

# Aviation Weather

## Convective Weather and Thunderstorms

Presented to: Research Community

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New Weather Capabilities Team

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Federal Aviation  
Administration



# Presentation Outline

- **Convective storm problem statement**
- **FAA short-term & long-term goals**
- **Support from the research community**



# Convective Storm Problem Statement

- **NextGen goal to improve efficiency, safety & capacity of NAS**
- **NAS Air Traffic Management (ATM) lacks adequate convective forecast information to support decision making**
  - Accuracy
  - Update rate
  - Forecast horizon
  - Spatial resolution



# Long term vision & goals

- **Meet NextGen FOC requirements for resolution, accuracy, domain, & time horizon**
- **Consolidated weather information & network enabled**
- **Weather information integrated in Decision Supports Tools**
- **Focus on gridded forecast information not displays**



# Current FAA Convective Storm Focus

- **Through AWRP, funding MIT/LL, NCAR, & ESRL to develop CoSPA**
- **Current prototype capability**
  - Provides seamless forecast of precipitation intensity and echo top from 0-8 hrs
  - Blends high-resolution numerical weather model with CIWS storm extrapolations
  - Maintains identical look and feel of the Corridor Integrated Weather System (CIWS)
  - Interpreted like radar reflectivity
  - Gridded for future integration into ATM Decision Support Tools (DST)
  - Developed using open software practices



# Short-term & Mid-term Goals

	<b>CoSPA 1.0</b>	<b>CoSPA 2.0</b>	<b>CoSPA 3.0</b>
<b>Date ready for NWEAC</b>	9/30/2011	9/30/2013	9/30/2015
<b>Coverage</b>	CONUS	CONUS+AK	CONUS+AK
<b>Forecast Horizon</b>	8 hrs	12 hrs	18 hrs
<b>Parameters</b>	2-D VIL/ET	2-D VIL/ET	3-D Convective Hazard Volume
<b>Blending</b>	Yes - seamless forecast from 0-8 hrs	Yes - seamless forecast from 0-12 hrs	Yes - seamless forecast from 0-18 hrs
<b>Horizontal Resolution</b>	0-2 hr: 1 km 2-8 hr: 5 km	0-2 hr: 1 km 2-12 hr: 3 km (full domain) with 1 km nests over large terminals	0-2 hr: 1 km 2-18 hr: 3 km (full domain) with 1 km nests over large terminals
<b>Vertical Resolution</b>	None (2-D Fcst)	None (2-D Fcst)	1 Kft
<b>Temporal Resolution</b>	0-2 hr: 5 min 2-8 hr: 15min	0-2 hr: 5 min 2-12 hr: 15 min	0-8 hr: 5 min 8-18 hr: 15 min
<b>Probabilistic / Deterministic</b>	Deterministic	Deterministic & Probabilistic toggle	Deterministic & Probabilistic toggle
<b>Latency</b>	2-3hr	<2hr	TBD
<b>Other Features</b>	8 hrs past to present, satellite and radar observations of precipitation and echo tops <ul style="list-style-type: none"> <li>- Lightning flash data</li> <li>- motion vectors, echo top tags, &amp; growth &amp; decay contours</li> </ul> 0-8 hr forecast <ul style="list-style-type: none"> <li>- Fcst &amp; verification contours</li> </ul>	CoSPA 1.0 plus: <ul style="list-style-type: none"> <li>- Observations to 12 hrs past</li> <li>- Lightning proxy for radar</li> <li>- 0-12 hr real-time confidence scores</li> <li>- other features TBD** by mid FY 2012</li> </ul>	CoSPA 2.0 plus additional features TBD** by mid FY2014

# Support from the Research Community

- **Incorporate latest science into our research efforts – collaboration & consolidation**
- **Awareness of opportunities for improvement**



# Back-Up Slides



# NextGen FOC Wx Requirements

Above Surface	Terminal		En Route		Global (Oceanic and Non-NAS)		
Location:		Convective	All Other**	Convective	All Other**	Convective	All Other**
Horizontal Resolution		1/2 km	1/2 km	1 km	4 km	10 km	10 km
Accuracy (Horiz Res)		1/4 km	1/4 km	1/2 km	2 km	5 km	5 km
Vertical Resolution	5,000 ft to Top of Terminal Airspace	500 ft	500 ft	500 ft	500 ft	500 ft	500 ft
	AGL to 5,000 ft	100 ft	100 ft				
Accuracy (Vert Res)	5000 ft to Top of Terminal Airspace	250 ft	250 ft	250 ft	250 ft	250 ft	250 ft
	AGL to 5,000 ft	50 ft	50 ft				
Update Period		1 min*	5 min*	2 min*	5 min*	10 min*	20 min*
Table N-1b							
Surface		Terminal (Designated Areas)		En Route (and other Terminals)		Global (Outside the NAS)	
Location:		Convective	All Other**	Convective	All Other**	Convective	All Other**
Horizontal Resolution		1/2 km	1/2 km	1 km	4 km	4 km	10 km
Accuracy (Horiz Res)		1/4 km	1/4 km	2 km	2 km	2 km	5 km
Update Period		1 min*	1 min*	2 min*	5 min*	10 min*	15 min*

**NOTES:**

\* Update Period is less than or equal to the value listed

\*\* "All Other" contains other weather that is other than Convection or Clouds (excludes Space Weather)

1) Terminal Airspace is volume of airspace within 100 km of centerfield to top of the Terminal Volume

2) The accuracy values are plus or minus ( + ) the number specified in the table(s)

3) Convection & Clouds are the same

# NextGen FOC Wx Requirements

**Table N-2 Forecast Performance Criteria**

**Table N-2a**

**Increment**

		<b>Terminal</b>		<b>En Route</b>		<b>Global</b>
		<b>Convective</b>	<b>Other Wx</b>	<b>Convective</b>	<b>Other Wx</b>	
	0-15 min	1 min	15 min	15 min	1 hour	1 hour
	15-45 min	5 min				
	45min - 2hrs	10 min		1 hour		
	2-4hrs	15 min				
	4-60 hrs	1 hour	1 hour			
	60hrs - 14 days	3 hours	3 hours	3 hours	3 hours	6 hours
Long Range Outlook*		12 hours				



# Related NextGen Midterm Ols:

- **Reduced Weather Impact – Improved Weather Information from Non-Ground Based Sensors (103116)**
- **Reduced Weather Impact – Integration of Weather Information into NAS Automation and Decision Making (103119)**

