



# HWT Experimental Warning Program: History & Successes

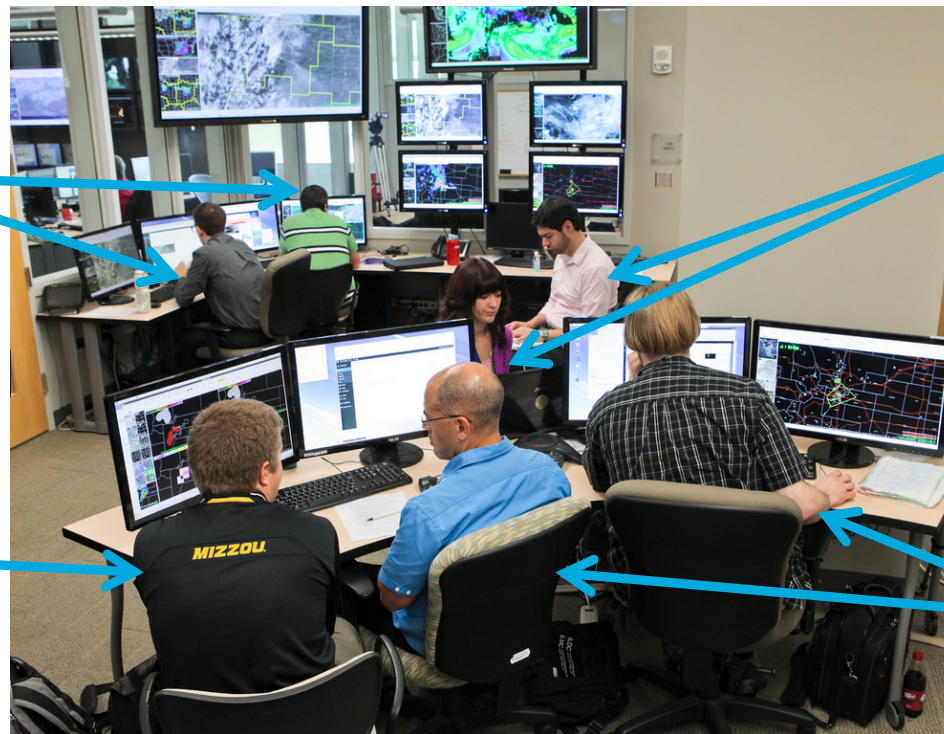
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February 25–27, 2015

National Weather Center  
Norman, Oklahoma



# The Experimental Warning Program (EWP)



**Technology Specialists**

**Trainers & Social Scientists**

**Researchers**

**Forecasters**

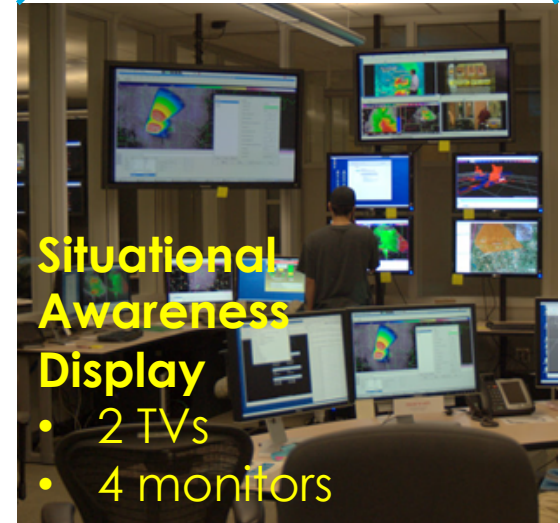
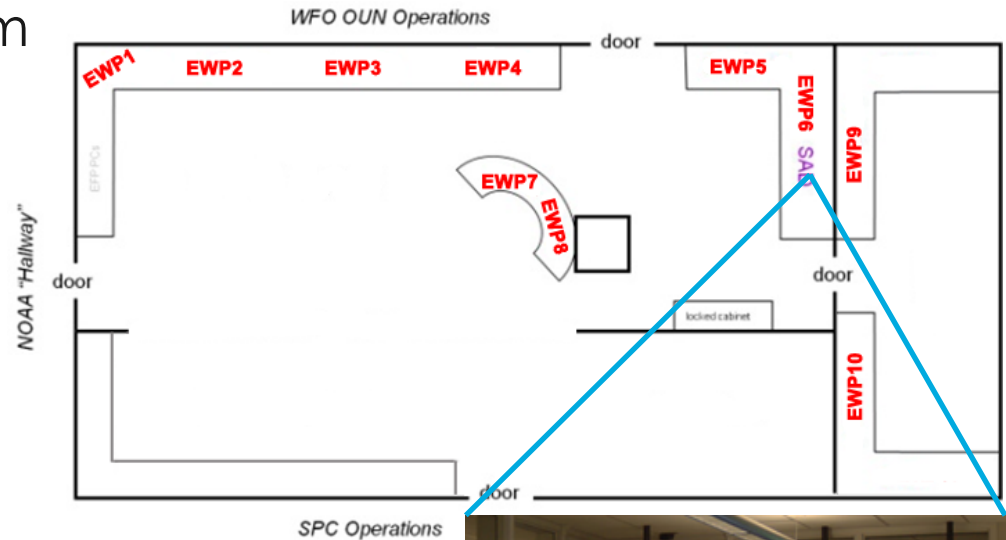
## **Goals:**

