NATIONAL WEATHER ASSOCIATION ANNUAL MEETING, 2019

Trip Report

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1. Purpose: I received an NPS Teaching and Learning Commons (TLC) travel mini-grant to attend the National Weather Association (NWA) annual meeting. The meeting ran from 08-12 September in Huntsville, Alabama. I attended to gain perspective and possible lecture material for MR/OC 4325 METOC for Warfighter Decision Making. This report provides TLC, as well as Naval Postgraduate School (NPS) Meteorology (MR) and Oceanography (OC) faculty, feedback on the value of attending the NWA meeting.

2. Background: The Meteorology and Oceanography faculty are very familiar with organizations such as the American Meteorology Society (AMS) and the American Geophysical Union (AGU). AMS and AGU meetings and journals are primary means to interact with the broader academic and scientific community. Less well known, the NWA is a relatively young organization (founded in 1976, vice the larger AGU and AMS organizations whose next annual meetings both mark their centennial) with the mission statement: “Connecting operational meteorologists in pursuit of excellence in weather forecasting, communication, and service.” Although operationally focused, the NWA does publish a technical journal, the Journal of Operational Meteorology, and the NWA follows typical academic meeting format with multiple focused oral presentation sessions, poster sessions, discussion panels, and keynotes.

The NWA vision statement is “Promoting excellence in operational meteorology to benefit society.” Definitions may vary, but what distinguishes operational meteorology from strictly academic meteorology is forecasts provided in real time to decision makers needing expert opinion. Therefore, Meteorology and Oceanography (METOC) officers who spend careers advising commanders are also operational meteorologists/oceanographers (or leaders thereof, as the enlisted Aerographer’s Mate community does the vast majority of actual forecasting). One can also view NPS METOC students’ education, research and interaction with faculty at NPS as part of the research-to-operations and operations-to-research (R2O and O2R) paradigm used in the National Weather Service (NWS), a common topic at NWA meetings. As a separate matter, in the broader Monterey area meteorology community there is an effort to restart a currently dormant joint AMS/NWA Local Chapter. I am involved in that effort. For NPS METOC students, such a chapter could provide additional professional development, as well as more opportunities to present research.
NWA membership is heavily composed of NWS personnel, as well as television/broadcast meteorologists (both AMS and NWA offer broadcaster certifications with some broadcasters pursuing both). Other members include additional weather industry professionals (e.g., from companies providing specialty forecast support, historical analysis, data, or equipment), as well as a small number of military members. University based members are not as prevalent in NWA as they are in AMS, however there has been a growing interaction with social and behavioral scientists over the last decade or so.

The link to social science comes particularly via the NWA focus on severe weather forecasting (i.e., tornadoes, flooding, blizzards, hurricanes). Although the United States has seen skillful severe weather forecasts greatly improve in accuracy and lead time over the last several decades, casualty rates do not always decrease proportionately (e.g., deaths in a tornado “super outbreak” in 1974 were approximately the same as during an extremely similar outbreak in 2011). Therefore, the NWA has become a forum for discussions between forecasters and social scientists about severe weather warning processes. Research focuses on such items as how do people get weather warnings, do they believe the warnings and why or why not, at what point will people act on warnings, how should warnings be phrased, what sort of misconceptions are prevalent with the current warning system, and how should graphics be redesigned to more effectively convey warnings.

In the last decade, the NWS response to these issues is the Weather Ready Nation (WRN) effort. WRN has included experimental techniques and procedures at various forecast offices. The WRN effort has also led the NWS to focus on impact-based decision support services (IDSS). IDSS and WRN are also major topics of discussion at NWA, both in their own sessions as well as a component of other research presented. This has represented a major cultural shift at NWS, taking the view that a perfect forecast that no one uses or understands may not be as valuable as a less accurate forecast that motivates a decision maker to take action. From one perspective, one might say that NWS/NWA is learning how to do what military METOC has always done. Therefore, some of the lessons learned presented at NWA, such as “know your customer” or “figure out your customer’s weather limits and forecast for those”, are nothing new. However, the members of NWA are looking at IDSS with a fresh perspective, actively collaborating with social scientists, where much of military METOC procedures evolved organically. Therefore, for the purposes of MR/OC 4325 METOC for Warfighter Decision Making, the work presented at NWA provides a novel source of comparison techniques. NWA presentations also cover “straight” meteorology topics, with interesting material for inclusion in other classes or for research ideas.

