12 March 2006, Saratoga Springs, NY.

Bosart, L. F., 2006: The small-scale New England coastal bomb of 9 December 2005: A near-miss Hurricane Zeta? Oral presentation 31st Annual Northeastern Storm Conference, 10-12 March 2006, Saratoga Springs, NY.

Greenstein, M. D., L. F. Bosart, D. Keyser, and D. J. Nicosia, 2006: Mesoscale structure of precipitation regions in northeast winter storms. Oral presentation 31st Annual Northeastern Storm Conference, 10-12 March 2006, Saratoga Springs, NY.

Wagner, K., L. F. Bosart, and D. Keyser, 2006: Cool-season moderate precipitation events in the Northeastern United States. Oral presentation 31st Annual Northeastern Storm Conference, 10-12 March 2006, Saratoga Springs, NY.

Wasula, A. C., 2006: The diurnal variation of synoptic scale structure of cool season tornado episodes in the Southeast United States. Oral presentation 31st Annual Northeastern Storm Conference, 10-12 March 2006, Saratoga Springs, NY.

Wasula, T. A., 2006: The Thanksgiving 2004 severe weather event across upstate New York and New England. Oral presentation 31st Annual Northeastern Storm Conference, 10-12 March 2006, Saratoga Springs, NY.

Bosart, L. F. (with contributions from A. Wasula, W. Drag, and K. Meier), 2006: Strong surface fronts over sloping terrain and coastal plains. Oral presentation, St. Louis (LSX) National Weather Service Forecast Office, 15 March 2006, St. Louis, MO.

Bosart, L. F, 2006: Modern weather forecasting: A scientific and operational perspective. Guest speaker, Eastern Region MIC Conference, 28 March 2006, Raleigh, NC.

Archambault, H. M., D. Keyser, and L. F. Bosart, 2006: Cool-season regime transition and its impact on northeast precipitation. Seminar (presented by D. Keyser), Program in Atmospheres, Oceans, and Climate, Massachusetts Institute of Technology, 8 May 2006, Cambridge, MA.

Archambault, H. M., D. Keyser, and L. F. Bosart, 2006: Cool-season regime transition and its impact on major northeast precipitation events. Oral presentation, Second Annual Eastern US Weather Conference, 8 July 2006, Baltimore, MD.

Archambault, H. M., D. Keyser, L. F. Bosart, and A. Aiyyer, 2006: Cool-season regime transition and its impact on Northeast precipitation. Seminar (presented by H. Archambault), NCEP/Climate Prediction Center, 6 September 2006, Camp Springs, MD.

Grumm, R., and L. F. Bosart, 2006: Model jumpiness and the need for ensembles. Oral presentation, 31st Annual Meeting, National Weather Association, 14-19 October 2006, Cleveland, OH.

Cote, M. R., L. F. Bosart, D. Keyser, and M. L. Jurewicz, Sr., 2006: Heavy rainfall events preceding the arrival of tropical cyclones. Oral presentation at the Eighth Northeast Regional Operational Workshop (NROW), 1-2 November 2006, Albany, NY.

Wilson, P., L. F. Bosart, D. Keyser, and T. Wasula, 2006: Warm-season lake-/sea-breeze severe weather in the Northeast. Oral presentation at the Eighth Northeast Regional Operational Workshop (NROW), 1-2 November 2006, Albany, NY.

Klein, J. R., L. F. Bosart, D. Keyser, and D. Vallee, 2006: Mesoscale precipitation structures accompanying landfalling and transitioning tropical cyclones in the northeast United States. Oral presentation at the Eighth Northeast Regional Operational Workshop (NROW), 1-2 November 2006, Albany, NY.

Cote, M. R., L. F. Bosart, D. Keyser, and M. L. Jurewicz, Sr., 2007: Heavy rainfall events preceding the arrival of tropical cyclones. Oral presentation, 32nd Annual Northeastern Storm Conference, 9-11 March 2007, Springfield, MA.

Klein, J. R., L. F. Bosart, D. Keyser, and D. Vallee, 2007: Mesoscale precipitation structures accompanying landfalling and transitioning tropical cyclones in the Northeast United States. Oral presentation, 32nd Annual Northeastern Storm Conference, 9-11 March 2007, Springfield, MA.

Wilson, P., L. F. Bosart, D. Keyser, and T. A. Wasula, 2007: Warm-season lake-/sea-breeze severe weather in the Northeast. Oral presentation, 32nd Annual Northeastern Storm Conference, 9-11 March 2007, Springfield, MA.

Cote, M. R., L. F. Bosart, D. Keyser, and M. L. Jurewicz, Sr., 2007: Heavy rainfall events preceding the arrival of tropical cyclones. Oral presentation, National Weather Service Spring Workshop, Binghamton, NY, 27 March 2007, Binghamton, NY.

Klein, J. R., L. F. Bosart, D. Keyser and D. Vallee, 2007: Mesoscale precipitation structures accompanying landfalling and transitioning tropical cyclones in the Northeast United States. Oral presentation, 22nd Conference on Weather Analysis and Forecasting/18th Conference on Numerical Weather Prediction, American Meteorological Society, 25-29 June 2007 Park City, UT.

Cote, M. R., L. F. Bosart, D. Keyser, and M. L. Jurewicz Sr., 2007: Heavy rainfall events preceding the arrival of Tropical Cyclones. Oral presentation, 22nd Conference on Weather Analysis and Forecasting/18th Conference on Numerical Weather Prediction, American Meteorological Society, 25-29 June 2007 Park City, UT.

Wilson, P., L. F. Bosart, D. Keyser, and T. Wasula, 2007: Warm-season lake-/sea-breeze severe Weather in the Northeast. Oral presentation, 22nd Conference on Weather Analysis and Forecasting/18th Conference on Numerical Weather Prediction, American Meteorological Society, 25-29 June 2007 Park City, UT.

Cote, M. R., L. F. Bosart, D. Keyser, and M. L. Jurewicz, 2007: Predecessor rain events in tropical cyclones. Oral presentation, 12th Conf. on Mesoscale Processes, American Meteorological Society, 9 August 2007, Waterville Valley, NH.

Klein, J. R., L. F. Bosart, D. Keyser, and D. Vallee, 2007: Mesoscale precipitation structures accompanying landfalling and transitioning tropical cyclones in the Northeast United States. Oral presentation, 12th Conf. on Mesoscale Processes, American Meteorological Society, 9 August 2007, Waterville Valley, NH.

Wilson, P. H., L. F. Bosart, D. Keyser, and T. A. Wasula, 2007: Warm-season lake-/sea-breeze severe weather in the Northeast. Oral presentation at the 32nd Annual National Weather Association Meeting, 13-18 October 2007, Reno, NV.

Bosart, L. F., D. Keyser, S. Weiss, R. Schneider, M. Cote, D. DeLuca, T. Fracasso, J. Klein, and A. C. Wasula, 2007: Lessons learned from CSTAR/COMET-sponsored research on convective storms and heavy rains. Invited speaker at the 32nd Annual National Weather Association Meeting, 13-18 October 2007, Reno, NV.

Wilson, P., L. F. Bosart, D. Keyser, and T. Wasula, 2007: Warm-season lake-/sea-breeze severe weather in the Northeast. Oral presentation at the Ninth Northeast Regional Operational Workshop (NROW), 7-8 November 2007, Albany, NY.

Cote, M. R., L. F. Bosart, D. Keyser, and M. L. Jurewicz, Sr., 2007: Predecessor rain events in tropical cyclones. Oral presentation at the Ninth Northeast Regional Operational Workshop (NROW), 7-8 November 2007, Albany, NY.

Bosart, L. F., D. Keyser, M. R. Cote, J. Klein, and D. DeLuca, 2007: CSTAR tropical cyclone-related research at the University at Albany/SUNY. Invited presentation at the National Centers for Environmental Prediction, 5 December 2007, Washington, DC.

Bosart, L. F., K. Corbosiero, M. R. Cote, and T. J. Galarneau, Jr., 2008: Mesoscale structures within transient synoptic-scale systems: Science and forecast challenges. Invited presentation at the First US-China Symposium on Meteorology: Mesoscale Meteorology and Data Assimilation, 27 February 2008, National Weather Center, Norman, OK.

Bosart, L. F., T. J. Galarneau, Jr., and A. C. Wasula, 2008: Modern weather forecasting: Where do we stand and where do we need to go? Invited presentation, 33rd Annual Northeastern Storm Conference, 14-16 March 2008, Springfield, MA.

Augustyniak, M., and L. F. Bosart, 2008: Flow channeling in the Mohawk and Hudson Valleys: A multiscale case study of surface flow convergence. Oral presentation, 33rd Annual Northeastern Storm Conference, 14-16 March 2008, Springfield, MA.

Bosart, L. F., T. J. Galarneau, Jr., and A. C. Wasula, 2008: Modern weather forecasting: Where do we stand and where do we need to go? Invited presentation, 12th Annual Russell L.

DeSouza Banquet, Department of Earth Sciences, Millersville University, 16 April 2008, Millersville, PA.

Cote, M. R., L. F. Bosart, and D. Keyser, 2008: Predecessor rain events in tropical cyclones. Oral presentation, 28th Conference on Hurricanes and Tropical Meteorology, American Meteorological Society, 27 April - 2 May 2008, Orlando, FL.

Bosart, L. F., and K. Meier, 2008: Front-mountain interactions in the long-lived, intense surface front of 28 February through 4 March 1972 over the United States. Oral Presentation, 13th Conference on Mountain Meteorology, American Meteorological Society, 11-15 August 2008, Whistler, Canada.

Bosart, L. F., M. Cote, T. J. Galarneau, Jr., and A. Srock, 2008: Troublesome precipitation events: A challenge for models and humans alike. Invited seminar, Earth System Research Laboratory, ESRL/PSD Seminar Series, 5 June 2008, Boulder, CO.

Bosart, L. F., J. C. Cordeira, and T. J. Galarneau, Jr., 2008: Modern weather forecasting: A status report and scientific opportunities." Invited seminar at GERT Joint Program in Applied Mathematics and Earth and Environmental Sciences, Columbia University, 9 October 2008, New York, NY.

Keyser, D., H. M. Archambault, and L. F. Bosart, 2008: Relationships between large-scale regime transitions and major cool-season precipitation events in the Northeast U.S. Oral presentation at the 14th Cyclone Workshop, 21-26 September 2008, Hôtel Mont Gabriel, Sainte-Adèle, Quebec, Canada.

Wasula, T. A., P. H. Wilson, L. F. Bosart, D. Keyser, and R. L. Tracey, 2008: A comparison of two lake breeze severe events with a threat checklist application. Poster presentation at the American Meteorological Society 24th Conference on Severe Local Storms, American Meteorological Society, 27-31 October 2008, Savannah, GA.

Wasula, T. A., N. A. Stuart, and A. C. Wasula, 2008: The 17 February 2006 severe weather and high wind event across Eastern New York and New England. Oral presentation at the 24th Conference on Severe Local Storms, American Meteorological Society, 27-31 October 2008, Savannah, GA.

Galarneau, T. J. Jr., and D. Keyser, 2008: Use of the nondivergent wind for diagnosing banded precipitation systems. Oral presentation at the Tenth Northeast Regional Operational Workshop (NROW), 5-6 November 2008, Albany, NY.

Scalora, M. A., L. F. Bosart, D. Keyser, N. A. Stuart, and T. A. Wasula, 2008: A diagnostic analysis of a difficult-to-forecast cutoff cyclone from the 2008 warm season. Oral presentation at the Tenth Northeast Regional Operational Workshop (NROW), 5-6 November 2008, Albany, NY.

Bosart, L. F., 2008: The "spin" on the active part of the 2008 North Atlantic hurricane season: Large-scale storm interations and mesoscale forecast challenges posed by inland flooding. Oral presentation (invited) at the NOAA/AOML/HRD, 15 December 2008, Miami, FL.

Bosart, L. F., 2009: Just how good are weather forecasts these days: Challenges and opportunities. Oral presentation (invited) at the AMS Southeastern Coastal and Atmospheric Processes Symposium (SeCAPS), 27-28 February 2009, Mobile, AL.

Bosart, L. F., T. J. Galarneau, Jr., and J. M. Cordeira, 2009: Storm-storm and storm-environment interations during the 2008 North Atlantic hurricane season. Oral presentation at the 34th Annual Northeastern Storm Conference, 6-8 March 2009, Springfield, MA.

Scalora, M. A., L. F. Bosart, and D. Keyser, 2009: An analysis of a high impact 500-hPa cutoff cyclone from the 2008 warm season. Oral presentation at the 34th Annual Northeastern Storm Conference, 6-8 March 2009, Springfield, MA.

Bosart, L. F., H. M. Archambault, T. J. Galarneau, Jr., and J. M. Cordeira: 2009: Modern weather forecasting: Scientific opportunities and operational challenges. The Robert D. Cess lecture (invited), 1 April 2009, University at Stony Brook, SUNY, Stony Brook, NY.

Galarneau, T. J., Jr., L. F. Bosart, D. Keyser, and R. S. Schumacher, 2009: A review of recent UAlbany CSTAR research on warm-season precipitation systems including predecessor rain events ahead of tropical cyclones. Oral presentation at the 1st NOAA Testbed USWRP Workshop, 28-29 April 2009, Boulder, CO.

Asuma, J. V., L. F. Bosart, and D. Keyser, 2009: Cool-season severe weather in the northeast U.S. Poster presentation at the 23rd Conference on Weather Analysis and Forecasting/19th Conference on Numerical Weather Prediction, 1-5 June 2009, Omaha, NE.

Bosart, L. F., H. Archambault, and J. M. Cordeira, 2009: Linked extreme weather events: Severe cold and record-breaking rains in Mexico and disruptive wildfires in California in late October 2007. Oral presentation at the 23rd Conference on Weather Analysis and Forecasting/19th Conference on Numerical Weather Prediction, 1-5 June 2009, Omaha, NE.

Galarneau, T. J., Jr., L. F. Bosart, and R. S. Schumacher, 2009: The life-cycle of tropical storm Erin (2007): Genesis, postlandfall reintensification, and widespread heavy rain. Oral presentation at the 23rd Conference on Weather Analysis and Forecasting/19th Conference on Numerical Weather Prediction, 1-5 June 2009, Omaha, NE.

Moore, B. J., L. F. Bosart, and D. Keyser, 2009: A predecessor rain event over the Upper Midwest associated with Tropical Cyclone Rita (2005). Poster presentation at the 23rd Conference on Weather Analysis and Forecasting/19th Conference on Numerical Weather Prediction, 1-5 June 2009, Omaha, NE.

Scalora, M. A., L. F. Bosart, and D. Keyser, 2009: An analysis of a high impact 500-hPa cutoff cyclone from the 2008 warm season. Oral presentation at the 23rd Conference on Weather Analysis and Forecasting/19th Conference on Numerical Weather Prediction, 1-5 June 2009, Omaha, NE.

Bosart, L. F., and T. J. Galarneau, Jr., 2009: An overview of predecessor heavy rain events associated with landfalling tropical cyclones. Oral presentation at the Conference on the Inland Impacts of Tropical Cyclones, 10-12 June 2009, Atlanta, GA.

Jurewicz, M. L. Sr., M. Cote, L. F. Bosart, and D. Keyser, 2009: A study of predecessor rainfall events (PRE) in advance of tropical cyclones. Oral presentation at the Conference on the Inland Impacts of Tropical Cyclones, 10-12 June 2009, Atlanta, GA.

Moore, B. J., L. F. Bosart, and D. Keyser, 2009: A comparison of significant predecessor rain events associated with Tropical Cyclone Rita (2005) and Tropical Cyclone Erin (2007). Oral presentation at the Conference on the Inland Impacts of Tropical Cyclones, 10-12 June 2009, Atlanta, GA.

Bosart, L. F., 2009: An overview of predecessor heavy rain events associated with landfalling tropical cyclones. Invited seminar, Department of Atmospheric and Oceanic Sciences, University of Wisconsin at Madison, 21 September 2009, Madison, WI.

Asuma, J. V., L. F. Bosart, D. Keyser, J. S. Quinlan, T. A. Wasula, H. W. Johnson, and K. S. Lipton, 2009: Cool-season high wind events in the northeast. Oral presentation at the Northeast Regional Operational Workshop XI (NROW), 4-5 November 2009, Albany, NY.

Bosart, L. F., T. J. Galarneau, Jr., J. M. Cordeira, and B. J. Moore, 2009: Predecessor rain events ahead of TC Ike and TC Lowell on 11-14 September 2008. Oral presentation at the Northeast Regional Operational Workshop XI (NROW), 4-5 November 2009, Albany, NY.

Moore, B. J., L. F. Bosart, D. Keyser, M. L. Jurewicz, Sr., 2009: Synoptic environments associated with predecessor rain events in advance of landfalling tropical cyclones. Oral presentation at the Northeast Regional Operational Workshop XI (NROW), 4-5 November 2009, Albany, NY.

Payer, M., L. F. Bosart, D. Keyser, N. A. Stuart, and T. A. Wasula, 2009: Analysis of precipitation distributions associated with two cool-season cutoff cyclones. Oral presentation at the Northeast Regional Operational Workshop XI (NROW), 4-5 November 2009, Albany, NY.

d) CSTAR/COMET related refereed publications:

Wasula, A. C., L. F. Bosart, and K. D. LaPenta, 2002: The influence of terrain on the severe weather distribution across interior Eastern New York and Western New England. *Wea. Forecasting*, **17**, 1277–1289.

Weisman, R. A., K. G. McGregor, D. R. Novak, J. L. Selzler, M. L. Spinar, B. C. Thomas, and P. N. Schumacher, 2002: Precipitation regimes during cold-season central U.S. inverted trough cases. Part I: Synoptic climatology and composite study. *Wea. Forecasting*, **17**, 1173–1193.

Bosart, L. F., 2003: Whither the weather analysis and forecasting process? *Wea. Forecasting*, **18**, 520–529.

Novak, D. R., L. F. Bosart, D. Keyser, and J. S. Waldstreicher, 2004: An observational study of cold season-banded precipitation in northeast U.S. cyclones. *Wea. Forecasting*, **19**, 993–1010.

LaPenta, K. D., L. F. Bosart, T. J. Galarneau Jr., and M. J. Dickinson, 2005: A multiscale examination of the 31 May 1998 Mechanicville, New York, F3 tornado. *Wea. Forecasting*, **20**, 494–516.

Novak, D. R., J. S. Waldstreicher, D. Keyser, and L. F. Bosart, 2006: A forecast strategy for anticipating cold season mesoscale band formation within eastern U.S. cyclones. *Wea. Forecasting*, **21**, 3–23.

Bosart, L. F., A. Seimon, K. D. LaPenta, and M. J. Dickinson, 2006: Supercell tornadogenesis over complex terrain: The Great Barrington, Massachusetts, tornado on 29 May 1995. *Wea. Forecasting*, **21**, 897–922.

Wasula, A. C., L. F. Bosart, R. S. Schneider, S. J. Weiss, G. S. Manikin, and P. Welch, 2007: Mesoscale aspects of the rapid intensification of a tornadic convective line across central Florida: 22-23 February 1998. *Wea. Forecasting*, **22,** 223–243.

Junker, N. W., R. H. Grumm, R. Hart, L. F. Bosart, K. M. Bell, and F. J. Pereira, 2008: Use of anomalous fields to anticipate extreme rainfall in the mountains of northern California. *Wea. Forecasting,* **23**, 313–335.

Archambault, H. M., L. F. Bosart, D. Keyser, and A. R. Aiyyer, 2008: Influence of large-scale flow regimes on cool-season precipitation in the northeastern United States. *Mon. Wea. Rev*., **136**, 2945–2963.

Bosart, L. F., A. C. Wasula, W. H. Drag, and K. W. Meier, 2008: Strong surface fronts over sloping terrain and coastal plains. *Fred Sanders Monograph,* L. F. Bosart and H. B. Bluestein, Eds., *Meteor. Monogr*., **33,** No. 55, Amer. Meteor. Soc., 35–85.

SECTION 3: Report by Warren R. Snyder and Eugene P. Auciello, (NWS Perspective)

Warren R. Snyder, Science & Operations Officer

Eugene P. Auciello, Meteorologist in Charge

WFO Albany, New York

CSTAR: May 2009 – October 2009

National Weather Service Perspective

The CSTAR III project "***The Cooperative Research with the National Weather Service on Cool and Warm-Season Precipitation Forecasting over the Northeastern United States***" is entering its third year. Several Collaborating projects have been completed, while over the summer, the remaining Major Foci projects continued at a high level.

The High Wind/Winter and Severe Convective events project accomplished much over the summer of 2009. The participants (Jonas Asuma, John Quinlan, Kevin Lipton) met in early June to establish criteria for events to include in the project. Events were selected for study based on these criteria and ninety events since 1993 were identified. Work proceeded over the summer within this framework, with John meeting with Jonas on several occasions. Composites were developed, with the preliminary work posted at http://www.atmos.albany.edu/student/jasuma/research.html. One case from this project was presented by Tom Wasula and Neil Stuart at the NWA conference in Norfolk, Virginia.

The CSTAR III project "Distribution of Precipitation Associated with 500 hPa Cutoff Cyclones" led by focal point Thomas Wasula has two components. The Warm Season component was completed with Mathew Scalora's Masters thesis. There were several meetings with Mathew in the Spring of 2009 in connection with the project's completion. Conceptual models were developed for this class of events, which use key synoptic and mesoscale parameters and structures. This work was presented at the WAF conference at Omaha, Nebraska. Mathew was recently hired by the National Weather Service. Work on the Cold Season component recently began. Tom Wasula and Neil Stuart met with graduate student Melissa Payer twice in the spring, and outlined criteria and events. Preliminary work has been posted at: http://www.atmos.albany.edu/student/mpayer/research.html . One case from Cool Season component was presented by Tom and Neil at the NWA Conference.

