



Orientation

AWOC Winter Weather Track
For AWOC Facilitators and Managers
by
Warning Decision Training Branch



Your Instructors Today

- Brad Grant



- Ed Mahoney



- Jim LaDue

- Don Rinderknecht



Here is the Outline of the Orientation

Section 1: Purpose of Course

Section 2: Overview of the Course

Section 3: Roles and Responsibilities

Section 4: Timelines

Section 1: Purpose of the Course

Why a Winter Weather Track?

- Winter Weather Impacts on Transportation
 - Nearly 74% of nation's roads are located in snowy regions
 - 7000 deaths/year
 - 1.4 million crashes
 - \$10 billion economic losses

Source: Federal Highway Administration (FHWA) 2004

Buffalo, New York, 1977, Photographer:
American Red Cross



Section 1: Why a Winter Weather Track?

- Winter Weather Impacts on Transportation (cont.)
 - Freeway speed and traffic volume reduced by 16-30 % (ISU study)
 - 23% of travel time delays
 - Increased operating and maintenance costs (nearly 39% of road operating costs can be attributed to winter maintenance annually)

Chicago, IL, Jan. 26, 1967, Photographer:
Dept. of Streets and Sanitation



Section 1: Why a Winter Weather Track?

- Impacts on Public
 - No energy reserves
 - Heating costs
 - Snow-removal costs
 - Closures
 - Insurance losses



Courtesy Department of Sanitation, New York City



Rapidly Escalating Societal Demands

- Energy Industry has changed in just the past 10 years
- Has evolved to a “No Storage” model

1 Missed forecast

Wednesday, Feb. 15: Xcel uses a weather forecast for Saturday that misses the low temperature by 19 degrees.

Forecasted low: **6°**
Saturday's actual low: **-13°**

2 Insufficient supplies

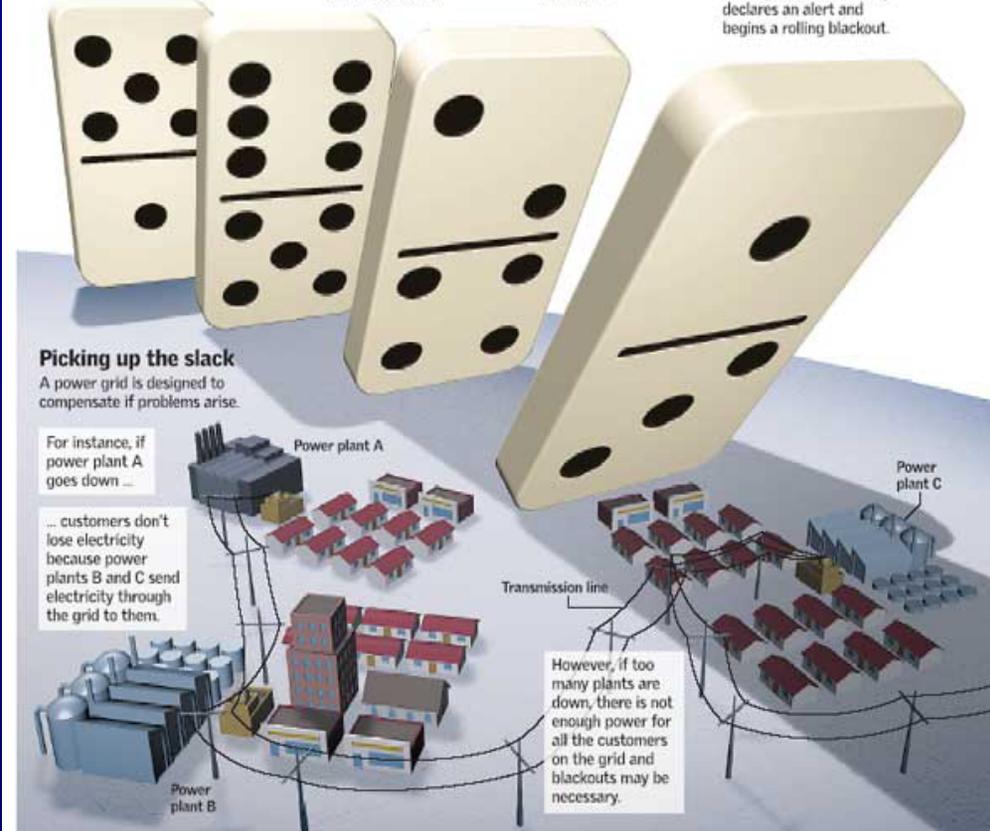
Thursday, Feb. 16: The utility decides not to make any additional purchases of natural gas that could be used to generate electric power for the weekend.

3 Plants shut down

Friday, Feb. 17: Some plants shut down or are unable to start as temperatures begin to plummet in the afternoon.

