Executive Summary
And
System Overview

June 21, 2002

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Introduction

All over the world, at both the global and local level, there is a need for the systematic and timely monitoring of evolving weather conditions. Meteorological and hydrological forecast activities serve a diversity of human activities from environmental monitoring to the administration of our resources in transportation, air traffic safety, agriculture, as well as construction, tourism, education and recreational activities.

Romania, despite its relatively small area, has a substantial variation in its terrain and thus in its weather. The northeast region is strongly influenced by stream flooding, while in the north and west a high recurrence of thunderstorm and hailstorm events are common. Modernizing and integrating the various sources of environmental and meteorological data to provide a more comprehensive understanding of the environment and the reciprocal impact on human activities is a necessity.

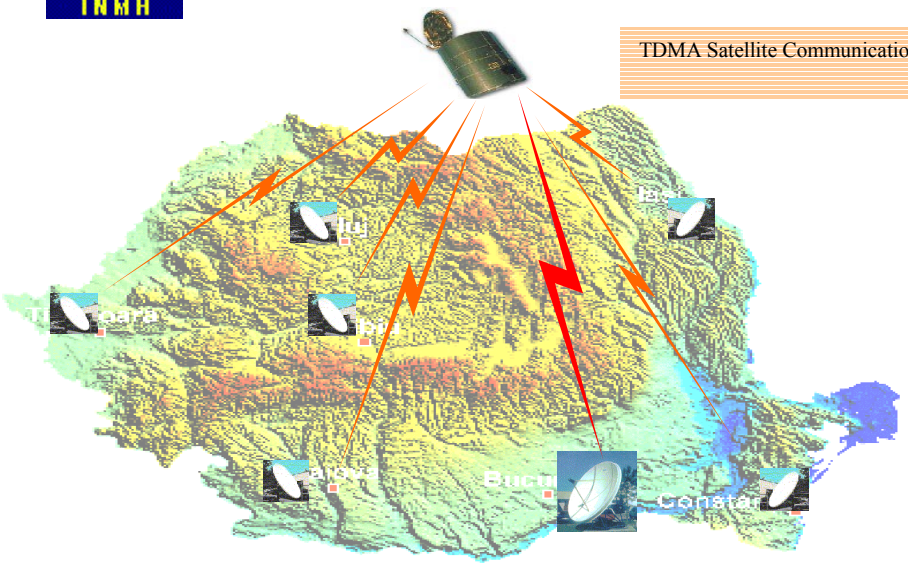
In November 2000 the Romanian Ministry of Waters and Environmental Protection, in concert with the National Institute of Meteorology and Hydrology (INMH) and Lockheed Martin, implemented the first stage of the Ministry's plan to modernize Romania's capabilities of detecting, monitoring and forecasting environmental, meteorological and hydrological phenomena affecting Romania. This first stage is the *National Integrated Meteorological System -SIMIN* project.

SIMIN's design realizes this first step in Romania's modernization program by integrating the data derived from Romania's legacy meteorological systems with the latest technology in meteorological radars, surface and hydrological sensor stations, data processing and forecaster decision/display systems and telecommunications/satellite broadcasting. The products/data derived from these assets are providing meteorologists with the capability for real-time detection and monitoring of weather phenomena within Romania, and facilitate the exchange of data at the Regional, European and global levels.

This paper provides a brief overview of the SIMIN system architecture, how the system components interact, and typical operation by anticipated users. Additional information can be obtained by contacting the Lockheed Martin web site.

SIMIN forecast activities' primary purpose is in protecting life and property against destructive and unfavorable meteorological phenomena.

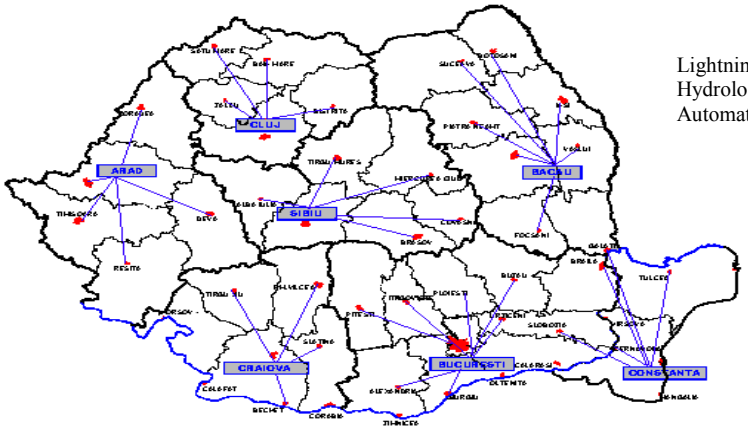
SIMIN



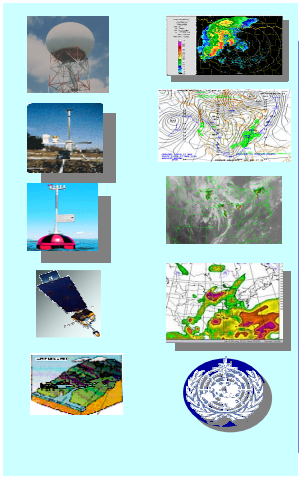
TDMA Satellite Communications Network

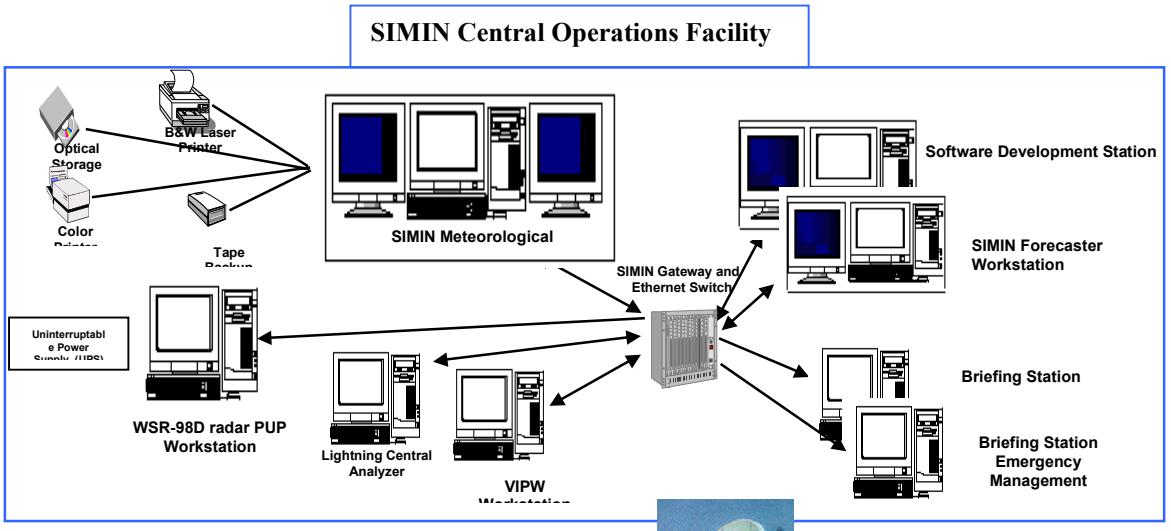
Five (5) WSR-98D Doppler weather radar

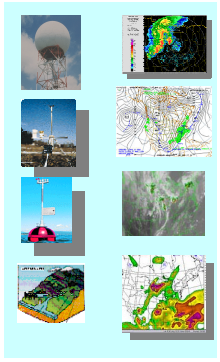
Four (4) Legacy C-band Doppler

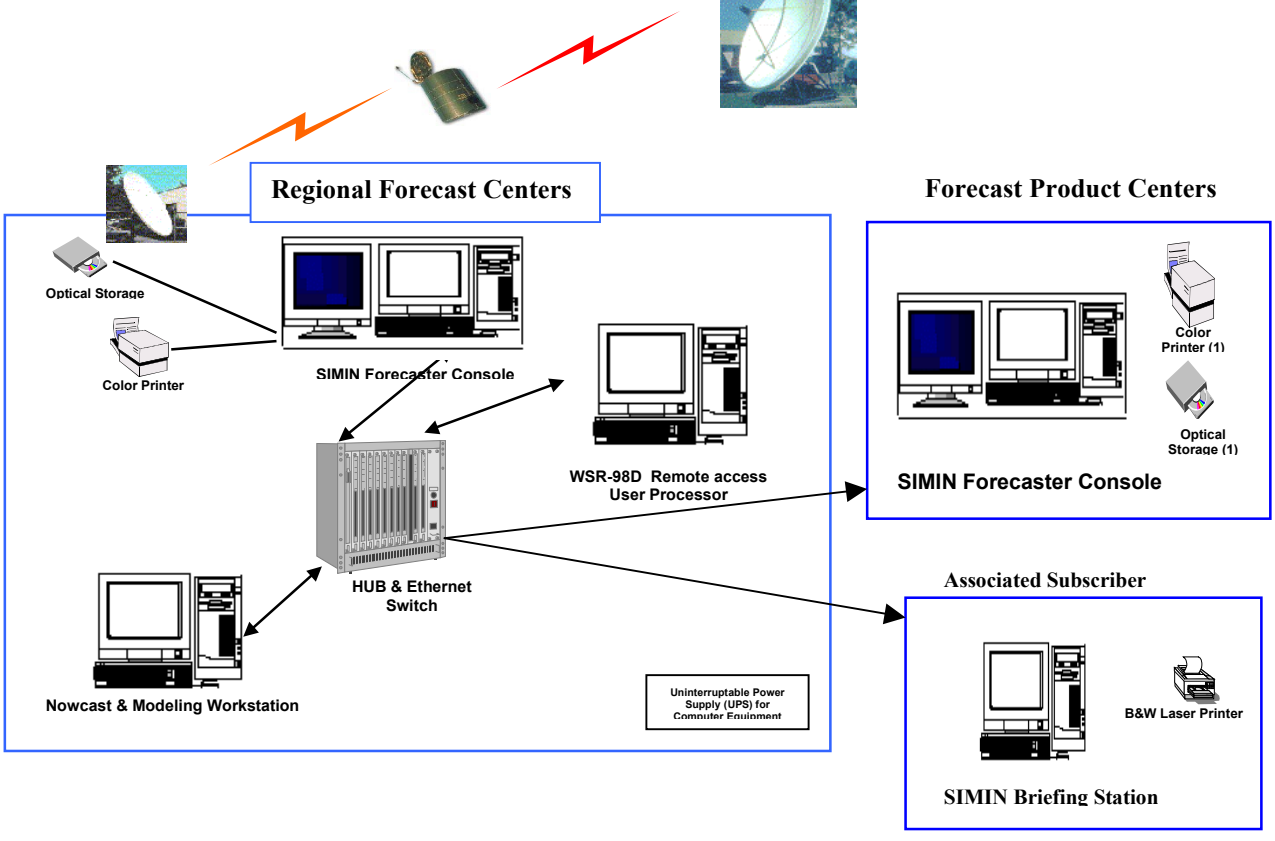


Lightning detection network - qty 8 sensors
Hydrological sensor buoys - qty 11(3 sea, 8 River)
Automated surface observation stations - qty 60




SIMIN Central Operations Facility
Optical Storage
B&W Laser Printer
Color
Tape
SIMIN Meteorological
Software Development Station
SIMIN Forecaster Workstation
SIMIN Gateway and Ethernet Switch
Uninterruptabl e Power
WSR-98D radar PUP Workstation
Lightning Central Analyzer
VIPW
Briefing Station
Briefing Station Emergency Management




Regional Forecast Centers
Optical Storage
Color Printer
SIMIN Forecaster Console
WSR-98D Remote access User Processor
HUB & Ethernet Switch
Nowcast & Modeling Workstation
Uninterruptable Power Supply (UPS) for Computer Equipment
Forecast Product Centers
Color Printer (1)
Optical Storage (1)
SIMIN Forecaster Console
Associated Subscriber
B&W Laser Printer
SIMIN Briefing Station

SIMIN Overview

1. SIMIN CONCEPT OF OPERATION

SIMIN is designed to meet varying operational needs of users in many different organizations within Romania. Figure 1-1 illustrates the relationship and basic operational needs of the primary SIMIN users.

