

# Weather Evaluation Team (WET)

Presented to:

Friends and Partners in Aviation Weather

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July 21, 2010

WET (Weather Evaluation Team)  
Friends & Partners in Aviation Weather /  
Washington, D.C.



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# WET Membership

## FAA

- Denver ARTCC
- Atlanta ARTCC
- ATCSCC
- Minneapolis TRACON
- AJP

## Core Members - Operators

- Continental
- Delta
- Jet Blue
- Southwest
- United
- UPS

## Contractors & Interested Parties

- Air Routing Int'l
- Alaska Airlines
- AvMet Applications
- Environment Canada
- FedEx
- MIT-Lincoln Labs
- Mitre
- National Weather Service (NWS) – Hdqtrs
- NWS - Aviation Weather Center
- NBAA
- NOAA-Earth System Research Laboratory
- TASC



# WET Overview

- **Responsibilities**

- CDM Focal Point for Feedback & Recommendations on Weather Products/Issues
  - e.g. Added FAA AJP core member to help bridge NowGen to NextGen
- External Outreach on Weather Issues for CDM
  - e.g. Consolidated Storm Prediction for Aviation (CoSPA) Program
- Internal Coordination with Other CDM Subteams
  - e.g. Future Concepts (FCT) & Flow Evaluation (FET) Meetings

# WET Overview

- **2010 Priorities**

- Overarching goal of proactive outreach to the other CDM subteams
- Latest (Feb 2010) Prioritized List of Activities:
  - LAMP & CCFP Hybrid (LCH) Demonstration for 2010 and COSPA
  - Extended Planning Process (CDM Flow Evaluation Team lead)
  - Traffic Compression in Terminal Area due to Winds
  - Weather Integration and Decision Support Tools
  - Add Weather Products/Site Links to the FAA's OIS Page

# WET 2010 Priorities - Priority #1

- **LCH**

- **The Acronym**

- L = LAMP = Localized Aviation Model Output Statistics (MOS) Program
    - C = CCFP = Collaborative Convective Forecast Product
    - H = Hybrid

- **The LAMP Product**

- Probabilistic Forecast out to 25 Hours
      - Covers 2 hr periods (e.g. 2 hr Fcst=1-3hrs, 25 hr Fcst=23-25hrs)
    - Produced Automatically using a Combined Approach
      - Physics Based Computer Model of the Atmosphere
      - Statistics ( “M” in LAMP = Model Output Statistics)
      - Observations (Lightning, Radar, etc.)
    - Forecast Graphic
      - Updated Every Hour
      - Coverage is Conus





# Status - LCH

- **2009 Demo Met Goal:**
  - 01Jun - 31Aug 2009: limited demonstration with CDM shareholders
  - Objective & Subjective assessments showed LCH met goal to improve confidence in the CCFP & extend the forecast time period
- **2010 Demo in Process:**
  - Coupled efforts with CoSPA to reduce impact on field personnel
    - Training & Assessments
  - Demo started June 1, 2010
  - Includes Trend Analysis Feature
- **WET has recommended for 2011 to:**
  - Expand LCH demonstration to entire CDM community
  - Continue Couple efforts with CoSPA
  - Probabilistic attribute introduces a key NextGen theme that needs exploration with TFM decision maker

