Final Report for COMET Partners Project

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SECTION 1: PROJECT OBJECTIVES AND ACCOMPLISHMENTS

Counties in the complex terrain of upstate New York are vulnerable to flash flooding from runoff and discharge of small, ungauged streams into low-lying areas. This project is designed to enhance the FFMP of the Albany WFO, and in doing so, provide a model for the FFMPs of Forecast Offices in the Northeastern U.S. The research is in the process of categorizing flash flood scenarios for Schoharie and Montgomery counties with respect to the four NWS flood severity categories. Assignments are with respect to inundation of man-made structures, so that a threatened watershed labeled with one of the four categories can be translated by NWS forecasters, county emergency management personnel, and the general public into dangers to roadways, villages, and business parks.

The first step in this process was to calculate the frequency distribution of intense rainfall to determine how often and how much intense rainfall occurs. Data from the NWS Cooperative Observing Program sites in Schoharie and Montgomery counties were used to determine these frequency distributions. The frequency distribution for the amount of rainfall is particularly important in developing rainfall-runoff relationships representative of the study area.

The second step was to obtain necessary data and training. The NWS researchers Timothy Scrom and Steven DiRienzo provided Amy Maddox, who is conducting the daily work on the project, with a digital map of small watersheds (scale 1–10 km²) for the study area. Additional data needed for the project were obtained from the GIS Clearinghouse web site of the New York Department of Environmental Conservation (DEC). This web site contains data available only to NY state agencies such as the University. Digital aerial photos, digital raster graphic maps, and high-resolution digital terrain maps were obtained from this web site and from personal contact with DEC personnel.

Ms. Maddox used the high-resolution digital terrain maps in the Arcview GIS environment to delineate watersheds and digitize streams. The watersheds originally provided by Mr. Scrom and Mr. DiRienzo were created from lower resolution digital terrain maps than the maps Ms. Maddox is currently using. Hence, Ms. Maddox had to redefine the small watersheds in the study area based on the new data.

The Weather Service Radar (WSR) Level II reflectivity data products and Level III precipitation data products can be easily transformed into Arcview GIS format. Using the GIS

environment, it is possible to overlay the WSR data products on the digitized watersheds to find where areas of heaviest rainfall intersect with or are near to vulnerable low-lying and densely populated areas. Ms. Maddox is using a radar data from a week-long period of flash flooding in early August 2003 to test this process. The combination of the digitized watersheds and aerial photos are used to estimate water surface profiles and the possibility of the threat to man-made structures.

SECTION 2: RELATED ACCOMPLISHMENTS

There was no additional work resulting from this project that was not funded by it.

SECTION 3: SUMMARY OF BENEFITS

3.1 The benefits to the University included bringing the new hydrologist, Steven DiRienzo, at the Albany Weather Forecast Office into his first COMET-sponsored research project. Mr. DiRienzo has assisted Ms. Maddox by his many contacts and experience with hydrological modeling. Ms. Maddox is the first of our graduate students to do a project involving hydrological modeling in a GIS environment, strengthening our ability to attract new students to partner with the Albany WFO on projects in this area. Ms. Maddox also received assistance from our partners at PAR Government Systems Corp., Rome, NY, furthering the possibility of a continuing relationship with a commercial firm.

3.2 The intended outcome of this project is to improve flash flood forecasting in rural counties. The detailed digitizing of watersheds with overlaid radar data will greatly improve the representation of the surface hydrology for a part of the Albany WFO area of responsibility. This digitizing was made possible by data that our WFO would not have been able to obtain directly. We plan on using the procedures that Ms. Maddox is developing for Schoharie and Montgomery counties towards the other counties in the warning area.

SECTION 4: PRESENTATIONS AND PUBLICATIONS

There have not yet been any presentations or publications resulting from this work. We will be submitting an abstract to the fall Northeast Regional Operational Workshop held at the University at Albany in conjunction with the Albany WFO.

SECTION 5: SUMMARY OF PROBLEMS ENCOUNTERED

We had originally planned to use the Army Corps of Engineers HEC software to model rainfall-runoff and water surface profiles from input radar data. However, these models require many user-determined parameters, some of them requiring physical surveys. We discovered that expense, time, and effort involved running these models limits its usefulness to small, urban areas rather than the large stretches of roadless farmland and forest that constitute much of the Albany WFO's area of responsibility. While we will not be able to model flooded areas, we are using the digitized watersheds and overlaid radar data to define potentially flooded areas and accomplish this with the speed and ease that operational forecasting demands.