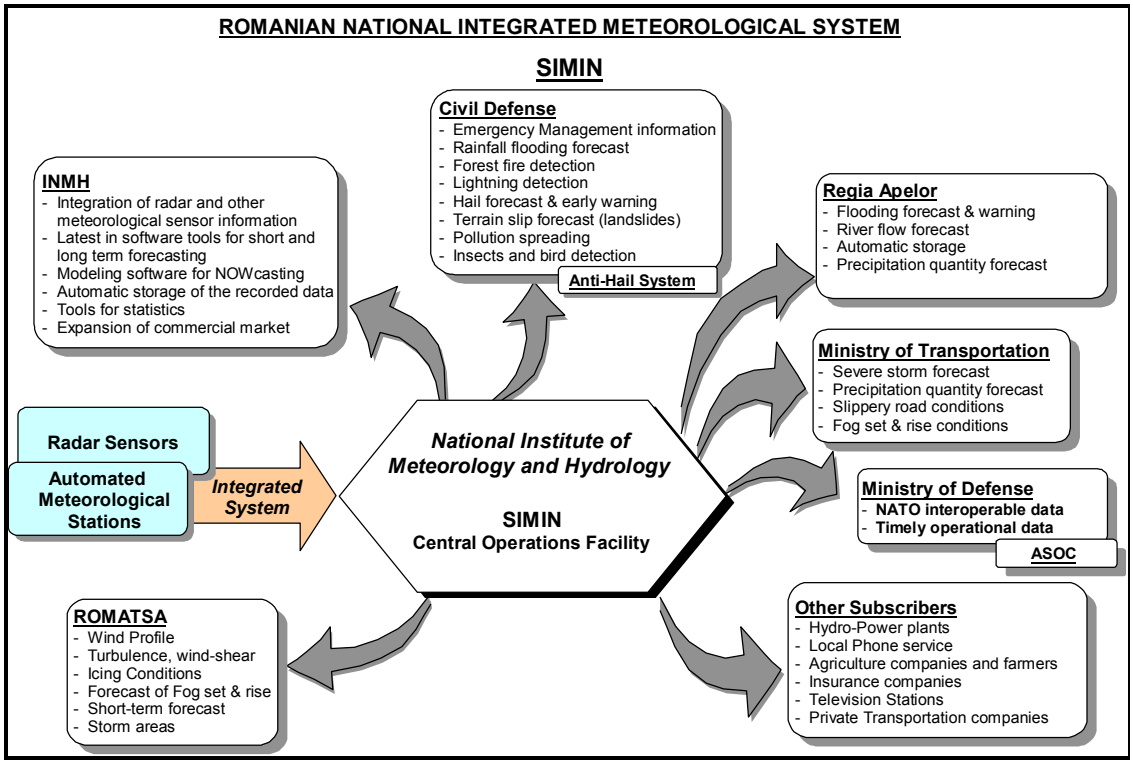


Figure 1-1. Primary SIMIN Users and Operational Needs

Within each of these organizations, users of the SIMIN system support many types of operations with a wide range of roles, responsibilities and experience levels. These roles and responsibilities generally include the following types of users:

- Those who generate the fundamental forecasts and products to meet national, regional and general needs
- Those who generate forecasts and products to meet special or targeted operational needs
- Those who support operational decision making by assessing the weather impact on an operation
- Those who operate and maintain the proper functioning of components in the system

Figure 1-2 illustrates the relationship of each user group to the SIMIN system and provides a few examples of the activities performed by each user group. The SIMIN system provides a tool set designed to support multiple user roles and varying levels of meteorological technologies.

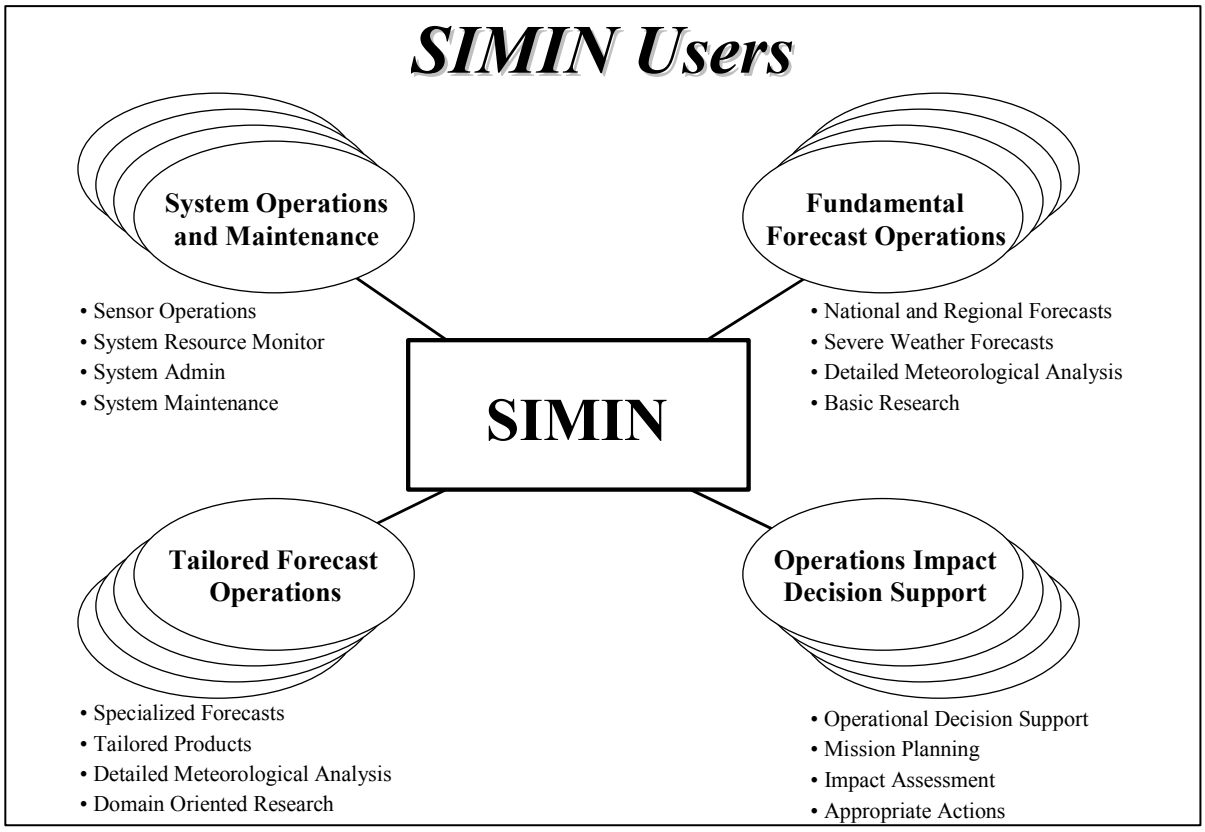


Figure 1-2. System User Roles and Responsibilities

1.1 Forecast Operations

For the purposes of defining the Concept of Operation, SIMIN sites are categorized as one of five operational classifications: the *Central Operations Facility (COF); Regional Forecast Centers (RFC), Forecast Product Centers (FPC), Associated Subscriber (AS)* and *Sensor Site*s. Each SIMIN site has a complement of components commensurate with its operational responsibilities.

1.1.1 Central Operations Facility

The *Central Operations Facility (COF),* located at the INMH facility in Bucharest, is the heart of the SIMIN system. The *COF,* staffed by Meteorologists, is the National Meteorological Center for Romania responsible for carrying out fundamental national forecast operations necessary to meet national requirements and ensure compliance with international WMO agreements. Operations at the *COF* include generating national scale weather products such as nowcasts, objective and subjective forecasts

for short-, medium-, extended-, and long-range time periods, severe weather, national radar mosaics, climate products, and environmental quality monitoring products.

The COF staff produces products that promote and support public and private operations such as air traffic control, resource management and public awareness. In general, the COF staff receives all sensor data and forecast products, monitors the weather as it evolves throughout the day, generates appropriate forecast products to meet national or regional requirements, and provide pertinent weather information to other decision makers responsible for making critical decisions in areas of their organization or related operation. The *COF* coordinates its operations between all sites within the SIMIN system to ensure that appropriate regional and local products are produced. The COF staff also conducts research and development of products and applications to increase the effectiveness of fundamental forecast operations.

The *COF* serves as the interface for receiving data from the RFCs, external international sources, and is the source for direct reception of weather satellite imagery. As appropriate, the data is integrated at the *COF* into SIMINcast (described in section 2.1) and broadcast for distribution to other sites within the SIMIN system**.** and as appropriate to external WMO networks for global distribution.

The *COF* also serves as a source center for the production and delivery of a set of hydro-meteorological weather briefing products. These value-added weather briefing products, referred to as SIMINbrief (described section 2.2) can be distributed to designated local or remote *Associated Subscriber (AS)* sites. These products range from routine products to severe weather warning products including local/regional, national, and international forecast and observed products.

1.1.2 Regional Forecast Centers

The six *Regional Forecast Centers* (*RFC*) located within Romania are responsible for coordinating meteorological operations within their region. The *RFC*, as an INMH designated regional center, is responsible to carry out fundamental regional forecast operations necessary to meet national and regional requirements. Operations at the *RFC* are responsible for generating regional and/or local scale products of all types, according to INMH standard policies and procedures. This may include appropriate regional and/or local scale products such as nowcasts, objective and subjective forecasts for short and medium range time periods, severe weather products, and certain environmental quality monitoring products.

*RFC*s are typically directly connected to one or more radar sites and serves as the regional collection point for sensor data used within SIMIN. Data derived from the *RFC*'s associated radar, upper air, surface, and hydrological sensors is forwarded to the *COF*, via a VSAT communications network. As appropriate, this data is integrated at the *COF* into the SIMINcast (described in section 2.1) and broadcast for distribution to other sites within the SIMIN system. The *RFC* also receives data from other sites via the SIMINcast shared weather data stream, distributed from the *COF*.

The *RFC*s also serve as a source center for the production and delivery of a set of hydro-meteorological weather briefing products, SIMINbrief, to the *AS* sites within their area of responsibility. These value-added products range from routine products to severe weather warning products including local/regional, national, and international forecast and observed products.

1.1.3 Forecast Product Centers

The *Forecast Product Centers* (*FPC*) are responsible for coordinating meteorological information needed by their respective organizations to meet operational mission support requirements. The FPCs are staffed

by meteorologists who support tailored forecast operations, as well as users supporting operations and maintenance. The FPCs typically produce special forecast products for operational activities that required dedicated forecast support. These operations are generally ones with extremely high impacts from weather such as Civil Air Traffic Management, Maritime Traffic Management, Commercial Aviation, Defense Operations, or Commercial Forecast Services. These centers have a responsibility to provide specific weather impact forecast products tailored to meet the specific operational needs of their organization or customers.

The *FPC*s also serve as the source center for the production and delivery of a set of tailored hydro-meteorological weather briefing products, SIMINbrief, to the *AS* sites within their organizational responsibility. These products may be tailored to include appropriate information to support the operational mission of individual *AS* sites, including local/regional, national, and international forecast and observed products.

1.1.4 Associated Subscribers

Associated Subscribers (AS) are those sites whose primary responsibility is to monitor the current and forecasted weather conditions and respond appropriately, according to how their specific operation is impacted by those conditions. *Associated Subscribers* are configured with a SIMIN weather Briefing Terminal which receives a tailored set of weather products, SIMINbrief, for viewing and display of weather information in support of their operational responsibilities. Typically these users are not trained in meteorology or atmospheric sciences, but do have considerable training or background knowledge of the impact weather has on their operation, industry, or business. Hence they do not forecast weather, but interpret the forecasts generated by the associated source center (COF, RFC or FPC) supporting them.

1.1.5 Sensor Sites

Sensor Sites are those sites that are configured with one or more hydro-meteorological data collection sensors. These sites provide data from the sensor to a nearby *RFC*, or the *COF*, for further distribution as appropriate within the SIMIN system. *Sensor Sites* include sites for the WSR-98D and legacy C-band radars, manual and automated Surface observation Stations, Upper Air Radiosonde Observations, Lightning detection sensors, and hydrological buoy sensors. *Sensor Sites* may have one or more sensor types at a single location. Some sensors may be collocated with an *RFC* to optimize use of staff and facilities resources. There are numerous *Sensor Sites* within the SIMIN system, to provide a comprehensive national coverage of appropriate weather data.

2. SIMIN PRODUCT DISTRIBUTION

2.1 SIMINcast - Broadcast of Meteorological Data Package

SIMINcast is defined as the combined stream of basic shared meteorological data distributed from the COF to RFCs and FPCs for use in local product generation1. The *COF* will deliver data and information gathered and stored in the database at the *COF* via IP Multicast technology on the SIMIN Wide-Area-Network. This delivery of data will be comprised of a standard meteorological data package and referred to as SIMINcast. The SIMINcast product package consists of radar imagery data, satellite imagery data,

[1] For readers familiar with the US NWS operations, SIMINcast is similar in concept to the US NWS NOAAPORT data service, but uses IP Multicast technologies for data broadcast delivery via the SIMIN satellite WAN.

gridded NWP model data, lightning data, Romanian observations network observations, WMO data of various types and sources, and manually generated products. Availability of data for distribution via SIMINcast is dependent on the availability of SIMIN communications network bandwidth for collection of data at COF and redistribution to all destinations using that data. The following paragraphs describe the contents of SIMINcast for each of these data types. The COF Communications Gateway provides the flexibility for full local control of all data broadcast on SIMINcast. The data and products described here are intended to represent a typical example of the product set to be delivered.

The COF CG uses the Multicast Dissemination Protocol, MDP, framework to support the IP Multicast capabilities of SIMINcast. MDP provides reliable multicast services with guaranteed transmission and negative acknowledgment. The COF CG is configured to collect all available data ready for SIMINcast transmission, compress the files for bandwidth optimization, and send the compressed files. The receiving CG decompresses the files, and distributes locally according to appropriate routing tables.