3. Sampling of Ideas for MR/OC 4325:

   a. Forecast metrics/uncertainty/forecast difficulty: An excellent talk was given by Dr. Patrick Marsh of the NWS Storm Prediction Center (SPC), titled: “A Cross-Cutting, Multi-Organizational Look at the Severe Weather Outbreak of 30 November 2018: A Case Study in the Challenges of Communicating Uncertainty.” Of particular interest to me was a great discussion of Probability of Detection (POD)/False Alarm Rate (FAR) in the context of a CAPE versus shear phase space. A gradient between areas is diagnostic of forecast uncertainty. Dr. Marsh is
willing to call in and give the brief remotely to the MR/OC 4325 students. I review POD/FAR early in MR/OC 4325 (as well as MR/OC 3140), and am confident that a dramatic SPC example will help solidify the concept for students.

b. Immersive experiences: an interesting talk was given by an instructor from the University of Alabama, Huntsville. In the context of an operational forecasting class, separate from their primary forecasting course, a final-exam exercise is a simulated severe weather event. The students play roles such as an NWS forecaster, at a WFO or embedded elsewhere, or perhaps a broadcast meteorologist. The class must coordinate briefs and messaging in real time, and receives acted-out phone inquiries and other scenario injects. Although heavily severe weather focused, the scenario did give me an idea. Within MR/OC 4325 I have been coordinating with Professor Jeff Appleget’s Wargaming class. When Professor Appleget gives a talk on the types of wargames, he delineates multiple types. Most of the wargames done in his class are for sponsors wanting to explore new tactics, techniques, and procedures. However, wargames for staff education and training, for instance before deploying to a new unfamiliar area, are also a valid exercise. Given that METOC students are part of a broader Information Warfare community, and those other communities are on campus, perhaps a standing wargame to encourage collaboration between say intelligence and METOC officers could be created. I have briefly discussed with Professor Appleget, and he thinks it is feasible. Further coordination at NPS would be necessary for a game with clear objectives.

c. Communication: The meeting featured many interesting comments, tips, and ideas about communication that I will highlight in MR/OC 4325. In the broadcaster keynote (Bryan Busby, Kansas City), the speaker described how after a severe weather incident in his viewing area, all of the TV meteorologists agreed on a standardized color scheme for their graphics. Even though each station still maintained their own products and formats, viewers would not have to mentally translate or be confused by the meanings of different colors on similar graphics. He also addressed the challenges of dealing with “media-ologists”, i.e., untrained individuals finding the most extreme (even if unlikely) model forecasts possible and posting them on social media to garner clicks (and revenue). This has parallels in the military in that intelligent, yet not trained as meteorologists or oceanographers, commanders and their staffs can easily access weather material online without really understanding its validity. This can lead to a need to devote scarce time to address conflicting forecasts, rather than describe forecast reasoning or coordination that has occurred with METOC personnel at other commands.

Another broadcaster (James Spann) gave a very interesting talk that at its core was about knowing your audience. In the context of severe weather, even with a very tornado-savvy public, he highlighted that things like radar images can look “like a bucket of paint” to worried viewers, and therefore you might not be conveying what you think you are conveying. In addition, a constant topic of conversation is NWS watches, warnings, advisories, and the confusion that can arise. Additionally, somewhat artificial warning area boundaries mean nothing to the public, i.e., a tornado can cross from the area of responsibility of one NWS office to another or from one viewing area to another. The public, or in the case of the military the decision maker/commander, should not have to care where such a warning is coming from, coordination
is key. Mr. Spann also highlighted that at least in the context of tornadoes, his viewers respond best to actual video. The use of pictures to convey conditions came up many times during the conference. This made me think that the Navy METOC community as a whole (operational and research) should compile an easy to access database of pictures of conditions (e.g., high sea state, high winds) from a variety of angles and view heights to add context to powerpoint type charts that are typically seen.

Further detailed comments are in my day-to-day notes (see enclosure (1)).

4. Additional thoughts:

   a. Radar: the severe weather community focuses much more on radar than Navy METOC. Until recently, afloat METOC personnel typically did not have access to a weather radar. Over the last several years, the Navy fielded a new capability on larger naval vessels (HWDDC). I am trying to gather more information on how this capability is used (was installed largely after my last major METOC sea tour), and am curious if NPS can help the Navy get more use out of the system, either through research/theses to improve available products, or use of real world examples in class to improve educational outcomes.

   b. Other research: NWS local offices presented various forecast challenges they have and in-house research that they have done to address that. Possibilities for collaboration exist. I discussed parallels between Navy forecasts for Western Pacific locations (in complex terrain during typhoon passage - even if not close) and strong inland winds seen in South Carolina during recent storms.

   c. Guest speakers: At the meeting, I approached Grant Cooper, a retired Navy METOC Captain who earned his PhD from NPS in 2002. He currently serves as the Director of the Western Region of the National Weather Service, which includes the Monterey office. He is willing to come and speak to the METOC students whenever he happens to be in town for NWS business. I was also able to talk to Dr. Mike Farrar, a retired U.S. Air Force weather officer. Since leaving active duty has worked as the director of the NOAA Environmental Modeling Center, and is currently in the Chief Scientist position for Air Force weather. He is also willing to come to NPS to speak, likely when he comes to town to coordinate with Fleet Numerical Meteorology and Oceanography Center (FNMOC).

5. Closing thoughts: The NWA has a different, generally more pragmatic, focus than AMS, with definite emphasis on severe weather. Although a heavy NPS presence is not required, I recommend that anyone who teaches MR/OC 4325 attend the annual meeting at least once. I also suggest the faculty consider NWA meetings and its journal as another forum for their work, particularly research and theses that are targeted at improving Navy forecasting. I thank NPS TLC for giving me the opportunity to attend this meeting.