Office of the Federal Coordinator for Meteorological Services and Supporting Research

2018 Special Session, 22nd Annual George Mason University (GMU) Atmospheric Transport and Dispersion (ATD) Conference

This document provides a summary of the Office of the Federal Coordinator for Meteorology (OFCM) sponsored special session within the 22nd Annual Atmospheric Transport and Dispersion (ATD) Conference at George Mason University (GMU). The session was chaired and moderated by Mr. Jeff McQueen of National Weather Service (NWS)/Environment Modeling Center, College Park, Maryland, and Mr. David Chorney of OFCM. The conference was held on the GMU campus in Fairfax, VA, and the session was conducted on Tuesday June 19, 2018.

OVERVIEW

The OFCM supports the annual GMU ATD conference and has sponsored a special session since 2003 to inform attendees on the status and plans of the federal government's atmospheric transport and dispersion experimental, observational, and modeling efforts.

In recent years the OFCM session has focused on several particular issues. This year the agencies provided briefings on the history of IMAAC, what is currently being done in IMAAC and HYSPLIT, and updates on the latest agency modeling development. The session was well-attended with nearly 100 people, and the presentations were well received.

There were representatives from the following departments and agencies: Department of Commerce/National Oceanic and Atmospheric Administration (DOC/NOAA); National Institute of Standards and Technology (NIST); Department of Defense (DOD): Army Research Laboratory (ARL); Defense Threat Reduction Agency (DTRA); Navy Research Laboratory (NRL); Department of Energy's (DOE) Brookhaven Laboratory; and the National Aeronautics and Space Administration (NASA). Attendees represented academia, industry, the emergency management community, as well as the spectrum (federal, state, and local) of government agencies.

SYNOPSIS OF PRESENTATIONS

The session consisted of ten presentations, which followed opening remarks by session co-chairs David Chorney representing OFCM, and Jeff McQueen. Questions were taken after each presentation.

1. **Opening Remarks:**

   Mr. David Chorney, OFCM representative, welcomed the participants, introduced the agenda and briefed about OFCM. Mr. Chorney emphasized the importance of keeping the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) and Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) informed about what the ATD working group was doing and is planning to do. He mentioned the FCMSSR is mostly made up of political appointees who have a lot of influence in the federal government. David recommended starting two new working groups, one on updating plans that have not been updated since 2004 and another working group to discuss urban modeling.

2. **Presentations:**

- **Mr. Al Mongeon, National Weather Service (retired).** Mr. Mongeon presented "*IMAAC – Butterflies to Fukushima*," a quick history of the Interagency Modeling and Advisory Center (IMMAC), as he is a plank owner of that working group. He discussed how the IMAAC was first started due to a breakdown in communication during the TOPOFF 2 exercise. He told how IMAAC has evolved from its establishment at Lawrence Livermore National Labs (LLNL) using the NARAC model, then migrating to the Defense Threat Reduction Agency (DTRA) who has now assumed the lead for modeling for IMAAC and acting as the IMAAC technical hub.
- **Mr. Jimmie Trigg, DTRA.** Mr. Trigg presented "*The Evolution of the IMAAC Product; Keeping Pace with Complex Questions*" and discussed the current state of IMAAC. Jimmie gave some examples of recent events where a DTRA and IMAAC response was requested, e.g. an atmospheric release at the Arkena Chemical Plant where they gave a daily analyses showing Above Environmental Guidance Levels (AEGL-2) population exposures, a plume release in water, a barge oil release, and ash from the Kilauea volcano. He also discussed volcanic ash response and how IMAAC worked with the Senior Duty Meteorologist (SDM) at the National Center for Environmental Prediction (NCEP) and with the Volcanic Ash Advisory Center (VAAC).
- **Dr. Tom Watson, DOE/Brookhaven National Laboratory.** Dr. Watson gave a briefing called "*Urban Dispersion Field Programs: History and Future*," which talked about modeling and gave some history of urban dispersion field programs over both the United States and Europe. He first summarized some historical dispersion experiments from the 1950s. Tom talked about model design to help support decision making, including: whether to shelter in place or evacuate, where to position resources, provision of more extensive data on particle deposition. He also emphasized the importance of collecting meteorological measurements at all scales to help resolve the connections between street level and mesoscale processes, simplifying the model, using of UAV/towers/ceilometers, Stoney Brook Laboratory New York, determining the preferred meteorological input to drive an urban dispersion model should be. Tom overviewed the importance of studying dispersion around the land-water interface and recommended a working group to engage the Federal Weather Enterprise (FWE) for these issues He also discussed the model design differences between urban, suburban and marine area. In conclusion, he said that the Next Generation Urban Dispersion experiment needs should be decided from input from the users of dispersion model products and the emergency response community.
- **Dr. Chatt Williamson, Army Research Laboratory.** Dr. Williamson provided an overview of the DOD highlighting the DOD labs' support for land forces. He updated progress on the new sensor array at White Sands Missile Range that was made available on 15 June 2018. He explained how the ARL is the premier lab for land forces support and the importance of partnering with academia and industry. Chatt discussed the 3DWF model and ABLE model and how to evaluate the ABLE-Lattice Boltzmann Method and the ABLE Vortex Filaments methods. Dr. Williamson also discussed ARL support for the Long Island Sound Tropospheric Ozone study (LISTOZ).
- **Ms. Anna Karion, National Institute of Standards and Technology (NIST).** Ms. Karion discussed the status of Urban Scale Meteorological Research at NIST. She discussed the urban greenhouse gas (GHG) monitoring activities in Los Angeles Indianapolis and the Baltimore –Washington corridor. Anna talked about emissions methods and the use of NOAA HYSPLIT dispersion model backward-dispersion capabilities using receptors to determine