2.1.1 Radar Products

All Doppler weather radar systems2 (both S-band and C-band) in SIMIN are configured to provide a standard set of NEXRAD products that can be shared throughout the network. The number of products chosen for the standard set is dictated by the bandwidth available on the SIMIN communication network and the product generation capabilities of each radar. Standard and non-standard radar products can be acquired and manipulated by the associated radar workstations, but only the NEXRAD standard set of products listed in Table 2-1 will be distributed within SIMIN.

Table 2-1. List of Standard Routine Radar Products Set

Typical Configuration of Standard Radar Products
Base Reflectivity (1 km res. at the lowest four tilt angles)
Composite Reflectivity (8 km in 8 or 16 levels)
Layer Composite Reflectivity at three altitude layers • 5,000 to 24,000 ft • 24,000 to 33,000 ft • 33,000 to 60,000 ft
Radial Velocity (1 km resolution)
Echo Tops
Vertically Integrated Liquid (VIL)
One hour Precipitation Accumulation
Three-hour Precipitation Accumulation
Storm Total Precipitation Accumulation
VAD Wind Profile (VWP)

2.1.2 Satellite Products

The Satellite Acquisition System receives data directly from the METEOSAT 7 satellite without reliance on other means of communications. Standard products can be acquired and manipulated by Forecaster

[2] Five Lockheed Martin WSR-98D S-band radars, two EEC C-band radars and 2 Gematronik C-band radars

Console/Workstations and will be distributed within SIMIN. The system will ingest, process, store and display data from the Geo-stationary METEOSAT 7 satellite, including the Visible, InfraRed, and Water Vapor imagery channels. A subset of those products summarized in Table 2-2 will be transmitted to the local integrated database via SIMINcast.

Table 2-2. Satellite Imagery in SIMINcast

	Visible	Infrared	Water Vapor
Wavelength	0.52-0.72υm	3.78-4.03um	6.47 - 7.02um
Coverage Description	Europe	Europe	Europe
Nominal Resolution	4 km	4 km	4 km
Per A & B Schedule	30 min nominal	30 min nominal	30 min nominal

2.1.3 Gridded Forecast Model Data

The SIMINcast data stream may be configured to distribute selected gridded numerical forecast model products produced by the INMH Aladin model on the SDS and the MM5 Mesoscale Model on the SIMIN Advanced Modeling Server. These model output products forms the primary national forecast model data used by applications throughout the SIMIN system. Gridded forecast data from the MeteoFrance Arpege model, acquired via the MESSIR communications interface in WMO standard GRIB format, will be processed by various components of the SIMIN system. The SIMINcast data stream may be configured to distribute selected Aladin, Arpege, and MM5 GRIB products within the SIMIN system as operations and system network bandwidth allow.

2.1.4 Lightning Data

Lightning strike data for each lightning strike detected by the SIMIN Romanian Lightning Detection Network will be delivered on SIMINcast. Lightning strike information is combined into files containing data from one minutes intervals, for distribution and integration throughout the SIMIN system.

2.1.5 Alphanumeric Data

The Meteorological Product Servers as well as the various Forecaster Console/Workstations will process alphanumeric Data, bearing a standard WMO abbreviated header. In particular, METAR formatted surface observations, SYNOP formatted surface observations, and TEMP formatted upper air observations will be decoded for plotting and processing. Other alphanumeric data with a valid WMO header (e.g., TAF data, plain text messages) will be stored in the alphanumeric database. Customer designated WMO formatted alphanumeric data types will also be distributed within SIMINcast.

2.1.6 Manually Created Graphic Products

Special manually created vector graphic products generated at the COF, RFC, or FPC may be distributed via SIMINcast. These products may include manually drawn fronts or other subjectively analyzed products created at the center and designated for distribution within the SIMIN system.

2.2 SIMINbrief - Standard Weather Product Package

The SIMIN system produces value-added products for use by local and remote Briefing Terminal users at Associated Subscriber sites. These products may be general in nature or specially tailored to the needs of the individual user through coordination with the product source center, the COF, RFC or FPC. Since SIMIN provides the capability for complete user control over the information distributed through SIMINbrief, only example product descriptions are provided here. It is important to note that the final configuration of products distributed to users through SIMINbrief will be determined by a coordinated effort between the product source center and the subscribing organization or user. In addition, the content of SIMINbrief will be limited by the network bandwidth available to each individual Briefing Terminal.

2.2.1 General Products

General weather products are produced by a product source center and distributed to most users of SIMINbrief. These general products provide important reference information easily interpreted by all users with little or no training. General SIMINbrief products are usually not tailored for a specific type of operation. All products may have appropriate general map information selected from the available map overlays. Examples of general SIMINbrief products are:

Radar Mosaic: A national and/or regional product with the current mosaic of real-time information from the SIMIN radar network. This product provides a broad area of coverage and easily conveys information on the current and approaching precipitation intensity and movement.

Visible Satellite Imagery: A hemispheric and/or national product with the current visible satellite image. This product provides a broad area of coverage and easily conveys information on the current and approaching cloud cover, density, and movement.

Infrared Satellite Imagery: A hemispheric and/or national product with the current infrared satellite image. This product provides a broad area of coverage and easily conveys information on the current and approaching cloud cover, cloud temperature, estimated cloud altitude, and movement. This product provides a good indicator of precipitation potential prior to actual occurrence of precipitation detected on radar.

Water Vapor Satellite Imagery: A hemispheric and/or national product with the current Water Vapor satellite image. This product provides a broad area of coverage and easily conveys information on the current atmospheric water content and associated movement. This product provides a good indicator of moisture available for precipitation, prior to actual occurrence of precipitation detected on radar.

Surface Analysis: A national and/or regional product with the current observed conditions from the SIMIN network. This product provides a broad area of coverage and easily conveys general information such as temperature, pressure, winds, fronts, etc.

Prognosis for 6, 12, 24 36 and 48 Hours: A series of national and/or regional forecast products for the designated time periods. These products provide a broad area of coverage and easily convey general information such as temperature, pressure, winds, fronts, etc.

Lightning Product: A national and/or regional product with the most recent information from the SIMIN Romanian Lightning Detection Network. This product provides a broad area of coverage and easily conveys information on the current and approaching lightning locations, strike density, and movement. This product provides a good indicator of building lightning activity often associated with intense storms.

Severe Weather Products: Special products indicating severe weather activity in a specified area. These products may include Alerts, Watches, and Warnings for weather phenomenon such as Severe Thunderstorm, Intense Lightning, Flooding, or Hail. This information is generally important to all users, who may assess the impact to their specific operations.

Surface Temperature Forecast: A national and/or regional product with the most recent forecast of surface temperatures derived from the forecast model outputs.

2.2.2 Special Tailored Products

Special tailored weather products are produced by a product source center and distributed to users of SIMINbrief with special operational interests such as aviation, water management, or maritime traffic management. These special products provide directed reference information targeted for user in one or more operational interest areas. Special SIMINbrief products are generally tailored for a specific type of operation but may pertain to more than one operational setting. All products may have appropriate general map information selected from the available map overlays. Examples of special SIMINbrief products are:

Precipitation Totals: A radar derived product of total precipitation detected by radar for a specified time period or individual storm. This product is particularly helpful to water management, flood control, agriculture, and civil defense users.

Precipitable Water Forecast: A model product of total water forecast to be contained in the atmosphere to be available for precipitation at a specified time. This product is also particularly helpful to water management, flood control, agriculture, and civil defense users.

Sea Surface Conditions: A maritime related product that may depict observed or forecast features such as sea surface temperature or wave height and/or swell in a specified area.

Weather Depiction: An aviation related product depicting the aviation flight rule conditions for specific airports or general areas. This chart may indicate if conditions meet instrument flight rules (IFR), marginal visual flight rules (MVFR), or visual flight rules (VFR) conditions established by ICAO. This product is important to all aviation-related operations such as military flight operations, air traffic control, airport operations, or commercial and general aviation.

Winds Aloft: An aviation related product depicting the wind speed and direction at various flight levels in the atmosphere.

Turbulence: An aviation related product depicting the observed or forecast turbulence conditions.

Cross Sections: A product depicting various parameters in a two dimensions vertical slice of the atmosphere. This product can be useful to aviation related interests, by depicting conditions along a route of flight. It may also be used by staffs that are more highly trained in meteorological forecasting, but are supporting operations at an Associated Subscriber site without a full suite of meteorological forecasting equipment or applications.

Thermodynamic Charts: A product depicting various parameters or indices that provide insight into the stability of the atmosphere. This product is useful to staff that are more highly trained in meteorological forecasting, but are supporting operations at a smaller or mobile Associated Subscriber site without a full suite of meteorological forecasting equipment or applications.

3. SIMIN ARCHITECTURE

The SIMIN system architecture is composed of equipment and components with interoperable capabilities and configurable features to meet the unique needs of varying site and user needs. Each identified site within the SIMIN system is configured with a suite of these user-oriented components commensurate with their operational needs and responsibilities. The family of equipment includes the WSR-98D S-band Doppler Weather Radar, Communications Gateway, Advanced Modeling Server, Forecaster Console Workstation, Meteorological Product Server, Radar Product Integrator and Modeling Workstation, Lightning Detection Sensors, Meteorological Satellites, Weather Briefing Terminals, a Software Development Server/Workstation, Hydrological Sensor buoys, Automatic Surface Observations Stations, and INMH Legacy Workstations/System Components. This document provides a general overview of the configurations and capabilities for each of the primary SIMIN components.

3.1 WSR-98D S-Band Doppler Weather Radar

The WSR-98D S-band Doppler Weather Radar is the latest multi-discipline radar integrating NEXRAD weather radar technology and enhanced meteorological algorithms for threat detection with state-of-the-art advanced signal processing and open systems protocols, conventions and data processing.

The WSR-98D Doppler radar is a stand-alone turnkey system that detects, processes, distributes, and displays radar data and derived products. The WSR-98D uses Doppler radar technology to acquire target Reflectivity, Mean Radial Velocity, and Velocity Spectrum Width data in addition to range, direction, and height of the target. Software processing is used to control the radar's operating characteristics producing optimum radar volume coverage patterns and radar returns. The resulting base weather data is then processed through the application of meteorological algorithms to generate base and derived products. These products are further processed using graphics algorithms to produce readily interpretable weather data displays on color monitors.

WSR-98D versatility supports the needs of many users, in part, by the ability to remotely locate various subsystem components to meet the needs of the customer.

The WSR-98D is functionally subdivided into three equipment groups: Radar Data Acquisition (RDA), Radar Product Generator (RPG), and the Principal User Processor (PUP), plus communications. The RDA provides the advanced sensor equipment components of the WSR-98D. The RPG provides the basic processing of the WSR-98D radar data and the automated generation of a user configured set of routine products. The PUP provides the main WSR-98D user workstation within the SIMIN architecture. Some additional detail is provided here on the WSR-98D PUP in order to provide an understanding of the primary user operational requirements.

3.1.1 WSR-98D Primary User Position Workstation

The WSR-98D Advanced PUP Workstation provides radar processing and display features as well as features to monitor and control the radar RDA and RPG. The workstation provides a means to display and analyze data quickly, and provides for the seamless integration and distribution of products by operational personnel.

Each PUP user with a dedicated connection to an RPG can specify the products to be received on a routine basis. Once a user's product mix and priority have been entered, the RPG maintains the information for future use until changed by the user. A user may make a manual request for a 'one-time'

product, in addition to those products routinely received. Examples of WSR-98D advanced products3 are provided in Figure 3-1 through Figure 3-3. The many display features of the WSR-98D PUP provide the detailed analysis capabilities required for all types of weather conditions. These features include all forms of product display, meteorological alerts, hydrological processing, and system maintenance operations.