# Consolidated Storm Prediction for Aviation (COSPA)

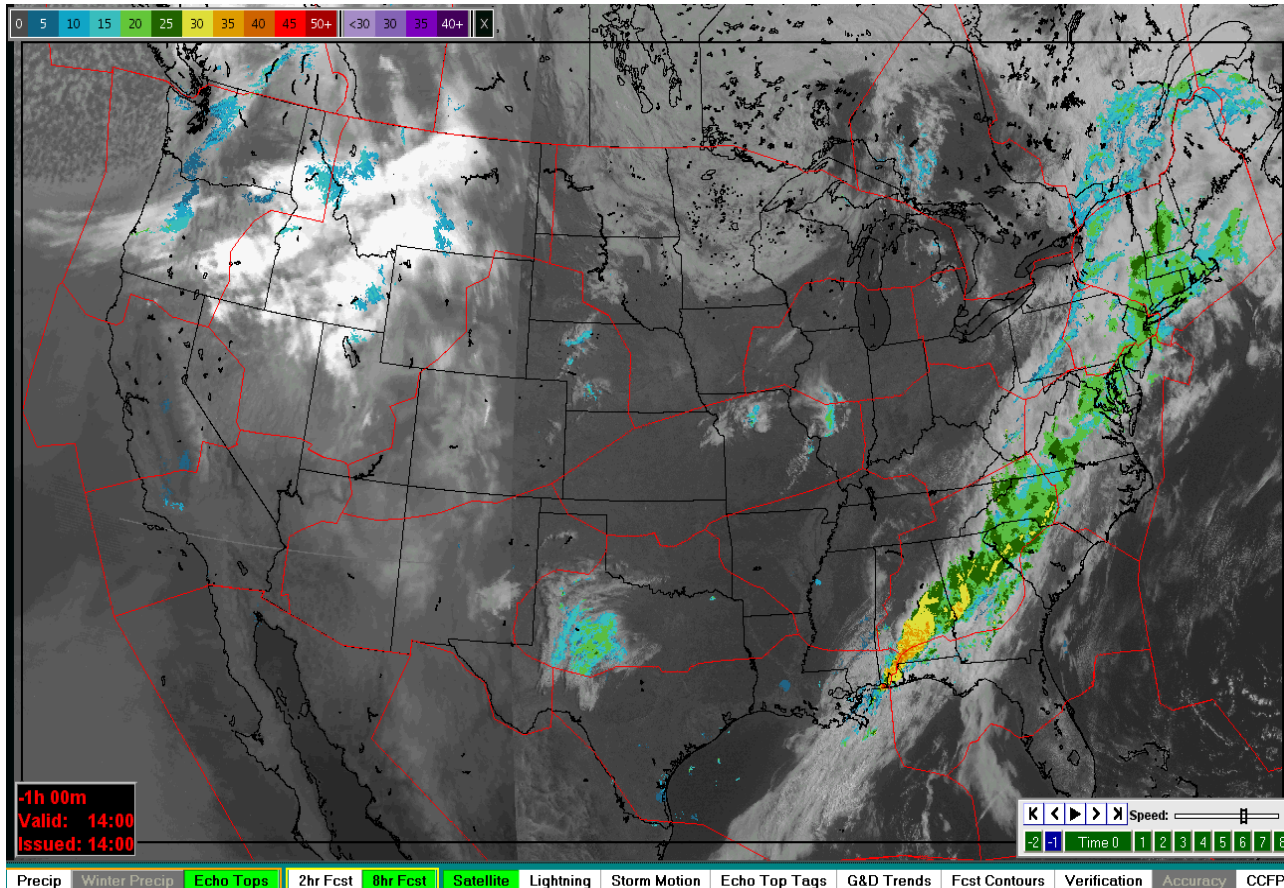
- **Provides seamless forecast of precipitation and echo top from 0-8 hrs**
- **Blends high-resolution numerical weather model with CIWS storm extrapolations**
- **Maintains identical look and feel of CIWS**
- **Gridded for future integration into FAA Air Traffic Management (ATM) Decision Support Tools (DST)**



# CoSPA 2010

- **CoSPA Capability**
  - Covers Full CONUS & 0-8 hr Forecast
  - CCFP Forecast Overlay
- **Operational Evaluation: June 1 – Sept 30, 2010**
  - Select FAA facilities & Airline Operation Centers evaluating CoSpa.
  - Investigating benefits & gathering user feedback
  - Coordinated with LCH demo
- **Quality Assessment Verification**
  - Data collection during summer for further analysis

