

# Tools for Storm Analysis Using Multiple Data Sets

FY 2004 Proposal to the NOAA HPCC Program

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Proposal Theme: HPCC Technology Transfer

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# **Tools for Storm Analysis Using Multiple Data Sets**

Proposal for FY 2004 HPCC Funding

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## **Executive Summary:**

The project objective is to modify the web-based "Tool for storm analysis using multiple data sets" previously funded under the FY 2003 HPCC program for use by the NOAA/NWS Storm Prediction Center (SPC). The tool was successfully developed for users to monitor atmospheric changes along the path of storm systems. It demonstrates the use of the Thematic Real time Environmental Data Distributed Services (THREDDS) being developed by University Corporation for Atmospheric Research's Unidata. However, the data sets currently available with THREDDS are still somewhat limited. Modifications to the software will be required to include higher resolution model data, additional model variables as they are added to THREDDS. In addition, additional features will be added to allow cross-referencing time trends of radar, satellite, and lightning data when tracking storms. The concepts developed in the web-based software (quantifying trends in satellite, radar, lightning, and model data along the path of storms) will be implemented for use at the SPC.

## **Problem Statement:**

The functionality of integrating and overlaying data from multiple sources (radar, satellite, lightning, model) in Lagrangian (moving) reference systems is not fully available to the operational community. The goal of this project is to transfer a first prototype with these capabilities to an operational forecast center (the SPC). In order for the concept to be fully utilized in the forecast office, transfer of functionality from a web-based tool to dedicated systems such as NAWIPS will be required at some future time.

## **Proposed Solution:**

This proposal extends the utilization of a successfully completed project funded by the HPCC in FY2003: "A web-based tool for storm analysis using multiple data sets". Under that project, a tool was developed for users to monitor atmospheric changes along the path of storm systems. It accesses real-time and archived data collected by NOAA including radar, satellite, lightning, and model analyzes. It makes use of the Thematic Real time Environmental Data Distributed Services (THREDDS) being developed by University Corporation for Atmospheric Research's Unidata and the NOAA Operational Model Archive and Distribution System (NOMADS) by the National Climatic Data Center (NCDC), National Centers for Environmental Prediction (NCEP) and the Geophysical Fluid Dynamics Laboratory (GFDL). The software allows users to look at loops of satellite and radar images and, using a mouse, click on a storm and view its track and time trends of cloud top temperature, radar reflectivity, environmental conditions etc. Forecasters at the SPC, for example, would use the tool to monitor changes in

atmospheric stability and moisture fueling a mesoscale convective system as it moves along, as well as other conditions, which might alter the strength and longevity of a storm.

Since the SPC already has a dedicated and timely source of the data required, the concepts of combining multiple data sets used in our previous project will be applied to their data stream. The ability to view time trends of radar reflectivity, cloud top temperature from satellite, lightning density, and atmospheric variables along the path of storms will be detailed and shared with NWS software developers for integration into existing operationally supported software systems at the SPC.

### **Analysis:**

This project provides a cost effective means to transfer technology developed under the HPCC to an operational unit of the NWS. Successful implementation at the SPC would lead to further use throughout NOAA.

### **Performance Measures:**

Successful implementation of the combined use of multiple data set for monitoring changes in atmospheric conditions and storm intensity at the SPC.

### **Milestones**

Month 03 - complete enhancements: access of higher resolution model data (20 km, RUC-2).

Month 06 - complete enhancements: cross referencing of radar, satellite & lightning time-series.

Month 09 - generation of storm tracking and time-series products at the SPC.

Month 12 - software and conceptual information provided to NWS.

### **Deliverables**

The primary deliverables will be: 1) an enhanced version of the Web-based tool for evaluation at the SPC, and 2) consulting to NWS software developers on the conceptual design and software to combine radar, satellite, lightning, and model data and to quantify atmospheric changes along the path of storm systems.