A VERY-SHORT-RANGE INTERACTIVE PREDICTION SYSTEM FOR REGIONAL SEVERE WEATHER WARNING SERVICE

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ABSTRACT

Weather warning is one of the key issues for the public and government decision maker. For the purpose of providing high temporal and spatial forecast for the 2008 Olympic weather service in Beijing, a new interactive prediction system was developed according to the requirement from Olympic and also from public weather warning service. Based on the concept of layered composite display and using mesoscale observation network data, mesoscale NWP product with the GIS information at the same time, this Very-short-range Interactive Prediction System (VIPS) can help forecasters to review realtime weather information quickly and interactively modify the forecasting from product generation system and then issue the warning efficiently. In this paper, we will introduce the system structure and emphasizing the networked Doppler radar composite analysis with lightning locating network data as well as dense network Automatic Weather Station surface data. Also we will introduce the interactive process of warning generation and issuing.

KEYWORDS: weather warning, nowcasting, VIPS, OpenMap

1. INTRODUCTION

With the rapid progress of meteorological modernization in recent years, more observational facilities have been established in Beijing area. Weather service need to focus more on the severe weather locally developed and high resolution observation should be integrated to nowcasting to support the warning making procedure. Also, government departments related to emergency management need to have weather products integrated with GIS information. VIPS is the result of this requirement and will be used in 2008 weather service.

2. CONCEPTS

For nowcasting and severe weather warning operation, the most important thing is how to issue the warning just in time (as earlier as possible) and as accurate in temporal and spatial aspects (higher resolution) as possible for the public and government to take effective steps to avoid lost in people and properties. So to provide a good very-short-range severe weather service, we need:

- Selected Multi-Sensor Realtime Observations
- Nowcasting Products (0-2 hours)
- High resolution NWP products (2-6 hours)
• GIS information
• Effective interactive warning making platform

3. SYSTEM STRUCTURE
VIPS is the key steps to connect the forecasting operation to the end-user like public, government and specified users. And the structure for the system is as Figure 1

4. METHODOLOGY
Based on the concept of layered composite display and using mesoscale observation network data, mesoscale NWP products with GIS information at the same time, this Very-short-range Interactive Prediction System (VIPS) can help forecasters to review realtime weather information quickly and interactively modify the forecasting from product generation system and then issue the warning efficiently.

This system is emphasizing the networked Doppler radar composite analysis with lightning locating network data as well as dense surface data of Automatic Weather Station network.

The methodology for this very-short-range interactive prediction system is as follows:
• System developed using Java language, and it’s platform (operational system) independent;
• GIS support from Open Source resource of OpenMap;
• Different kinds of data or products be ingested and displayed in separate Layers of OpenMap;
• Using standard data interface (NetCDF and XML format) for regional data sharing;
• System can easily be maintained and updated later with open source support and structured design;
• Nowcasting analysis based on integration of selected real time weather observation (regional Doppler Radar network data, lightning detection system data, AWS data, wind profiler data and other nowcasting-related observation products) , nowcasting products from Product Generation Systems like ANC, and gridded forecasting products from regional Numeric Weather Prediction system;
• When observation data or nowcasting products are enough to support a severe weather warning issue, forecasters can easily make and modify warning information interactively;
• Warning making is easy and quick with mouse drawing of areas affected by severe weather, then warning information can be
automatically generated accordingly;
- Warnings issued with several kinds of formats according to template definitions, and those definition can easily modified or adjusted by requirement;
- Observation products with GIS support can be used separately in other specified weather service.

OPERATIONAL FLOW CHART
For operational work, the flow chart related to use the system to issue the warning is showed below as Figure 2.

5. SUMMARY
VIPS provides and easy-to-use platform with GIS support for weather warning making and issuing. With the help of this tool, severe weather warning can be quickly prepared according to available products analysis and then be disseminated in different formats to specified end-users. Developed with Open Source resources of Java and OpenMap, and using standard interface for different data source, this system can easily be extended and used in other area of weather service in the future.

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