4 Blackouts

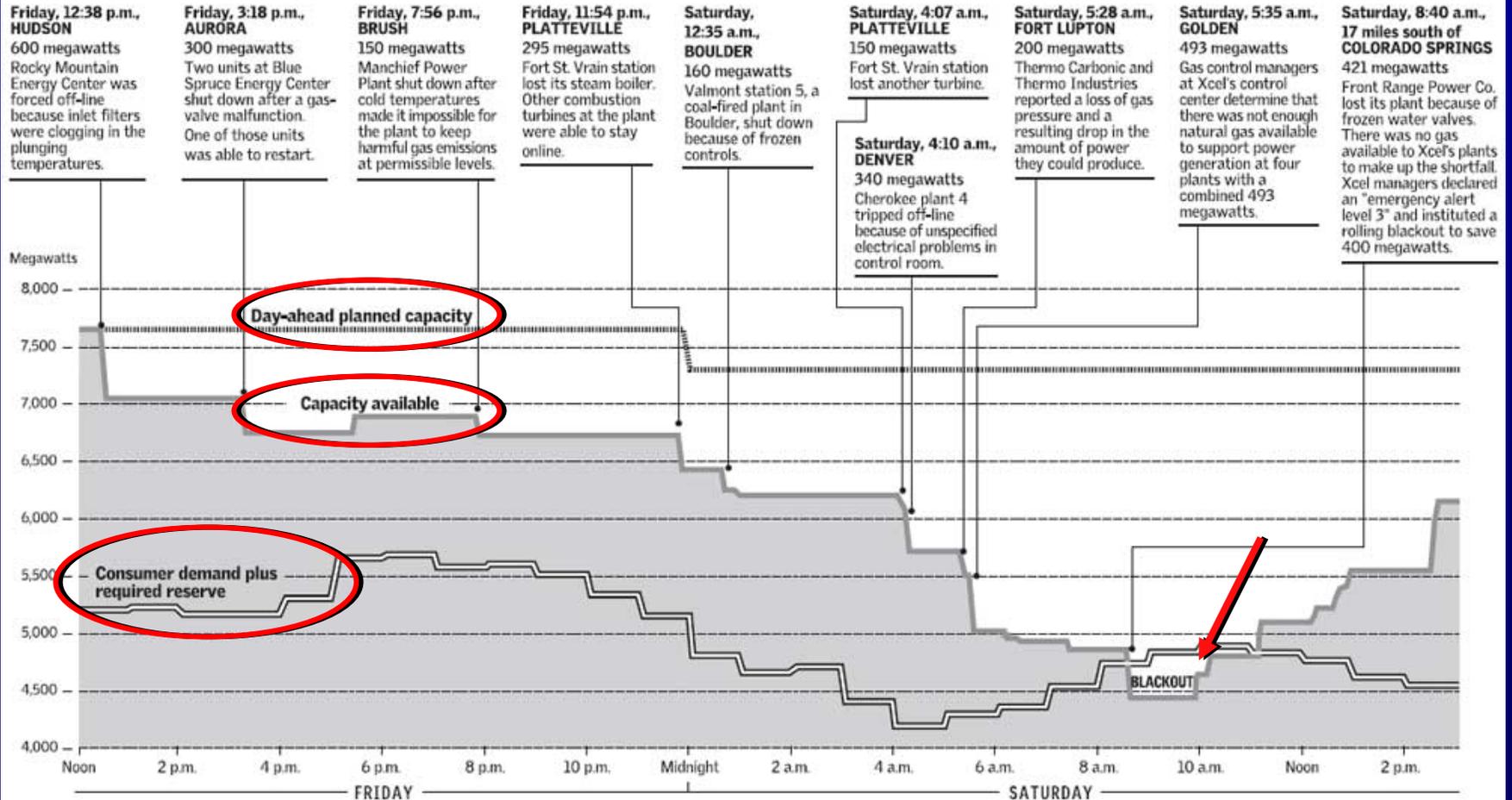
Saturday, Feb. 18: Additional power plants shut down because of cold temperatures and the lack of gas in Xcel's network to keep them running. Xcel's subsidiary declares an alert and begins a rolling blackout.



Rapidly Escalating Societal Demands

Critical outages

As power plants across Colorado failed, were off-line for maintenance or were unable to start on request on Friday, Feb. 17, and Saturday, Feb. 18, Xcel Energy found itself short 400 megawatts of electricity and chose to institute rolling blackouts. Here are some of the critical outages.



Source: Xcel Energy

Section 1: Why a Winter Weather Track?

- Impacts on Schools



Image Source: Tulsa
Union Public Schools

So, What are the Goals of the Course?

The Purpose Of AWOC

“To provide training to all warning forecasters on winter weather warning decision making principles”



We Use These Metrics to Report Our Performance to the Public and to Congress



EMAIL TO: All NWS Directors
 FROM: David L. Johnson
 SUBJECT: Advanced Warning Operations Course

Attainment of the highest levels of warning skill by our field staff is the cornerstone of our ability to protect lives and property. Our Government Performance Results Act (GPRA) goals reflect this high priority, as seven of our 14 goals are warning related.

NWS conducts training programs to support the highest levels of quality and professionalism among its staff so that they, in turn, can best serve the public. The Office of Climate, Water, and Weather Service's new Advanced Warning Operations Course (AWOC) is a particularly important offering at this time with respect to the NWS Warning Program.

I consider mastery of the skills that are central to AWOC as critical for all forecasters with warning responsibility. This training is the first large-scale warning preparedness training available to all field staff in many years. Accordingly, we need to ensure all Meteorologists/Hydrologists-In-Charge incorporate AWOC into their Office Training Plans for the coming year.

AWOC training is accomplished via a combination of distance learning approaches (web and teletraining) and in-office facilitation. It addresses the science, technology and human factors necessary for an effective office warning program. The entire curriculum for the course can be accomplished in 24 to 28 hours – and all on station.

Thank you in advance for your assistance in making your staff aware of my high priority for completion of this course by all forecasters with warning responsibility.



Performance

Tornado Warning

Tornado Warning

Tornado Warning

Flash Flood Wa

Flash Flood Wa

Winter Storm W

Winter Storm W

Hurricane Track

Aviation Foreca

Aviation Foreca

False Alarm Ra

U.S. Seasonal T

Precipitation Fo

Marine Wind Sp

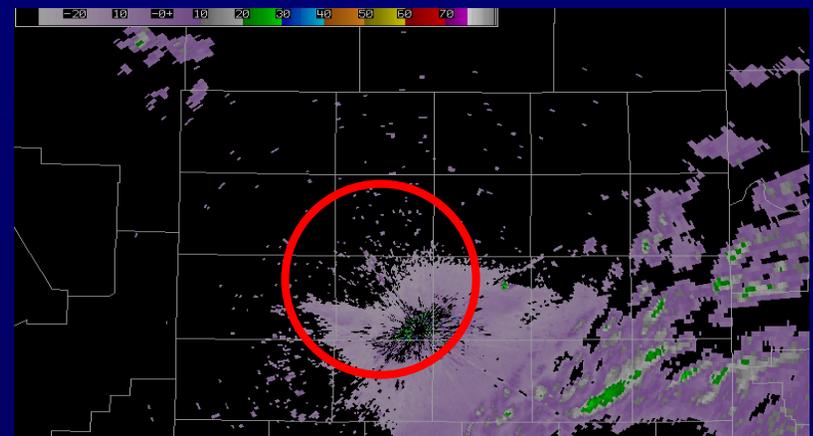
Marine Wave H

	2008	2009
	76	76
	68	67
	15	16
	90	91
	58	59
	90	91
	15	16
	126	125
	52	55
	66	65
	23	24
	28	29
	68	69
	80	81

Section 1: Purpose of Course (cont.)