While most of the collaborating projects have been completed several remain very active:

1. The Northeast Convective Flash Flood project has been quite active under Joseph Villani's leadership at NWS Albany, New York. Fifty cases were previously identified, and during the summer two student interns (Julie Gabriel, Derek Malia) investigated each of these cases on the Weather Event Simulator (WES). Each case was loaded with data extracted. Derek continues work on this project.

2. NWS Albany, NY, and Center Weather Service Unit (CWSU) WRF runs are produced on the University at Albany's Research IT Computers. This data is provided to NWS offices at Caribou, Portland, Upton, Cleveland, Taunton and the Great Lakes Ensemble Project. In May the WRF was upgraded to beta version 3. A new set of CWSU graphics was developed, and are routinely made available on the CSTAR Webpage. The WRF will be upgraded in mid November to the just released WRF v3.1. This will allow a 1.5 km or better resolution data set will be provided to the MARFC focusing on winds across the Hudson River Basin.

3. The following Collaborative projects have been completed: :
    a. Hydrometeorological Ingredients Which Enhance Widespread Harmful Algae Blooms (HAB) in the Gulf of Maine and Massachusetts Bay Waters
    b. Correlations between Observed Snowfall and NAM Model Parameters
    c. Northern New England Inverted Coastal Trough - (NORLUND) Trough
    d. Upslope Localized Snow Events (Albany Convergence Zone) – New work has begun on warm season versions.
    e. Developing Probabilistic Forecasts using Ensembles, and placing the data on the Web
    f. Transition of Ensembles of Mesoscale Models to Operational Forecasting
    g. An Investigation by Multiple Doppler Radars of Sea Breeze Circulations in and Around the New York Bight.

The Spring CSTAR meeting was held on May 1, 2009. Preparations are well underway for the 11th Northeast Regional Operational Workshop (NROW) to be held November 4-5, 2009 and the Fall CSTAR Meeting. All current projects will present results at one of these two meetings.

The Spring CSTAR Meeting, held at WFO Albany was attended by 14 people from NWS and UAlbany. CSTAR project status and students were reviewed. Lance Bosart noted that the CSTAR project's status was reported at the USWRP Testbed Workshop at Boulder, Colorado in late April. Joe Villani presented a progress report on the Collaborative project "Northeast Convective Flash Flood Events", while Warren Snyder presented an overview of the remaining Collaborating and Associate Projects. Each presentation was followed by question and answer sessions, and students were given operational meteorologist's perspectives and input to their projects. Technology transfer issues, documenting operational success, and reporting issues were reviewed.

Three previously developed Articulate teletraining sessions should be placed on the Commerce Learn Center during FY2010. The following CSTAR projects have teletraining sessions in the developmental stages: "Mesoscale Structure of Precipitation Regions in Northeast Winter

Storms," Thomas Wasula, NWS Albany, New York, and Heavy Rainfall Associated with Landfalling Tropical Cyclones," work from CSTAR II by Daniel St. Jean and John Cannon; NWS Portland, Maine.

One aspect of the new NWS-UAlbany Internship, will be that undergraduate students will spend a full academic year at the WFO, and participate in both local research and CSTAR projects. The CSTAR website has been updated with recent thesis's and occasionally hosts active discussion boards of current meteorological events which have or were CSTAR focuses.

SECTION 4: NWS Semi-Annual Reports

(a)

Semi-annual Report

CSTAR III Research (May 2009 - October 2009)

Focal Point Leader(s): Neil A. Stuart

Thomas A. Wasula, NWS Albany, NY

Paul Sisson, NWS Burlington, VT

Pete Banacos, Burlington, VT

Dr. Lance Bosart, University at Albany

Dr. Daniel Keyser, University at Albany

Warren Snyder, NWS Albany, NY

Research Focus: Distribution of Warm Season/Cold Season precipitation associated with 500 hPa cutoff cyclones. It will include the development of conceptual models and forecast methodologies to delineate cutoffs which produce significant precipitation events and those that do not.

Project Activities and Work Done

- Neil and Tom attended the annual Spring CSTAR meeting, which was May 1, 2009. An update on graduate student Matt's Scalora's research was discussed. Matt gave a short presentation on his results pertaining to 5 distinct pattern recognition conceptual models associated with 500 hPa cutoffs based on their tilt. The tilt orientation of the cutoff has certain lower-, mid-, and upper-level synoptic features tied to the number of potential severe or flood reports. Matt focused on standardized anomalies with each of the cases in the dataset. Anomalies in precipitable water, 850 hPa theta-e, temperature, u and v winds are just a few parameters looked at in detail with 20-cases (June-September 2004-2008). Each cut-off is also examined in terms of stratiform or convective precipitation. Two thirds of the cases fit into the Great Lakes/Zonal tracks of cutoffs, while one third fit into the Northwest/Hudson Bay category. The Great Lakes cutoffs typically have heavier precipitation. The 5 patterns with the cutoffs were: Neutral Tilt – Type A, Neutral Tilt Type B, Positive Tilt Type A, Positive Tilt Type B, and Negative Tilt. Tom will be showing an application of one of these conceptual models with the 29 June – 2 July 2009 case at the 4-5 November 2009, 11th Northeast Regional Operational Workshop (NROW) at the WFO at Albany.

- Matt gave an oral presentation at the 23rd AMS Conference on Weather Analysis & Forecasting on 1-5 June 2009 in Omaha, NE. The title of the talk was "An Analysis of a High Impact 500-hPa Cutoff Cyclone from the 2008 Warm Season".

- Tom and Warren had the staff do the Articulate teletraining session entitled "Warm Season Cutoff Lows in the Northeast – A Climatology and Case Studies", as a part of the spring drill. The staff appreciated the guidelines dealing with sensible weather with cutoffs, and the pattern recognition model for heavy rainfall. The finalized teletraining is located on the Eastern Region Scientific Services Division (ER SSD) website (http://www.werh.noaa.gov/SSD/rose/teletraining.htm) and the CSTAR-SUNYA web page (http://cstar.cestm.albany.edu/).

- A meeting took place in mid-June with Tom, Neil and graduate student Matt Scalora, reviewing the final results of this M.S. thesis. Matt gave his Masters' thesis presentation on 29 June 2009. Tom attended the seminar. Matt submitted his M.S. thesis 1 August 2009 entitled "Forecasting Distributions of Warm-Season Precipitation and Severe Weather Associated with 500-hPa Cutoff Cyclones". Matt will be joining the WFO New York (Upton), NY staff in late November/December. Tom and Neil will be working a publication and a teletraining session in 2010 pertaining to the CSTAR results.
- Tom and Neil attended the 19-22 October 2009 NWA Conference in Norfolk, VA. They gave several poster and oral presentations that tied into the cool season CSTAR III research (severe weather and cutoffs). A poster presentation entitled "Complex Forecast Issues with the Elevation Snowstorm of 28 October 2008 in the Northeastern US" was shown. This system became a cool season cutoff cyclone in its waning stages near New England.

- Tom and Neil attended the May 1, 2009 Spring CSTAR meeting where Melissa gave a short presentation on her preliminary work with precipitation patterns with cool season (October-April) cutoffs. She was looking at the interannual variability, interseasonal, and intra-seasonal variability with cutoffs and precipitation in the cool season with teleconnections, and other key synoptic features. We are still gathering cases for her research which began this past spring. She will be giving a presentation at the 11th NROW at Albany on "Analysis of the Precipitation Distribution Associated with Two Cool-Season Cutoff Cyclones". Her website with research results is located at http://www.atmos.albany.edu/student/mpayer/research.html. Standardized anomalies with various synoptic and mesoscale parameters will likely be looked at once the case list is compiled by the end of this year.

- Pete Banacos, and Paul Sisson were informed of Melissa's progress through e-mails and her web-site. They will be attending the 6 November 2009 Fall CSTAR meeting. This project is still in its spinning up stages, since it began in the spring.

(b)

Semi-annual Report

CSTAR III Research (May 2009 – October 2009)

Focal Point Leader: John S. Quinlan, NWS Albany, NY

NWS Contributor: Tom Wasula, NWS Albany, NY

NWS Contributor: Hugh Johnson, NWS Albany, NY

NWS Contributor: Kevin Lipton, NWS Albany, NY

Dr. Lance Bosart, University at Albany

Dr. Daniel Keyser, University at Albany

Warren Snyder, NWS Albany, NY

Research Focus: High Wind/Winter Severe Convective Events - Identify the structure of and environments in which high wind events occur. These events have occurred with and without embedded convection and also have resulted from channeled wind flow. Some of the more recent and more memorable events include: February 17, 2006, January 17 & 21, 2006, September 9, 2005, February 22, 1997, February 24-25, 1996, November 12-13, 1992, November 20, 1989, December 28, 1988 and November 25, 1950. These and many other high wind events have produced widespread damage and power outages and sometimes have embedded convection which results in localized enhancement of the winds producing more concentrated damage.

I. Project Activities and Work Done

- John, Tom, Hugh and Kevin attended the annual Spring CSTAR meeting, which was held on May 1, 2008. Jonas Asuma gave a presentation on "Cool-Season Severe Weather and High Winds in the Northeast U.S." While this presentation was given very early into the project, some initial findings from eight high impact events included: an anomalous jet off the Pacific Northwest (D−2) → three-jet configuration (D−1) → anomalous jet east of James Bay (D−0); simultaneous intensification of cyclone/anticyclone from D−2 to D−1; collocation of right entrance region of anomalous jet over surface cyclone (D−0); and negatively tilted trough (D−0).

- After receiving the data set of wind events across our study domain from Stuart Hinson at NCDC, there was much discussion during May and June on how to handle the gradient wind reports in Storm Data as they are listed by zone as opposed to the convective wind reports which are listed by exact location. In order to plot the gradient wind reports as a point it was decided to use the centroid of each zone as the location of the gradient wind

reports. It was also decided that we would have an inner domain defined as the Northeast which would just include the states of ME, VT, NH, MA, RI, CT, NY, PA, and NJ with the outer domain defined as the Greater Northeast including the states of ME, VT, NH, MA, RI, CT, NY, PA, NJ, OH, WV, VA, MD, DE, MI, IN, KY, TN, NC and District of Columbia.

- Jonas gave an oral presentation at the 23rd AMS Conference on Weather Analysis & Forecasting on 1-5 June 2009 in Omaha, NE. The title of the talk was "Cool-Season Severe Weather in the Northeast U.S."

- During June some important definitions developed through correspondence by e-mail. A Cool-Season High Wind Event would be defined as any series of ≥ 2 reports separated by 12 h before and after the initial and final report, and these events would be stratified by type (Pure Gradient (PG): No thunderstorm wind reports, Pure Convective (PC): No gradient wind reports, and Hybrid (HY): Both thunderstorm and gradient wind reports).

- John and Tom met with Jonas on August 11, 2009 and went over some initial composite charts (surface, 850 hPa, 500 hPa and 300 hPa) and drew some preliminary conclusions as well as items that need to be analyzed in more detail. The main highlights of our meeting included: the need for further stratification of events based on the type of synoptic system (primary low, secondary low, tropical transition, Miller Type A, Miller Type B etc.) and how to best define the stratification (evolution of system from 3 days before to the time of the event); a discussion of looking at wind fields compared to climatology to produce wind anomaly charts; a discussion of the severe weather during the cool season being lee trough severe weather; and the stronger dynamics that occur in the cool season accounting for a higher number of events during the late night-early morning hours than during the warm season in the Northeast U.S.

- Tom and Neil Stuart gave a poster presentation on a significant cool season severe weather event at the 19-22 October 2009 NWA Conference in Norfolk, VA. The title of the poster presentation was "The 1 December 2006 Anomalous Severe Weather Event across the Northeast".

- While the Fall 2009 CSTAR Meeting and NROW were held during early November of 2009 which will be included in the next report, it is important to note some of the preliminary results from the surface, 850 hPa, 500 hPa and 300 hPa composite charts which were stratified by Pure Gradient (PG), Pure Convective (PC), and Hybrid (HY). The following are some of the preliminary results from the composite charts at the time of the event: HY and PC cyclones are located north of initial report while PG cyclones are located east of initial report; PC events tend to be most moist, least stable while PG events tend to be least moist, most stable; HY and PG upper-level wave patterns are more amplified compared to PC composite which suggests stronger dynamical processes; HY reports occur in the warm sector in advance of the cold front while PG reports occur in regions of cold air advection and PC reports occur on the warm side of zonally oriented baroclinic zones; jet structures vary by event type; HY events are associated with favorable dynamic and thermodynamic environments and are common throughout the

cool season, PG events maximize in December and are dynamically driven, and PC events maximize in April and are thermodynamically driven; and inter-seasonal variability is likely due to variations in the storm track with the cyclone track north of the domain for HY events and east of the domain for PG events. Most of the research that has been completed on this project to date can be found at Jonas Asuma's web page: http://www.atmos.albany.edu/student/jasuma/

(c)

Semi-annual Report

CSTAR III Research on Predecessor Rainfall Events (PRE)

May through November, 2009

Compiled by: Michael L. Jurewicz, Sr. (CSTAR Tropical Rainfall Focal Point, NWS Binghamton, NY)

Ben Moore (primary CSTAR graduate student) continued to work diligently this past summer and during the current semester, mainly attacking this project from two angles. Firstly, to expand the PRE database from its original 8-year length (1998-2006) to a 20-year span (1988-2008). Once this more robust climatology was established, more thorough investigations of the synoptic-scale environments favoring PRE formation could be performed (Ben's second main goal). Ben has looked at numerous cases so far this semester, and utilized composite analyses, to identify common large-scale patterns for PRE development. Ben has also highlighted more subtle and smaller-scale differences, which may modulate both the magnitude of a particular PRE, and also the likelihood of its occurrence for a given area.

Ben, myself, Lance, and Dan have continued to enjoy a good working relationship. We've communicated with relative frequency during this period, and have collectively put in much effort to further this work.

I (Jurewicz) will be the lead author on a paper emphasizing the operational challenges of forecasting PRE. Ben Moore's newly established climatology and composite work will help facilitate this effort. This paper will hopefully provide the operational community tools and knowledge to better anticipate when PRE occur, and also when null events happen. We also may begin to look at some PRE examples involving Eastern Pacific tropical cyclones. Work to continue, and ultimately finish/submit this manuscript is ongoing.

Lance Bosart, Tom Galarneau, and others have submitted a paper to Monthly Weather Review on the PRE associated with tropical cyclone Erin (2007). They also looked at upper-level jet structures associated with other documented PRE. Ben and I are providing feedback on this paper, as it begins the formal review process.

Ben, myself, and Lance all submitted abstracts and presented orally at the Inland Impacts of Tropical Cyclones Conference in June (Atlanta, GA). Ben and Lance submitted abstracts and presented orally at the Weather and Forecasting Conference in June (Lincoln, NE). Ben, myself, and Lance submitted abstracts and presented orally at NROW in November.

(d) Status of "Snyder Proposal" Projects

Department of Commerce
NOAA, National Weather Service
251 Fuller Rd. Suite B-300
Albany, NY 12203-3640

November 17, 2009

MEMORANDUM FOR: Lance F. Bosart and Daniel Keyser

FROM: Warren R. Snyder
SOO, WFO, Albany, NY
(w/Input from Project Focal Points)

SUBJECT: Status of Collaborative and Associate Projects
in CSTAR III

I. Collaborating Projects

a. Regional WRF/WRF Ensemble

i. New-

1. The WRF package at WFO Albany has been upgraded to version 3.0 beta. A comprehensive new set of web based graphics were developed including several new products, better visualizations, and elimination of products that were not posting. The beta release resulted in some setbacks, mainly lack of BUFKIT data, removal of the Maine web graphics and limitations on the ability to distribute the CPU load across a cluster. Workarounds to the CPU issue were developed, and the 3.1 release is expected to resolve these. In addition there are many new physics and configuration options in ver 3.1 that we expect to explore and utilize.
2. The Northeast River Forecast Center and Forecast offices at Taunton began ingesting the ALY WRF and WFO Cleveland added ALY model runs. The ensemble run was discontinued, and the full 5km run is being re-gridded to provide the ALY member to the ensemble.
3. During the week of November 30 the WRF will be upgraded to version 3.1. The current domains have been retained to reduce disruption to current users. The upgrade will also add a high resolution nest of the Hudson River Basin for Taunton RFC and the Stevens Institute.
4. Additional members may be provided to the Great Lakes

Ensemble.

ii. Ongoing –

1. The SOO/STRC WRF is being run on the UAlbany Research IT Unix System with a 15 km resolution outer domain which covers much of the Eastern United States and Southeastern Canada, and a 5km inner nest that covers the area bounded by Indiana to New Hampshire, and from Northern New York to Maryland, with a separate nest over Maine.
2. This data is posted on the web, distributed via the Eastern Region LAN to the CAR, GYX and OKX NWS offices, and is posted in AWIPS and GFE at WFO Albany.
3. The Data is used both in research and in support of operations. The Maine data fed to the Grey and Caribou offices is being used in GFE and in a Maine ensemble. .
4. Albany is one of six offices contributing members to the Great Lakes Ensemble Project. Data is scaled and sent to WFO Cleveland where it is being compiled into the ensemble grids, which are being redistributed through the LDM to AWIPS.
5. WRF Runs are provided four times a day for CWSU's Oberlin and Nashua. Nashua began a routine assessment and evaluation of the model output in their operations.
6. Model runs are also available to DEAS in real time

iii. Focal Points – Warren Snyder (ALY), Mike Evans (BGM),

1. PI – David Knight
2. NWS Contributors – Robert LaPlante (CLE), Paul Sisson (BTV), Mark McKinley (ZOB), Scott Reynolds (ZBW), Nelson Vaz (OKX), Robert Rozumolski (STRC), Jeff Tongue (OKX), Christopher Mello (CLE), Daniel Liens (CLE)

b. Hydrometeorological Ingredients Which Enhance Widespread Harmful Algae Blooms (HAB) in the Gulf of Maine and Massachusetts Bay Watersheds

i. This project has been completed, and was included in a prior report. Project Participants

1. Focal Point– Dave Valle (NERFC)
2. Team - Alison Gillis (NERFC), Joseph Dellicarpini (BOX)

c. Discrimination between Marginal Severe Convective Weather (excluding Pulse storms), and No Warning Decision events

i. This project has been discontinued due to the passing of the project organizer and lead. The work was largely to be done in his office and had not gone beyond basic organizing of the project at the time of his passing.

ii. Project Participants

1. Lead - John DiStefano (ILN-SOO) (Deceased)

2. Team - Allen Randall (ILN), Stephen Hrebenach (ILN), Daniel Hawblitzel (ILN), Neil Stuart (ALY)

d. Correlations between Observed Snowfall and NAM Model Parameters

i. This project has been completed, and was included in a prior report.

ii. Project Participants

1. Team – Mike Jurewicz (BGM) & Mike Evans (BGM)
2. PIs – Lance Bosart, Dan Keyser

e. Northeast Convective Flash Flood Events

i. Since the main focus of the CSTAR III collaborating phase of the project dealing with the climatology aspect of warm season convective flash floods (FF) in the Northeast was completed by spring 2009, the focus shifted to in depth analysis of individual local FF events as CSTAR III comes to an end.

ii. From May to October of 2009, twenty local FF events from the Albany County Warning Area (CWA) were investigated in detail with help from University of Albany student Derek Mallia and University of Delaware student Julie Gabriel. The National Weather Service weather event simulator (WES) was primarily used to examine the data.

iii. Local cases studied spanned from June 2005 through July 2009 (warm seasons only). FF events were classified based on the type of dominant feature or regime that resulted in FF. Also, sounding derived parameters were complied for each event and the data was entered into a spreadsheet for further examination. Data was stratified based on whether events produced isolated or widespread FF. In addition, composites of synoptic scale features were plotted using the Climate Diagnostic Center website for the isolated and widespread events. Results from local case analysis were presented at the 11th Northeast Regional Operational Workshop in Albany, NY, in November, 2009.

iv. A descriptive database of warm season FF events from the Albany CWA from 2005-2009 was created as well, complete with sounding derived indices, synoptic and mesoscale analysis of key features, and storm scale investigation of cells that produced FF using radar data.

v. Other factors to consider include pre-flash flood environments and how some of the aforementioned parameters evolve prior to the onset of convection. Days with isolated flash flood events will compared to days with widespread or multiple events. Also, events with only one flash flood day will be compared with longer-duration events lasting multiple

(successive) days. Events will also be stratified into early vs. late season to determine any differences.

vi. Future work will focus on investigating case data for individual events based on the aforementioned parameters and ideas.

vii. Project Participants

1. Lead – Joe Villani (ALY)
2. Team – Alan Cope (PHI), Mike Evans and Mike Jurewicz (BGM)

f. Northern New England Inverted Coastal Trough - (NORLUND Trough

i. This project has been completed, and was included in a prior report.

ii. Project Participants

a. Team – Dan St. Jean (GYX), John Cannon (GYX), Mike Fitzsimmons (CAR), Todd Lericos (CAR)

II. Associate Projects

a. Integration of Research Into Operations - Capitalize on scientific and technological advances that result from CSTAR research.

i. CSTAR webpage maintenance items included adding thesis material and articulate presentations. ITSO Vasil Koleci plans on developing some technology transfer initiatives based on completed CSTAR (I-III) research.

ii. Articulate presentations now available for CSTAR projects. At the Fall 2009 CSTAR Meeting, transfer of this work to the CLC was planned.

iii. WFO Albany Senior Forecaster Neil Stuart created post mortem pages based on past events related to CSTAR projects.

iv. Project Participants

a. Lead – Vasil Koleci (ALY)
b. Team - Josh Korotky (PIT), Warren Snyder (ALY) Tom Wasula (ALY), Michael Jurewicz (BGM), Mike Evans (BGM), Justin Arnott (BGM)

b. Upslope Localized Snow Events (Albany Convergence Zone) Study these events and attempt to develop methods to better forecast them.

i. The initial work on cold season cases was completed by the collaborator, Micheal Augustyniak as his MS Thesis. One of the outcomes of this work was an operationally useful decision tree for forecasting the MHC events.

ii. Hugh W. Johnson is continuing this work, investigating "null", hybrid, warm, and southerly MHC flow cases. Kim Sutkevich has joined the project. They begun investigating the June 22, 2008 southerly flow event on the WES. This event produced funnel clouds, wind and hail damage.

iii. The project will attempt to develop operationally useful conceptual models or forecasting guidelines.

iv. Project Participants

a. Leads – Hugh W. Johnson IV (ALY), Kim Sutkevich (ALY)

c. ***Developing Probabilistic Forecasts using Ensembles, and placing the data on the Web***

i. This project was completed***.***

ii. Project Participants

1. Team - Josh Korotky (PIT) and Richard Grumm (CTP)

d. Transition of ensembles of mesoscale models to operational forecasting - Explore use of multiple runs of mesoscale models and their utility to forecasting. Working with SUNY at Stonybrook

i. This project has been completed, and was included in a prior report.

ii. Project Participants

1. Lead - Jeff Tongue (OKX)
2. Participants – Nelson Vaz (OKX)

e. An Investigation by Multiple Doppler Radars of Sea Breeze Circulations in and Around the New York Bight.

i. This project has been completed, and was included in a prior report.

ii. Project Participants

1. Lead – Jeff Tongue (OKX)

SECTION 5: Computer and Technology Transfer Issues (David Knight)

The results described herein would not have been possible without appropriate computing infrastructure. Students are exposed to NWS facilities and software, and NWS staff has access to capabilities not available in the local office. Both groups benefit from this interaction and sharing of facilities. Several Sun workstations and PCs are available for use by CSTAR participants. Approximately 230GB of disk space on the UAlbany Department of Atmospheric and Environmental Sciences (DAES) Sun servers is dedicated to storing CSTAR related data and software. This disk space is available on all DAES workstations and provides a central location where both UAlbany and NWS personnel can store, process, and exchange large datasets. Each CSTAR student has a PC or Mac laptop, which enables them to take familiar computers with them when visiting NWS staff, and provides them ready access to the DAES UNIX machines. Email lists created on the DAES computers at the beginning of the project continue to be important conduits for exchange of scientific ideas, results, and information between CSTAR participants. There are email lists for all the CSTAR participants, as well as focused lists for those involved in specific projects. Albany WSFO staff took the lead in maintaining content for the CSTAR webpage at http://cstar.cestm.albany.edu. The web page provides an additional mechanism for exchanging information and ideas. The DAES web server (http://www.atmos.albany.edu) and ftp server (ftp://ftp.atmos.albany.edu) are being used to facilitate exchange of large datasets between CSTAR collaborators. A recent NSF grant provided the DAES with a new Sun server (with 8 CPUs and 16GB RAM) and a large (20 TB usable space) disk storage array. While CSTAR money was not used for this, and the machines were not bought specifically for CSTAR use, they nonetheless directly benefit the CSTAR research by providing much faster servers for computation and storage space for commonly used datasets.