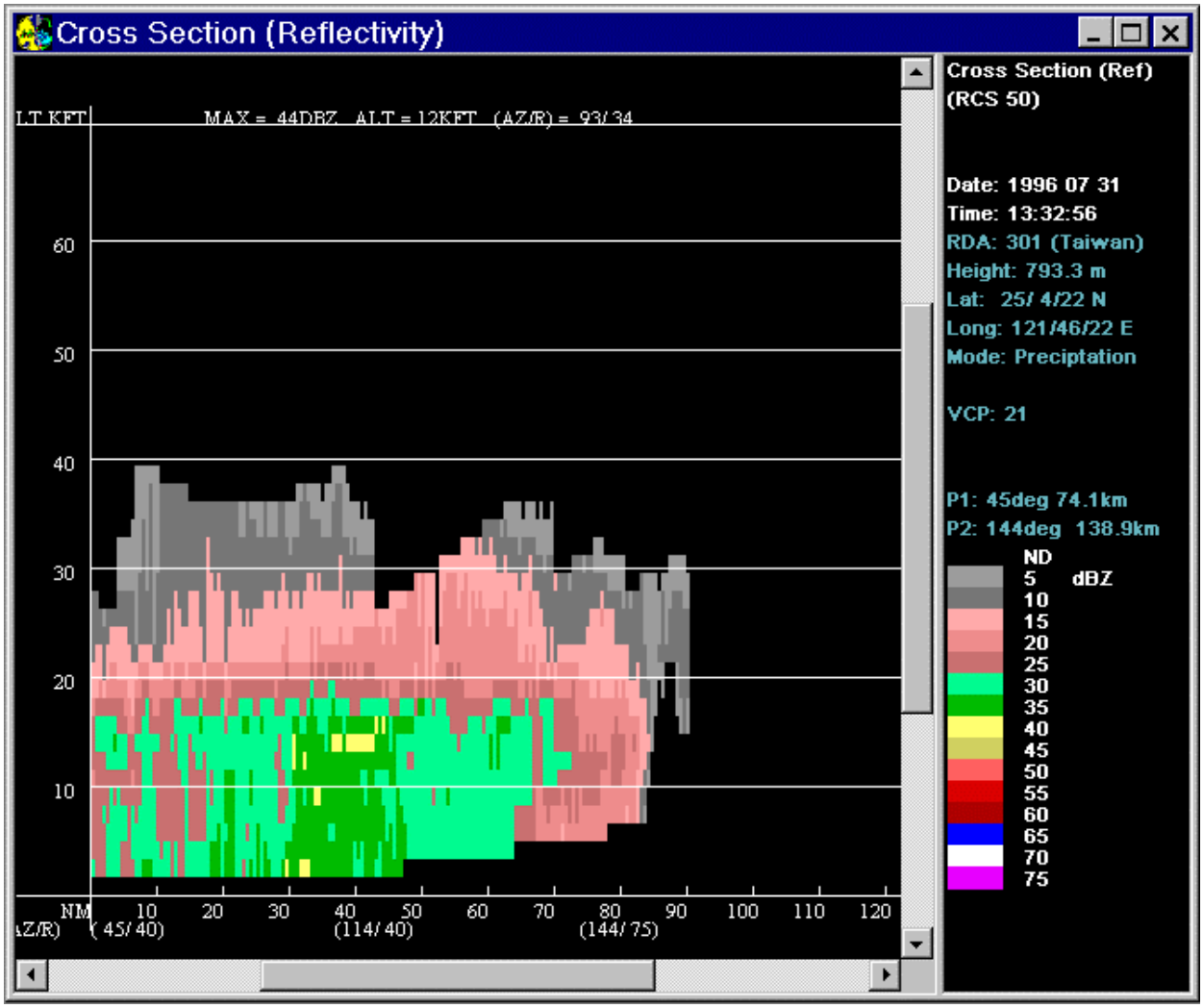


Figure 3-1. Example WSR-98D Reflectivity Cross Section Product

[3] Full suite of over 90 available products

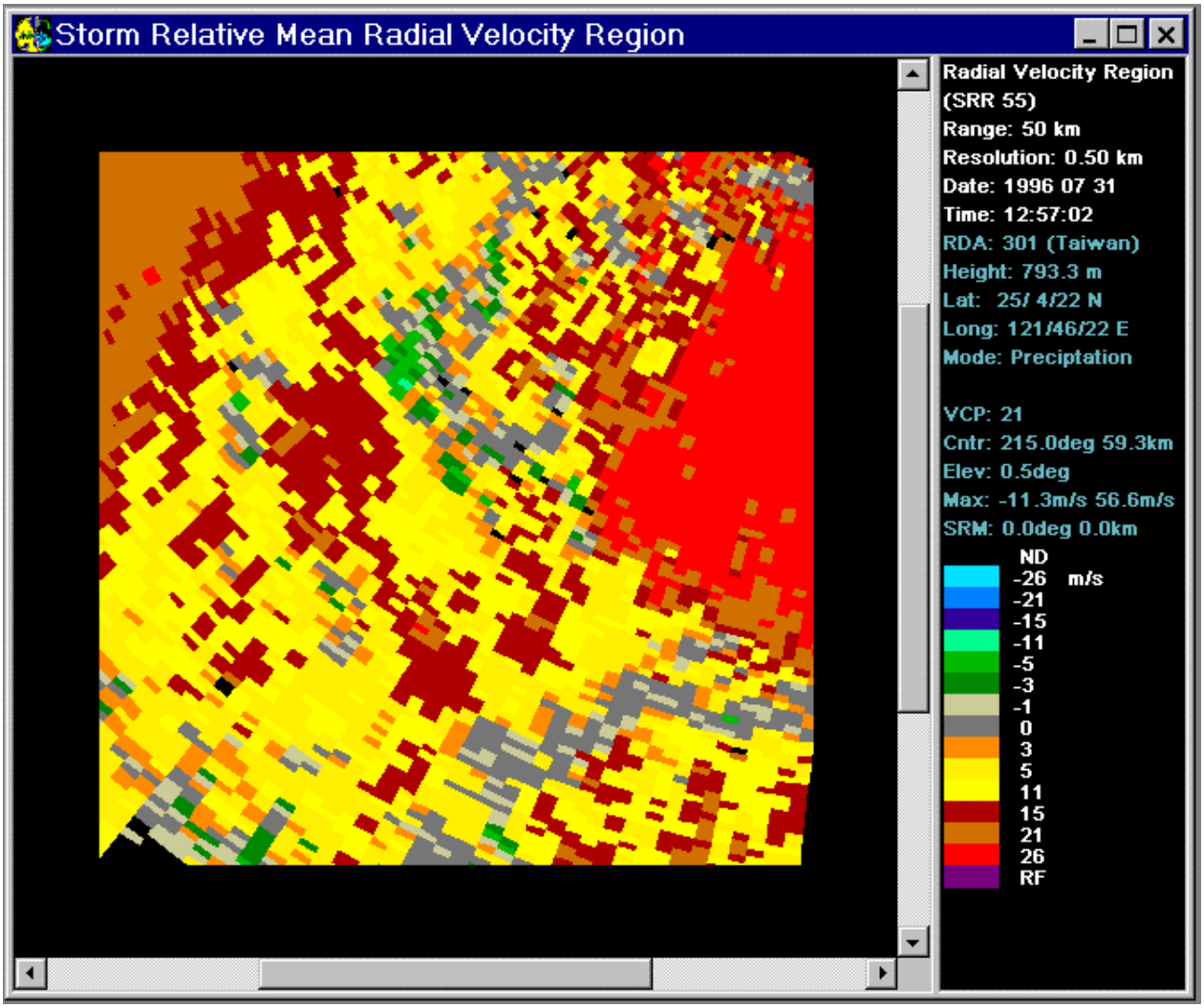


Figure 3-2. Example WSR-98D Storm Relative Mean Radial Velocity Product

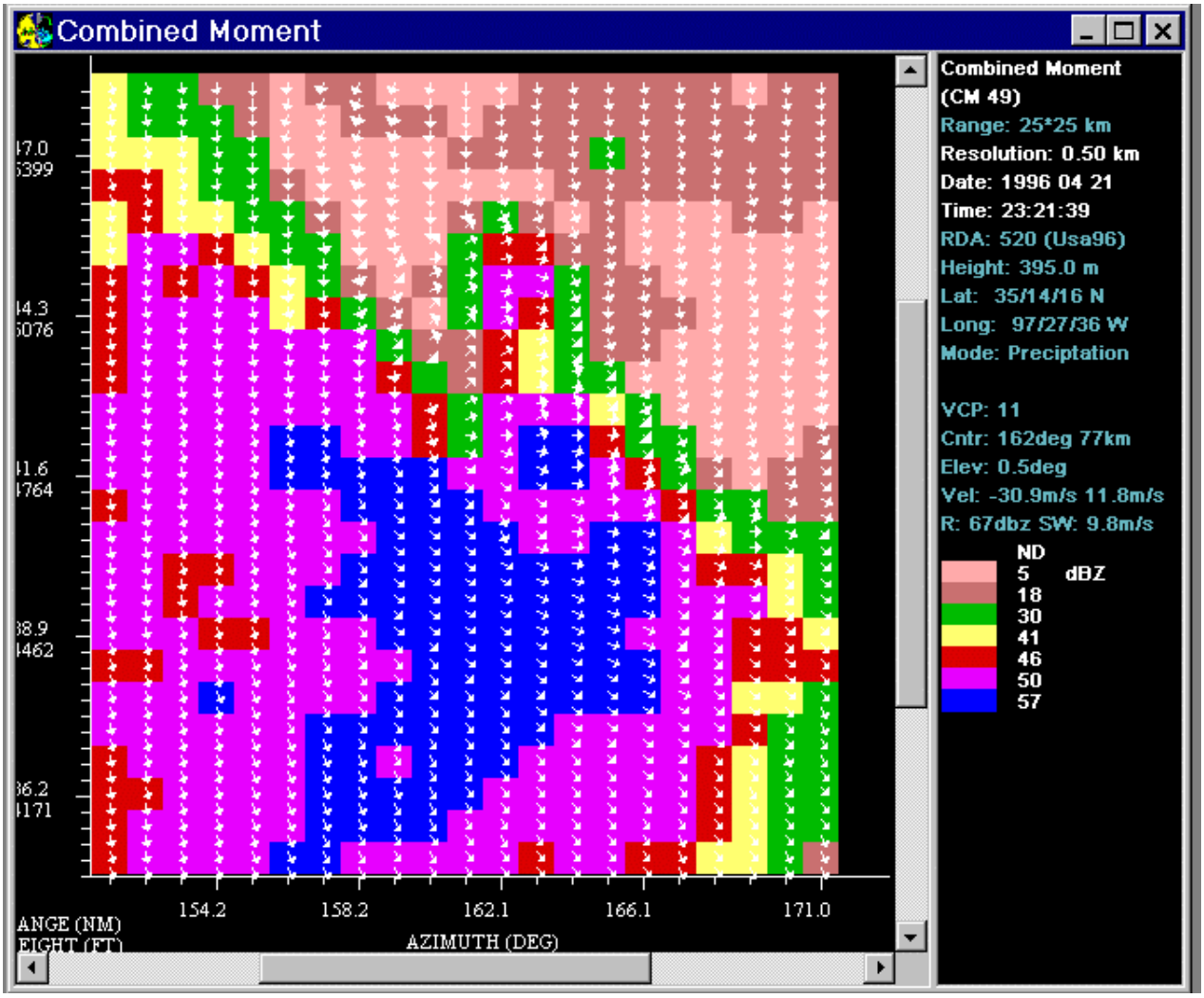


Figure 3-3. Example WSR-98D Combined Moments Product

3.1.2 WSR-98D Modes of Operation

The WSR-98D system supports two basic modes of operation: Precipitation Mode and Clear Air Mode. Clear Air Mode is intended for use during periods of little or no precipitation and is helpful in detecting the radar signatures of developing activity prior to the onset of precipitation. In Clear Air Mode, the WSR-98D provides a higher sensitivity through a combination of slower scan rate, and low Pulse Repetition Frequency (PRF). The Clear Air Mode is configured to complete a volume scan every 10 minutes. Due to the increased sensitivity, the Clear Air Mode may also be used to more efficiently detect light snow, which generally produces a lower radar cross section. Precipitation Mode is intended for use during periods of precipitation. It is selectable to complete a volume scan in either 5 or 6 minutes, depending on the selected number of scan elevations. In Precipitation Mode, the increased scan rate allows a greater number of elevation angle scans within the volume scan update time. This provides a

faster scan rate to monitor a larger volume of space in a shorter time and permits more effective tracking of rapidly evolving meteorological phenomena found in convective weather patterns.

3.2 Communications Gateway

The Communication Gateway (CG) and its associated network equipment is responsible for interfacing and interconnecting all other processing components within the SIMIN system at each site. It functions as a switching center for data and products entering and exiting the SIMIN system servers and workstations. Each site has a configuration of the CG necessary to meet the needs of the local equipment suite and data communications requirements for that site. The CG comprises a Communications Gateway computer, one or more 10/100Mbps auto negotiating Ethernet switches, and appropriate networking equipment to interface with the SIMIN communications networks and any existing local LAN. The CG is responsible to control the flow of data to and from the *COF*, *RFC* sites, *FPC* sites, and appropriate *Sensor Sites* as well as monitor and report the high level status of reporting components within the SIMIN system.

3.3 Advanced Modeling Server

The Advanced Modeling Server (AMS) uses the Fifth Generation Mesoscale Model (MM5) numerical weather prediction forecast model for the generation of national gridded forecast model data sets. The MM5 model[4] accepts the US NWS Global Spectral Model (GSM) grids received through the Communications Gateway as initialization and boundary conditions. Each run of the MM5 model produces a data set of gridded forecast products from analysis through the end forecast period, at all standard atmospheric levels, in predetermined time increments, consistent with the time and space domain of the boundary condition model. The high spatial and temporal resolution of the MM5 model output along with the unique local adaptation features, provide a national forecast model for SIMIN. These model outputs are placed in the *COF* integrated database for use by meteorological operations at the *COF*. Selected MM5 gridded model outputs are distributed to users via SIMINcast[5] for use by meteorological operations at those sites, including initialization of the local modeling capabilities of the Radar Product Integrator and Modeling workstation.