- The training is also directly related to NOAA Commerce and Transportation Goals
 - Surface Weather Program
 - Accuracy of onset of event (frozen and freezing precip)
 - 0-6 hrs period: 85%
 - Aviation Program

	2005	2006	2007	2008	2009		
Aviation Forecasts (Ceiling & Visibility) - Accuracy (%)	48	46	46	48	50	52	55
Aviation Forecasts - (Ceiling & Visibility) False Alarm Rate (%)	64	70	68	68	67	66	65



Section 2 : Overview of the AWWT

- Collaborative Development Process
- What's in the Course?

Partnerships

Peter Manousas (HPC)

Dan Peterson (HPC)

Paul Stokols (OCWWS)

Richard Grumm (CTP)

Eric Stevens (AFG)

Phil Schumacher (RAP)

David Schultz (NSSL)

Michael Evans (BGM)

Tom Niziol (BUF)

Randy Graham (GRR/SLC)

Ken Harding (ABR)

Dan Cobb (CAR/GRR)

Dan Baumgardt (ARX) review team

Carl Dierking (JNU)

Bruce Smith (APX)

Peter Banacos (SPC/BTV)

Pat Market (Univ. of Missouri-Columbia)

Brian Motta (FDTB)

John McLaughlin (Des Moines TV station)

Julie Adolphson (GGW)

Doug Wesley (COMET)

Dan Bikos (VISIT/CIRA)

Mike Myers (GJT)

Dave Reynolds (MTR)

Shannon White (OCWWS) review team



Section 2: Here is the AWWT

- Intended Audience
 - NOAA/NWS Forecasters with Winter Weather Warning Responsibility
 - WFOs/National Centers (HPC, SPC)
- Pre-requisites
 - DLOC or WSR-88D Ops Course Graduate
- Deliverables
 - Approx. 20 hours of instructional online courses on the LMS
 - Printed materials with binder (slides and notes)
 - Optional materials (job sheets, software applications, online courses)
 - Winter Weather WES Version (WES6.0ww)

So, What Will the AWOC Winter Weather Track Look Like?

AWOC Winter Track

Total = 20.5 hours*

IC 1
Orientation (30 min)

IC 2
Products and Services (1.5 hrs)

IC 3
Societal Impacts (1 hr)

IC 4
Climatology (3 hrs)

IC 5
Precipitation Forcing Mechanisms (3.5 hrs)

IC 6
Forecasting P-type and QPF (3 hrs)

IC 7
Monitoring (3 hrs)

IC 8
WES (5 hrs)

*includes 3
“optional”
lessons

Section 2: How are the ICs Structured?

Instructional Component 3 Societal Impacts of Winter Weather



Lesson 1: Significant Impacts to Users
(20-30 minutes)

Lesson 2: User Issues, Constraints, and Responses
(20-30 minutes)

Lesson 3: Conveying Forecaster Confidence
(20-30 minutes)

AWOC Winter Wx Web Site

- Training materials are still under construction
 - <http://wdtb.noaa.gov/courses/winterawoc/underreview/>
- OLT “courses” (we call them lessons) available on LMS on June 5

The screenshot displays the National Weather Service Warming Decision Training Branch website. The main content area is titled "Lesson Directory for Winter AWOC External Reviewers" and lists seven categories of lessons, each with a list of specific topics:

- IC Writer 1: Orientation**
 - Lesson 1: Orientation to the Winter Weather Track of AWOC
- IC Writer 2: Products and Services**
 - Lesson 1: Why Certain Products are Issued
 - Lesson 2: WFO/HPC Collaboration
- IC Writer 3: User Needs to Mitigate Societal Impacts**
 - Lesson 1: User Impacts
 - Lesson 2: User Issues, Constraints, and Responses
 - Lesson 3: Conveying Forecast Confidence
- IC Writer 4: Climatology**
 - Lesson 1: Using CPC Products
 - Part 1: SHSC
 - Part 2: Madden-Julian Oscillation
 - Part 3: Climatology - Teleconnections
 - Part 4: Climatology - Using CPC/CDO Products
 - Lesson 2: Climatological Degree of Rarity of Hazardous Winter Weather - Building a Climatology
 - Part 1: Building a Climatology
 - Part 2: Applying Climatic Anomalies to EPS Data
 - Lesson 3: Mesoscales: Interaction of Synoptic Pattern with Local Terrain
- IC Writer 5: Precipitation Forcing Mechanisms and Associated Diagnosis of Winter Weather Systems**
 - Lesson 1: Diagnosing Synoptic-Scale Internal Forcing: A Review of QG Theory and Potential Vorticity
 - Lesson 2: Diagnosing Mesoscale Internal Forcing: Frontogenesis
 - Lesson 3: The Effect of Stability on the Response to Internal Forcing in the Atmosphere
 - Lesson 4: Examples of Frontal Precipitation Bands
 - Lesson 5: Structure of TROWALS
 - Lesson 6: Cool-Season Orographic Precipitation Processes and Prediction
 - Lesson 7: Lake Effects
- IC Writer 6: Synoptic/Mesoscale Forecasting of Precipitation Type and Amount**
 - Lesson 1: Introduction to the Top-Down Methodology
 - Lesson 2: Strengths and Weaknesses of P-Type Algorithms
 - Lesson 3: Using Ensembles in Winter Weather Forecasting
 - Lesson 4: The Ingredients Based Method for Forecasting Heavy Precipitation
 - Lesson 5: Snowfall Forecasting
 - Part 1
 - Part 2
- IC Writer 7: Monitoring System Evolution**
 - Lesson 1: Monitoring Model Accuracy
 - Lesson 2: WSR-88D Winter Weather Precipitation Estimation
 - Part 1
 - Part 2
 - Lesson 3: Effective Use of Spotters and Webcasts
 - Lesson 4: Diagnosing Unexpected Precipitation Areas

The footer of the page includes contact information for the National Weather Service Office of Climate, Water, and Weather Services, Warming Decision Training Branch, located at 3200 Airpark Blvd, Suite 202, Norman, OK 73072. It also lists various organizational links and a copyright notice for the WDTB Webmaster, dated April 14, 2008.

What are Learning Objectives?

- Learning objectives are defined for each Instructional Component (IC).
- Learning objectives describe what learners should be able to do at the end of each lesson (and are testable via the OLT final tests in the LMS).

“Identify the key elements of the top-down approach to predict precipitation type and amounts in the watch and warning phases.”

