

NASA 4TH ICNS Conference & Workshop
Fairfax, Virginia



Weather Products for Airspace Management

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Office of the Federal Coordinator for Meteorological Services and
Supporting Research
April 28, 2004

OVERVIEW



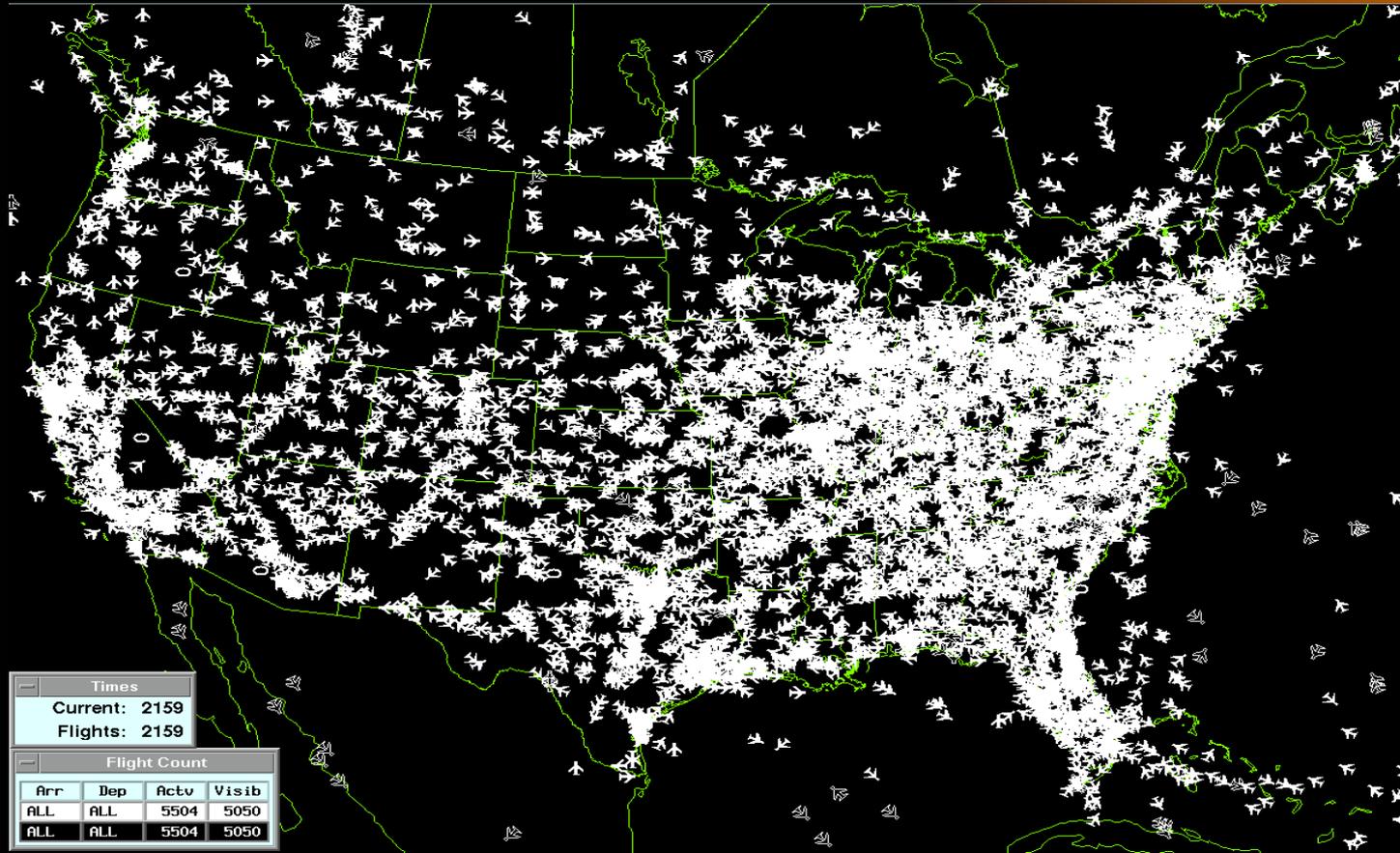
- INTRODUCTION
 - Airspace Management
 - Enroute
 - Terminal
 - Weather As Factor
- BACKGROUND
 - Public and Private Stakeholders
 - Aviation Weather Program
- WEATHER PRODUCTS
- SUMMARY