3.4 Forecaster Console

The SIMIN Forecaster Console uses the Harris Corporation neX-REAP™ software application and is the primary integrated workstation environment throughout SIMIN. NeX-REAP™ will accept a standard set of data delivered from the CG, decode, process and store the data into a local integrated database. This includes data received through the SIMINcast data stream delivered via the SIMIN communications network or data collected locally from associated sensor sites. The data set includes standard alphanumeric observation and forecast data, radar imagery, radar mosaics, satellite imagery, gridded forecast model data, hydrological data, and lightning data.

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[4] The MM5 is a nested model with a two-way interaction at a 3:1 ratio, or one-way with any integer ratio. Key features include terrain following, Polar/Lambert/Mercator map projections, four-dimensional data assimilation, temporal finite differencing, and spatial differencing. Physics options include Cumulus Parameterizations, Explicit Moisture Schemes, PBL Schemes, Radiation Schemes, and Ground Temperature Schemes. The MM5 produces gridded forecast model outputs of various atmospheric parameters at multiple atmospheric levels and multiple valid forecast times. The exact output is dependent on user configuration setup, selected to meet the forecast needs of current conditions and available system resources.

[5] described in Section 3

Using data available in the integrated database, the Forecaster Console/Workstation applications provide the capability for users to assimilate multiple data types into composite products such as a combined radar, satellite and lightning product. This state-of-the-art, integrated capability allows meteorological prognoses to be efficiently created manually or through the Automated Product Generator (APG) and real-time assessment of rapidly changing conditions to be efficiently and effectively supported.

Using the interactive tools and product generation features of the neX-REAP™ software application used in the Forecaster Console, a multitude of tailored products are available for use in the forecasts operations. Figure 3-4 illustrates an example of such a tailored product depicting a composite product of GOES infrared national satellite imagery, remapped to a Polar Stereographic projection, color enhanced, then overlaid with US state and country maps, decoded fronts, a contour of 34 kft wind speeds with filled thresholds, and a user-defined legend.

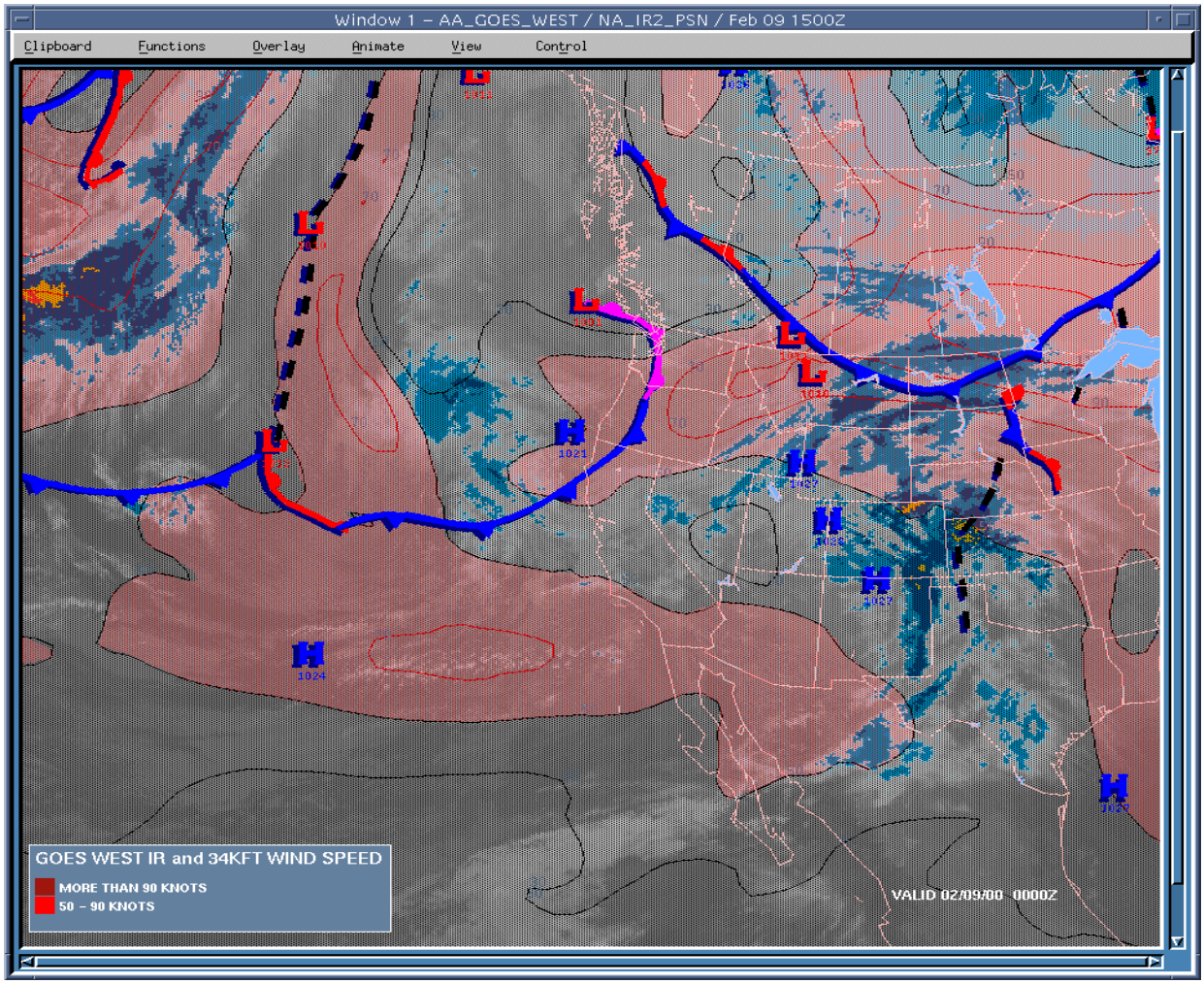

Figure 3-4. Example GOES West IR with Overlay of Fronts and 34Kft Wind Speed

3.5 Meteorological Product Server

The SIMIN Meteorological Product Server (MPS) serves two primary purposes. It provides the primary centralized integrated database for the SIMIN *COF* and performs automated background product generation for the *COF* operations and users it supports. The MPS provides an environment for the central assimilation and storage of the many data types being ingested into the SIMIN integrated database. It works as an ingest/database server to provide computer-based information storage, processing and retrieval of raw weather data, imagery and associated information using the neX-REAP application identical to the Forecaster Console workstation at the *COF* and other local applications. The MPS also performs automated background generation of routine products for use locally at the *COF* and for distribution to its *Associated Subscriber* sites, both local and remote. Figure 3-5 provides an example of a 6-hour Forecast of Relative Humidity product, which may be produced by the neX-REAP application on the MPS, or any Forecaster Console.

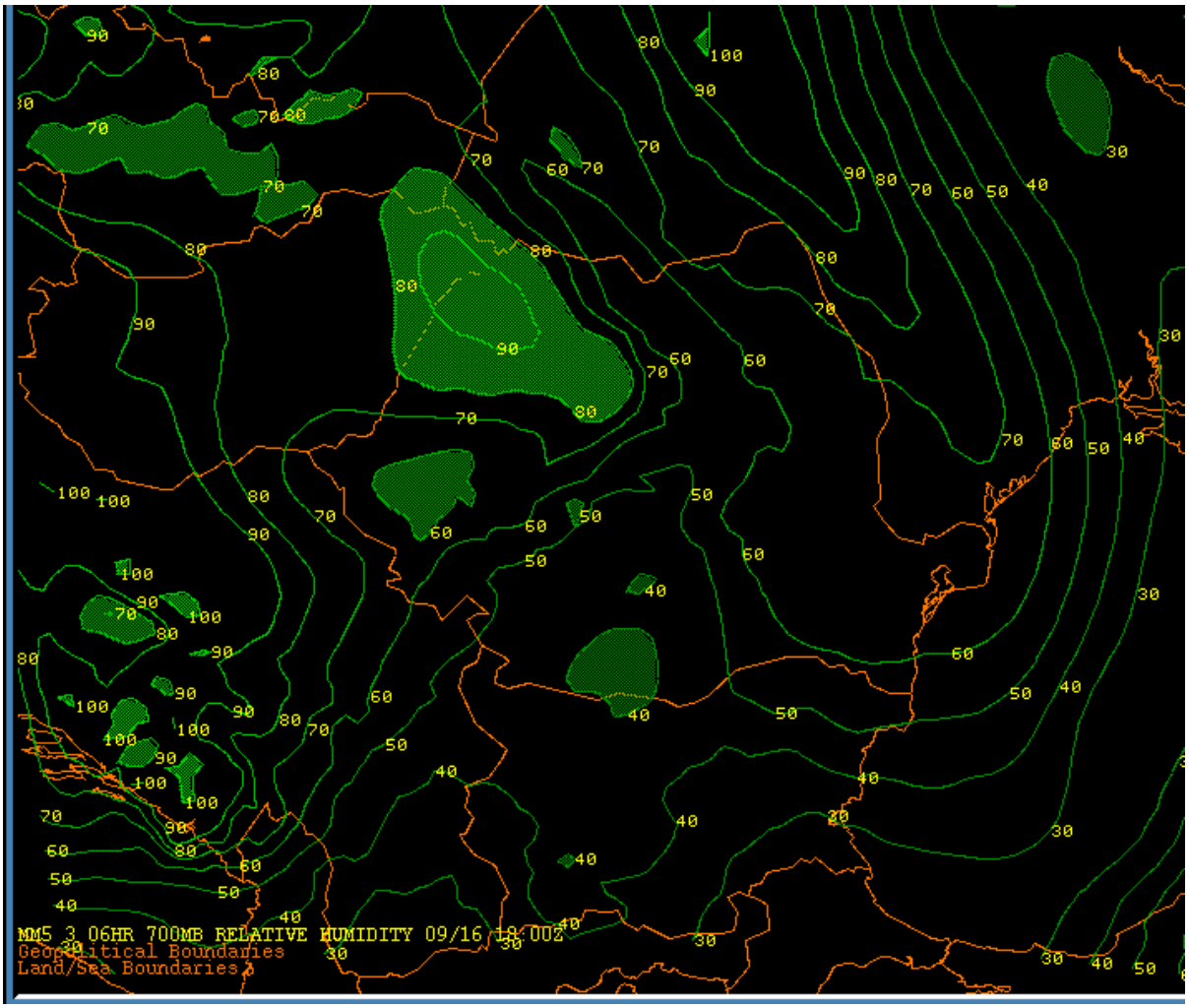

Figure 3-5. Example 700mb Relative Humidity 6 Hour Forecast

3.6 Radar Product Integrator and Modeling Workstation6

The Radar Product Integrator and Modeling Workstation is configurable to serve multiple purposes using six optional system components. The six components and modules of the Radar Product Integrator and Modeling Workstation, described in sections 3.6.1 through 3.6.6, are the Volumetric Imaging and Processing Workstation/server (VIPW™), the OmniWxTrac™ 2D display, the Volumetric Imaging and Processing of Integrated Radar (VIPIR™), the Nowcasting and Modeling Workstation (NMW), the National Mosaic Server, and the SAF-T-NET™ alert/warning server. All six components are present at the *COF* to support national operations. The RFCs are configured with the three system components necessary to support regional/local operations, the VIPW, OmniWxTrac, and NMW. In addition, the Radar Product Integrator and Modeling Workstation provides the interface for data from the legacy C-band radar systems to the SIMIN system. At the *COF* the Radar Product Integrator and Modeling Workstation integrates radar products from the WSR-98D and C-band radars available within the country and generates national mosaic products.

3.6.1 Volumetric Imaging and Processing Workstation / Server

The Volumetric Imaging and Processing Workstation (VIPW) from teammate Baron Services Inc. provides the foundation upon which other modules within the Radar Product Integrator and Modeling Workstation are built. Using the Computational Object for Baron Radar Algorithms (CORBA), the VIPW provides an open, distributed object computing environment which supports efficient configuration and interaction of appropriate modules to meet operational needs. The VIPW accepts processes and integrates standard radar products from WSR-98D and C-band radars including the generation of real-time radar mosaic displays, with other complementary data.

Concurrently, advanced real-time severe weather and hydrologic processing of radar data provides a full spectrum of higher-level geophysical parameters that enhance situation awareness of significant weather associated with strong thunderstorm and winter precipitation. Quantitative imagery of heavy rainfall, flooding, hail and wind shear are available at 1-km resolution every 5 minutes for use in the protection of lives and property.