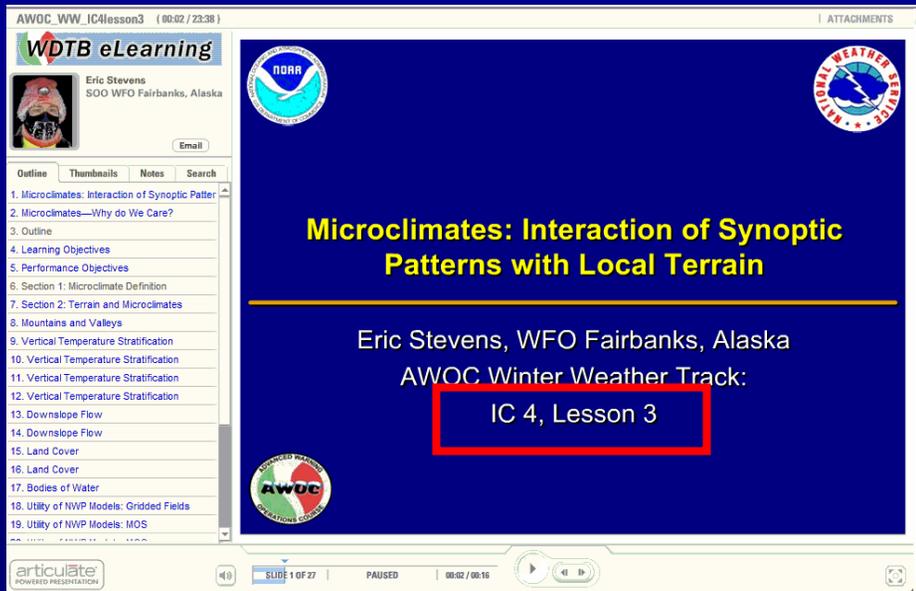
What are Performance Objectives?

- Performance objectives are defined for each IC.
- Performance objectives provide precise, measurable statements of the behaviors that course participants will be able to demonstrate on the job.

“For a given event, be able to disseminate pertinent products and event information to the user community in a timely fashion and update that information at appropriate intervals.”

Learning Activities for Each IC?

Articulate Presentations



The screenshot shows a presentation slide with the following content:

- Header: WDTB eLearning
- Author: Eric Stevens, SOO WFO Fairbanks, Alaska
- Title: **Microclimates: Interaction of Synoptic Patterns with Local Terrain**
- Presenter: Eric Stevens, WFO Fairbanks, Alaska
- Course: AWOC Winter Weather Track: IC 4, Lesson 3 (highlighted in a red box)
- Logos: NOAA and AWOC (Advanced Weather Observations Course)
- Table of Contents (left sidebar):
 1. Microclimates: Interaction of Synoptic Patter
 2. Microclimates—Why do We Care?
 3. Outline
 4. Learning Objectives
 5. Performance Objectives
 6. Section 1: Microclimate Definition
 7. Section 2: Terrain and Microclimates
 8. Mountains and Valleys
 9. Vertical Temperature Stratification
 10. Vertical Temperature Stratification
 11. Vertical Temperature Stratification
 12. Vertical Temperature Stratification
 13. Downslope Flow
 14. Downslope Flow
 15. Land Cover
 16. Land Cover
 17. Bodies of Water
 18. Utility of NWP Models: Gridded Fields
 19. Utility of NWP Models: MOS
- Footer: articulate POWERED PRESENTATION, SLIDE 1 OF 27, PAUSED, 00:02 / 00:16

WES Application

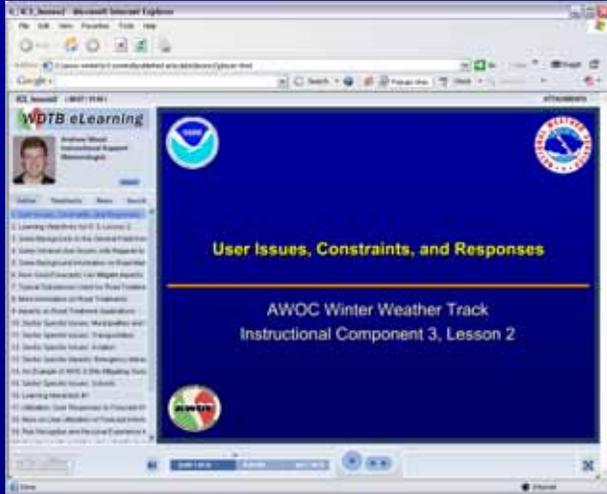


Two 2.5 hr Simulations

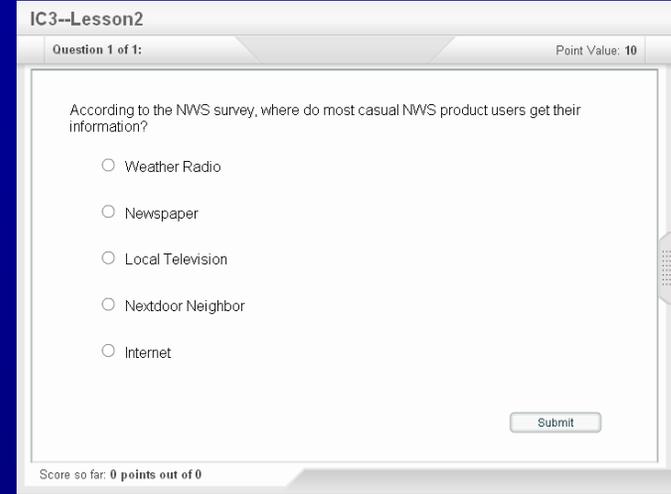
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Increased Interactivity

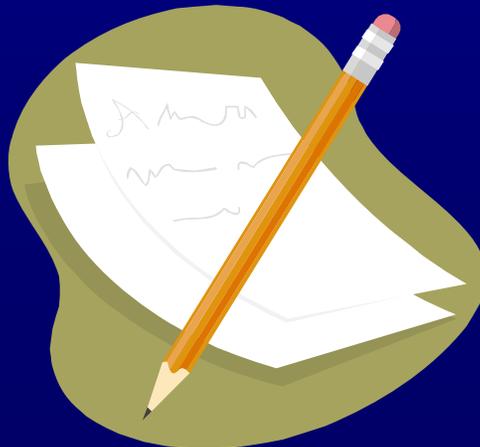
Interactivity Increases Knowledge Retention