INTRODUCTION



- **Airspace Management**
 - 4,000 to 6,000 Aircraft Operating in National Airspace System (NAS) During Peak Periods
 - Approximately 50,000 Aircraft Operations per Day
 - Balance NAS Capacity and Demand to Minimize Delay
 - Complex Problem; Many Factors Involved
 - Weather is One Factor

INTRODUCTION



INTRODUCTION



- Weather As Factor
 - Approximately 30% Aircraft Accidents
 - Approximately 70% ATC Delays
- Convection, Ceiling & Visibility, Winds Have Greatest Impact
- New Systems & Products to Mitigate Impacts
 - Integrated Terminal Weather System (ITWS)
 - Weather And Radar Processor (WARP)

BACKGROUND



- Stakeholders
 - FAA
 - Establish Requirements & Priorities
 - Conduct R&D On New Weather Products
 - NOAA
 - Provide Aviation Weather Services
 - Conduct R&D
 - NASA
 - Develop Enabling Technologies
 - Other Players
 - DOD, Private Weather Providers, Aviation Industry

BACKGROUND



- Notable Events
 - National Research Council Report (1995)
 - Called For Improved Aviation Weather Services
 - White House Commission (1997)
 - Established Goal of 80% Reduction In Fatal Accident Rate by 2007
 - NASA Aviation Safety Investment Strategy Team (1997)
 - Proposed Investment Strategies To Support National Goal
 - Led to Aviation Safety Program

BACKGROUND



- Notable Events (Cont)
 - National Aviation Weather Program Strategic Plan (1997)
 - Established Strategic Objectives For Meeting National Goal
 - National Aviation Weather Initiatives (1999)
 - Established Weather-Hazard Specific Initiatives
 - Follow-Up Reports (2001 & 2003)
 - Match R&D To Aviation Weather Initiatives
 - Mid-Course Assessment Report (2003)
 - Evaluated Progress Towards 80% Goal

WEATHER PRODUCTS

Convection-CCFP

- Collaborative Convective Forecast Product (CCFP)
 - Aviation Weather Center Has Lead
 - Collaboration Between Public & Private Sectors
 - Issued Eleven Times Daily
 - Expected Convection 2-, 4-, and 6-h after issuance
 - Used for Strategic Routing by Nationwide Air Traffic Control Network