The VIPW processing provides services that support the integration display and modeling portions of the Radar Product Integrator and Modeling Workstation and serves as the integration for these features. This includes modules such as the Snow Machine, which is based on a cooperative effort between team members Baron Services Inc. and Harris GCSD. This module provides an unprecedented level of accuracy for winter precipitation monitoring from the past, the present, and into the future. The system calculates hydrological accumulation products for various time periods from 1 to 24 hours with neighborhood level accuracy. Current numerical model data can be integrated and overlaid with WSR-98 data or C-band data to get a more precise definition of the type, rate and location of various winter precipitation events. Finally, Snow Machine allows a look into the future at various times up to 24 hours for snow, mix, and rain accumulation predictions providing unmatched capabilities for planning responses to winter weather. The SIMIN COF and each RFC have a VIPW Server.

[6] Sometimes referred to as the "C-Band Product Integrator and Modeling Workstation" or the "Met Model Server and C-Band Product Integrator".

3.6.2 OmniWxTrac™

The OmniWxTrac™ provides 2D-display capability for integrated radar information, which is very well suited for detailed analysis of severe or active weather. The OmniWxTrac is based on a modular approach that allows it to be scaled to meet specific needs. OmniWxTrac is feature rich with application software that maximizes operator effectiveness. The OmniWxTrac provides display of multiple WSR-98D or C-Band radars, as well as the data produced through advanced processing from the Baron VIPIR and Snow Machine products. The OmniWxTrac allows the meteorologist to monitor any location in their area of responsibility with as much resolution and detail required pinpointing weather down to a neighborhood level. The systems powerful flexibility allows the operator to instantly monitor anywhere in Romania and change the weather parameters under evaluation quickly and efficiently with a minimum of steps. An OmniWxTrac™ is present at the SIMIN COF and at each RFC. Figure 3-6 provides one example of an OmniWxTrac interactive display where a storm cell has automatically been identified and the projected track has been cross referenced with the available database of city locations, allowing the user to pinpoint an anticipated time of arrival for pending severe weather activity.

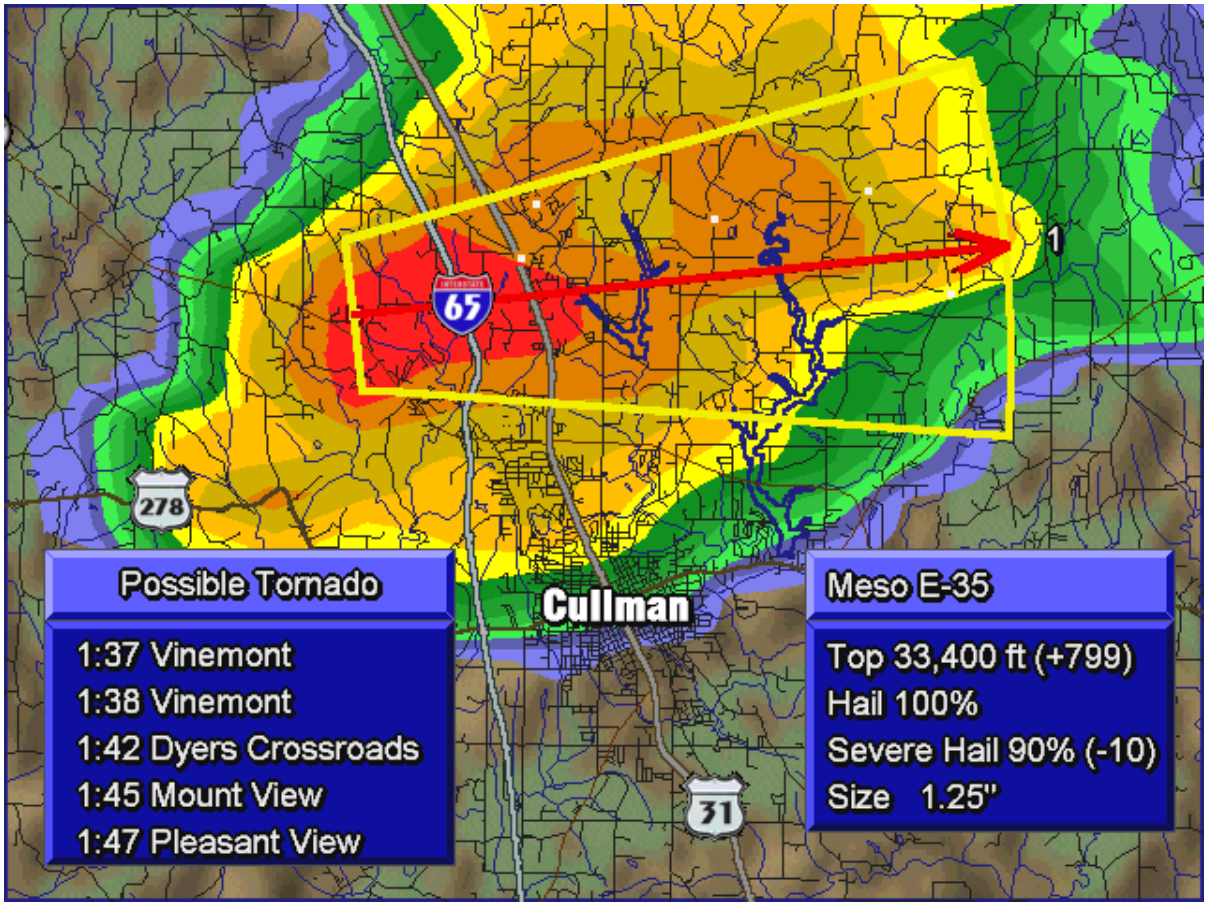

Figure 3-6. Example OmniWxTrac 2D Display

3.6.2.1 Snow Machine Module

Snow Machine redefines radar detection and processing capabilities for winter conditions. For the first time, you can clearly detect the 3 different types of winter precipitation affecting your area – **rain, snow**, and **mix** (a variable combination of snow, sleet, freezing rain and rain). With Snow Machine, the current depiction of winter precipitation types and location will be more accurate than has ever been possible before. Snow Machine produces historical products, which are extremely site-specific. No matter what conditions are present in the winter event – freezing rain, sleet, or snow – Snow Machine will show exactly what areas in detail have been hit the hardest over the past 1, 3, 12, and 24 hours. In essence, Snow Machine derives 3 kinds of products. Current products – what is happening right now – are useful on wider ranges. Far more site-specific are the historical products – what has happened in the past up to the current moment. Forecasting products involve hourly-updated projections of accumulations in four ranges: rain, mix, snow, and total accumulations. These forecasts, too, are provided in 3, 12, and 24-hour increments. By redefining the forecast information every hour, increased accuracy and preparedness is achieved. A Snow Machine Module is present at the SIMIN COF and at each RFC. An example of the Snow Machine product is shown in Figure 3-7.

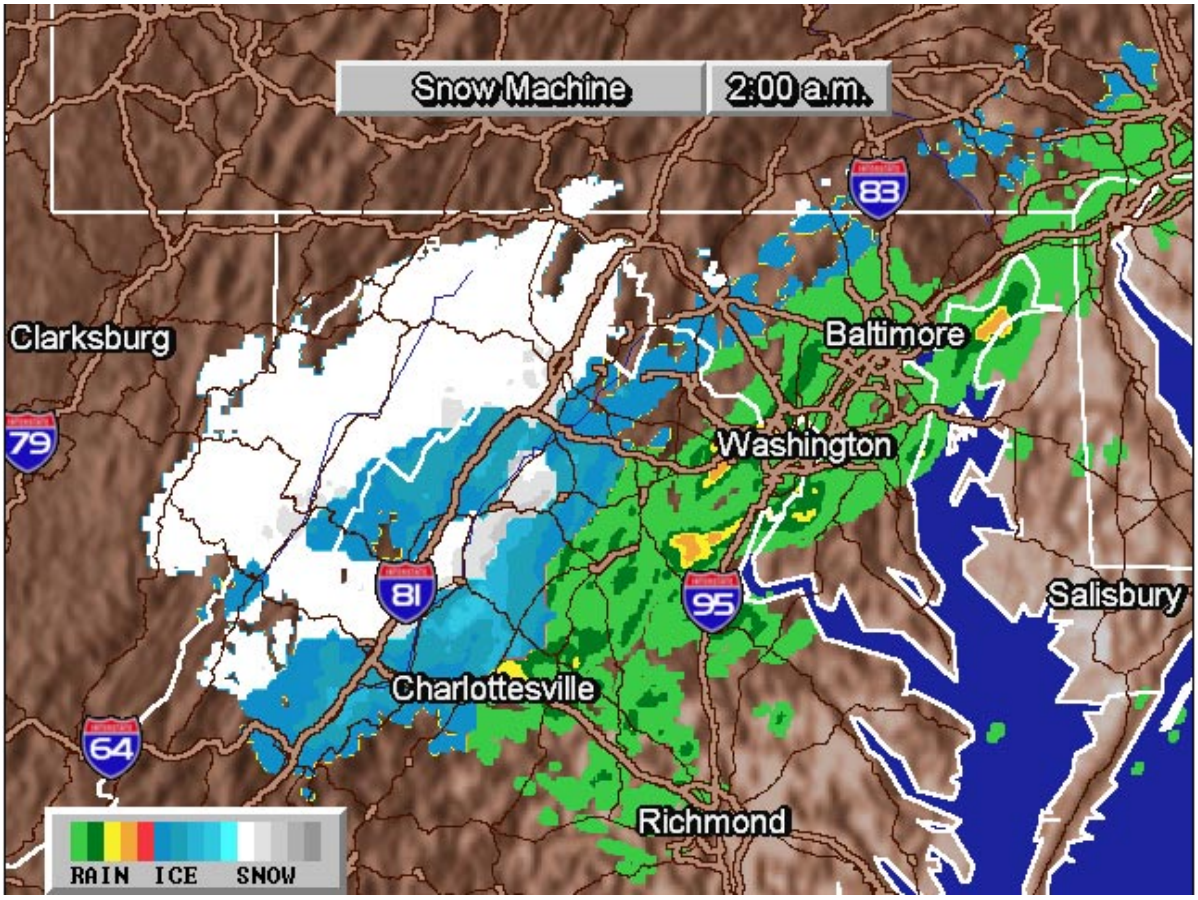

Figure 3-7. Example Snow Machine Display Product

3.6.2.2 FutureScan™ Module

Co-developed with MIT and based on a project developed for the US Federal Aviation Administration, FutureScan™ is a radar forecast and display product designed to project Doppler radar data into the future. FutureScan™, using advanced processing algorithms, integrates the raw and derived Doppler radar data in real-time and produces a visual display of the data, forecasting the radar data forward into the coming hour and as far out as three hours into the future. Predicted weather is displayed continuously in motion, as it is forecasted to be moving across a specific area in detail. Combined with other meteorologically relevant information, this capability to foresee where approaching severe weather and precipitation bands will be located, advances the uses of Doppler radar for state-of-the-art forecasting purposes. This can provide the advance notification and early warning necessary for severe weather and flood information for planning lifesaving evacuations or providing daily weather information to the public. FutureScan™ is combined with other Baron Services patented storm tracking products that include geographically accurate maps and display Doppler data. This combination puts FutureScan™ projected radar data into perspective with landmarks such as communities, roads, and rivers. Meteorologists will find this an excellent tool in severe weather, as well as daily forecasts. Designed for government entities, utilities, broadcasters, and other weather sensitive industries, FutureScan™ provides a new look at approaching weather patterns. Used on a real-time basis, meteorologists will be able to analyze the projected path of a pop-up rain shower and the path of potentially severe weather. Available for display in the Baron VIPIR™, FutureScan™ also can be displayed in a 3D manner. A FutureScan™ module is present at the SIMIN COF and at each RFC.

3.6.3 Volumetric Imaging and Processing of Integrated Radar

The Volumetric Imaging and Processing of Integrated Radar (VIPIR™) is the backbone of the advanced radar processing. The VIPIR system works in conjunction with the OmniWxTrac system for the combined ability to analyze in both the 3D volume and in 2D down to a neighborhood level. VIPIR provides a fully integrated 3D/4D-display capability for multiple radars simultaneously. VIPIR displays products from WSR-98D radar imagery, adverse weather alerts, FutureScan model graphics, other graphics, and specialized VIPIR products. VIPIR is based on a high performance Windows NT operating system environment. This allows the data ingest, processing, and automatic product generation functions to provide real-time 4-D manipulation of all radars at one time while VIPIR continues to produce advanced products easily passed to the OmniWxTrac system for display in 2D. VIPIR also provides a variety of display options such as real-time product manipulation, automated sequencing, user-defined alarms, and many other options. A VIPIR™ is present only at the SIMIN COF. Examples of VIPIR 2D and 3D display products with wind shear markers are provided in Figure 3-8 and Figure 3- 9 respectively.