In addition to DAES and NWS computing facilities, the formal CSTAR collaborative grant effort has allowed access to University Research Information Technology (RIT) services. In particular, Warren Snyder (SOO Albany WFO) is using the RIT 96 CPU Linux cluster for Weather Research and Forecasting (WRF) model simulations. This computing facility allows him to perform computations not possible at the local office. The facility will be used to generate additional members for the collaborative ensemble and to generate higher resolution runs for research purposes. So far this facility has been made available at no cost to the CSTAR project.

SECTION 6: Selected Documentation of CSTAR Project Activities:

From: Lance Bosart [bosart@atmos.albany.edu]
Sent: Wednesday, May 27, 2009 1:54 PM
To: Barbara J Zampella
Cc: Daniel Keyser; Lance F Bosart
Subject: Fwd: Re: PRE development later this weekend?
Attachments: May25.StageIV.gif; May26.StageIV.gif; hpcqpf_2009052306_12hr_f054.gif; hpcqpf_2009052318_12hr_f054.gif; David_Novak 8.vcf

Hi Barbara,

For possible incorporation into the six-month CSTAR progress report to be prepared during Fall 2009. Please be sure to include the attached figures with this email in the Fall 2009 progress report.

David Novak comments an email by Michael Jurewicz presenting a recent real time forecast of a possible PRE.

Thanks.

Lance and Dan

.....

Date: Wed, 27 May 2009 13:16:37 -0400
From: David Novak <david.novak@noaa.gov>
Subject: Re: PRE development later this weekend?
To: Michael Jurewicz <Michael.Jurewicz@noaa.gov>
Cc: Ben Moore <bm453975@albany.edu>, Lance Bosart <bosart@atmos.albany.edu>,
Dan Keyser <keyser@atmos.albany.edu>,
Michael Evans <michael.evans@noaa.gov>,
Faye Barthold <Faye.Barthold@noaa.gov>,
Mike Bodner <Mike.Bodner@noaa.gov>

Hi Mike,

So it appears there was ~1-3" in ND and northern MN (see attached), >which was actually well predicted by models and humans alike (see attached HPC 54 h forecasts). So this was a fairly predictable event in this case. I'm not sure it meets the formal PRE criteria, but it's good to see at least one of these types of events was well predicted.

Dave

Michael Jurewicz wrote:

Ben/Lance/Dave N.,

I know this subtropical low in the GOMEX doesn't have a name...but all the atmospheric signals for PRE formation seem to be there on Sunday and Monday across the Northern Plains/Upper Midwest...as the system comes ashore and into the Mississippi Valley. The folks in the Red River Valley certainly don't need that.

Check out the latest GFS/ECMWF runs.

Take care.

- Mike

--

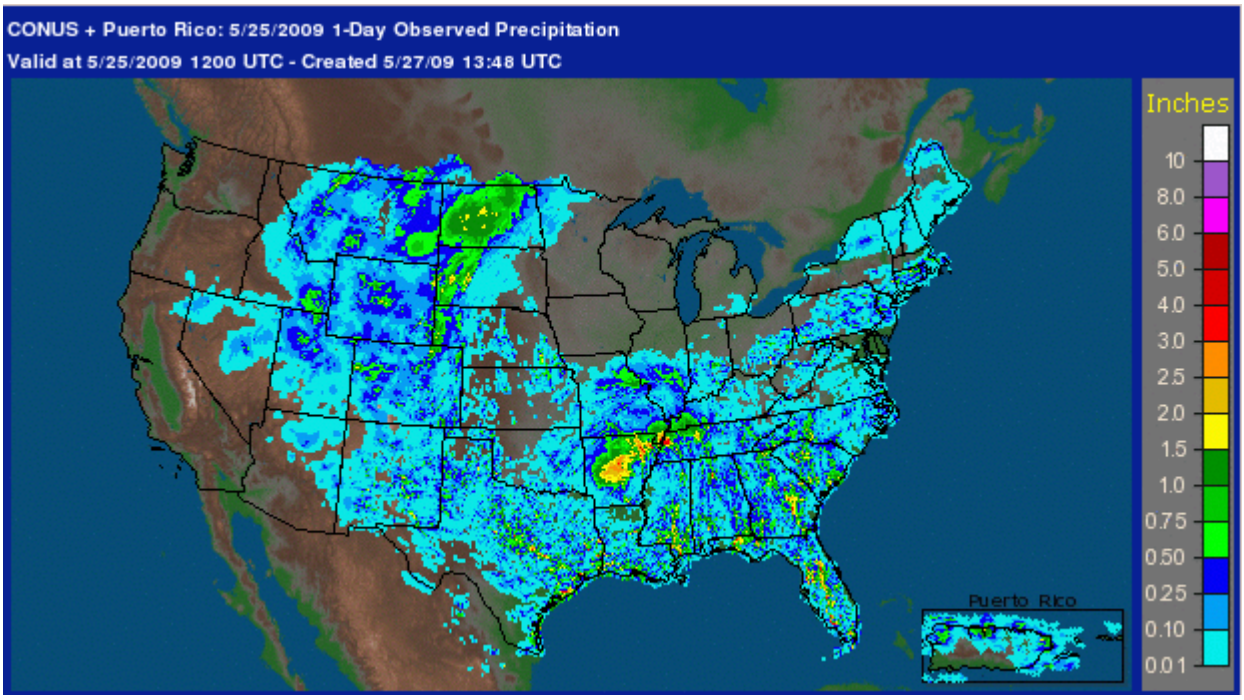
Lance F. Bosart

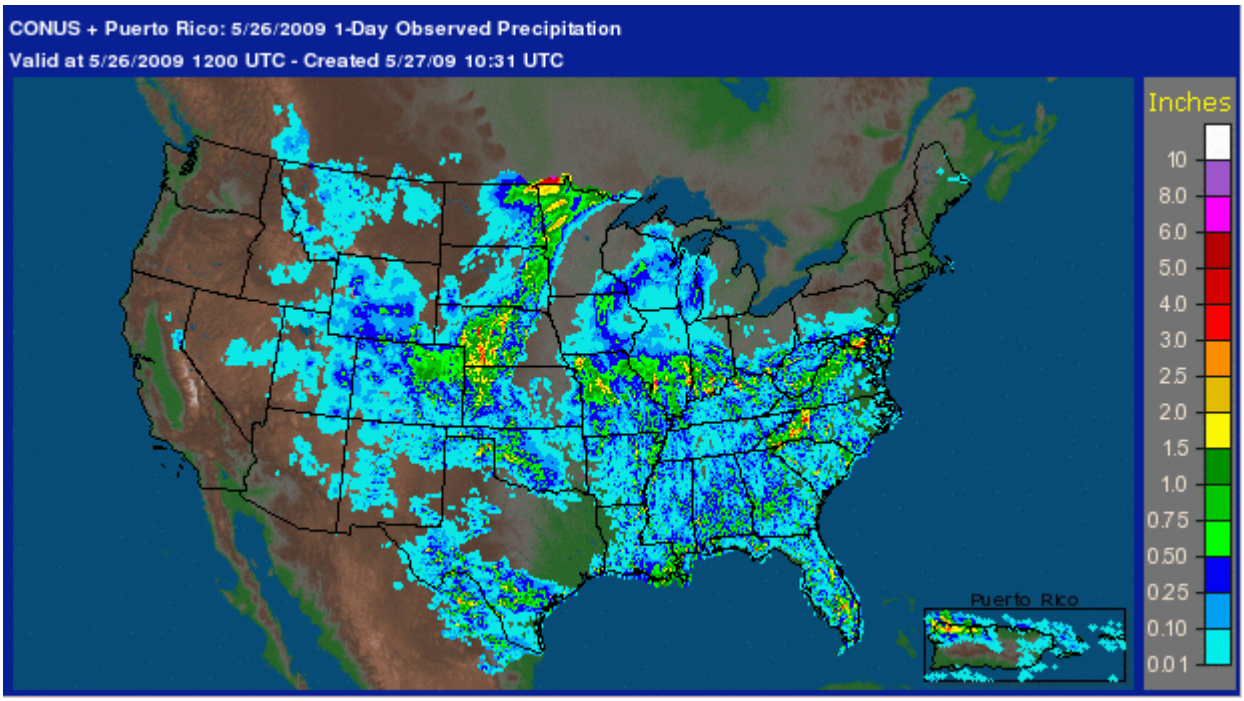
Department of Atmospheric and Environmental Sciences The University at Albany/SUNY/ES-227 1400 Washington Avenue Albany, NY 12222 USA

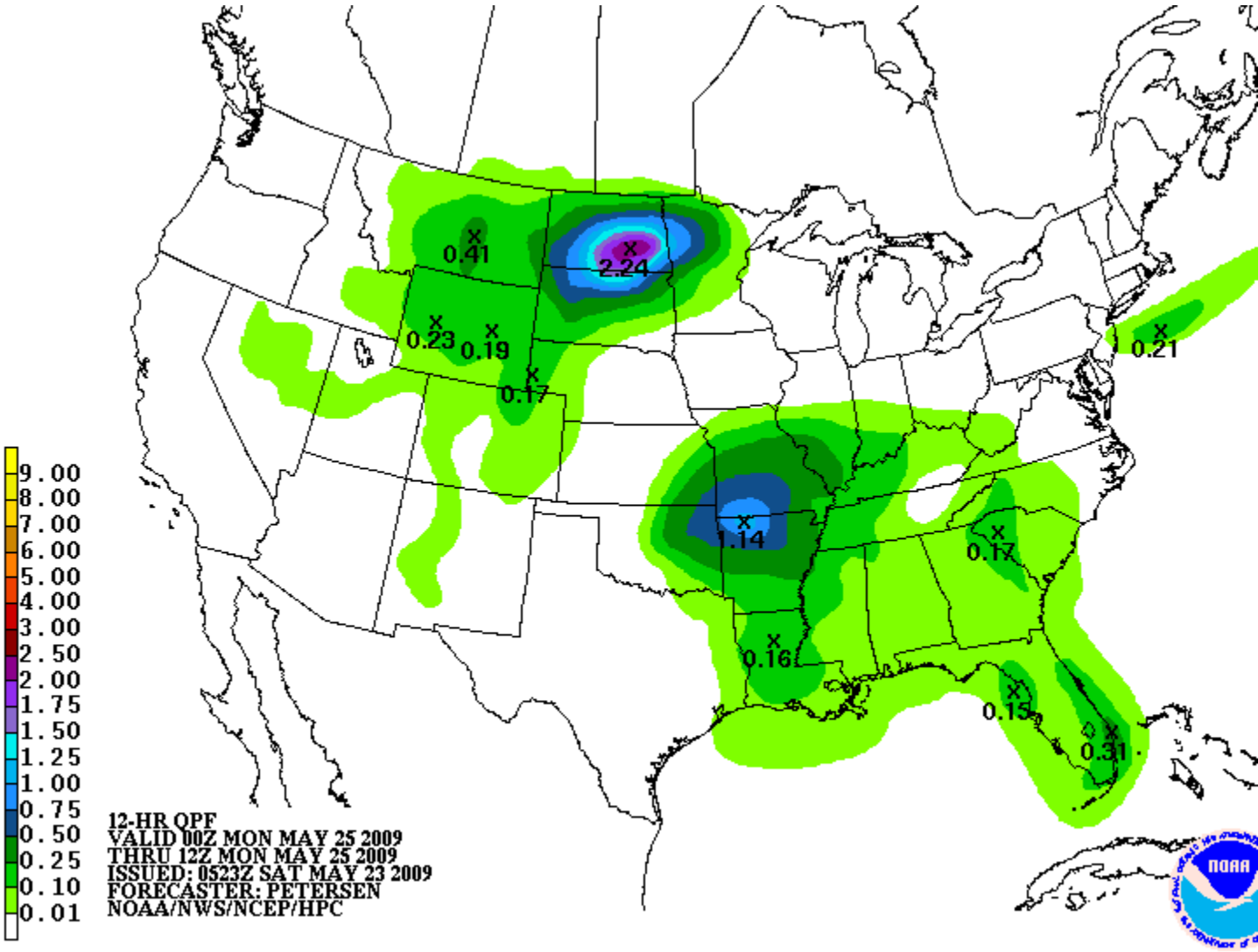
Email: bosart@atmos.albany.edu

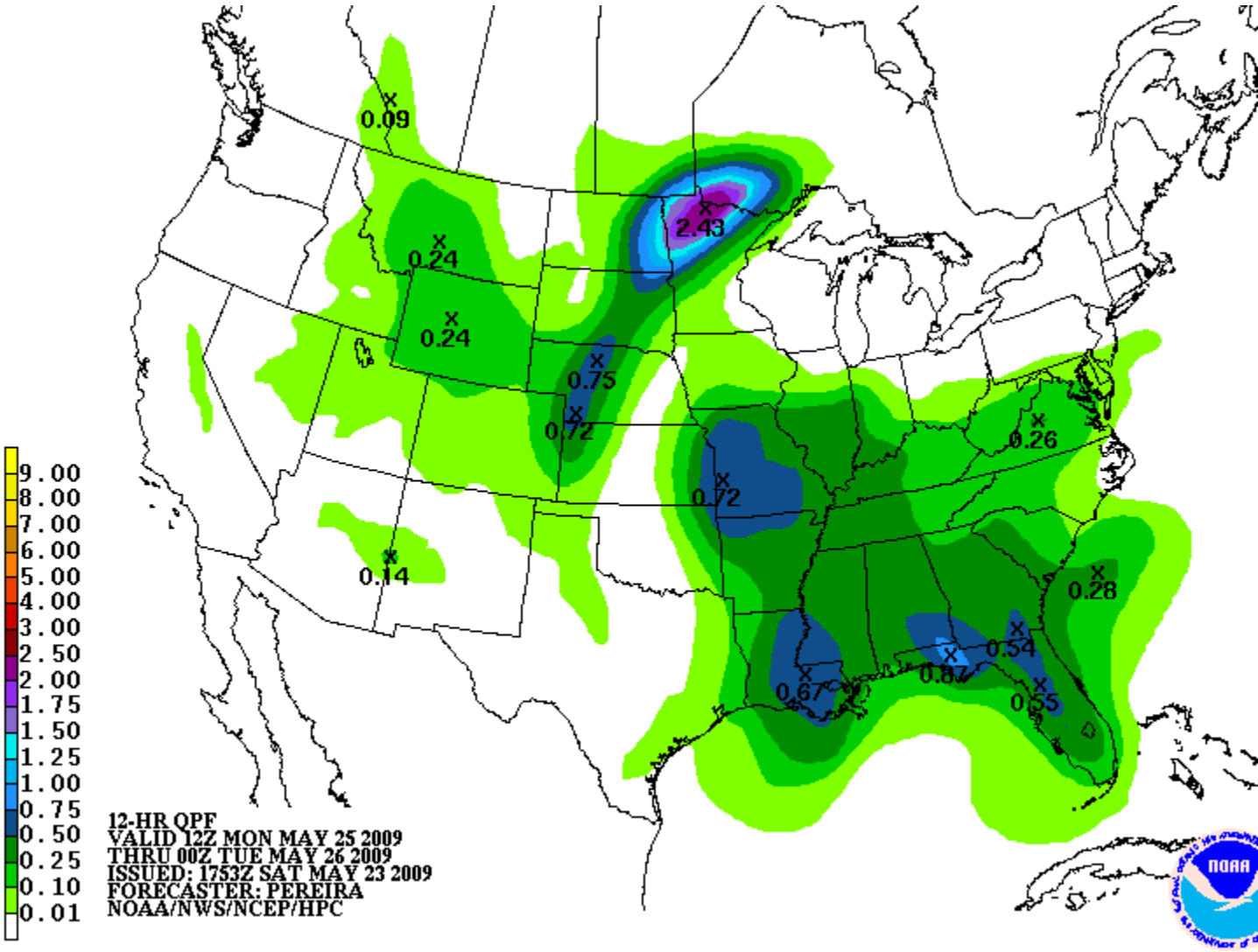
Phone: 518-442-4564

Fax: 518-442-4494


CONUS + Puerto Rico: 5/25/2009 1-Day Observed Precipitation
Valid at 5/25/2009 1200 UTC - Created 5/27/09 13:48 UTC
Inches
10
8.0
6.0
5.0
4.0
3.0
2.5
2.0
1.5
1.0
0.75
0.50
0.25
0.10
0.01
Puerto Rico


CONUS + Puerto Rico: 5/26/2009 1-Day Observed Precipitation
Valid at 5/26/2009 1200 UTC - Created 5/27/09 10:31 UTC
Inches
10
8.0
6.0
5.0
4.0
3.0
2.5
2.0
1.5
1.0
0.75
0.50
0.25
0.10
0.01
Puerto Rico


9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.50
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.10
0.01
12-HR QPF
VALID 00Z MON MAY 25 2009
THRU 12Z MON MAY 25 2009
ISSUED: 0523Z SAT MAY 23 2009
FORECASTER: PETERSEN
NOAA/NWS/NCEP/HPC
0.41
2.24
0.23
0.19
0.17
0.21
1.14
0.17
0.16
0.15
0.31


9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.50
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.10
0.01
12-HR QPF
VALID 12Z MON MAY 25 2009
THRU 00Z TUE MAY 26 2009
ISSUED: 1753Z SAT MAY 23 2009
FORECASTER: PEREIRA
NOAA/NWS/NCEP/HPC
0.09
0.24
0.24
2.43
0.75
0.72
0.14
0.72
0.26
0.28
0.54
0.87
0.67
0.55

==========

From: Dan Keyser [keyser@atmos.albany.edu]

Sent: Monday, June 22, 2009 4:23 PM

To: Barbara J Zampella

Cc: Lance F Bosart; Daniel Keyser

Subject: Fwd: Re: [Fwd: Predecessor Rainfall Event (PRE)] (fwd): Mon. 6/22/09

Monday 22 June 2009

Barbara,

An e-mail post from Sheldon Kusselson illustrating impact of CSTAR-funded PRE research from a NOAA perspective follows for possible incorporation into the next CSTAR six-month report.

Dan

cc: Lance

Date: Sat, 20 Jun 2009 15:37:18 -0400

From: Sheldon.Kusselson@noaa.gov

Subject: Re: [Fwd: Predecessor Rainfall Event (PRE)]

To: Michael Jurewicz <Michael.Jurewicz@noaa.gov>

Cc: Ben Moore <bm453975@albany.edu>, Lance Bosart ><bosart@atmos.albany.edu>>

Mike,

Thanks for your confirmation and will look forward to your further analysis. I did save some satellite imagery for the case, so if you need some of that, let me know. I know it maybe a stretch, but I think some of that moisture may have also worked its way north and northeast into the Midwest last evening, night and possibly today as I worked during the events from Iowa through southern WI, northern Illinois into the Ohio Valley/southern MI. Since I am off today, I did have a chance to look at the 24hr totals up there. One thing I learned about PREs is that there are those that meet the minimum requirements and then there are those that may qualify as 1/8, 1/4, 1/2, 3/4 PREs based on how much of the tropical moisture either at the low levels (TPW) or upper levels (GOES WV) get up into the mid- latitudes. Everybody's work on this subject has helped me do my job better at informing forecasters of the possibilities, like the Texas event a few days ago and build forecaster confidence, especially when the models, as in the case of the Texas event, were completely "out to lunch".

