COMET Final Report

University: University of Nevada, Reno

Name of University Researcher Preparing Report: Dr. Tim Brown, Nick Nauslar

NWS Office: Reno WFO

Name of NWS Researcher Preparing Report: Jim Wallmann

Partners or Cooperative Project: COMET Partners Project

Project Title: Development of the WN09 Dry Thunderstorm Forecast Procedure

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SECTION 1: PROJECT OBJECTIVES AND ACCOMPLISHMENTS

1.1

Nick Nauslar and Jim Wallmann applied the Dry Thunderstorm Procedure (DTP) while examining six case studies over the last five years where dry lightning occurred and ignited multiple problematic fires. Dates of the investigated events included 25-27 June 2006, 20-21 August 2006, 16-18 July 2007, 20-21 June 2008, 26-28 June 2008 (null case), 1 August 2009, and 20-21 August 2009. North American Model (NAM) and Global Forecast System (GFS) archived data obtained from NOAA/National Model Archive and Distribution System (NOMADS) provided the input for each of the plots created by the General Meteorology Package (GEMPAK) and Advanced Weather Interactive Processing System (AWIPS). Forecast plots of each part of the DTP generated analysis 48 hours in advance of the beginning to the end of the event. Each of the six cases showed with enough

confidence to predict dry thunderstorm formation 48 hours in advance while implementing the DTP.

1.2

Nick Nauslar obtained archived model and lightning data for each of the six case studies and created all the DTP plots with the exception of the dynamic tropopause maps. Jim Wallmann collected archived model runs and implemented AWIPS to create the dynamic tropopause maps. Wallmann also picked the six case studies examined and provided insight to Incident Management Team (IMT) and Incident Meteorologist (IMET) deployments during and after the events. Nauslar gathered archived National Interagency Coordination Center national situational reports to provide support the number of fires started and personnel deployed with each event. Nauslar then synthesized all the information and analysis into his Master's thesis and a presentation for his defense. Additionally, Nauslar presented his findings at the 5th Conference of the Application of Lightning Data during the 91st AMS Meeting in Seattle, WA. Wallmann created a presentation about the DTP and more specifically how it applied to the June 20-21, 2008 case study and presented it at the National Weather Association workshop in the fall of 2010.

SECTION 2: RELATED ACCOMPLISHMENTS

2.1

None as of right now.

2.2

Jim Wallmann gave a presentation dry lightning forecasting for NWS Incident Meteorologists at the Incident Meteorologist Workshop in Boise, ID in March 2010. The presentation showed the parameters used to forecast dry lightning.

SECTION 3: SUMMARY OF BENEFITS

3.1

The collaboration yielded the DTP, which showed its ability to predict dry lightning in the seven cases studies including one null case. The DTP collaboration incorporated other personnel at the NWS Reno WFO and provided insight to the forecasting and science operations at NWS WFO's. The DTP also provided Nauslar with a tool to use operationally while forecasting the Upper Colorado River Fire Management Unit in Grand Junction, CO. It helped synthesize coursework and journal articles to form the DTP and bridge the gap between academia and operational meteorology. The implementation of information gathered from professors, research scientists, and NWS personnel provided an invaluable experience of integrating abundant amounts of information and data into a tool to understand a specific meteorological forecasting problem. Nauslar implemented the DTP at Rocky Mountain Predictive Services during operational forecasting periods over the course of a week. It is now a tool utilized by the fire meteorologists at that office to ascertain dry thunderstorm potential.

3.2

The NWS office has benefited from this collaboration with the development of a new forecast procedure for dry lightning. So far, this procedure has resulted in capturing thunderstorm events that in the past may have gone unnoticed. One example dealt with a dry lightning event in August 2010. Forecasters were able to notice the strong forcing present through the presence of the jet streak and upper level front positions. In addition, the procedure was able to help capture the limited, elevated instability present over northern Nevada into southwest Idaho, and forecasters alerted land management agencies with a forecast for isolated dry thunderstorms. The NWS in Reno was also able to discuss the potential with neighboring offices in Elko, NV and Boise, ID using the new procedure. Several new fires broke out, with two large fires in southwest Idaho resulting in significant firefighter commitments.

SECTION 4: PRESENTATIONS AND PUBLICATIONS

4.1

Nauslar, N., Wallmann, J., and T.J. Brown, 2011. A Forecast Procedure for Dry Dry Thunderstorms. *5th Conference on Application of Lightning Data, 91st American Meteorological Society Annual Meeting,* Seattle, WA, January 2011.

Nauslar, N., 2010. *A Forecast Procedure for Dry Thunderstorms.* University of Nevada Press, 92 pp.

Nauslar, N., 2010. A Forecast Procedure for Dry Dry Thunderstorms. *Master's Thesis Defense, Desert Research Institute,* Reno, NV, December 2009.

SECTION 5: SUMMARY OF PROBLEMS ENCOUNTERED

5.1

Some issues with obtaining data from NOMADS arose during the process. Occasionally, NOMADS would become backed up with data requests and delays ranged from a day to over a week in some instances. Also, while using GEMPAK to present GFS data, gaps in the data occurred especially in certain plots (dynamic tropopause and vertical cross-sections), that had to be worked around. Nauslar contacted GEMPAK support and NOMADS support among other people, but was not able to remedy the gaps in the data. However, the gaps throughout most of the cases were isolated and sparse enough to work around and still be able to fully analyze the environment in each case study.

5.2

No problems were noted on the NWS side.