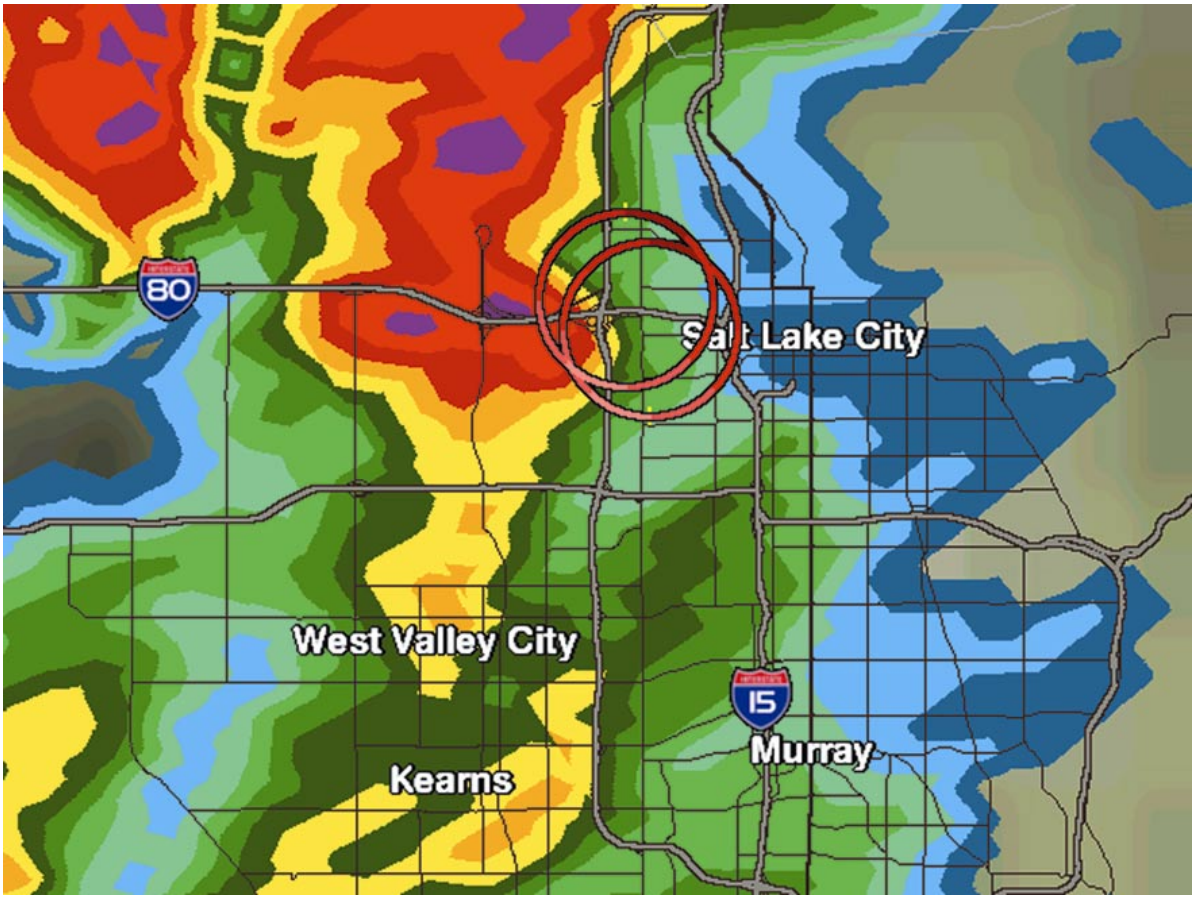

Figure 3-8. Example 2D VIPIR Display Product

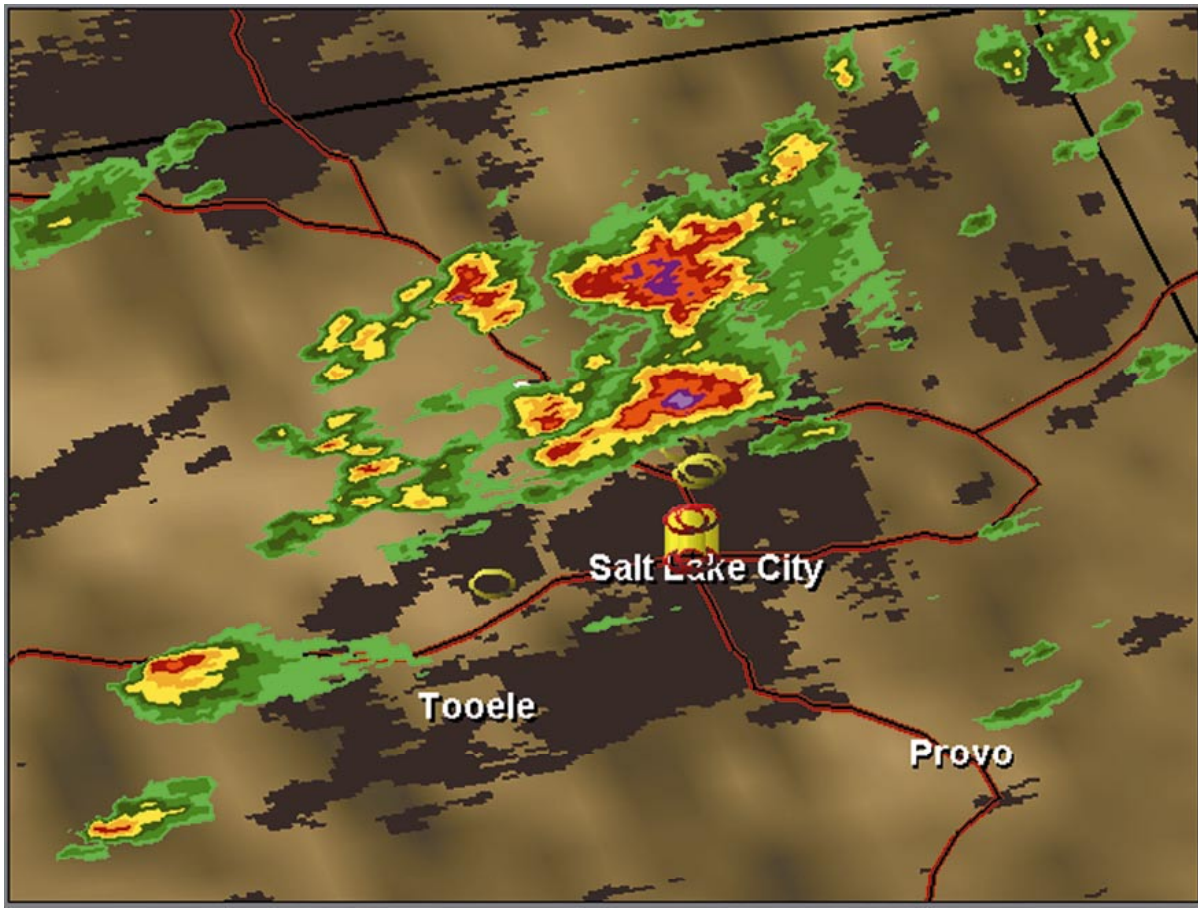

Figure 3- 9. Example 3D VIPIR Display Product

3.6.4 Nowcasting and Modeling Workstation

The Baron Services Inc. Nowcasting and Modeling Workstation (NMW) provides local, short-term weather prediction and modeling capabilities using advanced radar image processing and numerical weather prediction software. Continuous real-time assimilation of radar and standard meteorological data allows for accurate and site-specific NowCasting and short-term prediction of hydrologic and storm parameters from 5 minutes out to 24 hours over regional geographic areas. New predictions are generated continuously using rapid update cycle software in combination with advanced diagnostic analysis of important meteorological fields allowing highly accurate forecasts on local and regional scales. It is this analysis and forecast modeling that allows the Snow Machine and Future Scan modules to perform their highly integrated advanced processing. The OmniWxTrac and VIPIR applications provide display of the integrated radar output products. A NMW is present at the SIMIN COF and each RFC.

The WeatherCaster™ and MetModel™ are the local software applications that provide the modeling portion of the workstation. The WeatherCaster™ application provides a visualization capability tuned for local modeling and the MetModel™ application performs the local numerical forecast modeling and data assimilation. The MetModel™ is a Quasi-Lagrangian numerical weather prediction forecast model used

to extrapolate data from global and national models and assimilate current surface and radar observations, in near real-time. This integrated data assimilation and numerical modeling provides the capability for extremely high accuracy analysis and short-term forecasts in a timely fashion. The tightly integrated radar/modeling capability allows the Nowcasting and Modeling Workstation to generate specialized local forecast radar products such as precipitation accumulation or winter precipitation mix forecasts in 15-minute increments over the next 3 to 6 hours. These high-resolution forecast model output products are used by the Snow Machine module to determine analysis and forecasts of winter precipitation type. In addition, this capability provides the analysis and forecasts elements of the integrated Future Scan module.

3.6.5 National Radar Mosaic

At the *COF*, the Radar Product Integrator and Modeling Workstation integrates radar products from all Doppler radars within the SIMIN system and generates a base reflectivity national mosaic every 10 minutes. Radar data from all available WSR-98D and C-band radars are incorporated into the national mosaic. This national radar mosaic is stored in the *COF* integrated database and forwarded as appropriate through SIMINcast.

3.6.6 SAF-T-NET™

The SAF-T-NET™ alert/warning server automatically monitors the radar data to detect wind shear and other significant severe weather parameters and provide appropriate warnings to remote users. The patented *SAF-T-NET*™ constantly processes radar and other data sources to look for dangerous wind shear and other significant weather parameters. By doing so, areas of concern are reduced from whole weather systems to precise points, allowing for the mobilization of resources and instantaneous warning to those in harms way. Working with capabilities derived from other Baron products, SAF-T-NET™ adds the ability to automatically or manually process-warning messages to appropriate recipient divisions or individuals. These messages may be distributed in graphical form to users with the RADAR-NET® application, or as simple text messages by e-mail7. A SAF-T-NET™ server is present only at the SIMIN COF. Several Briefing Terminals will be fielded with the RADAR-NET® application to allow this advanced display processing at key locations in Romania.

3.6.6.1 C-band Legacy Radar Interface

The Radar Product Integrator and Modeling Workstation provides the SIMIN system interface for radar products from the legacy EEC and Gematronik C-band radars. The Radar Product Integrator and Modeling Workstation accepts and converts a selected set of C-band radar products to the standard SIMIN radar product exchange format. A subset of those products is forwarded to the local Communications Gateway, which packages and routes the data appropriately for distribution through SIMINcast (discussed in Section 2). The C-band radar interface module is present at those sites which interface directly with a C-band radar.

3.7 Romanian Lightning Detection Network and Central Analyzer

The SIMIN Romanian Lightning Detection Network (RLDN) is composed of a Central Analyzer, located at the *COF*, and eight (8) lightning detectors at various locations throughout the nation. The RLDN

[7] For distribution of messages through e-mail, the SAF-T-NET server is configured with network access to the Customers e-mail server.

Central Analyzer receives the signal produced by each detector via a continuous dedicated TCP/IP connection between each detector and the Central Analyzer. The Central Analyzer processes the lightning signal data received from multiple detectors and derives the lightning strike solution information for detected lightning strikes including time, location, intensity and polarity. That information is forwarded to the *COF* CG which packages and routes the data appropriately for distribution through SIMINcast and forwards it to the appropriate data decoder for storage in the *COF* local integrated database. This provides for the integration as a graphical overlay in composite products and allows forecasters throughout the nation to have lightning data, which is readily assimilated with other data sets such as radar and satellite imagery into composite products. These products support the evaluation of convective activity, lightning strike proximity, and the movement of large and meso-scale weather patterns. The RLDN Central Analyzer at the COF provides additional detailed information regarding lightning activity to the *COF* forecasters to aid in the development of national forecast products.

3.8 Meteorological Satellites

The SIMIN Meteorological Satellite Receiving Subsystem (MSRS) automatically receives direct downlink of METEOSAT 7 high resolution satellite imagery and provides the interface to the remainder of the SIMIN system. The MSRS also supports the upgrade to support the MSG satellite, after launch and successful on-orbit verification. Components have been selected to support limited dual operations of these satellites, during the transition period, in order to provide the maximum benefit and minimum risk to INMH operations, during this sensitive time of satellite transition. The MSRS is composed of two parts, the METEOSAT Satellite Receiving system, MSR, and the Satellite Acquisition System (SAS), both located at the *COF,* in Bucharest. The MSR provides the local stand-alone acquisition and display processing of the received METEOSAT imagery. The SAS interfaces with the MSR and the *COF* CG to provide the appropriate METEOSAT 7 satellite imagery data at medium resolution for distribution via SIMINcast and for storage in the COF integrated database. Satellite imagery is received on a periodic basis as defined by the METEOSAT 7 transmission schedule, and includes images from the Visible, Infrared and Water Vapor imagery channels. During normal operations, the MSRS operates continuously in a fully automated manner. Features of the MSRS provide setup, control and status monitor of equipment and processing within the MSRS. The hardware and software components of the MSRS have be selected to support a smooth transition from the METEOSAT 7 satellite currently deployed by EUMETSAT, to the MSG satellite soon to be launched.