Will keep in touch on these matters,

Sheldon

----- Original Message -----

From: Michael Jurewicz <Michael.Jurewicz@noaa.gov

Date: Saturday, June 20, 2009 12:42 pm

Subject: Re: [Fwd: Predecessor Rainfall Event (PRE)]

Sheldon Kusselson wrote:

Hello all Pre fans...this is what I posted to the tropical list serve. Wanted to copy a couple of pictures and get it out quickly. Any comments are welcome.

Sheldon

Subject:Predecessor Rainfall Event (PRE)

From: Sheldon Kusselson <sheldon.kusselson@noaa.gov

Date: Fri, 19 Jun 2009 13:58:57 -0400

To: Chris.Landsea@noaa.gov

To: Chris.Landsea@noaa.gov

CC:tropical storms list <tropical-storms@tstorms.org, bm453975@albany.edu Chris and others...

This may have been a late start to the eastern Pacific hurricane season, but it has started with a bang as I believe you can classify the convective complex that gave 10 inches or more of rainfall to Texas through this morning a "Predecessor Rainfall Event. I have attached an GOES IR image from 0845z and the distance between the center of the TD#1 and the Texas convective complex was about 1000 kms and the rainfall in 24hrs I believe met the criteria. I have also attached a blended Total Precipitable Water image from CIRA/Colorado > State's web site at http://amsu.cira.colostate.edu/gpstpw around 12z this morning that tries to capture the low level moisture that had come across the Mexican mountains into Texas.

Any comments on this are welcome as this is a learning experience for me.

Sheldon

Chris.Landsea@noaa.gov wrote:

Hi tropical storm folks,

With the Northeast Pacific cyclone EP01 operationally remaining a tropical depression this morning, 2009 will likely be known as the latest starting season (first occurrence of a tropical storm) since (relatively) accurate records began in 1970 for that basin. The previous latest starting season was 1994 with the development of Tropical Storm Aletta at 06Z on the 19th of June.

Best regards,

chris

****

Chris Landsea

Science and Operations Officer
NOAA/NWS/National Hurricane Center
11691 S.W. 17th Street
Miami, Florida, USA 33165-2149
Chris.Landsea@noaa.gov
P:305-229-4446 F:305-553-1901
****

"Over and over this jerky, four second video showed clumps and gauzy strips of clouds beginning to curl around a point, as if sucked in by a magnet. To tropical storm analysts this was a sign of 'organization,' a profane and inadequate word to describe one of nature's most beautiful mysteries, the transformation of chaos into order, of perturbation into cyclone."

The genesis of Hurricane Mitch, 1998 _The Ship and the Storm_ by Jim Carrier

---

Tropical-storms mailing list
Tropical-storms@tstorms.org
http://www.tstorms.org/tropical-storms/
Please do not forward this message to non-qualified individuals.

Sheldon,

Thanks for sending this message. I started looking at this evolving situation yesterday, with a nice developing conveyor belt of moisture up into Texas from the tropical East Pacific (vicinity of the TD). On a "pre"liminary basis, I would have to agree that this was/still is a PRE. Satellite/TPW loops showed a nice linkage between TD1-E and the convective complex over TX. Precipitable water values of 200+% of normal extended into TX and NM, owing to deep-layered meridional flow, with the main trough axis well west of the TD's longitude. As you said, rainfall amounts were quite heavy, and a quick check of that region shows numerous flash flood watches and warnings still in effect. I plan on looking at some of the upper-air data and maybe a few trajectories over the next few days, to try to confirm/pin down the TD's role in all of this.

Thanks again and take care.

- Mike J.

Dr. Daniel Keyser
Professor, Atmospheric Science
Department of Atmospheric and Environmental Sciences, ES-224, University at Albany State University of New York 1400 Washington Avenue Albany, NY 12222
518-442-4559 (office) 518-442-5825 (fax) keyser@atmos.albany.edu

==========

From: Dan Keyser [keyser@atmos.albany.edu]

Sent: Tuesday, June 23, 2009 1:07 PM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Fwd: More PRE stuff (fwd)
Attachments: Satellite_Andres.gif; nesdis.gif; ElPaso_AFD.gif

Tuesday 23 June 2009

Barbara,

An e-mail post from Mike Jurewicz noting the appearance of a southwestern U.S. PRE in current forecast discussions for possible incorporation into the next CSTAR six-month report.

Dan

cc: Lance

Dr. Daniel Keyser
Professor, Atmospheric Science
Department of Atmospheric and Environmental Sciences, ES-224
University at Albany State University of New York 1400 Washington
Avenue Albany, NY 12222
518-442-4559 (office)
518-442-5825 (fax)
keyser@atmos.albany.edu

---------- Forwarded message ----------
Date: Tue, 23 Jun 2009 15:54:16 +0000
From: Lance Bosart <bosart@atmos.albany.edu>
To: "Keyser, Daniel" <keyser@atmos.albany.edu>
Subject: Fwd: More PRE stuff

Hi Dan,

FYI.....Lance.

Date: Tue, 23 Jun 2009 10:48:51 -0400
From: Michael Jurewicz <Michael.Jurewicz@noaa.gov>
Subject: More PRE stuff

To: Ben Moore <bm453975@albany.edu>, Lance Bosart ><bosart@atmos.albany.edu>

Cc: michael.evans@noaa.gov

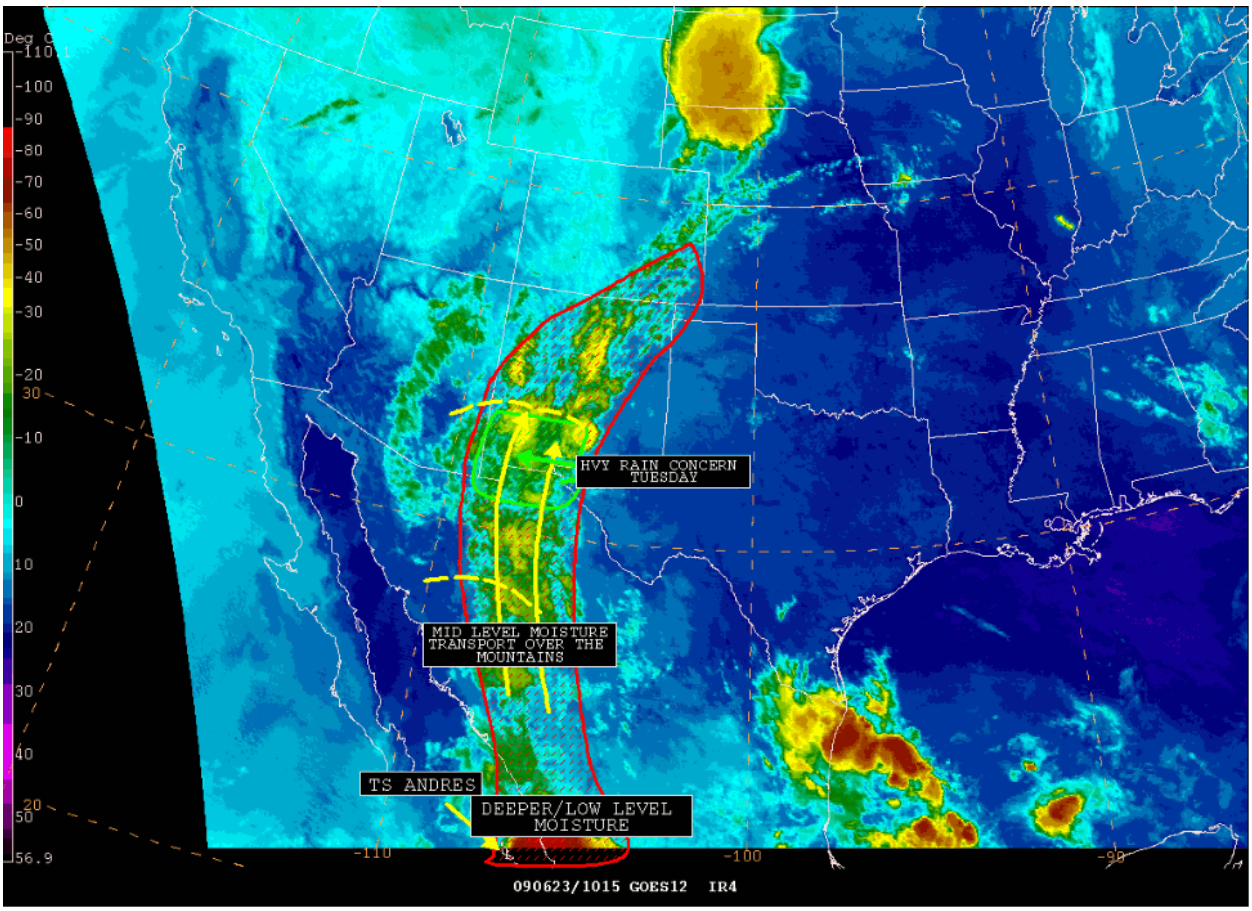
Lance and Ben,

PRE continue to show up in NWS discussions...as per the attachments. We'll see what happens over the Southwest with Andres.

Take care.

- Mike

--



```
ZCZC NFDSPENES ALL
SPENES
TXZ000-NMZ000-AZZ000-
.
SATELLITE PRECIPITATION ESTIMATES..DATE/TIME 06/23/09 1051Z
SATELLITE ANALYSIS BRANCH/NESDIS---NPPU---TEL.301-763-8678
LATEST DATA USED: GOES-12 1045Z KUSSELSON
.
LOCATION...SW TEXAS...S NEW MEXICO...EXT SE ARIZONA...
.
ATTN WFOS...EPZ...TWC...
ATTN RFCS...WGRFC...CBRFC...
.
EVENT...MID AND HIGH LEVEL MOISTURE CONTINUES NORTH FROM ANDRES...
.
SATELLITE ANALYSIS AND TRENDS...TROPICAL STORM ANDRES CONTINUES TO DRIFT
WEST SOUTH OF SOUTHERN MEXICO.  DEEP LAYERED MOISTURE WAS WELL SOUTH OF
TEXAS...NM AND ARIZONA.  BUT ON GOES WATER VAPOR...THAT SENSES MOISTURE
BEST BETWEEN 700 AND 400MB...A WELL DEVELOPED PLUME OR CONCENTRATION OF
MOISTURE AT THAT ALTITUDE CAN BE SEEN FROM THE STORM AND SOUTHERN MEXICO
NORTH INTO NM AND SE CO...W KS.  LOW LEVEL MOISTURE IN THE FORM OF UPPER
50'S AND LOW 60'S DEW POINTS MAKE SE AND S
NE MEXICO AND SW TX THE MOST VULNERABLE FOR INCRG CHANCES OF RAINFALL.
A PERSISTENT FLOW OF MOISTURE AT THE 700MB LEVEL AND GETTING OVER THE
MEXICAN MOUNTAINS WILL BEGIN TO INCR PRECIP WATER MOISTURE INTO
S CENTRAL NM/SW NM AND MAYBE AS FAR WEST AS EXT SE AZ...SO WILL HAVE
TO KEEP AN EYE ON THESE AREAS INCLUDING EXT SW TEXAS FOR DEVELOPMENT
OF HVY RAIN SHOWERS THAT COULD LEAD TO INCRG FF THREAT LATER TODAY AND
TUESDAY NIGHT.  GOES WATER SHOWED VERY SUBTLE HIGH LEVEL SHORT WAVES
ALONG THE WESTERN EDGE OF THE MOISTURE PLUME...ONE MOVING NORTH IN W
CENTRAL NM THAT WAS HELPING INCRG MID/HIGH LEVEL MOISTURE CENTRAL NM
AND OTHER ONE CENTRAL MEXICO NEAR 29N/108W THAT WILL FURTHER MOISTEN UP
S NEW MEXICO AND EXT SE AZ TODAY.
WILL CONTINUE TO MONITOR...SEE SATELLITE ANALYSIS GRAPHIC ON HOME PAGE
ADDRESS BELOW...
.
SEE NCEP HPC DISCUSSION AND QPF/S FOR FORECAST.
....NESDIS IS A MEMBER OF 12 PLANET....
.
SSD/SAB WEB ADDRESS FOR PRECIP ESTIMATES:
HTTP://WWW.SSD.NOAA.GOV/PS/PCPN/
...ALL LOWER CASE EXCEPT /PS/PCPN/
.
LAT...LON 3321 10574 3040 10529 2954 10860 3214 10928 3292 10866

.
NNNN
```

```
AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE EL PASO TX/SANTA TERESA NM
249 AM MDT TUE JUN 23 2009

.SYNOPSIS...
A MOIST PLUME OF TROPICAL AIR IS MOVING INTO THE BORDERLAND BETWEEN
AN UPPER LEVEL HIGH TO OUR EAST AND UPPER TROUGH TO OUR WEST. THIS
PATTERN WILL BRING SCATTERED SHOWERS AND THUNDERSTORMS TO MUCH OF
THE AREA TODAY AND TONIGHT. SOME OF THE RAIN MAY BE HEAVY AND
FLOODING OF A FEW AREA ROADS IS POSSIBLE.

AS THE UPPER LEVEL HIGH BUILDS WESTWARD LATER WEDNESDAY AND
THURSDAY THE PLUME OF MOISTURE WILL BE PUSHED FARTHER WEST
DECREASING RAIN CHANCES FOR AREAS EAST OF THE RIO GRANDE WHILE
CONTINUING THE THREAT OF THUNDERSTORMS FARTHER WEST.

TEMPERATURE WILL BE A LITTLE BELOW NORMAL TODAY BUT WILL INCREASE
TO NEAR OR SLIGHTLY ABOVE NORMAL OVER MUCH OF THE AREA BY THE END
OF THE WEEK.

&&

.DISCUSSION...
WITH FAIR AMOUNT OF WEATHER IN THE AREA WILL KEEP THIS SHORT.
SIGNIFICANT MOISTURE PLUME CONTINUES OVER REGION ATTM. VORT AXIS
TRANSLATING NW FROM SOUTH-CENTRAL PTNS OF CWA BRINGING MODERATE TO
HVY RAIN IN SEVERAL SPOTS. EXPECT CONTINUED SLOW NW MOVEMENT
THROUGH THE MORNING. NESDIS CONCERNED ABOUT POSSIBILITY OF
PRECURSOR RAINFALL EVENT ASSOCIATED WITH T.S. ANDRES SOUTHEAST OF
ACAPULCO. NOT SURE I SEE IT IN CURRENT SATELLITE IMAGERY..HOWEVER
WITH PWS ALREADY AROUND 1.50 INCHES PER BLENDED TPW PRODUCT
LOCALLY HEAVY RAIN IS POSSIBLE MOST ANYWHERE IN CWA TODAY AND
TONIGHT. AM WEIGHING ISSUING FFA FOR PORTIONS OF AREA. PRIMARY
CHANGES TO GRIDS WERE MADE IN FIRST 36 HRS INCREASING
POPS/QPFS/CLOUD COVER WITH LITTLE CHANGE THEREAFTER.

MODELS CONTINUE TO SHOW HIGH BUILDING WEST WITH PLUME DISPLACED TO
NM/AZ BORDER FOR WEDNESDAY THROUGH FRIDAY.

&&
```

Lance F. Bosart
Department of Atmospheric and Environmental Sciences
The University at Albany/SUNY/ES-227 1400 Washington Avenue Albany, NY 12222 USA

Email: bosart@atmos.albany.edu
Phone: 518-442-4564
Fax: 518-442-4494

==========

From: Dan Keyser [keyser@ginkgo.atmos.albany.edu]
Sent: Thursday, June 25, 2009 4:57 PM
To: Barbara J Zampella
Cc: bosart@ginkgo.atmos.albany.edu; keyser@ginkgo.atmos.albany.edu
Subject: Input for next CSTAR 6-month report: Th. 6/25/09

Thursday 25 June 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

CSTAR research on warm-season cutoff lows is mentioned by Tom Wasula in the first and second paragraphs of the long-term section of this afternoon's AFD issued by NWS ALY.

Dan

cc: Lance

FXUS61 KALY 252005
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
405 PM EDT THU JUN 25 2009

.SYNOPSIS...
A WEAK COLD FRONT...WHICH WAS JUST WEST OF LAKE ONTARIO...WILL MOVE TOWARD OUR REGION TONIGHT...AND SLOWLY CROSS OUR REGION OVERNIGHT INTO FRIDAY.

&&

.LONG TERM /SUNDAY NIGHT THROUGH THURSDAY/...
THE EXTENDED FCST FEATURES A VERY SHOWERY AND UNSETTLED PATTERN WITH A PAIR OF CUTOFF LOWS IMPACTING THE FORECAST AREA. CSTAR RESEARCH ON WARM SEASON CUTOFF LOWS HAVE SHOWN THESE FEATURES TO BE VERY PESKY AND TROUBLESOME IN TERMS OF GETTING THE SENSIBLE WEATHER RIGHT.

THE FIRST H500 CUTOFF/CLOSED CIRCULATION SHIFTS EASTWARD OFF THE NEW ENGLAND COAST SUNDAY NIGHT. HOWEVER...ANOTHER CUTOFF LOW MOVES INTO THE WRN-NRN GREAT LAKES REGION MONDAY MORNING BASED ON THE GFS/CAN GGEM/ECMWF/GEFS MONDAY MORNING. THIS LOOKS POTENTIALLY

TO BE A CLASSIC GREAT LAKES CUTOFF LOW FROM THE CSTAR RESEARCH...WHERE IT SLOWLY CHURNS E/SE ACROSS THE GREAT LAKES REGION...AND INTO THE UPPER MID ATLANTIC REGION INTO THE MID WEEK. MONDAY SHOULD START OUT FAIRLY DRY...BUT THE FIRST IMPULSE TIED TO THE CUTOFF...AND THE OCCLUDED BOUNDARY IN CONNECTION TO THE DOWNSTREAM ONE COULD TRIGGER SOME PM SHOWERS. THE GFS DOESN/T PROG TOO MUCH INSTABILITY...WE KEPT THUNDER OUT FOR NOW.

TUESDAY THRU WEDNESDAY...EACH DAY A VORT MAX ROTATING AROUND THE CUTOFF WILL MOVE THROUGH THE FCST AREA. THE GFS HAS LIFTED INDICES OF -1 TO -3C TUE PM...AND -1C TO -5C ON WED OVER THE BULK OF THE FCST AREA. THE SURFACE BASED INSTABILITY EACH DAY IS IN THE 500-1000 J/KG RANGE...AND THE MID LEVEL LAPSE RATES ARE NOT SUPER STEEP YET /AROUND 6C/KM/ DESPITE THE COLD POOL ALOFT. IT IS DAYS 5 AND 6...SO THESE MAY BE UNDERDONE A LITTLE THAT FAR OUT. WE WILL CONTINUE TO MENTION A CHANCE OF SHOWERS AND THUNDERSTORMS IN THE HAZARDOUS WEATHER OUTLOOK. THE CONVECTION WILL BE TIED TO THE DIURNAL HEATING...SO WE KEPT THE THUNDER CHANCES IN THE GRIDS NOON TO MIDNIGHT. PRECIPITABLE WATER VALUES WILL BE RUNNING A BIT HIGH IN THE 1-1.5" INCH RANGE...SO SOME HEAVY DOWNPOURS WITH THESE PWATS ABOUT A STANDARD DEVIATION ABOVE NORMAL WILL ALSO BE POSSIBLE.

THURSDAY...THERE WILL STILL BE A CHANCE OF SHOWERS WITH THE CUTOFF LOW LIKELY SOMEWHERE OVER NY/PA...POTENTIALLY LIFTING NORTHEAST INTO NRN NEW ENGLAND AND SOUTHERN QUEBEC. HOWEVER...ANOTHER DISTURBANCE MOVING THROUGH THE LONGWAVE TROUGH UPSTREAM...MAY KEEP THE UNSETTLED WEATHER THROUGH THE ENTIRE WORK WEEK.

OVERALL...TEMPS LOOK LIKE THEY WILL BE SLIGHTLY BELOW NORMAL WITH GENERALLY H850 VALUES OF 10-12C WITH HIGHS IN THE 70S TO L80S...AND LOWS IN THE 50S TO L60S ACROSS THE FCST AREA. PCPN DUE TO THE CUTOFF LOOKS LIKE IT WILL BE ABOVE NORMAL.

&&
$$

SYNOPSIS...NAS
LONG TERM...TAW

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Monday, June 29, 2009 12:56 PM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Input for next CSTAR 6-month report: Mon. 6/29/09

Monday 29 June 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

CSTAR research on warm-season cutoff lows is mentioned by Tom Wasula in the second paragraph of the short-term section of this morning's AFD issued by NWS ALY.

Dan
cc: Lance

FXUS61 KALY 290831
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
431 AM EDT MON JUN 29 2009

.SYNOPSIS...
A STRONG UPPER LEVEL LOW OVER THE GREAT LAKES REGION WILL KEEP THE WEATHER UNSETTLED THROUGH MOST OF THE WORK. THIS SLOW MOVING CUTOFF LOW WILL PRODUCE SCATTERED SHOWERS AND ISOLATED THUNDERSTORMS TODAY. THERE WILL BE MORE WIDESPREAD SHOWERS AND SCATTERED STRONG THUNDERSTORMS TUESDAY AND WEDNESDAY...AS DISTURBANCES ROTATE AROUND THE UPPER LOW.

&&

.SHORT TERM /6 PM THIS EVENING THROUGH WEDNESDAY/...
MONDAY NIGHT...ANY ISOLD-SCT SHOWERS LEFTOVER...ESPECIALLY OVER THE HIGHER TERRAIN SHOULD DIMINISH WITH THE LOSS OF THE DAY TIME HEATING. WE WENT RELATIVELY DRY HERE...AS THE CUTOFF OVER THE GREAT LAKES REGION SLOWLY CHURNS DOWNSTREAM TOWARD THE REGION.VARIABLE CLOUDINESS COUPLED WITH LIGHT WINDS IN THE BOUNDARY LAYER COULD ALLOW SOME RADIATIONAL COOLING EARLY ON...BEFORE SOME MID AND HIGH CLOUDS INCREASE AHEAD OF A SHORT WAVE TROUGH...AND A SFC OCCLUDED FRONT.