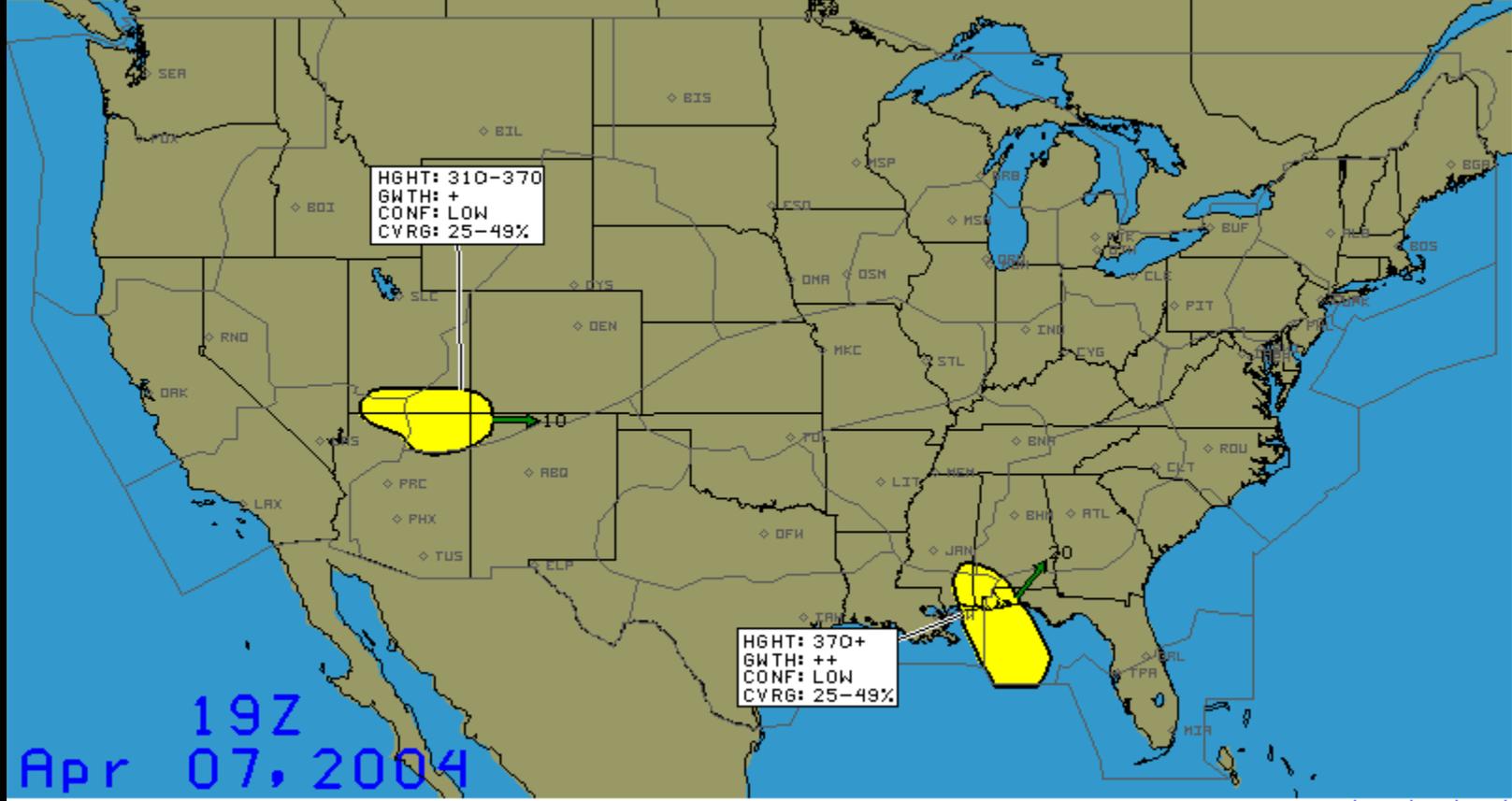
WEATHER PRODUCTS

Convection-CCFP

Issuance time: Apr 07, 2004 13Z

Collaborative Convective Forecast Product

Valid time: Apr 07, 2004 19Z



19Z
Apr 07, 2004

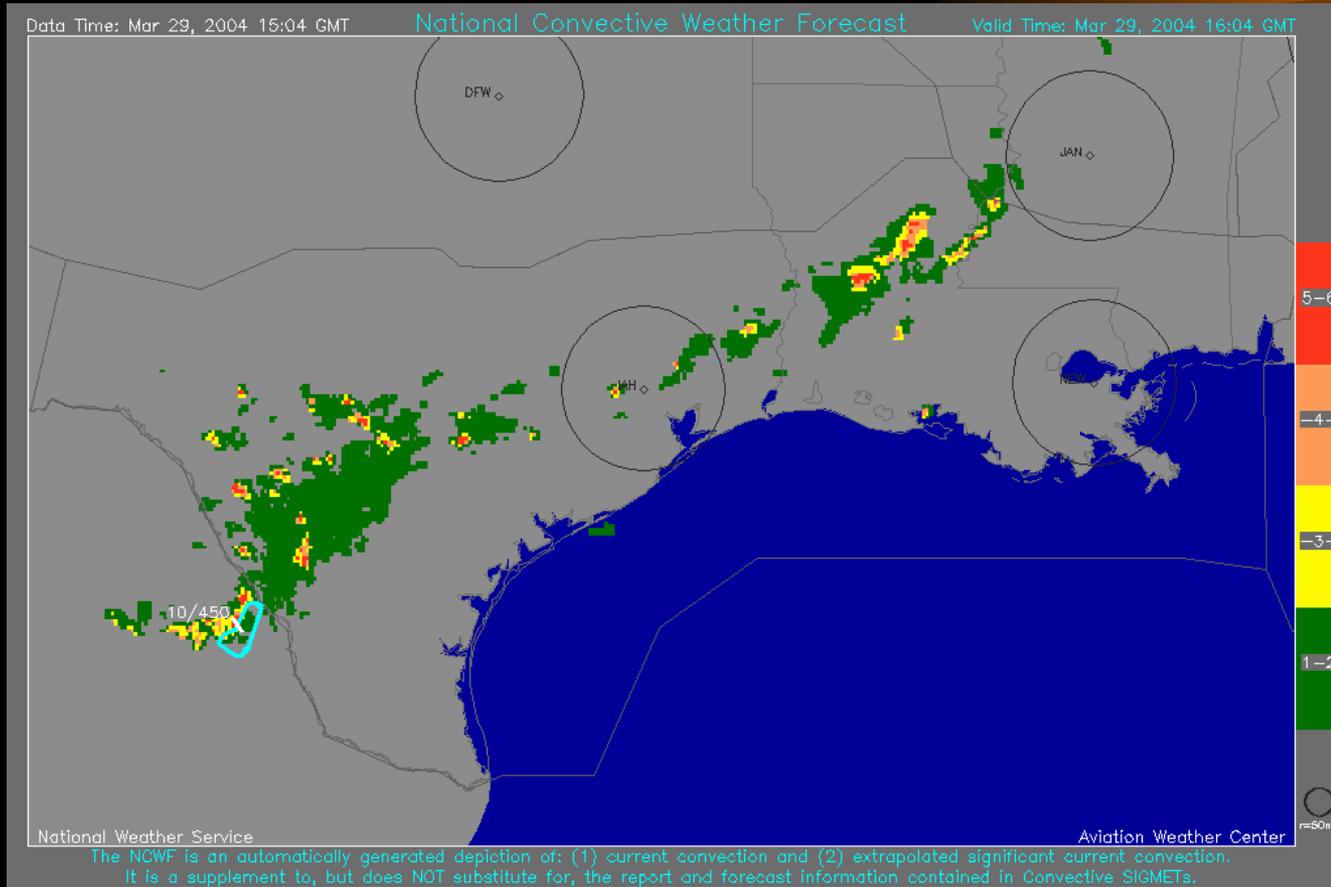
WEATHER PRODUCTS

Convection-NCWF

- National Convective Weather Forecast (NCWF)
 - Generated Automatically Every 5 Minutes
 - Detection Field and 1-h Extrapolation
 - Detection Field Combines Radar and Lightning Data
 - Operational At Aviation Weather Center
 - Supplement to Convective SIGMET
 - Used For Tactical Planning

WEATHER PRODUCTS

Convection-NCWF



WEATHER PRODUCTS

Convection-SIGMET

- Convective Significant Meteorological Advisories
 - Text Product Issued Hourly
 - Describes Thunderstorms Occurring or Expected During 2-h Valid Period
 - Outlook Period Valid 2 to 6 h After Issuance
 - Available via Internet And Satellite Distribution Systems

WEATHER PRODUCTS

Convection-RCWF

- Regional Convective Weather Forecast (RCWF)
 - Part of Corridor Integrated Weather System
 - Demonstration System
 - Focus on Regional Area
 - Take Advantage of Existing Sensors and R&D
 - 2-h Animated Forecast of Convection
 - Includes Growth and Decay Trending
 - Interface With Route Availability Planning Tool
 - Identify Opportunities to Increase Departure Rates