# CoSPA 0 – 8 Hour Forecast



- **Automated, deterministic, high resolution forecasts of VIL, echo tops**
  - 1km spatial, 15 minute temporal resolution
  - Updates every 5 minutes
- **Supports translation to weather impacts**
- **Improved forecasts of storm organization and evolution**

# WET 2010 Priorities - Priority #2

- **Extended Planning Process**

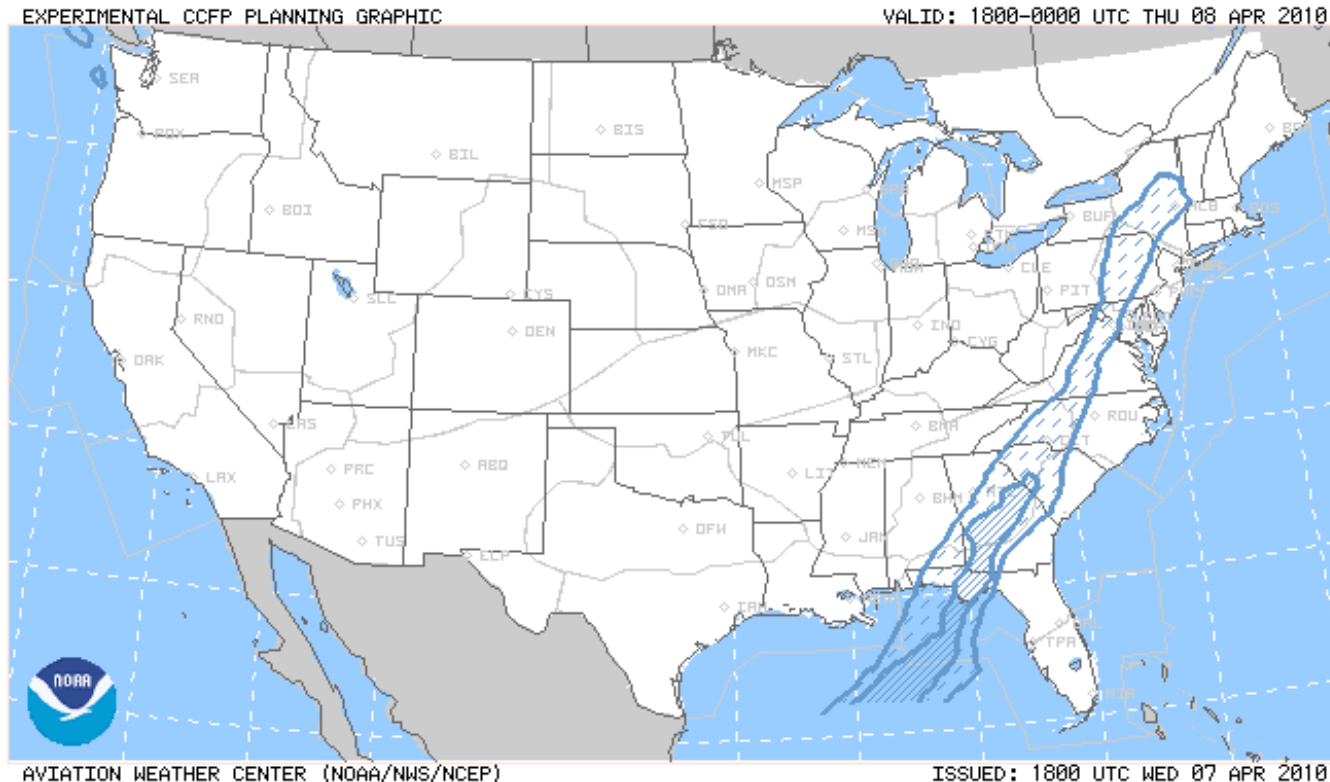
- WET helped coordinate startup of 2 products:
  - Extended Convective Forecast Product (ECFP)
  - Aviation Impact Guidance for Convective Wx (AIGCW)
- Operational Effort Deferred to later this year

# ECFP

## Extended Convective Forecast Product

(currently available for experimental use and evaluation on AWC web site)

- Contours drawn at 40, 60 and 80% probability of tstrm
- Hashed areas represent 40-59% probability
- Solid lined areas represent 60-79% probability
- Solid blue filled areas represent >80% probability.