TUESDAY MAY BE SHAPING UP FOR SOME STRONG TO SEVERE THUNDERSTORMS. CSTAR WARM SEASON CLOSED LOW RESEARCH CASES HAVE SHOWN A FAVORABLE SYNOPTIC SET UP SIMILAR TO THIS DAY. THE CUTOFF AND ITS ASSOCIATED SFC REFLECTION ARE NEAR LAKE HURON AND GEORGIAN BAY WITH AN OCCLUDED FRONT APPROACHING ERN NY DURING THE PM. A POTENT MID LEVEL JET STREAK OF 40-60 KTS EXTENDS FROM THE MID ATLANTIC REGION INTO SRN NY AND SRN NEW ENGLAND. THE HEART OF OUR FCST AREA WILL BE IN THE LEFT FRONT QUADRANT OF THE CYCLONICALLY CURVED JET WITH POTENTIALLY 1000-1500 J/KG OF SBCAPE. THE 0-6 KM DEEP SHEAR VALUES ARE AROUND 40 KTS. WET BULB ZERO HEIGHTS ARE IN THE 8-10 KFT AGL RANGE WITH MID LEVEL LAPSE RATES APPROACHING 6.5C/KM.

WITH SUFFICIENT BOUNDARY LAYER HEATING...WE ARE EXPECTING MULTI-CELLULAR CONVECTION TO POTENTIALLY EVOLVE INTO SMALL LINES OR CLUSTERS WITH THE THREAT OF MARGINAL SEVERE HAIL AND DAMAGING WINDS. WE HAVE ADDED ENHANCED WORDING TO THE ZONES/GRIDS FOR SMALL HAIL AND GUSTY WINDS FOR NOW. WE DO AGREE WITH SPC/S DAY 2 DISCUSSION...BUT BASED ON PAST RESEARCH WITH THESE SYSTEMS WOULDN/T BE OUT OF THE QUESTION TO SEE POSSIBLY A SLIGHT RISK LATER. WE ARE GOING TO MENTION THE POSSIBLY OF A FEW SEVERE THUNDERSTORMS IN THE HWO NOW.

TUE NIGHT...ANY ONGOING CONVECTION WILL DIMINISH THROUGH THE EARLY EVENING WITH SCT SHOWERS PERSISTING THEREAFTER. THIS SHOULD BE A PRETTY MUGGY MORNING WITH SFC DEWPOINTS CLIMBING INTO THE 60S IN THE VALLEYS. WE WENT WITH THE WARMER NAM MOS TEMPS WITH LOWS IN 60-65 RANGE IN THE VALLEYS/HILLTOWNS AND GENERALLY U50S OVER THE MTNS.

WEDNESDAY...THIS IS WHERE THE CUTOFF BECOMES EVEN TOUGHER TO DISTINGUISH WHAT SENSIBLE WHETHER TO DECIPHER. ANOTHER SHORT WAVE IMPULSE WILL ROTATE AROUND THE CUT OFF...AS IT SITS NEAR GEORGIAN BAY. THERE IS ENOUGH SBCAPE FOR SCT TSRAS AGAIN /500-1000 J/KG/...BUT PRECIPITABLE WATER VALUES ARE RISING TO 1-1.5". THESE ARE ABOUT A STANDARD DEVIATION ABOVE NORMAL. THE DEEP SHEAR IS LESS WITH THE CUTOFF CLOSER. SOME SLOWING MOVING SHOWERS/THUNDERSTORMS WILL LIKELY OCCUR WITH HEAVY RAINFALL. WE WILL HAVE TO WATCH FOR POOR DRAINAGE OR SMALL STREAM FLOODING IF ANY CONVECTION TRAINS OVER REPEATED AREAS. MAX TEMPS LOOK TO BE ABOUT 5 DEGREES COOLER THAN PREVIOUS FEW DAYS.

&&
$$
SYNOPSIS...WASULA
SHORT TERM...WASULA

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Tuesday, June 30, 2009 9:42 AM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Input for next CSTAR 6-month report: Tues. 6/30/09

Tuesday 30 June 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

CSTAR research on warm-season cutoff lows is mentioned by Tom Wasula in the first paragraph of the near-term section and in the second paragraph of the short-term section of this morning's AFD issued by NWS ALY.

Dan
cc: Lance

FXUS61 KALY 301130
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
730 AM EDT TUE JUN 30 2009

.SYNOPSIS...
A STRONG UPPER LEVEL LOW NEAR THE EASTERN GREAT LAKES REGION WILL KEEP THE WEATHER UNSETTLED THROUGH MOST OF THE WORK WEEK. THIS SLOW MOVING CUTOFF LOW WILL PRODUCE SHOWERS AND THUNDERSTORMS OVER THE NEXT FEW DAYS...AS DISTURBANCES ROTATE AROUND THE UPPER LOW. SOME OF THE THUNDERSTORMS THIS AFTERNOON INTO THE EARLY EVENING MAY BECOME SEVERE WITH HEAVY RAINFALL AND HAIL.

&&

.NEAR TERM /UNTIL 6 PM THIS EVENING/...
AS OF 400 AM EDT...THE LATEST SATELLITE IMAGERY THIS MORNING HAS A CUTOFF LOW CENTERED NEAR LAKE HURON. THIS CUTOFF WITH ITS ASSOCIATED COLD POOL /H500 TEMPS OF -15C TO -17C OVER MI/ WILL BE IMPACT THE FORECAST AREA TODAY THROUGH MOST OF THE WEEK.FORECASTER CONFIDENCE IS HIGH FOR THE AFTERNOON PERIOD FOR THE POTENTIAL OF STRONG TO SEVERE CONVECTION. PAST AND PRESENT CSTAR RESEARCH ON

WARM SEASON CUTOFF LOWS HAS SHOWN MINOR/MAJOR SEVERE WEATHER BOUTS CAN OCCUR OVER THE NORTHEAST. THE SYNOPTIC PATTERN AND CONVECTIVE PARAMETERS FROM THE NAM/GFS INDICATE MARGINAL SEVERE HAIL AND/OR WIND DAMAGE WITH BOWING SEGMENTS WILL BE POSSIBLE. WE AGREE WITH SPC FOR THE SLIGHT RISK TODAY ACROSS ERN NY AND WRN NEW ENGLAND.

THE CUTOFF HAS A NEUTRAL TILT WITH A SHORT WAVE TROUGH THAT WILL BE SLICING THROUGH THE REGION DURING THE PM. AT THE SFC...AN OCCLUDED FRONT IN ASSOCIATION WITH THE MID LEVEL SHORT WAVE WILL FOCUS THE SHOWERS AND THUNDERSTORMS. STRONG DIFFERENTIAL CYCLONIC VORTICITY ADVECTION WILL BE ONGOING. ALOFT...A MID-/UPPER- LEVEL JET STREAK WILL BE SETTING UP OVER THE MID ATLANTIC REGION/SRN NY/SRN NEW ENGLAND. AN AREA OF UPPER LEVEL DIVERGENCE WILL BE OVER ERN NY AND WRN NEW ENGLAND...AS WE WILL BE LOCATED ON THE CYCLONIC EXIT REGION/LEFT FRONT QUADRANT OF THE JET STREAKS. SFC DEWPOINTS WILL BE POOLING IN THE SOUTHERLY FLOW IN THE BOUNDARY LAYER INTO THE U50S TO POSSIBLY MID 60S. PRECIPITABLE WATER VALUES WILL GENERALLY BE IN THE 1-1.50 INCH RANGE. LOW-LEVEL THETA-E ADVECTION WILL BE INCREASING AHEAD OF THE IMPULSE ROTATING AROUND THE CUTOFF. SBCAPE VALUES ARE IN THE 1000-1500 J/KG RANGE FROM THE NAM...WITH POCKETS OF SLIGHTLY GREATER AMOUNTS. THE GFS SHOWS SOME CIN AND LIMITED INSTABILITY SOUTH OF THE CAPITAL REGION DUE TO STRATUS/LIMITED HEATING FROM THE MARINE AIR. WE THINK THIS IS A LITTLE OVERDONE...AND THINK SBCAPE VALUES OF AT LEAST 1000 J/KG ARE POSSIBLE THERE. THE H500 TEMPS ARE GOING TO COOL TO -12C TO -15C OVER THE REGION. MID LEVEL LAPSE RATES APPROACH 6-6.5C/KM. THE DETERMINISTIC GUIDANCE DOESN/T COOL THEM MUCH LOWER...SINCE THE CORE OF THE COLDEST AIR REMAINS WEST OF THE HUDSON RIVER VALLEY.

THE 0-6 KM BULK SHEAR IS GENERALLY 30-40 KTS WITH ORGANIZED CONVECTION LIKELY OF THE MULTI-CELLULAR VARIETY EVOLVING INTO LINES/CLUSTERS. IN TERMS OF THE HAIL THREAT...FREEZING LEVEL AND WET BULB ZERO HEIGHTS ARE IN THE 8.5-10 KFT AGL RANGE...WHICH PAST OFFICE RESEARCH HAS SHOWN TO BE QUITE OPTIMAL FOR SEVERE HAIL..IF SBCAPE VALUES OF AROUND 1000 J/KG ARE REALIZED. OUR LOCAL MAGLENTA SEVERE WEATHER INDEX YIELDS A MINOR SEVERE EVENT DUE TO LOW EHI VALUES WELL UNDER 1...AND 0-3 KM SRH VALUES WELL UNDER 100. THIS CONDITIONAL SEVERE WEATHER INDEX WILL HAVE A BETTER HANDLE OF THE POTENTIAL SEVERE WEATHER SITUATION WITH A 12/18Z SOUNDING.

WE EXPECT SOME SUNSHINE TO OCCUR ACROSS MUCH OF ERN NY IN THE PM TO HELP DESTABILIZE THE BOUNDARY LAYER...AND ALLOWING MAX TEMPS IN THE MID 70S TO NEAR 80 IN THE VALLEYS...AND U60S TO MID 70S OVER THE HILLS AND MTNS. WE PLACED ENHANCED WORDING FOR POSSIBLE SEVERE

THUNDERSTORMS...WITH DAMAGING WINDS...AND LARGE HAIL. HVY RAINFALL WILL ALSO BE POSSIBLE WITH ANY CONVECTION.

&&

.SHORT TERM /6 PM THIS EVENING THROUGH THURSDAY/...
TUE NIGHT...THE THREAT FOR ANY SEVERE CONVECTION WILL WANE WITH THE LOSS OF THE DAYTIME HEATING. WE KEPT SEVERE WORDING IN THE GRIDS UNTIL 01Z/9 PM. THE CONCERN INCREASES FOR HVY RAINFALL...AS THE 00Z LOCAL WRF RUN HERE AND THE NAM12 DO SHOW A CONVECTIVE BULLSEYE OF QPF FOR POSSIBLE TRAINING THUNDERSTORMS IN THE UPPER HUDSON RIVER VALLEY NORTHWARD INTO THE CHAMPLAIN VALLEY. THERE COULD BE SOME OROGRAPHIC ENHANCEMENT OFF THE NRN ADIRONDACKS TOO.WE WILL CONTINUE THE MENTION OF HVY RAINFALL WITH THE DIMINISHING CONVECTION UNTIL MIDNIGHT. WE LOWERED THE POPS TO CHANCE VALUES AFTER MIDNIGHT...EXCEPT WE KEPT LIKELY VALUES NORTH AND EAST OF THE CAPITAL REGION AND SARATOGA SPRINGS. ANY PARTIAL CLEARING COUPLED WITH SFC DEWPOINTS IN THE 60S...AND WET GROUND WILL ALLOW PATCHY DENSE FOG FORMATION.

WEDNESDAY... THE CUTOFF REMAINS CENTERED OVER LAKE HURON AND GEORGIAN BAY. ANOTHER VORT MAX ROTATES AROUND IT ACROSS ERN NY AND WRN NEW ENGLAND WITH MORE SHOWERS AND THUNDERSTORMS...ESPECIALLY TIED TO THE DIURNAL HEATING. IT IS A BIT MURKIER IN TERMS OF THE SEVERE WEATHER THREAT ON THIS DAY. THERE IS LESS INSTABILITY AND DEEP SHEAR. THE GFS DOES PAINT AN INSTABILITY AXIS OF 1500-2000 J/KG IN THE HUDSON RIVER VALLEY...BUT THAT IS WITH SFC DEWPOINTS IN THE U60S TO NEAR 70 /THIS LOOKS OVER DONE/. PWATS REMAIN SOMEWHAT HIGH AT 1-1.50 INCHES. THE GLOBAL AND SHORT RANGE ENSEMBLES INDICATE THESE PWATS ARE BARELY A STANDARD DEVIATION ABOVE NORMAL. CHANNELED S/SW FLOW COULD ALLOW SOME TRAINING AGAIN. PAST CSTAR HAS SHOWN GETTING THE SENSIBLE WEATHER RIGHT WITH CUTOFFS IS VERY DIFFICULT. WE KEPT THE HEAVY RAINFALL ENHANCED WORDING WITH ANY CONVECTION ON WED. WE WILL MENTION HEAVY DOWNPOURS IN THE HWO. WE WILL HAVE TO BE VIGILANT FOR ANY ISOLD FLASH FLOODING...WHICH WILL HINGE ON WHERE ANY HEAVY RAIN FALLS ON TUE. FORECASTER CONFIDENCE IS NOT HIGH ON THE FLASH FLOOD THREAT AT THIS TIME.

WEDNESDAY NIGHT INTO THURSDAY...NOT MUCH CHANGES WITH THE UNSETTLED WEATHER CONTINUING WITH THE CUTOFF. THE GOOD NEWS IS THAT IT IS BEGINNING TO LIFT N/NE TO NEAR OTTAWA. A SFC TROUGH EXTENDS SOUTHEAST TO NEW SOUTHWESTERN NEW ENGLAND WITH PERHAPS THE MODERATE TO HEAVY RAINFALL SHIFTING EASTWARD ACROSS NEW ENGLAND.WE CONTINUED LIKELY POPS WITH JUST ISOLD TSRAS THU PM. MOST THE FORECAST AREA SHOULD RECEIVED 1-2" OF RAINFALL WITH LOCALLY

HIGHER AMOUNTS BY THU EVENING. MAX TEMPS WILL CONTINUE TO RUN ABOUT 5-10 DEGREES BELOW NORMAL IN THE MOIST AND UNSETTLED AIR MASS. MIN TEMPS WILL ACTUALLY RUN A LITTLE ABOVE NORMAL.

&&
$$

SYNOPSIS...WASULA
NEAR TERM...WASULA
SHORT TERM...WASULA

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Wednesday, July 01, 2009 10:32 AM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Input for next CSTAR 6-month report: Wed. 7/1/09

Wednesday 1 July 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

CSTAR research on warm-season cutoff lows is mentioned by Tom Wasula in the first paragraph of the near-term section of this morning's AFD issued by NWS ALY.

Dan
cc: Lance

FXUS61 KALY 011056
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
656 AM EDT WED JUL 1 2009

.SYNOPSIS...
A STRONG UPPER LEVEL LOW NEAR THE EASTERN GREAT LAKES REGION WILL KEEP THE WEATHER UNSETTLED TODAY THROUGH FRIDAY. THIS SLOW MOVING CUTOFF LOW WILL PRODUCE SHOWERS AND THUNDERSTORMS OVER THE NEXT FEW DAYS...AS DISTURBANCES ROTATE AROUND THE UPPER LOW. THE SHOWERS AND THUNDERSTORMS TODAY THROUGH TONIGHT WILL PRODUCE VERY HEAVY RAINFALL ACROSS PORTIONS OF THE FORECAST AREA.
&&
.NEAR TERM /UNTIL 6 PM THIS EVENING/...
THE WATER VAPOR LOOP THIS MORNING CONTINUES TO SHOW A CUTOFF LOW OVER LAKE HURON AND GEORGIAN BAY. IT IS IN A CLASSIC GREAT LAKES REGION POSITION TO PRODUCE HEAVY RAIN...STRONG CONVECTION...AND POTENTIAL FLOODING FOR PORTIONS OF THE NORTHEAST BASED ON CSTAR RESEARCH. THIS FEATURE WILL CONTINUE TO IMPACT THE FORECAST AREA THE NEXT FEW DAYS. THE FIRST ROUND OF STRONG TO SEVERE CONVECTION AND HVY RAINFALL MOVED THROUGH YESTERDAY WITH THE HUDSON RIVER VALLEY E/NE INTO SOUTHERN VT HIT THE HARDEST. ALSO PORTIONS OF THE MOHAWK VALLEY HAD VERY HEAVY RAINFALL WITH SOME FLASH FLOODING IN MONTGOMERY COUNTY. THE PUMP HAS BEEN PRIMED WITH THE HEAVY RAINFALL...AND LOWERING 1/3/6-HR FLASH FLOOD GUIDANCE VALUES

...SATURATED GROUND...AND THE POSSIBILITY OF TRAINING SHOWERS AND THUNDERSTORMS TODAY HAS PROMPTED US TO ISSUE A FLASH FLOOD WATCH TODAY AND TONIGHT.

AFTER THE PATCHY DENSE FOG BURNS OFF TODAY...ANOTHER SHORT WAVE TROUGH WILL PIVOT AROUND THE CUTOFF LOW TOWARDS THE REGION. IT LOOKS LIKE THE BOUNDARY LAYER/SFC HEATING WILL BE LESS TODAY COMPARED TO YESTERDAY. THE DEGREE OF INSTABILITY IS IN QUESTION. THE NAM INDICATES SBCAPES OF 500-1000 J/KG ACROSS THE FCST AREA WITH THE GREATER AMOUNTS SOUTH OF THE CAPITAL REGION. THE GFS ADVERTISES SBCAPES OF 1000-2500 J/KG...WITH 2000+ J/KG SOUTH OF THE CAPITAL REGION. HOWEVER...THIS LOOKS WAY OVER DONE...SINCE THE GFS HAS SFC DEWPOINTS IN THE U60S TO L70S IN THIS AREA. A CURRENT CHECK OF THE SFC OBS SHOWS DEWPOINTS IN THE MID 50S TO L60S ACROSS THE REGION.WE ARE NOT BUYING INTO THE GFS. WET BULB ZERO HEIGHTS LOOK TO BE A TAD LOWER IN THE 7.5-9.5 KFT AGL RANGE. THE MID LEVEL LAPSE RATES ALSO LOOK WEAKER TODAY AT 5.5-6C/KM. 0-6 KM BULK SHEAR VALUES ARE ALSO SLIGHTLY LOWER AT 25-35 KTS. SOME LOOSELY ORGANIZED CONVECTION INTO LINES WILL BE POSSIBLE. WE CAN/T RULE OUT ISOLATED SEVERE TSRAS...AND KEPT ENHANCED WORDING OF SMALL HAIL AND GUSTY WINDS IN FROM THE CAPITAL REGION SOUTH...WHICH JIVES WITH SPC/S LATEST DAY 1 GRAPHIC.

THE BIGGER THREAT LOOKS LIKE CONVECTIVE DOWNPOURS OR TRAINING SHOWERS AND THUNDERSTORMS. PRECIPITABLE WATER VALUES WILL BE RISING INTO THE 1-1.5" RANGE. THESE ARE SLIGHTLY ABOVE NORMAL FOR JULY 1ST /ABOUT A STANDARD DEVIATION ABOVE NORMAL/. KALB/S NORMAL VALUE IS AROUND 1.1" RIGHT NOW. THE H850 THETA-E RIDGE WILL BE OVER THE HUDSON RIVER VALLEY/WRN NEW ENGLAND. THE LOW LEVEL JET WILL BE ABOUT 20-30 KTS. THE ASSORTED MODEL GUIDANCE PLACES THE HVY QPF AXIS IN DIFFERENT LOCATIONS OVER THE FCST AREA. HOWEVER...WE ARE LEANING CLOSER TO THE 12Z/00Z ECMWF...HPC GUIDANCE...AND TO AN EXTENT THE NAM 12 WITH THE LOWER CATSKILLS...MID HUDSON VALLEY EASTWARD INTO WRN NEW ENGLAND HAVING THE BEST CHANCE FOR VERY HEAVY RAINFALL. WE WILL PLACE THE FLASH FLOOD WATCH OVER THE ENTIRE FORECAST AREA /AGAIN WESTERN ZONES MAYBE LESS VULNERABLE/ TIL 10Z THU. THANKS FOR THE OFFICE COLLAB.

TEMPS TODAY LOOK COOLER WITH MORE CLOUD COVER AND LESS HEATING WITH HIGHS GENERALLY IN THE LOWER TO MID 70S...EXCEPT SOME MID AND UPPER 60S OVER THE SRN GREENS...SRN ADIRONDACKS...AND ERN CATSKILLS.
&&
$$
SYNOPSIS...WASULA
NEAR TERM...WASULA

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Thursday, July 02, 2009 11:16 AM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Input for next CSTAR 6-month report: Th. 7/2/09

Thursday 2 July 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

CSTAR research on warm-season cutoff lows is mentioned by Tom Wasula in the last line of the second paragraph of the near-term section of this morning's AFD issued by NWS ALY.

Dan
cc: Lance

FXUS61 KALY 021037
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
637 AM EDT THU JUL 2 2009

.SYNOPSIS...
A STRONG UPPER LEVEL LOW NEAR THE EASTERN GREAT LAKES REGION WILL KEEP THE WEATHER UNSETTLED THE NEXT FEW DAYS. THIS SLOW MOVING CUTOFF LOW WILL RESULT IN SHOWERS AND THUNDERSTORMS WITH VERY HEAVY RAINFALL TODAY AND TONIGHT...AS A WAVE OF SURFACE LOW PRESSURE MOVES ACROSS THE REGION. THE UPPER LOW WILL BEGIN TO MOVE NORTHEAST OVER SOUTHERN QUEBEC ON FRIDAY...STILL PROVIDING A CHANCE OF SHOWERS AND THUNDERSTORMS.