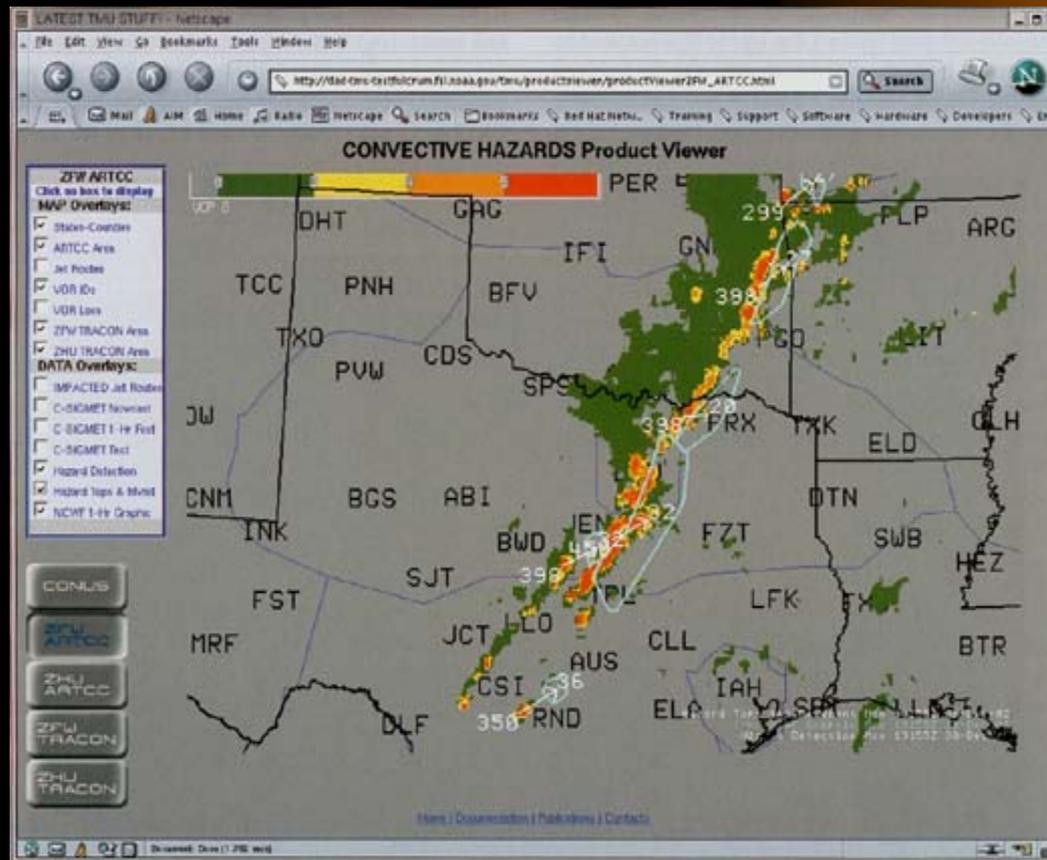
WEATHER PRODUCTS

Convection-PACE

- **Prototype Aviation Collaboration Effort (PACE)**
 - NOAA & FAA Supported
 - Fort Worth ARTCC Testbed
 - High Resolution Forecast Products
 - Tactical Convective Hazard Product (TCHP)
 - Prototype Convection Product
 - Graphical Depiction of Current Hazard & 1-h Extrapolation
 - Generated Every 5 Minutes
 - Use Key Attributes From NCWF & Convective SIGMETS

WEATHER PRODUCTS

Convection-TCHP



WEATHER PRODUCTS

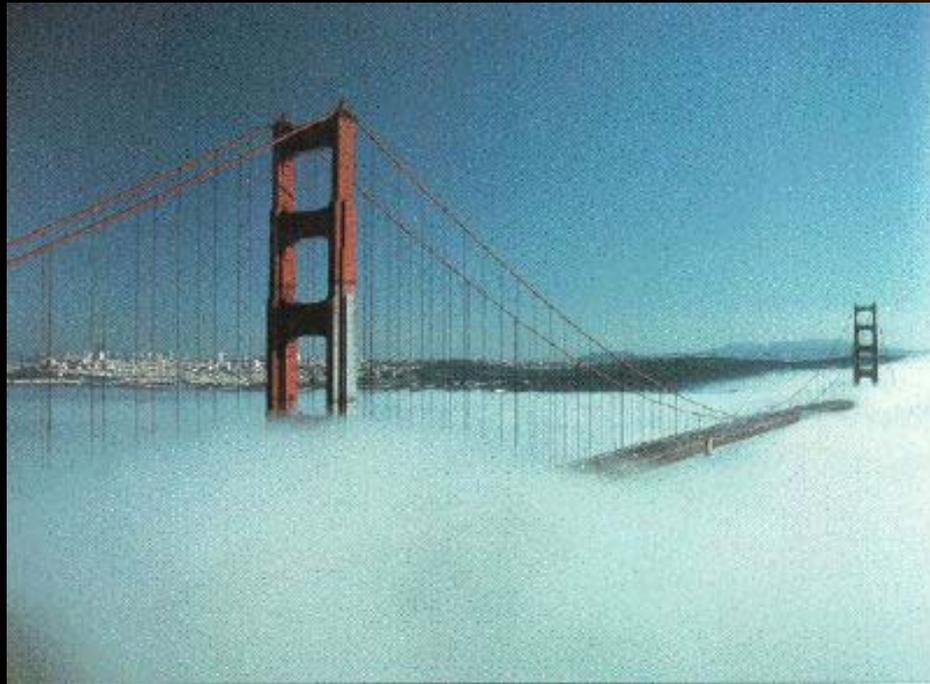
Ceiling & Visibility-MSFS



- Marine Stratus Forecast System (MSFS)
 - Stratus (low ceiling & visibility) Reduces Aircraft Acceptance Rate at San Francisco Int'l Airport
 - Stratus Burn-off Coincides With High Arrival Demand
 - Sensors Installed and Models Developed to Generate Consensus Forecast
 - Provides Forecaster Decision Aid