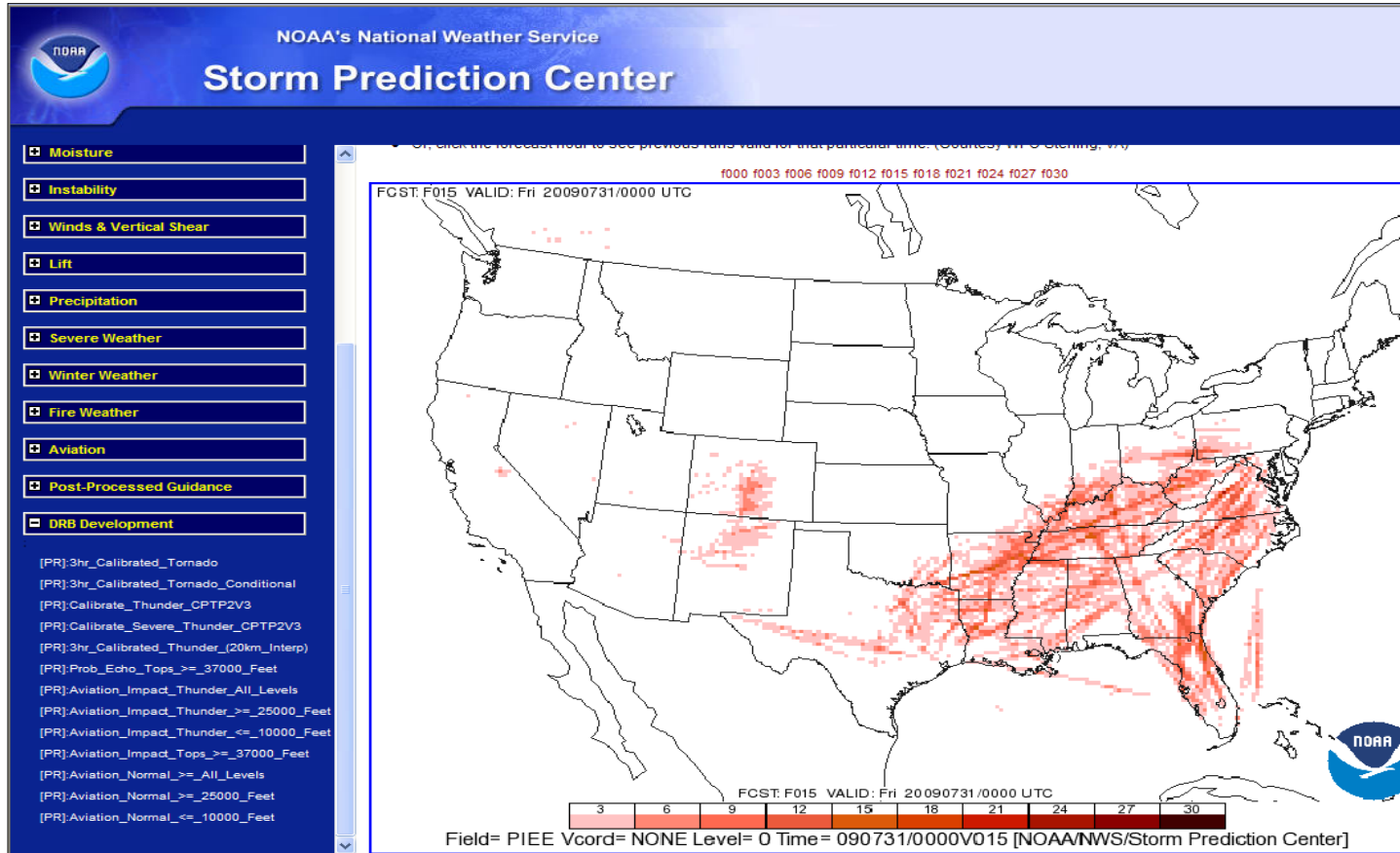


- Updated by 1800Z each day and is valid for time period of 18-24Z the next day (Day 2)