Through
Presentations

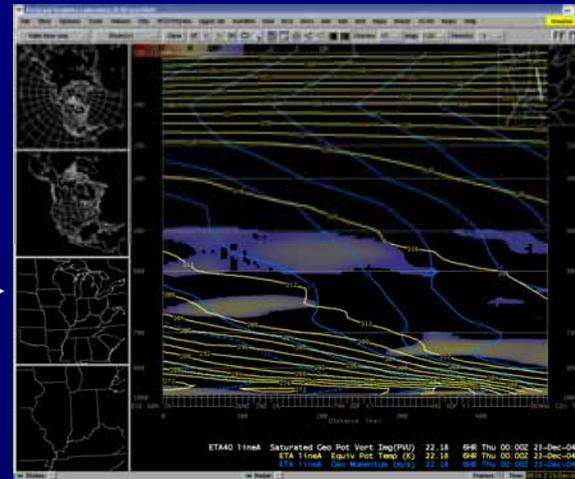


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JOB SHEET
(Optional, ~15 min)

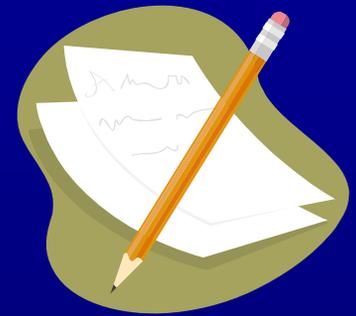
With



SEPARATE MINI-CASE –
Review Mode

What are Job Sheets?

- Application with 10 mini-cases on WES
 - Case Study Mode
- One job sheet per lesson (IC 5-7)
- Several job sheets can be applied to each case
- Jobs sheets and case data shipped by June 1



Job Sheets—An Example

Winter Weather AWOC IC 5 Lesson 1 Job Sheet

IC 5 Lesson 1 Performance Objectives

- 1) What grid resolution to examine Q-vectors within AWIPS
- 2) How to recognize jets, fronts, troughs, and ridges on a tropopause map
 - i. How to use tropopause maps to observe short waves
 - ii. How to use tropopause maps to recognize convectively created “vorticity maximum”
- 3) Understand how upper level potential vorticity can impact the low-level wind fields

Case Review Mode Procedures and Questions

On your WES machine, load the case 2004Mar15, FSD localization, and set the clock to 15 March 2004, 13:00 UTC.

- A. On the Regional map scale, load a GFS 90 500mb Height, V_g , V_{ag} , then answer the following questions.
 - 1) Where are the QG assumptions valid and invalid (location detail such as “northern Missouri” would suffice)? Explain why.

 - 2) What does the change in V_{ag} in the loop say about the development of the system?

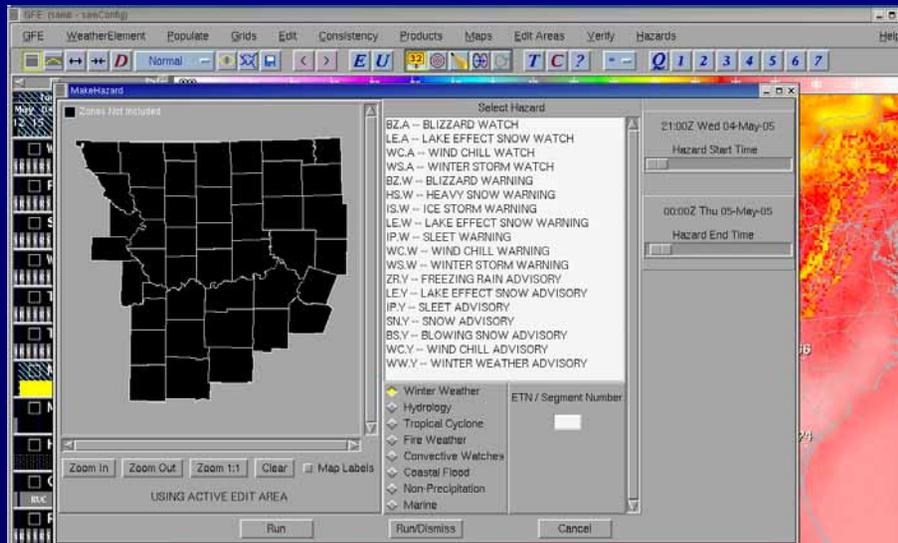
- B. Load GFS 90 Cross Section with Θ_{es} , Q vectors, Q_n , and Q_s at 3 layers: 850-700 mb (or 900-800 mb), 600-500 mb, and 400-300 mb. Answer the following questions.
 - 1) Focusing on each layer, where is the upward forcing located? If there is no upward forcing, answer “None”.

Sample Quiz Question

- A complex winter storm event is expected to produce 8" of snow in the northern part of your CWA, 1-2" of sleet and 4 inches of snow in central part of your CWA, and ½" of ice in the southern part of your CWA. Winds are expected to be 10 to 20 mph across the north with some local blowing snow.
- What product (s) should be issued?
 - A) Three separate warnings – Heavy Snow Warning north, Winter Storm warning central, and Ice Storm Warning south
 - B) Two separate warnings – Winter Storm Warning north and central, and Ice Storm Warning south.
 - C) Single Winter Storm Warning for the entire CWA

Simulation Case

- 22-23 Dec. 2004 heavy snow (IND) and snow/sleet/ice (LMK)
 - SREF, WESSL
- Can use your own local case
- Utilize GFE*