WEATHER PRODUCTS

Ceiling & Visibility-MSFS



WEATHER PRODUCTS

Ceiling & Visibility-MSFS

SFO Marine Stratus Forecast Guidance

20:13:40 GMT

[Surface Observations - 11/07/2002](#) [More Obs](#)

| Time | Site | T | Td | Wind | Layer1 | Layer2 | Visib |
|------|----------------------|----|----|------|--------|--------|-------|
| 1700 | SFO | 55 | 52 | 2805 | 01 FEW | 08 OVC | 10 |
| 1700 | SMB | 57 | 52 | 2805 | 11 OVC | | 05 |
| 1700 | SQLL | 59 | 54 | 0204 | N/A | N/A | N/A |

[SODAR Inversion Base](#) [Full Page Sodar...](#)

San Carlos - 11/07/2002

San Francisco - 11/07/2002

[Visible Satellite](#) 17:00 GMT - 09/13/2

Animate:

- STOP
- PLAY
- STEP BWD
- STEP FWD
- SLOWER
- FASTER

[Solar Radiation](#) [Full Page Radiation...](#)

San Carlos - 11/07/2002

San Francisco - 11/07/2002

CONSENSUS FORECAST

| | | | |
|-----------|-------------------|-------|-----|
| 17z | Approach Clear At | 18:55 | GMT |
| Model Run | Confidence | HIGH | |

COMPONENT FORECASTS

| Run | Model | Fest | Conf |
|-------|---------------------------|-------|------|
| 17:00 | COBEL | 19:08 | MOD |
| 17:00 | Local | 18:38 | HIGH |
| 17:00 | Regional | 19:34 | MOD |
| 17:00 | Satellite | 18:52 | HIGH |

[Hourly Forecast Summary](#)

More Forecast Info

[Model Forecast Details](#)

[Model Performance Summary](#)

[Regional Maps / Data \(UQAM\)](#)

On-Line Archive

[View Prior Day\(s\)](#)

[2002 Rate-Change Times](#)

Help

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[System Status](#)

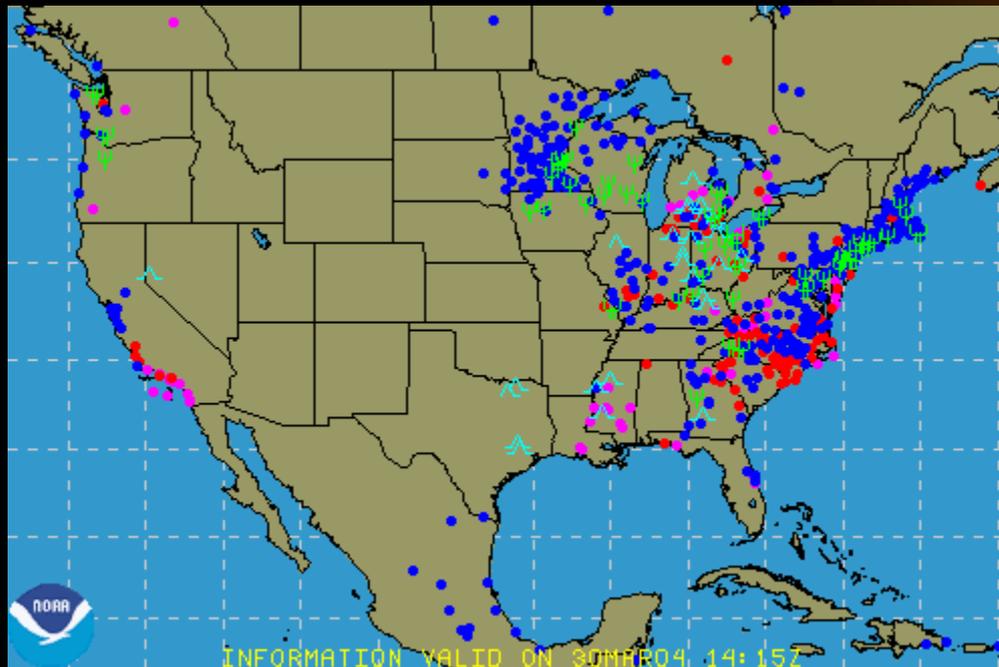
WEATHER PRODUCTS

Ceiling & Visibility-TC&V

- Terminal Ceiling & Visibility Product
 - Address C&V Problem at Northeast Airports
Associated With Large Scale Weather Systems
 - Integration of Observations and Numerical Model
Output
 - Developing Baseline C&V Product
 - Use NYC ITWS As Testbed