# AIGCW

## Aviation Impact Guidance for Convective Wx

(currently available for experimental use and evaluation on SPC web site)



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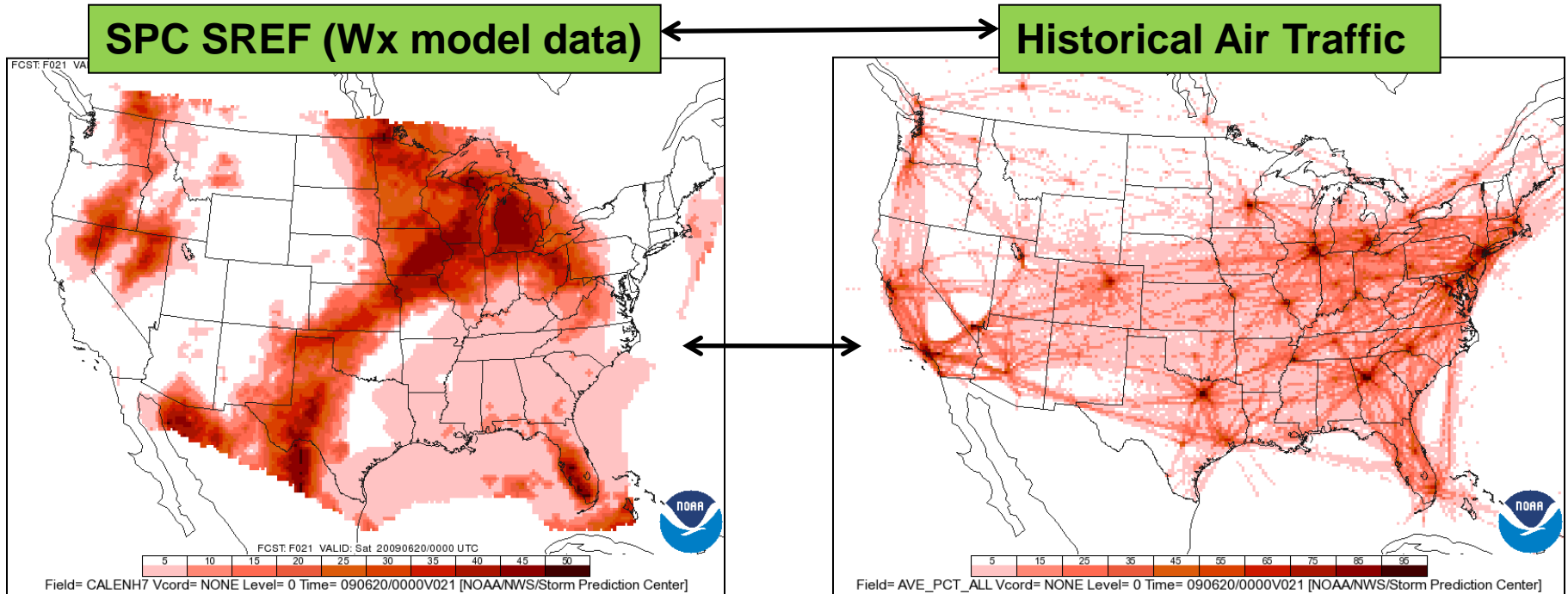


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# AIGCW: Wx Translation for TFM Long Range Strategic Planning



**Left:** Represents a sample output from SPC SREF forecast. It is presented as a gridded plot, interpolated from a 40 km output grid down to 20 km, to better align with the air traffic data.