- 1) Evaluate new techniques, observation systems, and applications at the “warning scale” (0-2 hour time period).
- 2) Gather feedback for product improvement, best practices training, and evidence of relevancy in NWS operations.



# EWP Technology

- Advanced Weather Interactive Processing System (AWIPS)
  - AWIPS-1: 2008-2011
  - AWIPS-2: 2012-present
- 10 AWIPS-2 workstations
  - Can replicate any NWS forecast office
- Satellite Broadcast Network Access
  - Every operational product available to the NWS



**Situational Awareness Display**

- 2 TVs
- 4 monitors

**Benefit:** An analog environment of a NWS office that a forecaster is familiar with while providing a head start to operational implementation.



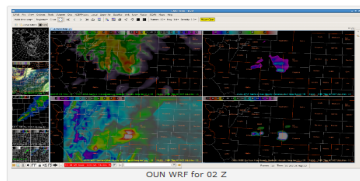
# Receiving Forecaster Feedback

## Blogging

### Supercell E of Pueblo (Colorado)

Wednesday, May 23rd, 2012

Well anticipated by OUNWRF, strong to severe storms formed over E-C Colorado (here E of Pueblo) by 0030 Z. This is the latest forecast for 0200Z, showing the supercell moving straight to the east.

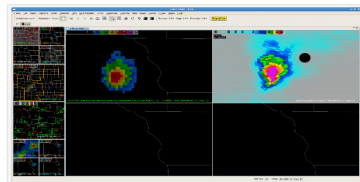


Posted in Live Blogs | No Comments »

### OAX: Utilization of MRMS within Radar Cone of Silence

Wednesday, May 23rd, 2012

Below are DVIL images at 0058 UTC and 0107 UTC. Left image is MRMS and right image is KOAX 88-D. By 0107 UTC, the severe storm moved into the KOAX cone of silence, causing it to disappear, while the MRMS kept the storm's integrity.



Pre-warning decision  
Making thoughts and  
Images in real-time.

» April 2008

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## Daily/Weekly Surveys

### EWP 2012 - HWT Spring Experiment

pGLM Total Lightning Data Product Evaluation

What were the strengths and weaknesses of the lightning data during this particular event?

What particular products (e.g., pGLM flash extent density, 60 min or 120 tracks) did you like or find useful? Why?

What features and individual products did you NOT like or would change (and how would you envision them changing)?

How do you envision using total lightning data in the future? What other thunderstorm modes and cases would you like to see examples of?

Did any ideas or suggestions for new products or displays occur to you as you were using the existing products?

What was your overall impression of the pGLM lightning data?

Strengths/Weaknesses  
of the applications  
evaluated.

## Daily/Weekly Debriefs



Dedicated face-to-face  
time between forecasters  
and developers on the  
evaluated products.