Simulation Guide: Dec 22-23, 2004 Event

Advanced Warning Operations Course



Simulation Guide: Dec 22-23, 2004 Event

Presented by the
Warning Decision Training Branch





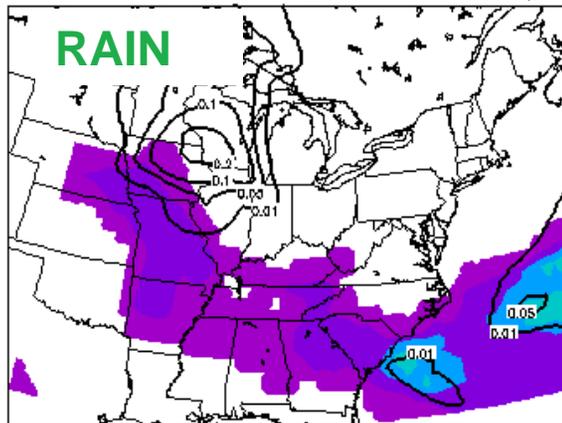
Version 1.0

* Special Spring WES release

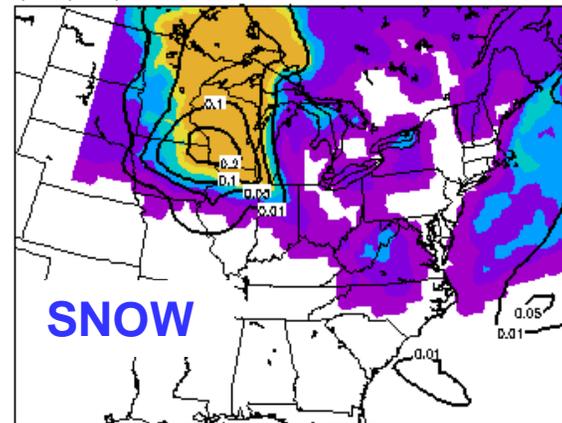
How Difficult are the Lessons?

- Advanced Warning Operations Course

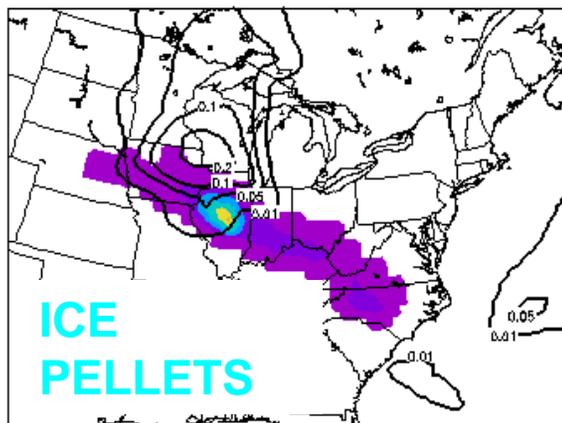
NCEP SREF 3h Mean Prob. of Precip Type (shaded) & Mean 3hr QPF (contour)
21Z21JAN2005 SREF run 3hr forecast valid at 03Z22JAN2005 (Sat)
QPF contoured at 0.01, 0.05, 0.1, 0.2, 0.3, 0.4, and 0.5 inches.



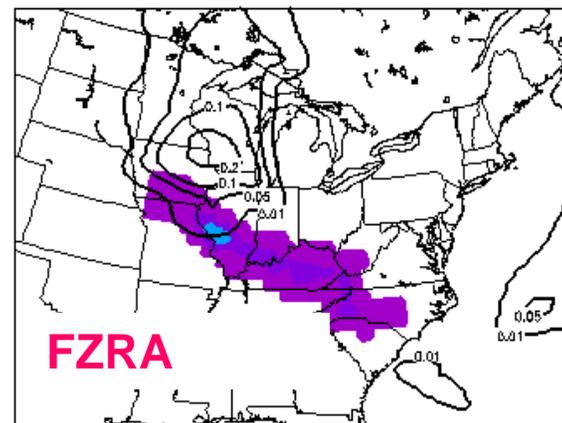
Mean Probability of Rain & Mean QPF



Mean Probability of Snow & Mean QPF

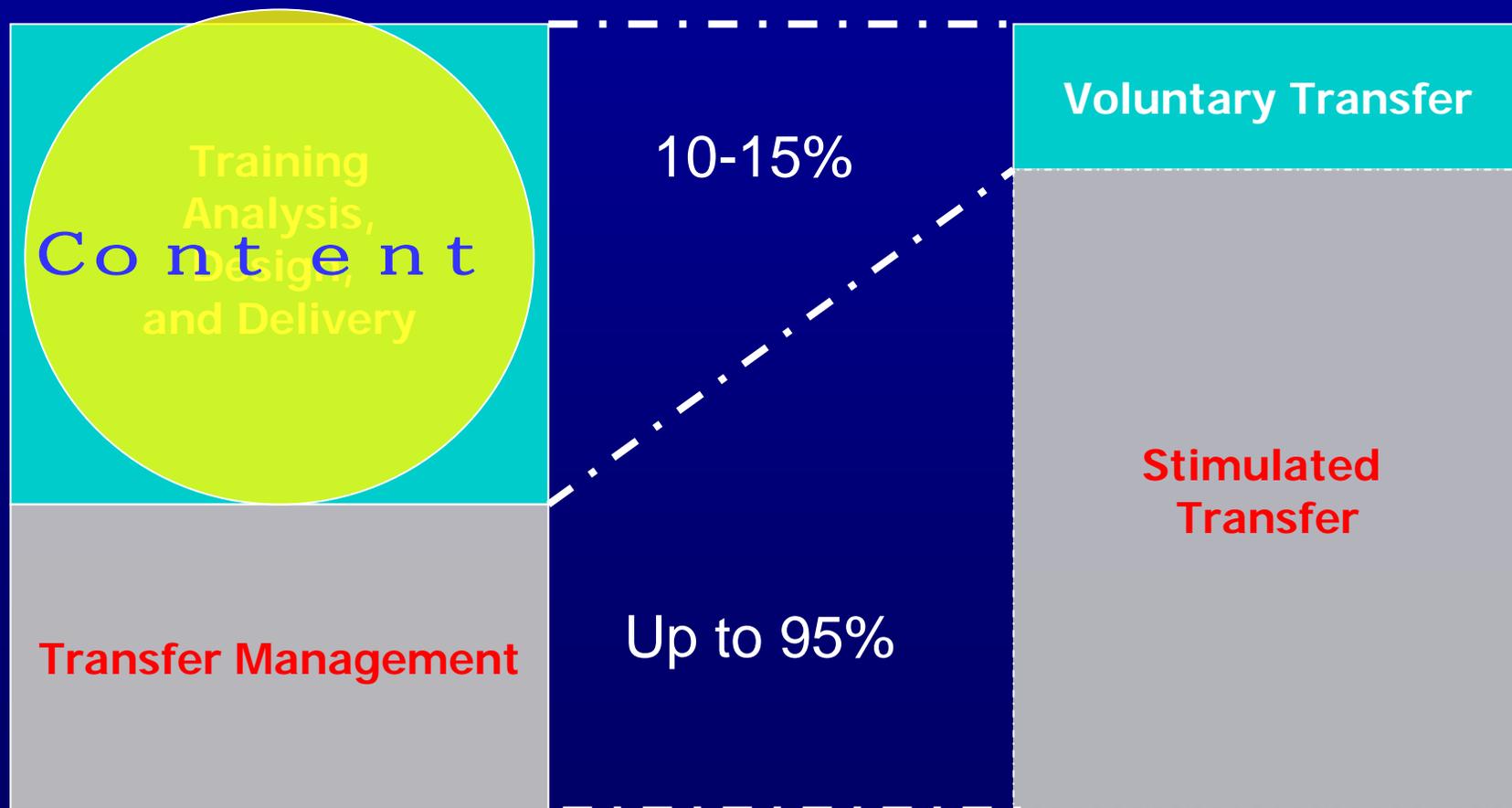


Mean Probability of Ice Pellets & Mean QPF



Mean Probability of Freezing Rain & Mean QPF

Transfer of Training into Performance Requires Management Support



Who's Responsible for Performance Improvement? (Broad, 2005)