observations and sources. She showed the network of towers for collecting CO2 and methane measurements. She discussed the need for instruments with very high precision and the high cost of these sensors.

- **Mr. Chris Walmsley, National Weather Service, National Program Manager, Decision Support Services**. Mr. Walmsley discussed the operational use of the HYSPLIT dispersion model for emergency response. After a brief introduction to HYSPLIT, he explained that all of the 122 NWS offices practice using a PC and web-based version of HYSPLIT. Chris discussed the recent effort by NOAA's Air Resource Lab and the National Ocean Service's Office of Response and Restoration developers, along with the EPA, on the use of the CAMEO/ALOHA software suite and how they were trying to merge it with the HYSPLIT model. He stated this system allows WFOs to model the release of hazardous chemicals to the atmosphere by combining the strengths of both the ALOHA and HYSPLIT with the complete chemical database of CAMEO. Chris showed the many uses of HYSPLIT to include volcanic ash, wild fire smoke, and other air quality products. He gave an example of HYSPLIT for the refinery fire over Wisconsin in 2017. He also explained how HYSPLIT predictions are shared with DTRA/IMAAC, but on average 80-90% of the incidents that elicit a NWS HYSPLIT response producing the HYSPLIT model are not large enough for a federal response involving IMAAC.
- **Mr. Chris Loughner, NOAA Air Resources Lab.** Mr. Loughner gave a briefing called **"***The Evaluation of mixing methods in HYSPLIT using measurements from Sagebrush Tracer Experiment*". This briefing explained the mixing characteristics generated by five different turbulent mixing schemes in HYSPLIT that estimate the turbulent velocity variance, which affects the dispersion results. High resolution WRF simulations run with a horizontal resolution of 333 meters were fed into the HYSPLIT model. All HYSPLIT simulations were evaluated with velocity variance and tracer observations from the Sagebrush Tracer Experiment conducted in October 2013.
- **Mr. Akshay Gowardhan, NARAC.** Mr. Gowardhan discussed the National Atmospheric Radiological Advisory Center (NARAC) at the Lawrence Livermore National Labs (LLNL). He explained how NARAC can predict the impact of a wide range of airborne releases of hazardous material that can rapidly impact large areas and populations. NARAC has been used for nuclear accidents, releases from radiation dispersal devises, nuclear detonations, toxic industrial chemical spills and fires, and biological and chemical agents. The briefing included results from model runs for urban environments.
- **Dr. Shobha Kondragunta, NOAA/NESDIS.** Dr. Kondragunta illustrated the use of satellite data to indicate areas of high particulate matter in the atmosphere associated with smoke plumes, blowing dust, and haze. It was also explained that satellite products were needed to complement ground measurements of aerosols/air quality. Higher spatial and temporal resolution is a MUST for the users of satellite data. The briefing included a discussion on new satellite products from the Joint Polar Satellite System (JPSS) and the GOES-R geostationary satellite.

DISCUSSION: Overall the session provided a useful summary on the history and current status of urban modeling for ATD. The briefings gave us insight on how things were done in the past, how they are done now, and what we can look forward to in the future.

So where does the ATD working group go from here? The most current OFCM plans relating to ATD are FCM-R17-2002 called *Atmospheric Modeling of Releases from Weapons of Mass Destruction for Homeland Security*, from 2002, and FCM-R23-2004 *Federal Research and*

Development Needs and Priorities for Atmospheric Transport and Diffusion Modeling from 2004. Both of these publications are outdated. Therefore a working group is recommended to review these two plans and decide if it is necessary to update, cancel or start completely from scratch with new plans.

Additionally, the discussion generated enough interest to suggest that a working group should be formed to collaborate on urban dispersion modeling. Tom Watson, Department of Energy (DOE), has been identified as the potential leader for this group.