

NEXRAD (WSR-88D) TRAINING AT WSFO WASHINGTON, DC

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1. INTRODUCTION

The 90's are upon us, and with it a potential revolution in operational meteorology! With the development and implementation of new technologies such as the WSR-88D, ASOS (Automated Surface Observing System), the wind profiler, and AWIPS (Advanced Weather Interactive Processing System), we should see more changes in NWS operations within the next decade than occurred during the past century.

The improved data gathering and assimilation capabilities will provide a considerable challenge as well as a tremendous opportunity for today's NWS forecaster. Local (on-station) preparation for receipt of the new technologies, and their integration into day-to-day operations, will be a significant task.

This paper will describe the local training program and the pre-training phase of WSR-88D implementation at WSFO Washington, DC (WBC). The goals of this program are: (1) to prepare the staff for the formal WSR-88D course at the Operations Training Facility (OTF, Norman, OK), the formal training phase; and, (2) to minimize "future shock" when the radar arrives on station and its products are integrated into daily operations by familiarizing them with the WSR-88D, (a Doppler radar) including its output and applications.

2. PHILOSOPHY OF LOCAL TRAINING

A local training program is the first important step in the transition to the new radar system or to any other new technology.

The Doppler Training Program Leader (DTPL), must take an active role in this process from the very beginning. As the WSR-88D delivery approaches, the addition of the Science and Operations Officer (SOO) will assist in the training efforts. From a personal development standpoint, the DTPL duties also present an opportunity to perform "SOO-like" functions.

From a management perspective, the DTPL must keep things simple and take care not to overwhelm the forecasters with pre-training activities. The DTPL must work closely with station management and staff, the regional WSR-88D and modernization focal points, and other national experts to assure that the station's pre-training program meets the staff's needs. Establishing a good rapport with the local FAA and military concerns, who will be local associated users of WSR-88D data, as well as with members of the Unit Radar Committee, is beneficial. Sharing ideas and resources with these users should pay excellent dividends in the future.

Each local training program will vary somewhat due to the fact that each office's staff has different levels of radar expertise. Therefore, the initial step in developing a local pre-training program is to assess the station's particular pre-training needs.

The OTF, NWS Training Center (NWSTC), and regional SSDs continue to develop training modules and lists of suggested reading material that will assist in pre-training activities for WSR-88D implementation. It is clear that enough high-quality reference material is available today to begin local pre-training activities.

3. DESCRIPTION OF WBC'S LOCAL TRAINING PROGRAM

WBC's local training has focused on three principal topics. These are: (1) general radar theory; (2) Doppler principles and the WSR-88D system; and (3) severe weather recognition and mesoscale processes.

A solid background in general radar theory is essential in order to successfully complete other topics that comprise the WSR-88D pre-training schedule. Initially, WBC used several modules on general radar theory available from the NWSTC. Now, OTF Module 1, "Principles of Weather Radar" is available. This module has been found to be an excellent compilation from many sources. Based on material from the NWSTC modules, three short, locally prepared exercises on general radar theory were distributed to the staff. Completion of these exercises reinforced forecaster understanding of the basic theory.

Eastern Region's Scientific Service Division (SSD) has prepared and distributed a WSR-88D pre-training package that includes a series of exams on several topics that should be covered prior to attending the operations course at the OTF. Portions of the package should be incorporated into the local program as needed.

The NWSTC radar module, "Beginning Doppler Principles for NEXRAD," with accompanying videotape, should be next on a list of required activities. It covers the WSR-88D's components, output and displays, characteristics and limitations of the data, as well as important concepts such as the Doppler effect, radial velocity, and the Doppler dilemma. It is very important to understand the concept of radial velocity. For this reason, it is suggested that locally prepared diagrams on radial velocity supplement the information presented in the text. Appropriate portions of Federal Meteorological Handbook 11, "Doppler Radar Meteorological Observations - Part B: Doppler Radar Theory and Meteorology," should be incorporated into the local training program.

An important part of WBC's pre-training program has been a series of seminars given by national experts in topics related to WSR-88D implementation. A dozen seminars have been arranged for our staff and WSR-88D associated users. Presenters have included the Joint System Program Office (JSPO), members of the Air Weather Service, individuals from WSFO Norman, OK, the National Severe Storms Laboratory, and others in the field possessing experience with Doppler radar. A wide variety of topics have been offered, including an introduction to the system, operational uses and issues associated with NEXRAD, base moments and derived products related to velocity data, the use of mesoscale data in day to day forecasting, load-shedding, vertically integrated liquid water (VIL) measurements and their relationship to severe weather, hydrologic applications using WSR-88D outputs, and the fundamentals of WSR-88D training.

Several of the seminars were videotaped and shared with our associated users and others throughout the Eastern Region. Of special note was the seminar given by Dr. Kenneth Crawford, formerly Area Manager of the WSFO in Norman, OK. Dr. Crawford focused on the operational uses and issues associated with the WSR-88D system. A videotape of this outstanding seminar has been distributed throughout the Eastern Region and should be included in each station's local training program.

The OTF has prepared and distributed 10 computer-based training (CBT) modules. These modules provide an introduction to the WSR-88D and its algorithms, with insights about the strengths and weaknesses. These should be located in a convenient personal computer, preferably one which is separate from any used for daily operations. Each module should be viewed and all the questions answered.

Judith Levan (WSFO Buffalo) has created printed versions of each CBT module, including questions and answers. At WBC, the answers to the questions were removed before they were distributed. Each person

was required to view the module and hand in the answers to the questions. A problem with the original software has been corrected, allowing one to answer the questions while viewing the module and then print out the answers.