Top 6 Factors	Instructors	Students	Managers
Clear performance specifications	I	S	M
Necessary support	I	S	M
Clear consequences	I	S	M
Prompt feedback	I	S	M
Individual capability	I	S	M
Necessary skills and knowledge	I	S	M

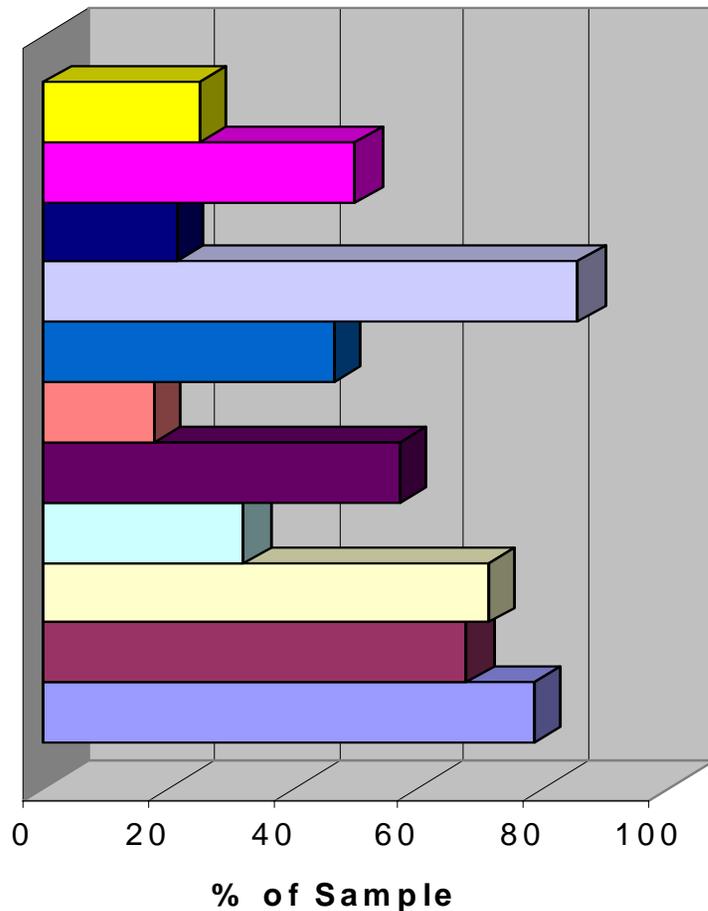
New Research on Autonomous Learners

- 3 factors determine extent of transfer
 - Credibility of information (who is saying it)
 - Practicality (how easy to apply it)
 - Recognition (need to improve their own performance)

All 3 stakeholder groups play a role in supporting these factors!

Research conducted by Yelon, Sheppard, Sleight,
and Ford (2004)

What Were MIC Supports that Helped the SOO During AWOC?