3.9 Weather Briefing Terminal

The SIMIN weather Briefing Terminal (BT) is used for local and remote display of meteorological information for critical real-time weather impact assessment in support of operational decision making. Briefing products generated at a designated product source center[8] are sent to the BT as a standard set of meteorological graphics and alphanumeric products, SIMINbrief. The SIMINbrief products may be tailored to the operational needs of each Briefing Terminal site or user, and includes such items as radar imagery, adverse weather alert graphics, forecast model graphics, satellite imagery, alphanumeric text, and many more. The Weather Briefing Terminal uses the WIND™ software application.

[8] A product generation source center may be the COF, and RFC, or an FPC

3.9.1 Briefing Terminal WIND™

The WIND™ software application provides an intuitive user interface with a multiple window environment to display (e.g., cascade, multiple thumbnails), manipulate (e.g., zoom, pan, animate, sequence), and print products. The WIND™ application provides many user selectable features to assist in efficient weather support of critical operations. The WIND™ uses a Download Server application to manage the transmission of products from the designated source center to the BT. The Download Server uses standard TCP/IP to transfer products which supports access via a LAN/WAN connectivity or dial-up access through a Remote Access Server (RAS).

With the interactive product display features of the WIND™ application used in the weather BT, a multitude of tailored products are available for use in operations support. Figure 3-10 illustrates one example of such a product[9] depicting a 12-hour forecast of Low Level Significant Weather.

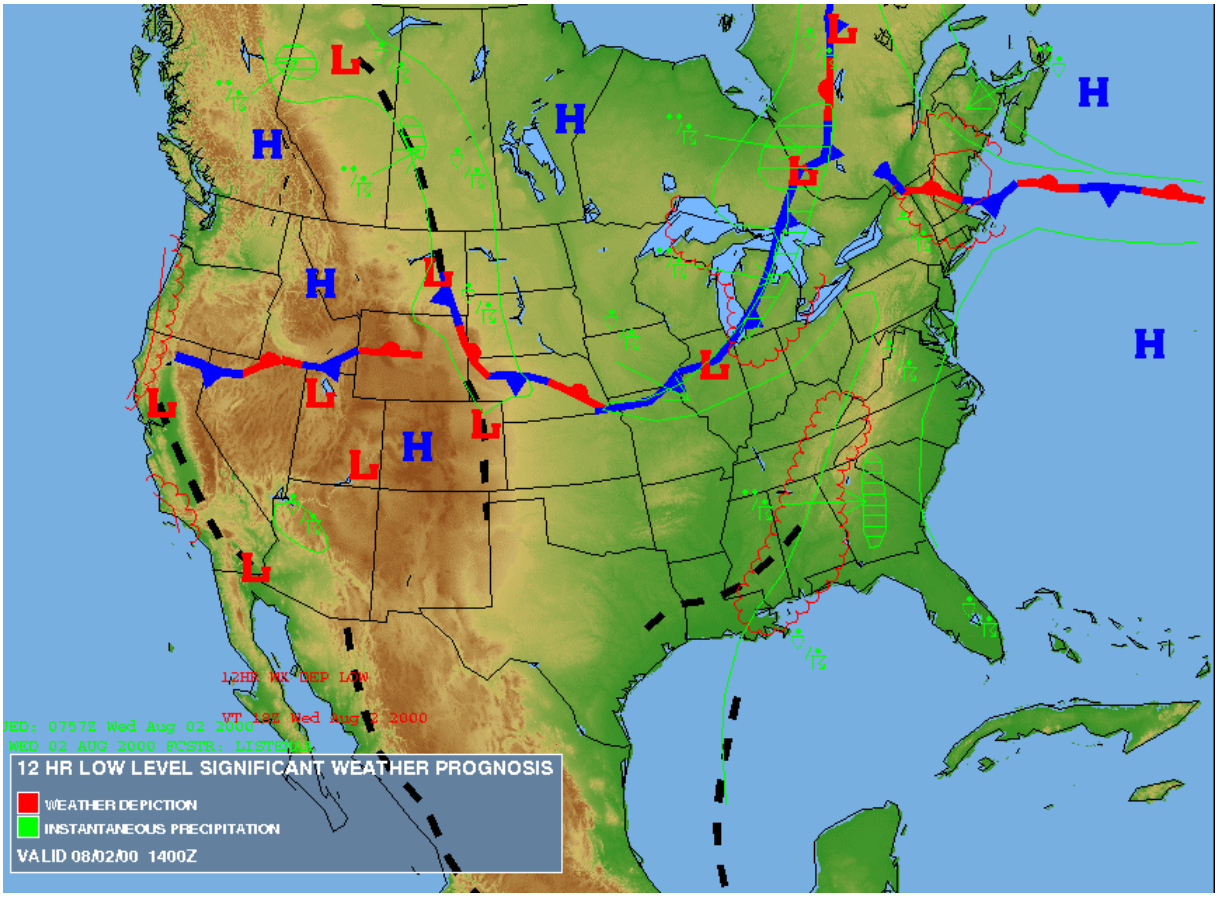

Figure 3-10. Example Low Level Significant Weather Forecast

[9] Note that information used in these example products uses data available from the US NWS sources and does not reflect identical information that will be available for use in SIMIN.

3.9.2 Briefing Terminal RADAR-NET®

The Briefing Terminals at selected sites also provide a capability for receipt and distribution of alert, watch, and warning information via RADAR-NET®. RADAR-NET® is a patented weather briefing system which displays timely information and detailed mapping, along with real-time Doppler radar data. RADAR-NET® is a distribution of Doppler radar information for critical positions within Romania. RADAR-NET® delivers to those agencies a fully operational system to review real-time radar and mapping information for operational decision-making.

3.10 Software Development and NWP Server

The SIMIN Software Development and NWP Server (SDNS) provides the development and run-time environment for the ALADIN mesoscale model adapted for use in Romania by the INMH team. This high performance multiprocessor environment provides the performance necessary to achieve significant enhancements in ALADIN model generation time. This performance increase improves the availability of the forecast model output, and the corresponding lead-time available to forecasters and end users. It also allows advancements in the ALADIN model to be made, such as improvements in the model domain coverage area, resolution, and number of vertical levels produced. For initialization and boundary conditions, the ALADIN model accepts the ARPEGE model outputs from MeteoFrance.

3.11 Hydrological Sensor Buoy

Real-time information on current speed and direction, significant wave height and water levels is of great importance to safe navigation in harbors and coastal waters in an age of increasing sea traffic. The Hydrological Sensor Buoy contains sensors for wave height and period, wind orientation and speed, salinity, Doppler current sensors for current/speed and water temperature, a solar cell power module and rechargeable NiCd batteries, and a datalogger. The datalogger is a rugged unit that displays, stores, and tranmits the data in engineering units. The Buoy platform is a polyform foam filled superstructure which contains a ballast chain, mooring rope, anchor, and subsurface float for a mooring line.

3.12 Surface and Upper Air Sensors

New and legacy sensor data will be collection in standard WMOSYNOPTIC and TEMP format for the dissemination within SIMIN. Legacy sensors provide data from exiting meteorological , synoptic and climatological stations (e.g., surface reports), pluviometric posts, hydrometric stations and aerological observatories. New sensors will provide additional wind speed and direction, air temperature, relative humidity and barometric pressure, precipitation, solar radiation, and soil temperature data on a continuous real-time basis at local sensor sites. This observation data will be distributed within SIMIN for use by all users at standard intervals.

3.13 INMH Legacy Workstations and System Components

There will be several legacy INMH workstations and applications connected to the SIMIN system network. These workstations shall continue to be used by INMH to perform various functions within the INMH operations. These resources are primarily used as data input to the SIMIN system. A brief summary of these systems follows:

- The ALADIN Numerical Weather Prediction modeling software maintained by INMH for use within INMH operations. Existing MESSIR Vision workstations may be utilized for the

transition periods and for the further processing of the ALADIN information. Aladin model output data is also integrated for use on the Forecaster Workstations and Meteorological Product Server.

- The Legacy C-band weather radars and associated workstations.
- The INMH Polar Orbiting Satellite receiving and processing display systems maintained by INMH but not interfaced with the SIMIN system at this time.
- Other INMH specialized Hydro-Meteorological modeling software maintained by INMH but not interfaced with the SIMIN system at this time.

List of Acronyms and Abbreviations

This section provides a list of acronyms and/or abbreviations that are used in SIMIN.

Acronym/Term	Meaning	Notes
AMS	Advanced Modeling Server	
APG	Automatic Product Generator	
AS	Associated Subscriber	
ASOS	Automated Surface Observation System	
AWOS	Automated Weather Observation System	
BT	Briefing Terminal (or Briefing Station)	The PC and SW applications used by Associated Subscriber site users
CD	Compact Disc	
CG	Communication Gateway	
COBRA	Computational Object for Baron Radar Algorithms	Trademark of Baron Services Inc.
COF	Central Operation Facility	
COTS	Commercial Off The Shelf	
CSU/DSU	Channel Service Unit/ Data Service Unit	
EUMETSAT	European Meteorological Satellite organization	
FPC	Forecast Product Center	Such as GSN and GSAvAAD
FTP	File Transfer Protocol	
Future Scan™	A component of the OmniWxTrac product suite of applications designed for integrated radar forecast processing.	Trademark of Baron Services Inc
GCSD	Government Communications Systems Division	A division of Harris Corp
GIS	Geographic Information System	
GOES	Geostationary Operational Environmental Satellite	US Geosyncronous weather satellites
GPS	Global Positioning System	
GSM	Global Spectral Model	Global System for Mobile communications
GSMA	General Staff of Military Aviation	
GSN	General Staff of Navy	
GTS	Global Telecommunications System	
ICAO	International Civil Aviation Organization	
IFR	Instrument Flight Rules	
INMH	National Institute of Meteorology and Hydrology	Romanian government Hydro-Meteorological organization
IP	Internet Protocol	
Kbps	Thousand (K) bits per second	
LAN	Local Area network	

Acronym/Term	Meaning	Notes
Mbps	Million (M) bits per second	
METEOSAT	Meteorological European Operational Satellite	European Geosyncronous satellite
MetModel™	Meteorological Modeling tool for local modeling	Trademark of Harris Corp
MM5	Mesoscale Model 5	5 is for fifth generation
MPS	Meteorological Product Server	
MSRS	METEOSAT Satellite Receiving System	
MVFR	Marginal Visual Flight Rules	
MVFR	Marginal Visual Flight Rules	
NCAR	National Center for Atmospheric Research	A division of UCAR, a U.S. government sponsored research center
NCRW	National Company of Romanian Water	
NE&SS	Naval Electronics and Surveillance Systems	A division of Lockheed Martin Corp
neX-REAP™	Next generation X-windows Real-time Environmental Applications Processor	Trademark application of Harris Corp
NMW	Nowcasting and Modeling Workstation	A component of the Radar Product Integrator and Modeling Workstation
NOAA	National Oceanographic and Atmospheric Administration	An agency of the US government
OmniWxTrac™	A suite of integrated radar processing applications used for advanced 2D radar display processing.	Trademark of Baron Services Inc
PRF	Pulse Repetition Frequency	
PUP	Principal User Processor	
RADAR-NET®	Radar and warning product display for safety critical operations at Associated Subscriber sites.	Trademark of Baron Services Inc
RAS	Remote Access Server	
RDA	Radar Acquisition	
RFC	Regional Forecast Center	
RLDN	Romanian Lightning Detection Network	
RPG	Radar Product Generator	
SAF-T-NET™	Product server for monitor and distribution of radar and warning products for safety critical operations.	Trademark of Baron Services Inc
SDNS	Software Development and NWP Server	
SIMIN	Romanian National Integrated Weather Meteorological System	

Acronym/Term	Meaning	Notes
SIMINbrief	The distribution from a forecast generating source center (COF, RFC or FPC) of selected weather products tailored for Briefing Terminal users at Associated Subscriber sites	SIMINbrief may contain general products and/or products individually tailored for each user, depending on available network bandwidth
SIMINcast	Combined stream of basic shared data distributed primarily from the COF to RFCs and FPCs for use in local product generation	Availability of data for distribution via SIMINcast is dependent on SIMIN communications network bandwidth for collection of data at COF
SnowMachine™	A component of the OmniWxTrac product suite of applications designed for winter integrated radar processing.	Trademark of Baron Services Inc
TCP/IP	TCP / Internet Protocol	
US NWS	United States National Weather Service	Designated US government Hydro-Met organization, a department of NOAA
USDD	Universal Software Downloadable Decommutator	Trademark of Harris Corp
VFR	Visual Flight Rules	
VIPIR™	Volumetric Imaging and Processing for Integrated Radar	Trademark of Baron Services Inc
VIPW™	Volumetric Imaging Processing Workstation	Trademark of Baron Services Inc
WAN	Wide Area Network	
WeatherCaster ™	Weather forecaster model display and analysis toolbox integrated in the Radar Product Integrator and Modeling workstation.	Trademark of Harris Corp
WIND™	Weather Information Network Display	Trademark of Harris Corp
WMO	World Meteorological Organization	A specialized agency of the UN
WSR-98D	Weather Surveillance Radar – 1998 Doppler	A product of Lockheed Martin's Joint Venture company -Beijing Metstar Radar Co. Ltd.