**Flexible metrics of data capture allow investigators to receive quality feedback on their terms while providing transparency in the evaluation process.**

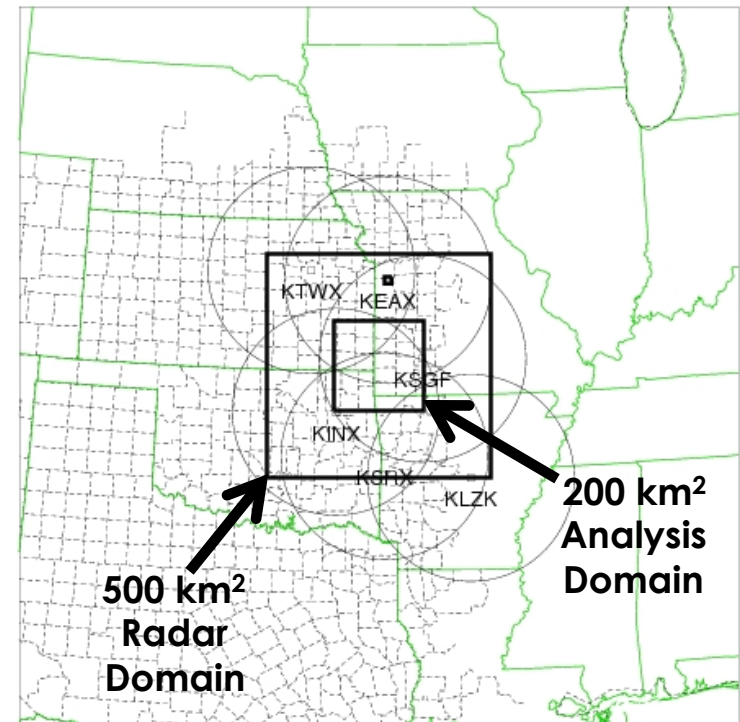


# Past Successful Initiatives: NSSL 3DVAR

**3DVAR = A storm-scale data assimilation system blending observational and numerical model data**

## NSSL 3DVAR

- Reflectivity and radial velocity from nearby WSR-88D radars blended with 12km model background
- Four floating 200x200 analysis domains
- 1km horizontal resolution, 500m vertical resolution (31 total levels) every 5 min.