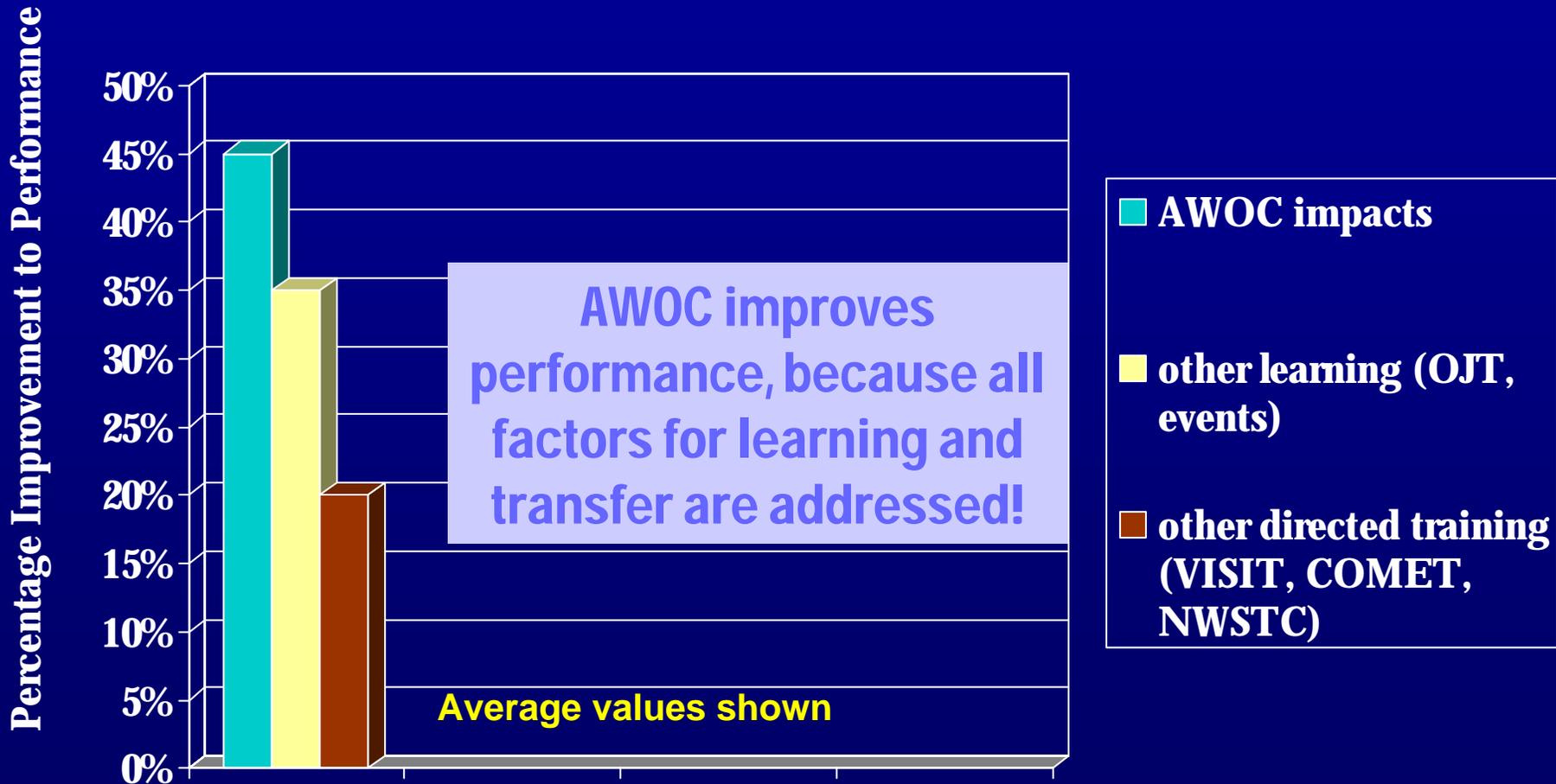


Supports Reported

- participated in post-mortems
- encouraged use
- gave reminders to use AWOC
- completed tracks
- recognized completions
- gave positive feedback on fac. skills
- provided added time for sims
- asked for briefings
- Conferred regularly
- Arranged for uninterrupted time
- Oriented fcsters on AWOC importance

This Can Be Winter Wx AWOC's Impact

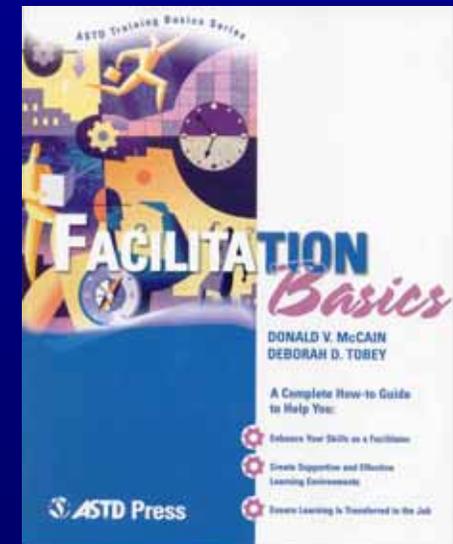
From AWOC post-training survey Sept-Oct. 2005



260 Meteorologists from all regions surveyed!

What Can Facilitators Do to Help AWOC?

- Make the learning easier
 - Meet with each forecaster to determine needs/goals
 - Assign Winter AWOC learning paths
 - Set up a training completion schedule



SOO Transfer Strategies for AWOC

Stakeholder Group	Before Training	During Training	After Training
SOO	<p>Provide advanced information about upcoming course – so they know it's coming. Get them excited about what they'll learn.</p> <p>Describe a scenario that they'll be better equipped to handle operationally, thanks to what they'll learn in the course.</p>	<p>Provide adequate time to complete course. Provide each forecaster with 1-2 WW AWOC training days (with management filling in on shift).</p>	<p>Reinforce course content in real-time as much as possible. Look for examples of how to directly apply course content to real world cases. Share this with the entire staff. Make a clear connection between course content and the improved forecast.</p>

Example provided by Bruce Smith (WFO APX)

Facilitator and Learning Management System

- **LMS Duties**

(See Job Sheets in “LMS Resources” links below)

- NOTE: Must be “Facility Instructor” in LMS.
- 1. Assign a Learning Path (NWS AWOC FY06 Winter Weather Track)
- 2. Mark User Defined Tasks Complete (Simulations)
- 3. “Complete” the Track

- **LMS Resources**

- AWOC Documents Page:
<http://wdtb.noaa.gov/courses/awoc/documents.html>
- LMS Support Page: <http://wdtb.noaa.gov/LMS/index.asp>

- LMS URL: <http://e-learning.doc.gov/>

Course Completion Requirements

- Prerequisites (DLOC or WSR-88D Ops)
- All 28 required lessons
 - Complete LMS OLT final tests
- 2 WES simulations
- Notify WDTB when completion certificate is awarded



Section 4: Timelines

AWOC Winter Wx Delivery Schedule

A M J J A S O N D

Facilitator
Teletraining

Forecasters Complete
Winter Weather ICs

Training
Materials
Released

Local Winter Wx Training

2006



Who Can Help?

- WDTB (LMS problems, etc.)
 - 405-573-3321 (Linda Curtis)
- awochelp@wdtb.noaa.gov
 - Just WDTB sees these
- awocfac@wdtb.noaa.gov
 - All facilitators see these
- icwinterX@wdtb.noaa.gov
 - Particular questions about lesson X
- WDTB.NOAA.GOV

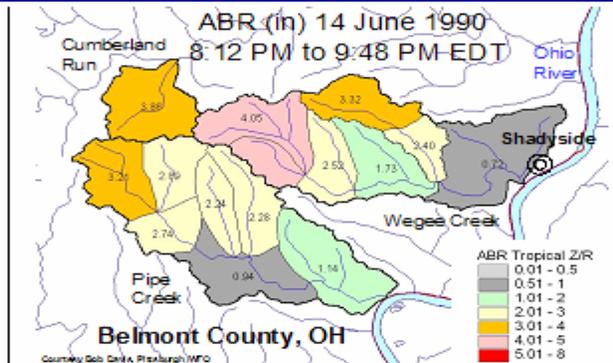
Summary and Questions

- AWOC will provide an excellent opportunity for improvement in warning performance
- But...

*Success
Depends on
All of Us!*

How Many Handouts Do You Need?

Slide 5
Belmont County ABR: Tropical Z/R
 Advance mode: Auto



Notes:

Shadyside Ohio ~90min ABR using the tropical Z/R relationship. Amounts are over twice as much in many instances.

- Estimate your # of handouts
- Email linda.j.curtis@noaa.gov by May 31 the names as you want them to appear on the Certificate
- ftp://ftp.wdtb.noaa.gov/Pub/WDTB/Courses/AWOCwinter/orientation/AWOCWWFacOrientation_Print.pdf

(for a copy of this presentation)

