The NOAA/NWS Warning Decision Training Branch (WDTB): On-line Training Resources for Emergency Managers & Intro to Dual-Polarization Radar

Andy Wood
CIMMS (University of Oklahoma)/WDTB (NOAA/NWS)
The Warning Decision Training Branch (WDTB) develops and delivers training on the integrated elements of the warning process within a National Oceanic and Atmospheric Administration (NOAA)/National Weather Service (NWS) forecast office.
What WDTB’s Mission Looks Like in Practice

• Teach the science, technology, and human factors of radar interpretation & warnings to NWS staff
• Focus on base data interpretation, expertise, and maintaining situation awareness
WDTB Is a Part of the NWS Training Division
Example of WDTB’s Science & Technology Training: Dual-Polarization WSR-88D

Most significant modification to the WSR-88D since the original deployment
Why Is Human Factors Training Important to the WDTB?

Factors Contributing to Missed Tornado Events (%)

- Science: 27%
- Technology: 12%
- Human Factors: 61%
Example of WDTB’s Human Factors Training: Communicating Risks in High Impact Events

Lessons learned from NWS “Stories from the Field” & links to what social science has taught us
How to Impact Warning Performance?

Relating training outcomes to improved services

Water rescues at Millington (TN) Naval Air Base on May 1, 2010
Flash Flood Warning Emergencies Issued

Flash Flood Warning Best Practices Course Released (4/1/11)

FFEIs Issued annually:
- 2009: 2
- 2010: 3
- 2011: 25
### How WDTB Reaches 2000 Meteorologists Each Year

<table>
<thead>
<tr>
<th>Delivery</th>
<th>Students per Year</th>
<th>Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-Residence</td>
<td>~100</td>
<td>- Immersive&lt;br&gt;- Hands On Application&lt;br&gt;- WDTB Facilitation&lt;br&gt;- Responsive to Students</td>
</tr>
<tr>
<td>Instructor-Led</td>
<td>~400</td>
<td>- Low Cost&lt;br&gt;- WDTB Facilitated&lt;br&gt;- Responsive to Students</td>
</tr>
<tr>
<td>Web-Based</td>
<td>~2000 (21,084 Modules)</td>
<td>- Low Costs&lt;br&gt;- Reaches Large Audience in a short time</td>
</tr>
<tr>
<td>Simulations</td>
<td>~1600 (4 Sims/student)</td>
<td>- Hands On Application&lt;br&gt;- Evolved into Low Cost&lt;br&gt;- ”Train as you fight”</td>
</tr>
</tbody>
</table>
Courses That May Interest Emergency Management Community

- Dual-Polarization Radar Training

- Integrated Warning Team Training
  - [http://www.wdtb.noaa.gov/courses/iwt/index.html](http://www.wdtb.noaa.gov/courses/iwt/index.html)

- Communicating Risks in High-Impact Events

- EF-Scale Training
  - [http://www.wdtb.noaa.gov/courses/EF-scale/](http://www.wdtb.noaa.gov/courses/EF-scale/)

- Wind Farms, the WSR-88D and Coexistence
An Example of WDTB On-Line Training: Dual-Polarization WSR-88D Radar Training

• New technology upgrade aka: Dual-Pol

• Most significant modification since original WSR-88D deployment

• Previous radar products remain the same

• Additional base and derived radar products
Current Status of the Dual-Polarization Upgrade (as of 9 Jan 2013)
## Overview of Dual-Pol Training Solutions

<table>
<thead>
<tr>
<th>Course</th>
<th>WSR-88D Dual-Pol Operations Course</th>
<th>Dual-Pol Education and Outreach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Audience</strong></td>
<td>All NWS Forecasters</td>
<td>- First Responders</td>
</tr>
<tr>
<td></td>
<td>- Meteorologists</td>
<td>- Broadcast Mets</td>
</tr>
<tr>
<td></td>
<td>- Hydrologists</td>
<td>- Other Private Sector</td>
</tr>
<tr>
<td></td>
<td>- CWSUs</td>
<td>Meteorologists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Emergency Managers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Other Public Stakeholders</td>
</tr>
<tr>
<td><strong>Scope</strong></td>
<td>Two ~8 hour courses delivered over 2 years</td>
<td>Two tracks (Mets and non-Mets)</td>
</tr>
<tr>
<td></td>
<td>Web- and WES-based</td>
<td>Support materials for WCMs</td>
</tr>
</tbody>
</table>
Outreach Training Dilemma: Need to Reach Different Audiences

To adequately meet training needs of each group, two solutions are necessary.
Solution #1: Train Meteorologist Partners by Leveraging NWS Forecaster Training

• Make NWS training available to non-NWS mets
• Create separate introduction to course
  – Outline available training
  – Highlight content designed for NWS
Solution #2: Present High-Level Overview & Key Topics for Non-Meteorologist Partners

- **Overview:** What is dual-polarization technology

- **Focus on:**
  - Benefits of new technology
  - Aspects of radar that have not changed

- **Provide non-met users with some application of new data**

*Courtesy of Benton Co., WA Emergency Management*
How Can Dual-Polarization Technology Help Emergency Managers?

- Data helps NWS provide better service
- Experienced EMs can make use of some data in right circumstances
- If you try to use dual-pol products:
  - Always use them in context of other data
  - Know their limitations
  - Trust local experts

Photo from South Texas EOC
Example of What Dual-Pol Training Covers: How Does Dual-Polarization Radar Work?
Example of What Dual-Pol Training Covers:
Five Benefits of Dual-Polarization Radar

1. Identify non-weather targets more easily
2. Differentiate rain, snow, melting snow
3. Detect when hail is present in a thunderstorm
4. Detect areas of heavy rain better
5. Detect debris lofted by damaging tornadoes

It will take years for benefits to fully materialize!
Example of What Dual-Pol Training Covers: Tornadic Debris Signatures

Most beneficial when:
- Spotters unavailable
- Tornado not visible
- Storms relatively close to radar
Example of What Dual-Pol Training Covers: Radar Range Dependence Still Applies

Lowest height WSR-88D can observe at 90 nm away: 10,000 feet
Highest height WSR-88D can observe at 10 nm away: 20,000 feet
Summary

• The WDTB provides training on the NWS warning process and the tools forecasters use.

• Most of our training is available on-line.

• Emergency managers may find some of our training useful.

• One example: Dual-polarization technology upgrade to WSR-88D training.
Contact Info

- My e-mail:
  Andrew.C.Wood@noaa.gov

- Warning Decision Training Branch’s web site:
  http://www.wdtb.noaa.gov/

- For more information on the dual-polarization technology upgrade:
  &
  http://www.wdtb.noaa.gov/courses/dualpol/outreach