Each station's WSR-88D materials should be organized into a reference library. Pre-training modules should be kept in one area, completely separated from any other WSR-88D references. A convenient location and easy access to these modules facilitates completion of the program. The library at WBC includes a quick-reference source for each WSR-88D algorithm. The purpose, input, output, strengths and limitations of each algorithm are readily available. Research papers describing Doppler radar applications have been placed in another book.

The final portion of WBC's training program involves severe weather recognition and mesoscale processes. An excellent overview of the subject was provided by a seminar conducted by a SELS forecaster. He worked the staff through the issuance of severe weather watches, then set up a synoptic situation for us to issue the watches. Afterward, each forecaster's work was critiqued. Another seminar given by a member of NSSL reinforced the importance of local analysis in day to day operations. The interchange of ideas and philosophies between a forecaster from a national center and local forecasters proved very beneficial. It is highly recommended that all stations take advantage of any opportunity to schedule this type of activity prior to WSR-88D delivery.

A locally prepared severe weather/mesoscale exercise was presented to the staff as part of the WSR-88D pre-training program. Topics included environmental factors which affect severe weather development, characteristics of the many severe storms types, the use of AFOŚ automated data processing graphics during convective situations, and the use of sounding data and hodographs to determine storm type and potential intensity. The

main reference used in preparing this exercise was the NWSTC module, "Severe Convective Storms."

4. CONCLUSION

Many good texts, videos, slides, and other modules were utilized as our program evolved. The DTPL is in the best position to judge which ones fit local station needs. WBC's pre-training checklist (Figure 1) details each portion of the program and lists the references used. Other stations have already developed additional approaches toward WSR-88D training (Marine 1990). Testing is one issue each station must grapple with. Based on our experience, in order to gauge the progress of your program, enough testing should be included to demonstrate a satisfactory understanding of each topic covered.

Another difficult issue is how to find the time to accomplish the training. Tough competition with seasonal weather drills, focal point activities, station projects, and that ever present forecast deadline further reduce the time for training. However, all personnel must realize the importance of accomplishing their pre-training activities. At WBC, these are being accomplished through individual initiative, scheduling dedicated WSR-88D training shifts, using slack time on shift, having the DMIC pick up shifts as needed, and having the training materials readily available and completely organized.

Considerable time and effort is going into the modernization of the National Weather Service at all levels. Your local training program is a key to your station's modernization, and it is up to you to make it a success.

REFERENCES

Marine, R. A., 1990: A Comprehensive WSR-88D (NEXRAD) On-Station Study Guide (Draft). Portland, ME, 11 pp.

WSR-88D PRE-TRAINING CHECKLIST AT WSFO WBC: ...page 1

1. GENERAL RADAR THEORY READINGS AND PROBLEM-SOLVING:

A. OTF MODULE 1 "PRINCIPLES OF WEATHER RADAR" - READ, COMPLETE ALL EXERCISES AT THE END OF EACH SECTION, AND PASS CLOSED BOOK EXAM:

B. COMPLETE LOCALLY PREPARED EXERCISES:

#1

#2

#3

2. NWSTC RADAR MODULE "BEGINNING DOPPLER PRINCIPLES FOR NEXRAD"

READ MODULE AND VIEW VIDEOTAPE...COMPLETE QUESTIONS AT THE END OF EACH SECTION.

3. SEMINARS:

VIEW VIDEOTAPE OF THE FOLLOWING SEMINARS OR CHECK TO INDICATE YOU'VE ATTENDED. (RE)VIEWING VIDEOTAPE OF SEMINARS YOU ATTENDED IS ENCOURAGED.

A. INTRODUCTION TO NEXRAD - PIERCE/THOMAS - JSPO

B. THE PROMISE OF NEXRAD - LES LEMON

C. NEXRAD EXPERIENCES AT WSFO OUN - KEN CRAWFORD

D. MESOSCALE WINTER FORECASTING/COLLIDING BOUNDARIES USING DAR³E AND NEXRAD PROTOTYPES AT WSFO DEN

E. BASE MOMENTS AND DERIVED PRODUCTS RELATED TO VELOCITY - BOB ELVANDER - JSPO

F. HYDROLOGIC APPLICATIONS USING NEXRAD MARK WALTON - NWSH

WSR-88D PRETRAINING CHECKLIST AT WSFO WBC: ...page 2

4. COMPUTER-BASED TRAINING (CBT) MODULES:

SEE NEXRAD CLIPBOARD FOR INSTRUCTIONS. PRINTED TEXTS FROM THE CBT'S AVAILABLE IN THE NEXRAD TRAINING AREA.

ANSWER ALL QUESTIONS WITHIN THE MODULE AND THE TEN AT THE END. TURN YOUR ANSWERS IN TO ED SCHOENBERG.

- 1. INTRODUCTION TO NEXRAD _____
- 2. INTRODUCTION TO ALGORITHMS _____
- 3. STORM SEGMENTS ALGORITHM _____
- 4. STORM CENTROIDS ALGORITHM _____
- 5. STORM TRACKING ALGORITHM _____
- 6. STORM POSITION FORECAST ALGORITHM _____
- 7. STORM STRUCTURE ALGORITHM _____
- 8. HAIL ALGORITHM _____
- 9. MESOCYCLONE AND TVS DETECTION ALGORITHMS _____
- 10. VELOCITY AZIMUTH DISPLAY ALGORITHM _____

5. SEVERE WEATHER RECOGNITION AND MESOSCALE PROCESSES:

READ PERTINENT SECTIONS OF NWSTC MODULE "SEVERE CONVECTIVE STORMS" AND COMPLETE LOCALLY PREPARED SEVERE WEATHER EXERCISE.

REMINDER:

RETURN COMPLETED FORM TO DOPPLER TRAINING PROGRAM LEADER OR SOO BEFORE ATTENDING OPERATIONS COURSE AT THE OTF.