&&

.NEAR TERM /UNTIL 6 PM THIS EVENING/...
AT 330 AM EDT...THE WATER VAPOR LOOP WITH H500 HEIGHTS FROM THE GFS40 OVERLAYED CONTINUES TO SHOW A GREAT LAKES CUTOFF LOW SPINNING NEAR LAKE HURON AND GEORGIAN BAY. ROUND 3 OF ACTIVE WEATHER IS BEGINNING WITH THIS CUTOFF. THE 2ND ROUND OF SIGNIFICANT WEATHER RESULTED IN SEVERAL FLASH FLOODS IN AN AROUND THE CAPITAL REGION. THERE WAS ALSO A MINOR SEVERE EVENT WITH MARGINAL HAIL AND ISOLD DAMAGING WINDS.

THE INTERESTING FEATURE TO DEAL WITH FIRST TODAY IS THE SFC TROUGH/OR WAVE OF LOW PRESSURE THAT HAS DEVELOPED ALONG THE BASED OF THE LONGWAVE TROUGH ASSOCIATED WITH THE CUTOFF. THE LATEST MSAS DATA SHOWS THE TROUGH OF LOW PRESSURE OVER SRN NJ. ANOTHER WEAK SFC WAVE CLOSER TO THE CUTOFF IS OVER WRN NY/LAKE ONTARIO. A FAIRLY ROBUST BAND OF SHOWERS WITH EMBEDDED THUNDERSTORMS IS APPROACHING ERN NY. IT IS A SYNOPTIC RAINBAND IN ASSOCIATION WITH THE CUTOFF. WE HAVE SEEN THESE FEATURES WITH SOME OF THE CUTOFF CASES IN CSTAR WITH THE UALBANY /FOR EXAMPLE...14-17 JUL 2000/.

THE HYDRO PUMP CONTINUES TO BE PRIMED OVER THE CAPITAL REGION AND LOCATIONS NORTH OF THE FORECAST FOR THE CONTINUE POTENTIAL OF FLASH FLOODING. A VERY MOIST ENVIRONMENT IS IN PLACE WITH THE 00Z KALB SOUNDING HAVING A PRECIPITABLE WATER /PWAT/ VALUE OF 1.43".THIS VALUE IS ABOUT A STANDARD DEVIATION ABOVE NORMAL. WE ARE EXPECTING PWATS BASED ON THE NAM/GFS TO BE IN THE 1.25-1.66" RANGE TODAY. THE GFS HAS THE LOW LEVEL THETA-E RIDGE /1000-850 HPA/ AXIS SHIFTING WEST OVER THE MOHAWK VALLEY/CATSKILLS...WHILE THE NAM CONTINUES TO SHOW IT OVER THE HUDSON RIVER VALLEY/CAPITAL REGION INTO WRN NEW ENGLAND. THE H850 FLOW CONTINUES TO BE FAIRLY WEAK AT 10-20 KTS FROM THE S/SE. WE ARE EXPECTING TRAINING SHOWERS AND THUNDERSTORMS. HOURLY RAIN AMOUNTS COULD EXCEED 1 INCH IN AN HOUR.

THE NEBULOUS AREA IN THE FCST IS SEVERE WEATHER. SPC CONTINUES TO HAVE FROM APPROX THE CAPITAL REGION...SRN VT SOUTH IN A SLIGHT RISK. WE AGREE THAT ONCE THIS RAINBAND OF SHOWERS AND THUNDERSTORMS LIFTS NORTH WITH THE WAVE...THAT SOME LOCATIONS MAY CLEAR A LITTLE TO THE SOUTH. THERE IS A SHORT WAVE EVIDENT ON THE WATER VAPOR LOOP OVER SE MI/WRN LAKE ERIE THAT WILL BE APPROACHING IN THE LATE PM/EARLY EVENING. THE GFS SHOWS SBCAPE VALUES OF 750-1250 J/KG FROM THE CAPITAL DISTRICT SOUTH WITH BETTER SFC DEWPOINTS TODAY IN THE MID 60S TO POSSIBLY U60S NEAR KPOU. THE NAM SHOWS LESS SBCAPE IN THE 500-1000 J/KG RANGE WITH LIFTED INDICES OF -1C TO -3C. THE DEEP BULK SHEAR /0-6 KM/ IN BOTH MODELS CONTINUES TO BE 30-35 KTS ESPECIALLY SOUTH OF THE CAPITAL REGION AND THE BERKSHIRES. A BAND OF ORGANIZED CONVECTION IS POSSIBLE IN A CLUSTER/LINE. THE MID LEVEL LAPSE ARE AROUND 6C/KM...SO A FEW SEVERE THUNDERSTORMS WITH MARGINAL HAIL/DAMAGING WINDS COULD OCCUR...IF ENOUGH SFC DESTABILIZATION OCCURS WITH CAPE VALUES APPROACHING 1000 J/KG. WE DON/T THINK SRN VT WILL BE IN THE MIX...SO IN THE GRIDS/ZONES WE WILL PHRASE IT FROM THE CAPITAL REGION...SCHOHARIE VALLEY...BERKSHIRES SOUTH...THAT A FEW STORMS MAYBE SEVERE. THE BIGGER THREAT WILL CONTINUE TO BE THE HVY RAINFALL.MORE DISCUSSION ON RAINFALL IN THE NEXT SEGMENT.

TEMPS TODAY LOOK LIKE THEY WILL BE ABOUT 5-7 DEGREES COOLER THAN YESTERDAY WITH MORE CLOUDS AND MORNING RAINFALL. WE USED A BLEND OF THE AVN/NAM MOS MAXES.

&&
$$

SYNOPSIS...WASULA
NEAR TERM...WASULA

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Sunday, July 05, 2009 5:00 PM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Input for next CSTAR 6-month report: Sun. 7/5/09

Sunday 5 July 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

CSTAR research on warm-season cutoff lows is mentioned in the third-to-last sentence of the second paragraph of the short-term section of this afternoon's AFD issued by NWS ALY.

Dan
cc: Lance

FXUS61 KALY 051946
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
346 PM EDT SUN JUL 5 2009

.SYNOPSIS...
ANOTHER UPPER LEVEL LOW PRESSURE SYSTEM WILL MOVE ACROSS THE REGION EARLY THIS WEEK AND BRING CLOUDS ALONG WITH A CHANCE FOR SHOWERS AND THUNDERSTORMS. WARMER AND DRIER WEATHER IS EXPECTED FOR THE SECOND HALF OF THIS WEEK.

&&

.SHORT TERM /MONDAY THROUGH TUESDAY NIGHT/...
AS SEEN IN THE H2O VAPOR IMAGERY...NEXT UPPER LOW IS POISED TO TRACK EAST-SOUTHEAST THE NEXT 24-48 HOURS. GIVEN THE COMPLEXITY OF THESE SYSTEMS...NCEP MODEL SUITE AN INTERNATIONAL GLOBAL MODELS ARE HAVING A DIFFICULT TIME WITH PLACEMENT AND INTENSITY OF THIS LOW AND ASSOCIATED SHORT WAVES. THE GFS SEEMS TO HAVE INITIALIZED THE BEST THIS MORNING WITH THE LOWER HEIGHT FIELDS AND PLACEMENT OF THIS UPPER LOW FEATURE NORTH OF LAKE SUPERIOR. CANADIAN RADAR MOSAIC REVEALS A BANDED SHOWER FEATURE WHICH MATCHES WELL WITH EXPECTED QPF FROM THE GFS/NAM/GEM BUT QUICKLY DIVERGE DUE TO SHORT WAVE PLACEMENT AND THE EVENTUAL TRACK OF THIS UPPER LOW.

CONSENSUS FAVORS A GRADUAL DECREASE IN LOWERING HEIGHTS OVER NY STATE ON MONDAY WITH PRE-FRONTAL TROUGH SLOWLY MIGRATING SOUTHWARD THROUGH THE DAY. WE WILL CONTINUE WITH THE PREVIOUS FORECAST WITH THE CHANCE FOR SHOWERS IN THE DACKS VICINITY IN THE MORNING THEN SPREAD THE CHANCE INTO THE REMAINDER OF THE CWA BY AFTERNOON. WITH COOLER TEMPS ALOFT ADVECTING INTO THE REGION AND LOWERING WET BULB ZERO HEIGHTS TO LESS THAN 10K FEET...ANY CONVECTION THAT DOES DEVELOP WILL HAVE THE POTENTIAL TO PRODUCE HAIL. MODIFIED SOUNDINGS POINT TOWARD SBCAPES CLIMBING TOWARD 1000 J/KG. PER RECENT CSTAR RESEARCH...THE INITIAL DAY TENDS TO BE MORE PROBLEMATIC WITH RESPECT TO SEVERE. IN FACT...SPC HAS NOW PLACED THE REGION INTO A SEE TEXT FOR SWODY2. CURRENT HWO LOOKS GOOD WITH MINOR UPDATES NEEDED AT THIS TIME.

THIS UPPER LOW BECOMES IN CLOSER PROXIMITY TO THE REGION ON TUESDAY AS WE ANTICIPATE ANOTHER ROUND OF SHOWERS AND THUNDERSTORMS. AFTER SOME EARLY MORNING FOG...IF WE ARE ABLE TO HEAT THE SURFACE PARCELS IT COULD PROVE TO BE AN INTERESTING DAY WITH MORE HAIL. FURTHERMORE...FORECAST WIND FIELD AND SHEAR VALUES NEAR 30KTS COULD BE ENOUGH FOR CELL ORGANIZATION AND PERHAPS THOSE WINDS REACHING THE SURFACE.

WITH SINGLE DIGIT TEMPS AT 850MB ADVECTING IN THROUGH THE DAY TUESDAY...HIGH TEMPS WILL LIKELY RANGE FROM THE 60S NORTH AND WEST OF ALBANY TO LOW-MID 70S FROM ALBANY AND POINTS EAST AND SOUTH. TUESDAY NIGHT LOWS ARE EXPECTED TO DROP BACK TO BETWEEN THE MID 40S AND LOWER 50S ALONG WITH PATCHES OF FOG.

&&
$$

SYNOPSIS...BGM
SHORT TERM...BGM

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Tuesday, July 07, 2009 2:23 PM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Input for next CSTAR 6-month report: Tues. 7/7/09

Tuesday 7 July 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

CSTAR research on severe convection associated with warm-season cutoff lows is mentioned by Tom Wasula in the third paragraph of the near-term section of a late-morning update to this morning's AFD issued by NWS ALY.

Dan
cc: Lance

FXUS61 KALY 071524
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
1124 AM EDT TUE JUL 7 2009

...SEVERE WEATHER LIKELY THIS AFTERNOON ACROSS EASTERN NY AND WESTERN NEW ENGLAND...

.SYNOPSIS...
ANOTHER UPPER LEVEL LOW PRESSURE SYSTEM WILL MOVE ACROSS THE REGION THROUGH WEDNESDAY...BRINGING MORE UNSETTLED WEATHER AND BELOW NORMAL TEMPERATURES. A BRIEF DRY PERIOD WITH MODERATING TEMPERATURES IS EXPECTED TOWARDS THE END OF THE WORK WEEK.

&&

.NEAR TERM /UNTIL 6 PM THIS EVENING/...
SEVERE THUNDERSTORM WATCH # 559 IS IN EFFECT UNTIL 7 PM EDT.

INFORMATIONAL NOTE...AN 18Z SOUNDINGS WILL BE DONE.

YET ANOTHER CUTOFF/CLOSED LOW AT H500 OVER THE ONTARIO/QUEBEC BORDER IS IMPACTING THE REGION WITH AN IMPRESSIVE SHORTWAVE MOVING IN VIA THE WATER VAPOR LOOP ACROSS LAKE ERIE/WRN NY. THIS SHORT WAVE

WILL FOCUS SCT SEVERE STORMS. ACCORDING TO THE CSTAR RESEARCH ...THIS LOOKS LIKE A CLASSIC SEVERE ENVIRONMENT FOR LARGE HAIL AND DAMAGING WINDS. BUF/S 500 HPA TEMPS IS -21C ! OUR 12Z TEMP IS -16C. AN ANOMALOUSLY COLD POOL OF AIR IS ALOFT.

THE FORECAST AREA HAS A PREFRONTAL BAND OF SHOWERS AND THUNDERSTORMS MOVING ACROSS ERN NY. WE ARE EXPECTING SOME SCT SEVERE WITH THIS LINE WITH SBCAPES ACCORDING TO THE LAPS DATA...AND A MODIFIED 12Z KALB SOUNDING RISING INTO THE 1000-1500 J/KG RANGE. LAPSE RATES CONTINUE TO STEEPEN TO ABOUT 7C/KM IN THE H850-500/H700-500 LAYERS. WET BULB ZERO HEIGHTS ARE IN THE 7.5-9 KFT RANGE ACROSS THE RANGE WHICH ARE VERY OPTIMAL FOR SEVERE HAIL WITH SUFFICIENT HEATING. THE DEEP SHEAR IN THE 0-6 KM LAYER IS ABOUT 40 KTS...WITH A STRENGTHENING LOW LEVEL FLOW IN THE AFTERNOON WITH THE APPROACHING SHORT WAVE. WE ARE EXPECTING MULTI- CELLS/ISOLD SUPER CELLS. THE TORNADO THREAT IS VERY SMALL DUE TO A WEAK LLJ/AND HIGH LCLS.

VIL OF THE DAY AT KALB FROM 12Z SOUNDING IS 41 KG/M2...WE ARE EXPECTING THIS VALUE TO DROP INTO THE UPPER 30S.

OUR EXTENDED FCST IS ALSO DONE FOR THE DAY...SEE BELOW.

...PREVIOUS NEAR TERM BELOW...

SHOWERS AND STORMS HAVE MOVED INTO ADJACENT WESTERN NEW ENGLAND AND SHOULD BE COMPLETELY OUT OF OUR CWA AFTER 400 AM. AFTER A BRIEF BREAK MORE SHOWERS FROM THE NIAGARA FRONTIER WILL HEAD INTO OUR ADIRONDACKS BY SUN RISE OR A LITTLE LATER.

THEN...THE MAIN ENERGY ASSOCIATED WITH THE UPPER AIR LOW LOCATED NORTH OF SUE SAINT MARIE MI (A SURFACE COLD FRONT)...AIDED BY 110+ KT JET AT THE 300 HPA LEVEL...WILL ARRIVE BY MIDDAY. DYNAMICS ARE STRONG WITH SYSTEM. 500 HPA TEMPERATURES ARE FORECAST TO DROP TO -18C...QUIET COLD FOR THE TIME OF YEAR. EVEN WITHOUT SUFFICIENT SUNSHINE TODAY...SBCAPES WILL LIKELY JUMP UP TO THE 750-1000 J/KG RANGE. IF WE WERE TO GET SOME GOOD SUNSHINE AND TEMPS WERE RAISED A COUPLE OF DEGREES...SBCAPES COULD EASILY JUMP TO ABOUT 1500 J/KG. ONCE AGAIN WE FEEL THE NAM PLANAR DEWPOINTS ARE A LITTLE HIGH...FORECASTING POCKETS OF SBCAPE VALUES EXCEEDING 2000 J/KG!HOWEVER...EVEN THE GFS INDICATES DEWPOINTS WILL EASILY REACH INTO THE 60S JUST TO THE SOUTH AND EAST OF ALBANY.

850-500 HPA LAPSE RATES APPROACH (AND IN SOME CASES) EXCEED 7.0C/KM.WETBULB TEMPERATURES FALL TO AROUND 8,000 FEET AND THE BULK SHEAR APPROACHES 40KTS.

THE POTENTIAL TODAY IS THERE FOR SOME OF OUR STORMS TO BECOME SEVERE...CONTAINING LARGE HAIL AND DAMAGING WIND GUSTS. THERE IS AN OUTSIDE THAT ONE OR TWO CELLS COULD BECOME SUPER CELLS. HOWEVER...LCL VALES DROPPING TO ABOUT 2500 FEET AGL WILL PROBABLY PRECLUDE ANY TORNADOES IN OUR REGION. EITHER WAY...IT COULD BE A ROUGH DAY IN OUR PARTS. FOR NOW...WILL CONTINUE WITH SMALL HAIL AND GUSTY WIND WORDING IN OUR ZONES. (IF AND WHEN AN OFFICIAL SEVERE THUNDERSTORM WATCH IS ISSUED...FORECASTERS CAN "PUMP" UP WORDING).

WENT WITH A BLEND OF THE MAV/MET VALUES FOR AFTERNOON HIGHS. WITH 850 HPA FORECAST AROUND +9C WE FORECAST HIGH TEMPERATURES 70-75 IN THE HUDSON VALLEY...60S HIGHER TERRAIN. NORMALLY THESE VALUES WOULD NOT BE WARM ENOUGH TO TRIGGER CONVECTION BUT ONCE AGAIN WE ARE LOOKING AT AN UNUSUALLY COLD UPPER AIR LOW.

&&
$$

SYNOPSIS...HWJIV
NEAR TERM...WASULA/HWJIV

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Friday, July 17, 2009 3:06 PM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Input for next CSTAR 6-month report: Fri. 7/17/09

Friday 17 July 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

CSTAR research on Great Lakes cutoff lows is mentioned by Tom Wasula in the first line of the second paragraph of the short-term section of yesterday morning's AFD issued by NWS ALY.

Dan
cc: Lance

FXUS61 KALY 160744
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
344 AM EDT THU JUL 16 2009

.SYNOPSIS...
A WEAK COLD FRONT WILL BRING SOME SHOWERS AND THUNDERSTORMS TO EASTERN NEW YORK AND WESTERN NEW ENGLAND TODAY.SOME OF THE THUNDERSTORMS MAY BECOME SEVERE WITH LARGE HAIL AND DAMAGING WINDS. THE BOUNDARY WILL BECOME STATIONARY NEAR THE ATLANTIC SEABOARD THURSDAY NIGHT...WITH AN AREA OF LOW PRESSURE MOVING ALONG IT LATE FRIDAY INTO SATURDAY...PRODUCING A WIDESPREAD RAINFALL IMPACTING THE REGION TO OPEN THE WEEKEND.

&&

.SHORT TERM /TONIGHT THROUGH SATURDAY/...SHOWERS AND THUNDERSTORMS WILL WANE QUICKLY WITH THE LOSS OF THE DIURNAL HEATING...AND SFC TROUGH SLIPPING THROUGH. THE SFC COLD FRONT IS WEAK WITH ONLY MINIMAL COLD AIR ADVECTION EVIDENT AT H850. THE BOUNDARY WILL BECOME STATIONARY NEAR THE FORECAST AREA...IT LOOKS LIKE IT WILL SAG SOUTH OF THE CAPITAL REGION BASED ON THE SHORT TERM GUIDANCE. PATCHY FOG WILL BE POSSIBLE DUE TO THE MOIST GROUND FROM THE POTENTIAL AFTERNOON CONVECTION. WE LEFT SOME SLIGHT CHANCES OF

SHOWERS SOUTH OF THE CAPITAL REGION AFTER MIDNIGHT WITH THE FRONT PASSING. LOWS WILL CONTINUE TO BE WARM WITH LOWS IN THE LOWER 60S FROM THE CAPITAL REGION SOUTH...EXCEPT SOME MID AND UPPER 50S NORTH...AND OVER THE HIGHER TERRAIN.

FRIDAY...A GREAT LAKES CUTOFF /QUITE COMMON ACCORDING TO CSTAR RESEARCH IN JULY...ESPEC THIS JULY !/ CONTINUE TO SPIN NEAR THE UPPER PENINSULA OF MI. SOUTHWEST FLOW ALOFT CONTINUES OVER THE REGION WITH MINOR PIECES OF SHORT WAVE ENERGY MOVING THROUGH. NO REAL CLEAR FOCUS FOR CONVECTION...BUT WEAK INSTABILITY COUPLED WITH MARGINAL LOW AND MID LEVEL LAPSE RATES MAY ALLOW POP UP SHOWERS AND THUNDERSTORMS ESPECIALLY OVER THE HIGHER TERRAIN. THE VALLEY LOCATIONS MAY STAY WARM...HUMID...AND DRY DUE TO A LOW LEVEL CAP EVIDENT ON THE BUFKIT PROFILES FOR KALB/KPOU/KGFL. THE GFSMOS ACTUALLY GIVES KPOU 90F FOR A HIGH. WE THOUGHT THIS WAS OVER DONE STILL AND WE LOWERED THE MAVMOS VALUES ABOUT A CATEGORY WITH H850 TEMPS AROUND 12-15C FROM NW TO SE ACROSS THE FCST AREA.

FRIDAY NIGHT INTO SATURDAY...UNSETTLED WEATHER PATTERN RETURNS WITH A WAVE OF LOW PRESSURE IMPACTING THE REGION FROM THE MID ATLANTIC REGION. THIS SFC WAVE MOVES ALONG THE ERN EDGE OF THE UPPER TROUGH IN ASSOCIATION WITH THE CUTOFF. THE SFC WAVE INTENSIFIES A BIT SINCE IT FORMS NEAR THE RIGHT REAR QUADRANT/RIGHT ENTRANCE REGION OF AN H250 JET STREAK. WE ARE EXPECTING OVER RUNNING RAINFALL WITH THE WARM FRONT EXTENDING NORTHEAST OF THE SFC WAVE TO COMMENCE AROUND MIDNIGHT...OR SHORTLY THEREAFTER FROM SOUTHWEST TO NORTHEAST ACROSS THE FCST AREA. WE INCREASED THE POPS TO LIKELY VALUES WITH DECENT AGREEMENT AMONG THE GFS/NAM/CAN GGEM/ECMWF. THE BEST H850 THETA-E ADVECTION WILL BE SOUTH AND EAST OF THE CAPITAL REGION TAPPING INTO PWAT VALUES APPROACHING 1.75".THE PERIODS OF SHOWERS WILL CONTINUE INTO SATURDAY...WITH PERHAPS ONLY SCATTERED ACTIVITY IN THE AFTERNOON. THE SHOWALTER VALUES STAY ABOVE 0C...WITH THE BEST LIFTED INDICES ONLY LOWER SLIGHTLY BELOW ZERO...SO WE JUST INCLUDED A SLIGHT CHANCE OF THUNDER IN THE AFTERNOON. A DRY SLOT POKING IN WITH THE SYSTEM MAY PRECLUDE ANY CONVECTION. OVERALL...IT LOOKS LIKE A COOL AND WET START TO THE WEEKEND WITH HIGHS ONLY IN THE 70S IN THE VALLEYS..AND MID 60S TO L70S OVER THE HILLS AND MTNS.