**Goal:** Synthesize storm dynamics in a manner that is quick and easy for forecasters to interrogate.





# Past Successful Initiatives: NSSL 3DVAR

Multi-year experiment allowed for integration of feedback for re-evaluation

## AWIPS-2 Products Evaluated

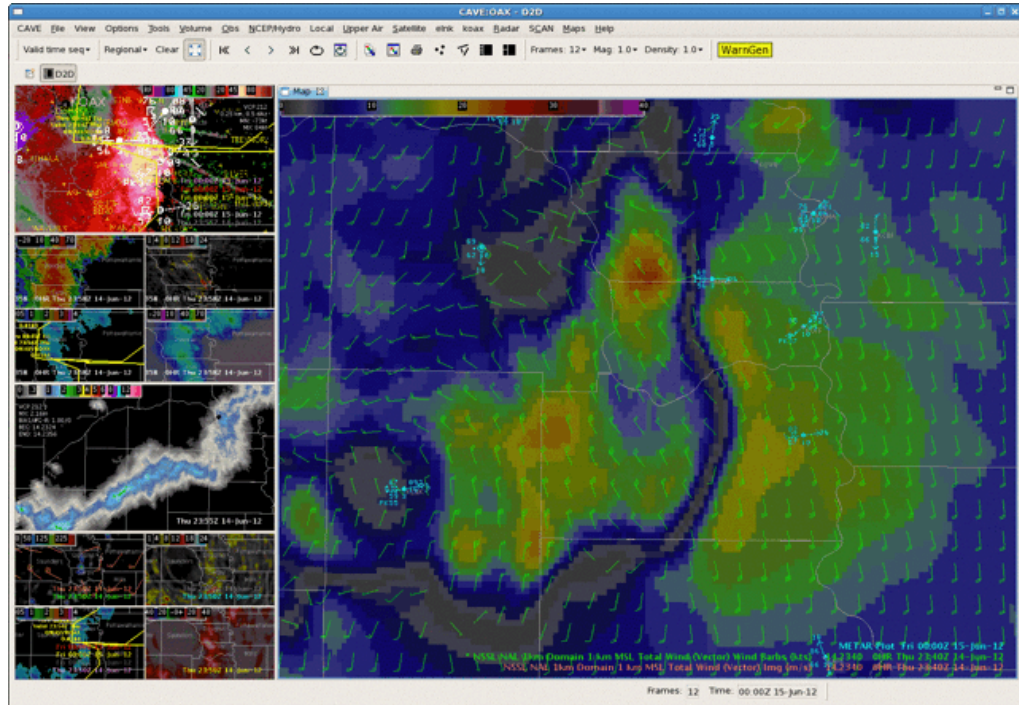
**Bold = Evaluated Both Years**

2011

- Downdraft Track
- Downdraft Composite
- Simulated Reflectivity**
- Updraft Track**
- Updraft Volume
- Updraft Max**
- Vorticity**
- 2D Wind Fields**

2012

- Storm-top Divergence
- Updraft Helicity



**Above:** AWIPS-2 display of the NSSL 3DVAR 1km wind field displayed as both barbs and as a colored image for a damaging wind event on 14 June 2012.

More Info: Calhoun et al. (2014) - <http://dx.doi.org/10.1175/WAF-D-13-00107.1>



# Past Successful Initiatives: MR/MS

## What is Multi-Radar/Multi-Sensor?

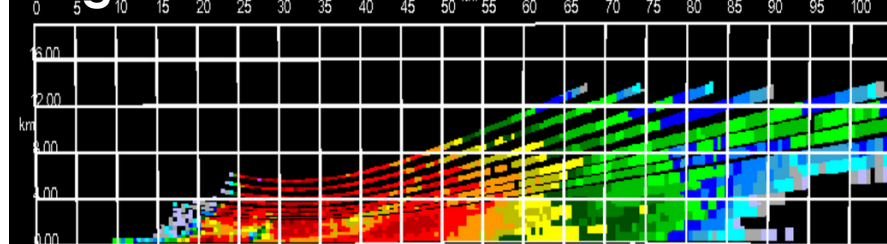
Exploits areas of overlapping radars to generate 3D cube of reflectivity and shear products and derivatives

- 2 min. output – 500m-1km resolution

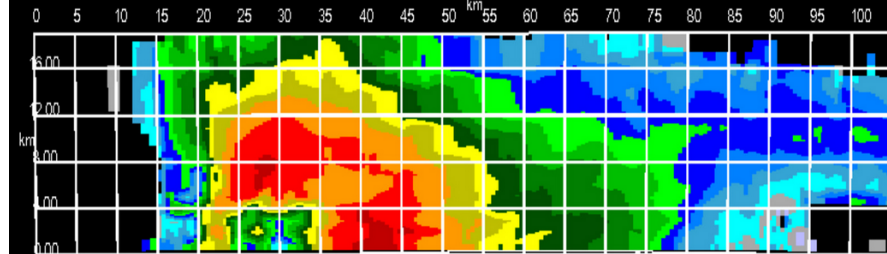
## EWP History

- Evaluated for last 8 years
  - Multiple iterations of product development
- Gained NWS support and trust
  - System Requirements & Evaluation Committee **Top 10 implementation candidate from all NWS regions**
- Implementation into AWIPS-2 operations this year

## Single Radar



## Multi-Radar



MRMS

---Multiple-Radar/Multiple-Sensor---

- Hail Products
- Lightning Products
- Precipitation Products
- Reflectivity Products
- Velocity Products

**AWIPS-2  
Menu**





# Current Initiative: Earth Networks (ENI) Total Lightning

## First EWP public/private sector data evaluation experiment

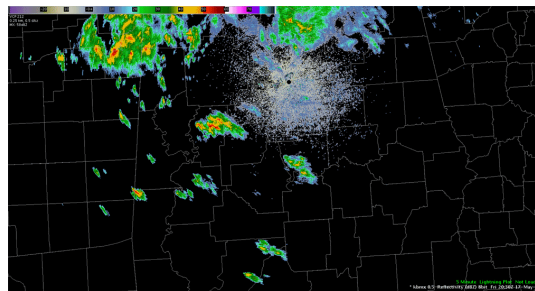
**Objective:** Does ENI total lightning and derivative products have value in warning operations?