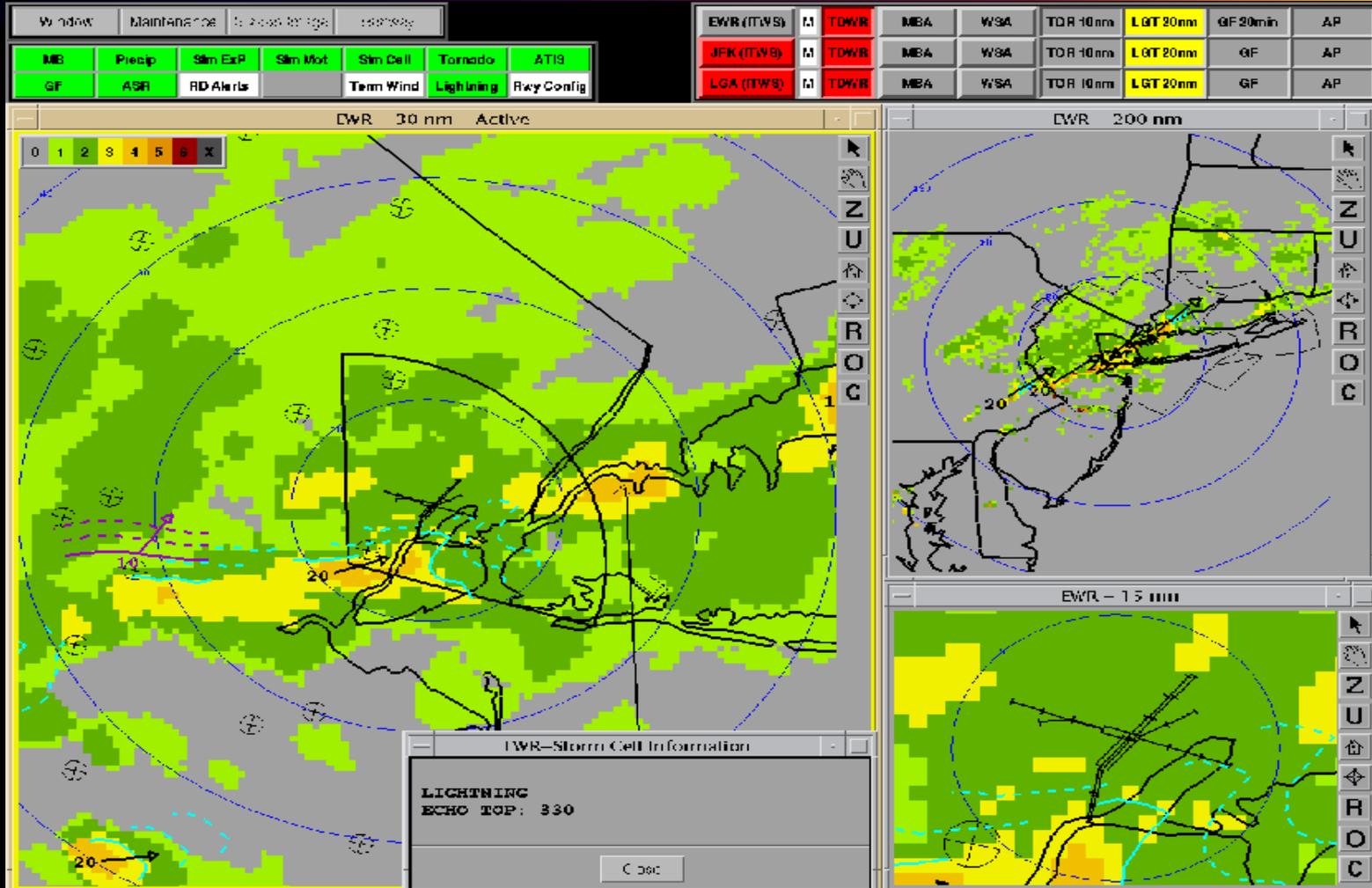
WEATHER PRODUCTS

Ceiling & Visibility-TC&V



WEATHER PRODUCTS

Ceiling & Visibility-TC&V



SUMMARY

- Many Weather Products Support Airspace Management
- Collaboration Among Entities Important
- Training On Capabilities and Limitations of Products Required
- Dissemination to Decision Makers Vital
- Graphical Products Preferred