&&
$$

SYNOPSIS...WASULA
SHORT TERM...WASULA

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Wednesday, July 29, 2009 7:49 PM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Input for next CSTAR 6-month report: Wed. 7/29/09

Wednesday 29 July 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

CSTAR research on rotating convective storms is mentioned in the next-to-last line of the first paragraph of the previous near-term section of this evening's AFD issued by NWS ALY.

Dan
cc: Lance

FXUS61 KALY 292246
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
645 PM EDT WED JUL 29 2009

.SYNOPSIS...
AN UPPER LEVEL TROUGH WILL REMAIN ANCHORED ACROSS THE GREAT LAKES MUCH OF THIS WEEK. A SOUTHWEST FLOW ON THE EASTERN SIDE OF THIS TROUGH WILL KEEP WARM AND HUMID CONDITIONS ACROSS THE REGION. SHOWERS AND THUNDERSTORMS WILL BECOME WIDESPREAD THROUGH THE EVENING LOW PRESSURE AND A COLD FRONT MOVE ACROSS OUR REGION FROM THE WEST...AND AGAIN FRIDAY AFTERNOON INTO FRIDAY NIGHT AS ANOTHER WAVE OF LOW PRESSURE MOVES ACROSS THE REGION.

&&

.NEAR TERM /UNTIL 8 PM THIS EVENING/...
AS OF 6PM...WE HAVE DROPPED THE SEVERE THUNDERSTORM WATCH FOR ALLBUT OUR SOUTHERN TIER COUNTIES. SBCAPES IN THOSE AREAS STILLAROUND 1000 J/KG SO THERE IS A POTENTIAL FOR REDEVELOPMENT OF "TALL"THUNDER.

OTHERWISE...THE REST OF THE AREA IS PRETTY MUCH DONE WITH SEVERETHUNDERSTORM THREAT AS SBCAPES ARE MARGINAL AND HEATING IS DONE.

FOCUS CONTINUES FOR SHOWERS AND STORMS WITH "HEAVY" RAINERS. WEHAVE GOTTEN GROUND TRUTH REPORTS OF OVER 4 INCHES IN PORTIONS OFCOLUMBIA COUNTY...AND OVER 3 INCHES ACROSS PORTIONS OF SARATOGAAND EVEN FULTON COUNTIES.

THE FLASH FLOOD THREAT IS NOT DONE YET. ANOTHER LINE OF SHOWERSAND POSSIBLE STORMS IS MOVING INTO THE REGION (NON SEVERE STORMSTORMS) BUT POSSIBLY CONTAINING AN INCH OR MORE OF RAIN...WHICH COULD FALL IN A SHORT TIME AND AGGRAVATE THE FLASH FLOODING SITUATION.

**********PREVIOUS NEAR TERM DISCUSSION**********

AS OF 5PM...STILL HAVE ONE WARNING FOR A ROTATING THUNDERSTORM IN CENTRAL COLUMBIA COUNTY. VILS WITH THIS STORM WERE NOT IMPRESSIVE...GENERALLY HALF OF THE "VIL" OF THE EVENING. HOWEVER...WE KNOW FROM MANY PAST CSTAR STUDIES STORMS IN THE HUDSON VALLEY...THAT ROTATE CAN PRODUCE SEVERE WEATHER ON THEIR OWN.

WE ALSO HAVE CONTINUED FLASH FLOOD WARNING AND ADVISORIES...WITH COLUMBIA COUNTY HARDEST HIT. COLUMBIA COUNTY HAS BEEN HARDEST HIT WITH RADAR ESTIMATES NOW IN SOME CASES APPROACHING OR EVEN EXCEEDING 4 INCHES IN CENTRAL COLUMBIA COUNTY!

AGAIN...PLEASE REFER TO OUR LSR FOR ALL THE WEATHER UPDATES.

AREAS TO THE NORTH OF MID HUDSON VALLEY...HAVE BEEN GENERALLY "WORKED" OVER WITH MORE WIDESPREAD SHOWERS...WHICH HAVE COOLED SURFACE TEMPERATURES TO AROUND 70 FROM ALBANY NORTHWARD. SBCAPES HAVE BEEN REDUCED FROM EARLIER VALUES NEAR 2000 J/KG LOCALLY TO ONLY ABOUT 200 J/KG. THE ONLY AREAS TO HAVE FAIRLY HIGH SBCAPES ARE TO THE SOUTH WHERE WE STILL HAVE TO ONE WARNING.

I WOULD SAY THE SEVERE THREAT IS ALL BUT OVER FROM ALBANY NORTHWARD. HOWEVER...THE SWATH OF WIDESPREAD SHOWERS WAS LIFTING NORTHWARD. THERE LOOKS TO BE A BREAK IN THE ACTION FROM SOUTH TO NORTH (FIRST ACROSS THE MID HUDSON VALLEY WORKING NORTHWARD). SATELLITE PICTURES DO INDICATE SOME HOLES IN THE CLOUDS JUST SOUTH OF THE MID HUDSON SO IT IS REMOTELY POSSIBLE THAT ENOUGH SUN COULD

REHEAT THE ATMOSPHERE. IT IS A LONG SHOT...BUT POSSIBLE DURING THE NEXT HOUR.

STAY TUNED.

UPDATE HOURLY GRIDS TO REFLECT HIT IN TEMPERATURES DURING THE PAST HOUR DUE TO ALL THE RAIN.

&&
$$

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Wednesday, August 19, 2009 4:23 PM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Input for next CSTAR 6-month report: Wed. 8/19/09

Wednesday 19 August 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

CSTAR research on Great Lakes cutoff lows is mentioned by Tom Wasula in the eighth line of the fourth paragraph of the short-term section of this morning's AFD issued by NWS ALY.

Dan
cc: Lance

FXUS61 KALY 190753
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
353 AM EDT WED AUG 19 2009

.SYNOPSIS...
A WEAK COLD FRONT WILL MOVE ACROSS EASTERN NEW YORK AND WESTERN NEW ENGLAND TODAY WITH ISOLATED SHOWERS AND THUNDERSTORMS.WEAK HIGH PRESSURE WILL BRIEFLY BUILD IN FROM SOUTHERN QUEBEC WEDNESDAY NIGHT INTO THURSDAY MORNING...WHILE THE COLD FRONT RETURNS NORTHWARD AS A WARM FRONT WITH MORE SHOWERS AND THUNDERSTORMS FOR THE AFTERNOON. THE REGION WILL BE IN A WARM AND HUMID AIR MASS FOR FRIDAY WITH SHOWERS AND THUNDERSTORMS POSSIBLE AGAIN...AS A COLD FRONT SLOWLY MOVES EASTWARD FROM THE MISSISSIPPI RIVER VALLEY AND THE GREAT LAKES REGION.

&&

.SHORT TERM /9 PM EDT TONIGHT THROUGH FRIDAY NIGHT/...
WED NIGHT...ANY ISOLD CONVECTION SHOULD BE GONE BY 01Z...AS THE FRONT SAGS SOUTH NEAR LONG ISLAND...NRN NJ...AND PA. A 1017 HPA SFC HIGHS BUILDS IN OVER NRN NY AND SRN QUEBEC...WITH CLEARING SKIES AND LIGHT TO CALM WINDS. SOME CLOUDS MAY LINGER SOUTH OF THE CAPITAL REGION...AS THE FRONT WILL START TO LIFT SLOWLY NORTH TOWARDS

12Z.LOWS WILL GENERALLY BE IN THE LOWER TO MID 60S FROM THE CAPITAL REGION...SRN BERKS SOUTH...AND 50S NORTH ASIDE FROM A FEW U40S OVER THE SRN ADIRONDACKS.

THU...THE WARM FRONT BEGINS TO SLOWLY LIFT NORTH DURING THE MORNING WITH SHOWERS AND THUNDERSTORMS DEVELOPING DUE TO THE WARM AIR ADVECTION. THERE IS A WEAK IMPULSE IN THE S/SW FLOW ALOFT THAT COULD TRIGGER SOME MORE INTENSE ELEVATED CONVECTION OR SOME SURFACE BASED PARCELS LATE IN THE PM. AT THIS POINT...THE CONVECTION LOOKS TO US TO BE MORE ELEVATED WITH MUCAPES APPROACHING AROUND 1000 J/KG WITH SHOWALTER VALUES OF 0 TO -2C. THE QUESTION WILL BE HOW FAST THIS FRONT LIFTS NORTH. THE GFS IS FASTER THAN THE NAM AND CAN REGIONAL. THE PRECIPITABLE WATER VALUES DO RISE BACK TO 1.5 TO 2" DURING THE PM. SOME OF THIS IS DUE TO THE WARM FRONTAL RAINFALL /NOT ATYPICAL TO SEE THESE RISE QUICKLY LIKE THIS WITH AIR MASS FLUCTUATION/. THE FORECAST AREA COULD USE A WIDESPREAD SOAKING RAINFALL...AS MANY LOCATIONS HAVE NOT RECEIVED EVEN A HALF AN INCH FOR THE MONTH /FOR EXAMPLE...THE ALBANY AIRPORT HAS HAD A MERE 0.36 INCHES FOR THE MONTH...AFTER A RECORD BREAKING JULY/. WE RAISED THE POPS TO LIKELY VALUES BY THE LATE AFTERNOON...AND PHRASED IT AS A LIKELY SHOWERS WITH A CHANCE OF THUNDERSTORMS.TEMPS WILL STRUGGLE INTO THE U70S TO L80S.

THU NIGHT...THE SHOWERS AND THUNDERSTORMS SHOULD WANE...AS THE WARM FRONT CONTINUES TO TREK NORTH OF THE REGION. THE FCST AREA WILL GET INTO A SOUPY AIR MASS WITH MIN TEMPS GENERALLY IN THE MID 60S TO L70S. THE LOW AND MID LEVEL FLOW WILL BE SOUTHWESTERLY WITH A TRANSPORT OF LOW LEVEL MOISTURE FROM THE TROPICS...WELL IN ADVANCE OF A COLD FRONT APPROACHING FROM THE MS RIVER VALLEY.

FRI-FRI NIGHT...HIGHLY ANOMALOUS PRECIPITABLE WATER VALUES WILL BE IN PLACE ACROSS THE FCST AREA /2-3 STANDARD DEVIATIONS ABOVE NORMAL ACCORDING TO THE GEFS/. THE GFS SHOWS A SWATHE OF 2+ INCHES FROM THE HUDSON RIVER VALLEY INTO WRN NEW ENGLAND. THE QUESTION WILL BE IF ENOUGH HEATING WILL OCCUR AHEAD OF AN EMBEDDED PREFRONTAL SHORT WAVE TROUGH FOR HVY RAINFALL. ALSO...A POSITIVELY TILTED H500 CUTOFF IS OVER THE CNTRL-NRN GREAT LAKES ASSOCIATED WITH THE LONG WAVE TROUGH. CSTAR RESEARCH HAS SHOWN THIS CUTOFF ORIENTATION SUPPORTS HVY RAINFALL...AND POSSIBLY ISOLD-SCT FLASH FLOODING. NOT SURE ABOUT THE FLASH FLOOD THREAT RIGHT NOW...BUT FEEL CONFIDENT THAT TO MENTION HVY RAINFALL WITH ANY CONVECTION DURING THE DAY INTO THE EVENING IS PRUDENT. HURRICANE BILL MEANDERS CLOSE TO BERMUDA DURING THIS TIME FRAME. THE BIGGER PLAYER FOR OUR REGION LOOKS TO BE THE CUTOFF LOW. THEIR IS A LOT OF VARIABILITY WHERE THE HEAVIEST RAINFALL COULD OCCUR ACROSS NY AND NEW ENGLAND AT THIS TIME. WE CONTINUED LIKELY POPS FOR BOTH FRI/FRI NIGHT.

&&
$$

SYNOPSIS...WASULA
SHORT TERM...WASULA

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Thursday, August 20, 2009 11:21 AM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Input for next CSTAR 6-month report: Th. 8/20/09

Thursday 20 August 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

Tom Wasula cites CSTAR research on Great Lakes cutoff lows in the last line of the third paragraph, and refers to CSTAR research on PREs within the fourth paragraph, of the short-term section of this morning's AFD issued by NWS ALY.

Dan
cc: Lance

FXUS61 KALY 200807
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
410 AM EDT THU AUG 20 2009

.SYNOPSIS...A WARM FRONT WILL MOVE NORTH OF THE REGION TODAY WITH SOME SHOWERS AND THUNDERSTORMS. EASTERN NEW YORK AND WESTERN NEW ENGLAND WILL BE IN A VERY WARM AND HUMID AIR MASS THURSDAY NIGHT INTO SATURDAY. SHOWERS AND THUNDERSTORMS WITH LOCALLY HEAVY RAINFALL WILL IMPACT THE REGION OCCASIONALLY FRIDAY INTO SATURDAY AHEAD OF A SLOW MOVING COLD FRONT APPROACHING FROM THE WEST.

&&

.SHORT TERM /TONIGHT THROUGH SATURDAY/...
THU NIGHT...RESIDUAL SCT SHOWERS AND THUNDERSTORMS MAY LINGER EARLY ON AS WE ENTER THE BALMY AIR MASS. THE WARM SECTOR WILL CONTAIN SFC DEWPOINTS IN THE U60S TO L70S. MIN TEMPS WILL GENERALLY BE IN THE MID TO U60S OVER THE HIGHER TERRAIN...AND U60S TO L70S IN THE VALLEYS.

FRIDAY...THE UPPER TROUGH OVER ONTARIO...THE GREAT LAKES REGION...AND MIDWEST AMPLIFIES...WITH IT CLOSED OFF NEAR LAKE SUPERIOR. A SOUTHWESTERLY FLOW ESTABLISHES ITSELF OVER THE ERN SEABOARD WITH TROPICAL MOISTURE STREAMING IN FROM THE GULF OF MEXICO. SOME OF THE MOISTURE IS THE LEFTOVERS FROM TS ANA.PRECIPITABLE WATER ANOMALIES WILL BE 2-3 STANDARD DEVIATIONS ABOVE NORMAL WITH WIDESPREAD 2" PWAT VALUES. THE ISSUE WILL BE A CLEAR FOCUSING MECHANISM FOR CONVECTIVE DEVELOPMENT. IT APPEARS A SHORT WAVE IMPULSE IN THE SW FLOW MAY APPROACH FROM ERN OH/PA DURING THE PM.THIS MAY ALLOW A CLUSTER OR LINE OF CONVECTION TO IMPACT WRN- CNTRL NY WITH SBCAPES RISING TO 1000-2000 J/KG AND 0-6 KM DEEP SHEAR VALUES RISING TO 40-50 KTS ALONG THE WRN PERIPHERY OF OUR FCST AREA. SPC HAS THE WRN ADIRONDACKS AND W-CNTRL MOHAWK VALLEY IN THE DAY 2 OUTLOOK FOR POSSIBLE DAMAGING WIND GUSTS. WE WILL GIVE A BRIEF MENTION IN THE HWO...BUT WE ARE NOT SUPER CONFIDENT THAT THE POSSIBLE CONVECTION WILL HIT OUR AREA WITH THE SEVERE VARIETY. THE INCREASING THREAT OF HVY RAINFALL WILL OCCUR LATE FRI PM. THE ONE ITEM TO NOTE IS THAT THE ANTECEDENT SOIL CONDITIONS ARE NOT WET IN THE HYDRO SERVICE AREA /HSA/. ASIDE FROM ISOLD TO SCT CONVECTION...MOST OF THE HSA HAS BEEN VERY DRY SINCE AUGUST 1...AFTER RECORD BREAKING JULY RAINFALL. WE DID MENTION HVY RAIN WITH THE THUNDERSTORMS AFTER 19Z FRI. WE BELIEVE THE THREAT INCREASES FOR HVY RAINFALL IN THE OVERNIGHT PERIOD.

FRI NIGHT INTO SAT...THERE IS DECENT MODEL AGREEMENT AMONG THE NAM/GFS/CAN GGEM THAT A QUASI STATIONARY RAINBAND OF HVY RAINFALL COULD SET UP SOMEWHERE NEAR THE HUDSON RIVER VALLEY FRI NIGHT. MODEL SOUNDINGS INDICATE TALL AND SKINNY PROFILES WITH SOME SBCAPE AROUND 500 J/KG. A PREFRONTAL TROUGH AHEAD OF THE MAIN COOL FRONT WITH IMPULSES ZIPPING ALONG IT FROM THE SOUTH WILL FOCUS THE RAINFALL. PWAT VALUES RISE TO UNCHARTED LEVELS FOR OUR AREA...IF YOU BUY THE NAM WITH 2.25-2.50 INCHES POSSIBLE.TYPICALLY...RAINFALL RATES WITH PWATS NEARLY 200% ABOVE NORMAL ARE EQUATED WITH 2 INCHES/HR RAINFALL RATES OR GREATER. THE 00Z ECMWF JUST CAME IN NOT SHOWING TREMENDOUS QPF AMOUNTS WHICH CAUTIONS US NOT TO OVERDUE THE POSSIBILITY OF FLASH FLOODING AT THIS TIME.HOWEVER...HVY RAINFALL WILL OCCUR WITH ANY CONVECTION...AND WE WILL MENTION THE CONDITIONAL ISOLD RISK OF FLASH FLOODING IN THE HWO. IF CONFIDENCE INCREASE LATER...WHICH THERE IS PLENTY OF TIME...A WATCH MAY BE NEEDED IF THE FFW POSSIBILITY LOOKS TO BE WIDESPREAD. ANOTHER CONCERN IS THAT THE GFS SHOWS AN H850 SW LLJ OF 35-50 KTS ON THE WRN PERIPHERY OF A 344K THETA-E RIDGE OVER THE ERN CATSKILLS/MID HUDSON VALLEY BTWN 6Z-12Z SAT. THE CUTOFF/CLOSED LOW OVER THE LOWER GREAT LAKES REGION/MIDWEST IS ALSO PROBLEMATIC WITH ITS NEUTRAL TO WEAKLY POSITIVELY TILT BASED ON CSTAR RESEARCH FOR POSSIBLE FLASH FLOOD ISSUES TOO.

WE ARE RIDING CLOSE TO HPC WITH A STRIPE OF 1-3 INCHES OF RAIN POSSIBLE FRI NIGHT INTO SAT. THIS IS NOT A CLASSIC "PRE" SET UP DUE TO THE CLOSE VICINITY OF THE RAINBAND TO HURRICANE BILL PASSING EAST OF CAPE COD. WE ARE KIND OF NEAR THE RIGHT REAR QUAD OF THE UPPER JET...AND THERE WILL BE A SHARP THETA-E TRANSITION...BUT IT DOESN/T FIT THE CLASSIC CSTAR SCHEMATIC FOR PRE/S. THE BAND OF HVY RAIN SHIFTS EAST OVER WRN NEW ENGLAND ON SAT. WE WILL CALL IT A "QUASI-PRE" ! AFTER SULTRY MINS STILL IN THE MID 60S TO L70S SAT MORNING ...MAX TEMPS WILL BE COOLING DOWN INTO THE 70S AND L80S ON SAT.

THANKS FOR THE EXTENSIVE COLLABORATION WITH BOX TONIGHT.

&&
$$

SYNOPSIS...WASULA
SHORT TERM...WASULA

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Friday, August 21, 2009 11:22 AM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Input for next CSTAR 6-month report: Fri. 8/21/09

Friday 21 August 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

CSTAR research on cutoff lows is mentioned by Tom Wasula in the next-to-last line of the first paragraph of the short-term section of this morning's AFD issued by NWS ALY.

Dan
cc: Lance

FXUS61 KALY 210810
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
410 AM EDT FRI AUG 21 2009

.SYNOPSIS...
A TROPICAL AIR MASS WILL BE OVER EASTERN NEW YORK AND WESTERN NEW ENGLAND TODAY...AS A DISTURBANCE AHEAD OF A SLOW MOVING COLD FRONT WILL FOCUS SOME STRONG TO SEVERE THUNDERSTORMS WITH VERY HEAVY RAINFALL. OCCASIONAL SHOWERS AND THUNDERSTORMS WILL PERSIST OVERNIGHT THROUGH SATURDAY AHEAD OF THE FRONT PRODUCING A MODERATE TO HEAVY RAINFALL. AN UPPER LEVEL DISTURBANCE NEAR THE EASTERN GREAT LAKES REGION WILL KEEP A CHANCE OF SHOWERS OVER UPSTATE NEW YORK AND NEW ENGLAND ON SUNDAY.

&&

.SHORT TERM /TONIGHT THROUGH SUNDAY/...
FRIDAY NIGHT INTO SATURDAY...SOME MODEL UNCERTAINTY ON THE EXACT LOCATION AND EVOLUTION OF A QUASI STATIONARY RAINBAND OVER THE REGION DURING THE OVERNIGHT ASSOCIATED WITH THE PREFRONTAL TROUGH...AND A SFC WAVE MOVING ALONG IT. MEANWHILE...HURRICANE BILL CONTINUES TO CHUG INTO THE WRN ATLANTIC. NOT A CLASSIC PREDECESSOR RAIN EVENT /PRE/ SETUP...BUT SOME OF THE KEY INGREDIENTS ARE THERE

WITH THE RIGHT ENTRANCE REGION OF THE MID AND UPPER JET STREAK...DEEP BOUNDARY LAYER MOISTURE WITH A FAIRLY SHARP THETA-E CONTRAST. ALSO...A CLOSED/CUTOFF LOW CONTINUES TO REMAINS UPSTREAM WHICH CSTAR WORK HAS SHOWN TO BE PROBLEMATIC FOR HVY RAIN SITUATIONS IN THESE SYNOPTIC ENVIRONMENTS.