### Experiment Design

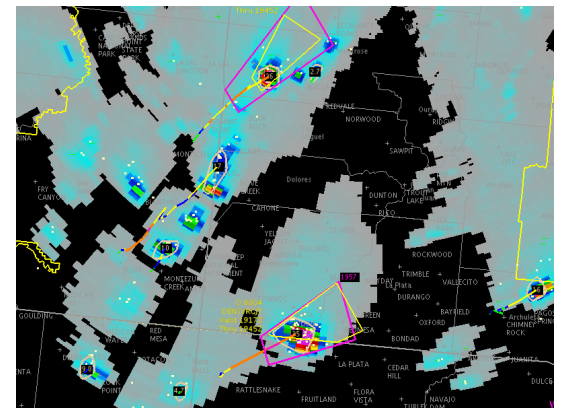
A blend of meteorology & social science



**18 NWS  
Forecasters**



**Six two-hour  
scenarios of  
varying  
convective modes**



**Three tiers of data  
available for storm  
interrogation**





# ENI Total Lightning: Results & Future Work

## NASA Task Load Index

Assess perceived workload of a new task or product

## Year 2: Spring 2015

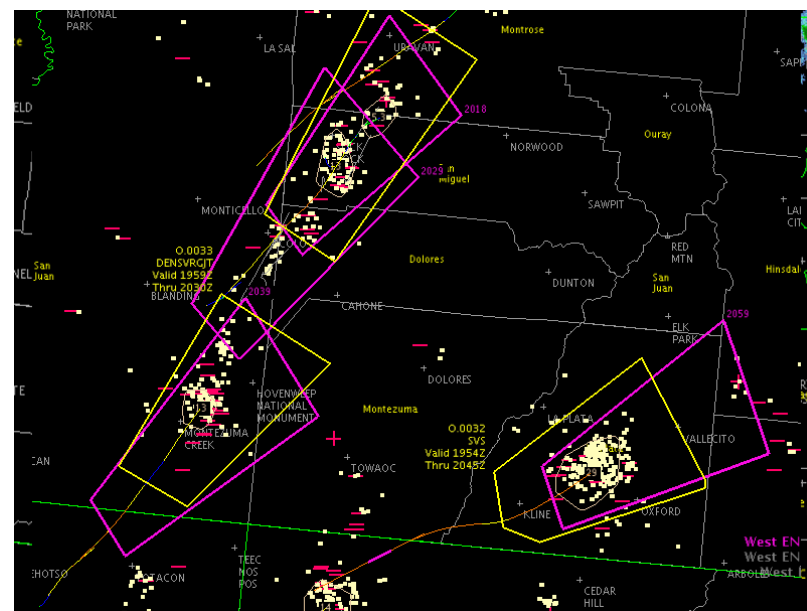
Integration of forecaster feedback into a renewed product set for real-time evaluation

### Interpretation

0 = No Stress ; 100 = High Stress

| Data Provided                         | Mean Workload |
|---------------------------------------|---------------|
| Radar Only                            | 55            |
| Radar + Total Lightning               | 52            |
| Radar + Total Lightning + Derivatives | 54            |

- Similar workloads observed
- Case meteorology plays larger role



**Above:** ENI total lightning and Dangerous Thunderstorm Alerts





# Summary

NOAA's HWT has a record of success and will continue to provide a mechanism for the evaluation of new products and services to meet the needs of the National Weather Service.

## The Path Ahead

- Planned Future Initiatives:
  - **Continued work with the Phased Array Radar Innovative Sensing Experiment (PARISE)**
    - Exploring the role of rapid-scan radar data on human factors and forecaster conceptual models
  - **GOES-R Risk Reduction Activities**
    - Evaluate proposed algorithms and tools to support the GOES-R mission
  - **Probabilistic Hazard Information (PHI) into AWIPS-2 Hazard Services**
    - FACETs, decision support services, and human factors experiments
  - **Continued work with Flooded Locations and Simulated Hydrographs (FLASH) Program**
    - Forecaster use and evaluation of a new paradigm for flash flood prediction