THE CONSENSUS IS FOR THE BAND TO POSSIBLY ALIGN OVER THE ERN CATSKILLS...CAPITAL REGION...HUDSON RIVER VALLEY...INTO THE BERKSHIRES AND SRN VT. PWATS WILL CONTINUE TO RUN OVER 2 INCHES...AND THE 340K H850 THETA-E RIDGE AXIS SETS UP OVER THE AREA.WE COORDINATED WITH LOCAL OFFICES /BOX...BTV...BGM...AND OKX/...NESDIS AND HPC...AND WE FELT IT WAS PRUDENT TO HOLD ON A FLASH FLOOD OR FLOOD WATCH UNTIL CONFIDENCE INCREASES FOR THE POTENTIAL OF WIDESPREAD AREAL FLOODING. FRIDAY NIGHT THRU MOST OF THE DAY SATURDAY IT LOOKS LIKE 1-3 INCHES OF RAINFALL FROM SHOWERS AND SCT THUNDERSTORMS LOOKS POSSIBLE. MAX TEMPS WILL BE MAINLY IN THE 70S WITH A FEW L80S IN THE CLOUDY AND MUGGY CONDITIONS.

SATURDAY NIGHT...IT IS INTERESTING THAT HPC FAVORS THE ECMWF AND NAM. BOTH MODELS ACTUALLY HAVE THE CUTOFF LOW OVER THE CNTRL GREAT LAKES REGION CAPTURING THE MOISTURE AND RETROGRADING IT WESTWARD OF THE HUDSON RIVER VALLEY BACK OVER CNTRL NY FOR THIS TIME FRAME ! MEANWHILE HURRICANE BILL MOVES EAST OF CAPE COD. MOST OF THE ALY FCST AREA GETS CAUGHT IN A SUBSIDENCE REGION BETWEEN THE TWO SYSTEMS. WE LOWERED THE POPS TO CHANCE VALUES SATURDAY NIGHT FOR NOW.

THE MAIN HVY RAIN IMPACT PERIOD LOOKS LIKE IT WOULD LATE FRIDAY NIGHT/SAT MORNING THROUGH THE DAY ON SATURDAY. WE WENT CLOSE TO HPC/S QPF. IT YIELDS ONE TO FOUR INCHES OF RAINFALL FOR THE ENTIRE48 HOURS THROUGH SAT NIGHT. PLEASE SEE OUR HYDRO DISCUSSION WITH FURTHER DETAILS.

SUNDAY...THE CUTOFF/CLOSED LOW NEAR THE ERN GREAT LAKES OPENS...AS ITS ASSOCIATED COOL POOL MOVES OVERHEAD. STEEP LAPSE RATES...AND THE CYCLONIC VORTICITY ADVECTION WILL CONTINUE THE CHANCE OF SHOWERS DURING THE DAY...ESPECIALLY NORTH OF THE MID HUDSON VALLEY. HURRICANE BILL WILL BE AN EXTRATROPICAL DISTURBANCE BY THIS TIME N/NE OF LABRADOR. HUMIDITY LEVELS WILL START TO LOWER LATE SUNDAY.

&&
$$
SYNOPSIS...WASULA
SHORT TERM...WASULA

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Friday, August 28, 2009 12:32 PM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Input for next CSTAR 6-month report: Fri. 8/28/09

Friday 28 August 2009

Barbara,

For possible incorporation into the next six-month CSTAR report.

CSTAR research on PREs (predecessor rain events) is mentioned by Hugh Johnson in the fourth and fifth paragraphs of the short-term section of this morning's AFD issued by NWS ALY.

Dan
cc: Lance

FXUS61 KALY 280901
AFDALY

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE ALBANY NY
500 AM EDT FRI AUG 28 2009

.SYNOPSIS...
HIGH PRESSURE WILL MOVE TO OUR EAST TODAY...ALLOWING AN EASTERLY FLOW OF INCREASING MOIST AIR TO THICKEN CLOUDS AND BRING SOME SHOWERS INTO THE REGION...ESPECIALLY SOUTH OF ALBANY. LOW PRESSURE IN THE MISSISSIPPI VALLEY WILL MOVE TO THE GREAT LAKES WHILE TROPICAL STORM DANNY MOVES NORTH FROM THE CAROLINAS PAST CAPE COD TO NOVA SCOTIA. THE RESULT WILL BE RAIN...WHICH COULD BE HEAVY AT TIMES...FROM EARLY THIS EVENING THROUGH MUCH OF SATURDAY. A COLD FRONT WILL CROSS THE REGION EARLY SUNDAY BRINGING INITIALLY DRIER AND EVENTUALLY COOLER AIR FOR EARLY NEXT WEEK.
&&
.SHORT TERM /SATURDAY THROUGH SUNDAY/...
ALL CURRENT MODELS SUPPORT THE OFFICIAL NHC TRACK OF KEEPING THE CENTER OF DANNY OFFSHORE. HOWEVER...EVEN SO...MOISTURE WITH THE AFOREMENTIONED UPPER AIR TROUGH...INTERACTING WITH THE STALLED OUT FRONT TO OUR SOUTH AS WELL WITH MOISTURE FROM DANNY WILL BRING (AT THE VERY LEAST) A PRETTY GOOD SOAKING RAIN TO MOST OF REGION FRIDAY NIGHT INTO MUCH OF SATURDAY. IT APPEARS THAT THE HEAVIEST OF RAIN MIGHT STAY JUST TO OUR EAST...BUT THAT REMAINS TO BE SEEN.

FOR NOW...WE HAVE DEFERRED ANY DECISION FOR A FLOOD/FLASH FLOOD FOR THE DAY CREW. MORE ABOUT FLOOD POTENTIAL CAN BE FOUND IN OUR HYDRO SECTION.

INSTABILITY LOOKS TO APPROACH NIL AGAIN AS THE ATMOSPHERE ALOFT ACTUALLY WARMS A BIT IN RESPONSE TO THE INCREASED TROPICAL AIR.PWATS APPROACH 2.00 INCHES.

ANOTHER UPPER LEVEL JETSTREAK...WHILE NOT ALL THE STRONG (ONLY UP TO ABOUT 75KTS) LOOKS TO NEVERTHELESS GENERATE A PREDECESSOR RAIN EVENT(PRE) AHEAD OF TS DANNY TONIGHT BASED ON CSTAR RESEARCH. THIS BRUNT OF THIS PRE LOOKS TO JUST STAY EAST OF OUR REGION...BUT THAT LOCATION COULD EASILY CHANGE QUITE A BIT EITHER WAY IN THE NEXT 24 HOURS.

THE PRE LOOKS TO LIFT NORTHEASTWARD LATER SATURDAY. HOWEVER...WITH A STRONG UPPER AIR LOW LIFTING TO OUR NORTHWEST...OUR ATMOSPHERE ALOFT WILL COOL ONCE MORE. FURTHERMORE...A NEW COLD FRONT WILL APPROACH FROM THE NORTHWEST SO WHILE MID LEVEL DRYING IS TAKING PLACE...THE ATMOSPHERE WILL BECOME MORE UNSTABLE. THIS WILL TRANSLATE TO ADDITIONAL AFTERNOON AND EVENING SHOWERS ON SATURDAY. WITH SBCAPES APPROACHING 500 J/KG THIS WOULD BE JUST ENOUGH INSTABILITY TO WARRANT PLACING A CHANCE OF THUNDER IN THE FORECAST ALONG WITH SCATTERED SHOWERS. AT THIS POINT...ANY THUNDERSTORMS THAT FORM ON SATURDAY AFTERNOON DO NOT LOOK SEVERE. HOWEVER...WITH A VERY LOW LCL LEVEL (UNDER 1000 FEET) AND A PRETTY GOOD LOW LEVEL DIRECTIONAL SHEAR...WE COULD SEE SOME WEAK ROTATION IN ANY CELLS. LAPSE RATES ARE WEAK (WELL BELOW 6.0 C/KM) SO AGAIN...THE ODDS OF ANY CELL REACHING SEVERE OR EVEN STRONG THRESHOLDS LOOKS QUITE LOW.

EARLIER RUNS HAD THE AFOREMENTIONED COLD FRONT SLOWER TO WORK THOUGH ON SUNDAY. NOW...THE TREND IN ALL MODELS IS FASTER...ALLOWING DRIER AIR TO TAKE HOLD. THERE STILL COULD BE A WEAK SHORT WAVE OR TWO ROTATING THROUGH THE BROAD TROUGH BEHIND THE COLD FRONT...SO WE LOWERED OUR AREA TO SLIGHT CHANCE OF SHOWERS...BUT DID NOT COMPLETELY YANK CHANCES. AT THIS POINT...DEEP INSTABILITY LOOKS VERY LOW...SO NO MENTION OF THUNDER AT THIS TIME.

GENERALLY WENT WITH A BLEND OF THE MET/MAV GUIDANCE REGARDING HIGH/LOW TEMPS WITH SOME TWEAKING.
&&
$$
SYNOPSIS...HWJIV
SHORT TERM...HWJIV

==========

From: Dan Keyser [keyser@atmos.albany.edu]
Sent: Sunday, October 25, 2009 10:50 AM
To: Barbara J Zampella
Cc: Lance F Bosart; Daniel Keyser
Subject: Fwd: [Fwd: Predecessor Rainfall Event (PRE)] (fwd): Sun. 10/25/09

Sunday 25 October 2009

Barbara,

For incorporation into the upcoming CSTAR six-month progress report.

Dan

cc: Lance

Date: Sat, 24 Oct 2009 22:22:00 -0400
From: Sheldon.Kusselson@noaa.gov
Subject: Fwd: [Fwd: Predecessor Rainfall Event (PRE)]
To: Michael.Jurewicz@noaa.gov
Cc: bm453975@albany.edu, bosart@atmos.albany.edu,
Jon.Zeitler@noaa.gov

Mike,
Good to see you at the NWA. Here is the e-mail Jon Zeitler, SOO of San Antonio, sent out to his fellow workers on "PRE". Jon does a great job of getting out the work on the good research that is done at Albany.
I am glad Blended TPW products are helping as well with the analysis of these creatures.
Sheldon

Return-path: <Jon.Zeitler@noaa.gov>
Date: Mon, 05 Oct 2009 13:57:53 -0500
From: Jon Zeitler <Jon.Zeitler@noaa.gov>
Subject: [Fwd: Predecessor Rainfall Event (PRE)]
To: Clay Anderson <Clay.Anderson@noaa.gov>,
Constantine Pashos <Constantine.Pashos@noaa.gov>,
Cristy Mitchell <Cristy.Mitchell@noaa.gov>,
David Schumacher <David.Schumacher@noaa.gov>,
Jim Ellis Jim.Ellis@noaa.gov>,
Jon Zeitler <Jon.Zeitler@noaa.gov>,

Mark Brundrett <Mark.Brundrett@noaa.gov>,
Monte Oaks <Monte.Oaks@noaa.gov>,
Robert Blaha <Robert.Blaha@noaa.gov>,
Marianne Sutton <Marianne.Sutton@noaa.gov>,
Mark Lenz <Mark.Lenz@noaa.gov>,
Joe Arellano <Joe.Arellano@noaa.gov>,
Paul Yura <paul.yura@noaa.gov>,
Bob Fogarty <bob.fogarty@noaa.gov>,
Mark Oliver <Mark.Oliver@noaa.gov>,
Christopher Morris <Christopher.Morris@noaa.gov>,
Amanda Fanning <Amanda.Fanning@noaa.gov>,
Joseph Baskin <Joseph.Baskin@noaa.gov>,
Patrick Mcdonald <Patrick.Mcdonald@noaa.gov>,
Steve Smart <Steve.Smart@noaa.gov>,
Christopher Morris <Christopher.Morris@noaa.gov>,
Amanda Fanning <Amanda.Fanning@noaa.gov>
Cc: Alexander Tardy <Alexander.Tardy@noaa.gov>,
Lance Wood <Lance.Wood@noaa.gov>,
Gregory Patrick <Gregory.Patrick@noaa.gov>,
Greg Waller <Greg.Waller@noaa.gov>,
Amy Mccullough <Amy.Mccullough@noaa.gov>,
Sheldon Kusselson <Sheldon.Kusselson@noaa.gov>,
Ken Falk <Ken.Falk@noaa.gov>,
"Van Speybroeck,
Kurt M. (JSC-WS8)" <Kurt.M.VanSpeybroeck@nasa.gov>
>
>
>EWX Ops Staff, Neighbor SOOs, and WGRFC,
>
>Predecessor Rainfall Events (PREs) are not normally associated with our area, at least in terms of the research completed so far (see attached Powerpoint presentations). That said, the combination of a decaying Pacific TC and low level Gulf moist air might generate a PRE event, or at least something that resembles a PRE event. The email chain below is courtesy of Sheldon Kusselson from NESDIS SAB (the SPENES message guys).

While PREs may be uncommon in our area, there could be a high correlation with decaying Pacific TCs, or in some cases Atlantic TCs under the right circumstances. The attached ppt's are a good intro, and there is even an Articulate session available:
http://cstar.cestm.albany.edu/CAP_Projects/Project10/NEW_PRE_NWS_Teletraining/player.html
http://cstar.cestm.albany.edu/CAP_Projects/Project10/NEW_PRE_NWS_Teletraining/player.html

Questions are out of my realm, but Sheldon or Mike Jurewicz should be able to answer or get you in the right direction:
<mailto:Sheldon.Kusselson@noaa.gov>Sheldon.Kusselson@noaa.gov

<mailto:Michael.Jurewicz@noaa.gov>Michael.Jurewicz@noaa.gov

-Jon

-------- Original Message --------
Subject: Re: [Fwd: Predecessor Rainfall Event (PRE)] Date: Sun, 04 Oct 2009 07:53:51 -0400
From: Sheldon Kusselson <mailto:Sheldon.Kusselson@noaa.gov>Sheldon.Kusselson@noaa.gov
To:Michael Jurewicz<mailto:Michael.Jurewicz@noaa.gov>Michael.Jurewicz@noaa.gov
CC:
Ben Moore <mailto:bm453975@albany.edu><bm453975@albany.edu>,
Lance Bosart <mailto:bosart@atmos.albany.edu><bosart@atmos.albany.edu>,
mailto:michael.evans@noaa.gov>michael.evans@noaa.gov, Jon Zeitler
mailto:Jon.Zeitler@noaa.gov><Jon.Zeitler@noaa.gov>

Mike and others,
The event over Texas appears to be a "PRE", although I must admit that the center of Olaf had been sheared to death probably prior to the 4"+ rains occurring in central and southern Texas starting last evening through the overnight period. But the cold tops were still nearby the remains of Olaf at the time of the event.Here are our last classifications:
East Pacific Ocean Basin: Imagery

DATE/TIME	LAT	LON	CLASSIFICATION	STORM
03/1800 UTC	23.7N	114.2W	TOO WEAK	OLAF
03/1200 UTC	24.2N	116.3W	T1.0/2.0	OLAF

and an IR image and blended TPW image from around Saturday evening.
Any of the experts want to comment,

Sheldon
Michael Jurewicz wrote:
<mailto:Sheldon.Kusselson@noaa.gov>Sheldon.Kusselson@noaa.gov
wrote:
Mike, Thanks for your confirmation and will look forward to your further analysis. I did save some satellite imagery for the case, so if you need some of that, let me know. I know it maybe a stretch, but I think some of that moisture may have also worked its way north and northeast into the Midwest last evening, night and possibly today as I worked during the events from Iowa through southern WI, northern Illinois into the Ohio Valley/southern MI. Since I am off today, I did have a chance to look at the 24hr totals up there. One thing I learned about PREs is that there are those that meet the minimum requirements and then there are those that may qualify as 1/8, 1/4, 1/2, 3/4 PREs based on how much of the tropical moisture either at the low levels (TPW) or upper levels (GOES WV) get up into the mid- latitudes.
Everybody's work on this subject has helped me do my job better at informing forecasters of the possibilities, like the Texas event a few days ago and build forecaster confidence, especially when the models, as in the case of the Texas event, were completely "out to lunch". Will keep in touch on these matters, Sheldon

----- Original Message -----
From: Michael Jurewicz
<mailto:Michael.Jurewicz@noaa.gov><Michael.Jurewicz@noaa.gov>
Date: Saturday, June 20, 2009 12:42 pm
Subject: Re: [Fwd: Predecessor Rainfall Event (PRE)]

Sheldon Kusselson wrote:

Hello all Pre fans...this is what I posted to the tropical list serve. Wanted to copy a couple of pictures and get it out quickly.
Any comments are welcome.
Sheldon

Subject:
Predecessor Rainfall Event (PRE)
From: Sheldon Kusselson
<mailto:sheldon.kusselson@noaa.gov><sheldon.kusselson@noaa.gov>
Date:
Fri, 19 Jun 2009 13:58:57 -0400
To:
<mailto:Chris.Landsea@noaa.gov>Chris.Landsea@noaa.gov

To:
<mailto:Chris.Landsea@noaa.gov>Chris.Landsea@noaa.gov
CC: tropical storms list
<mailto:tropical-storms@tstorms.org><tropical-storms@tstorms.org>,
<mailto:bm453975@albany.edu>bm453975@albany.edu>

Chris and others...
This may have been a late start to the eastern Pacific hurricane season, but it has started with a bang as I believe you can classify the convective complex that gave 10 inches or more of rainfall to Texas through this morning a "Predecessor Rainfall Event. I have attached an GOES IR image from 0845z and the distance between the center of the TD#1 and the Texas convective complex was about 1000 kms and the rainfall in 24hrs I believe met the criteria. I have also attached a blended Total Precipitable Water image from CIRA/Colorado State's web site at <http://amsu.cira.colostate.edu/gpstpw>http://amsu.cira.colostate.edu/gpstpw around 12z this morning that tries to capture the low level moisture that had come across the Mexican mountains into Texas.
Any comments on this are welcome as this is a learning experience for me.

Sheldon

<mailto:Chris.Landsea@noaa.gov>Chris.Landsea@noaa.gov wrote:

Hi tropical storm folks,

With the Northeast Pacific cyclone EP01 operationally remaining a tropical depression this morning, 2009 will likely be known as the latest starting season (first occurrence of a tropical storm) since (relatively) accurate records began in 1970 for that basin. The previous latest starting season was 1994 with the development of Tropical Storm Aletta at 06Z on the 19th of June.

Best regards,
chris

****

Chris Landsea

Science and Operations Officer
NOAA/NWS/National Hurricane Center
11691 S.W. 17th Street
Miami, Florida, USA 33165-2149
<mailto:Chris.Landsea@noaa.gov>Chris.Landsea@noaa.gov
P: 305-229-4446 F: 305-553-1901

Sheldon,

Thanks for sending this message. I started looking at this evolving situation yesterday, with a nice developing conveyor belt of moisture up into Texas from the tropical East Pacific (vicinity of the TD). On a "pre"liminary basis, I would have to agree that this was/still is a PRE. Satellite/TPW loops showed a nice linkage between TD1-E and the convective complex over TX. Precipitable water values of 200+% of normal extended into TX and NM, owing to deep-layered meridional flow, with the main trough axis well west of the TD's longitude. As you said, rainfall amounts were quite heavy, and a quick check of that region shows numerous flash flood watches and warnings still in effect. I plan on looking at some of the upper-air data and maybe a few trajectories over the next few days, to try to confirm/pin down the TD's role in all of this. Thanks again and take care.

- Mike J.

Sheldon, Lance, and Ben,

The possible PRE in West Texas from this past weekend was interesting, in a couple of respects. I've attached a few figures to help illustrate the points I'll mention below.

Firstly, the moisture contributions to this heavy rainfall event were somewhat complicated. Based on trajectory analyses, it appears that the lower-level (sfc-700 mb) moisture advections originated from the GOMEX, independent of the TD, while mid to upper-level contributions (aoa 700 mb) were more closely associated with the TD's circulation itself. As I'm sure Lance will recall, we've seen this kind of thing before with Eastern Pacific TC/possible PRE, as the higher terrain over Mexico effectively blocks lower-level moisture inflow from a SSW direction into TX. Looking at the KMAF sounding from 12z, 19 June (most of the rainfall appeared to fall between 06z and 12z), anomalous PWAT values/significant warm cloud depths were present. Certainly, if you were to somehow erase the moisture supply above 700 mb (presumed TD contribution), these values would not have been as high. Secondly, in comparing the 250 mb jet from 12z, 18 June, to 24 hours later, it looked like the main speed maximum did back-build somewhat to the south, placing western TX within its entrance region.
From the upper-level streamlines on these same maps, it also looks like perhaps some height rises were evident poleward of the TD (a better defined anticyclonic gyre), which could have acted to tighten the height gradient and strengthen the jet. I suppose you would have to look at upper-level PV analyses from this time frame to better confirm the TD's role in the behavior of this jet.
Certainly, the rainfall amount criteria for PRE seems to have been satisfied. I could not, however, from any of the local WFO's, find any verification of actual flooding, so far.

In a nutshell, I think this heavy rain event had several ingredients in common with past documented PRE (including a favorable large-scale pattern, with the main trough west of the TC). However, the lack of a low-level tie in makes me hesitate a bit.

Any thoughts welcomed.
- Mike

Dr. Daniel Keyser
Professor, Atmospheric Science
Department of Atmospheric and Environmental Sciences, ES-224
University at Albany State University of New York 1400 Washington
Avenue Albany, NY 12222
518-442-4559 (office)
518-442-5825 (fax)
keyser@atmos.albany.edu