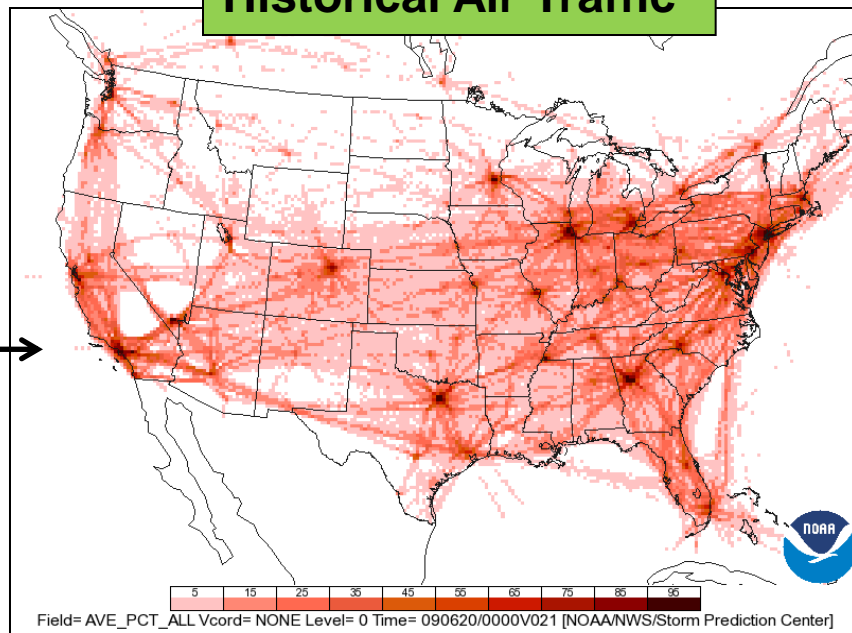
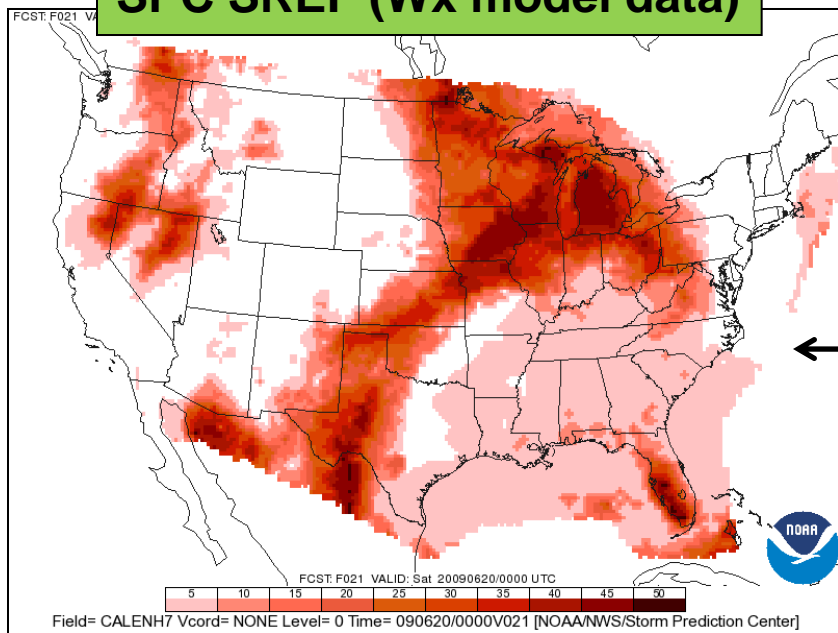
**Right:** Illustrates air traffic in the NAS utilizing a 5-year sample set of historic air traffic data to produce an “air traffic composite”. The data was gridded to construct various composites hourly for every day of the week (e.g., traffic positions on a Tuesday at 22 UTC).



# AIGCW: TFM Long Range Strategic Planning

SPC SREF (Wx model data)

Historical Air Traffic

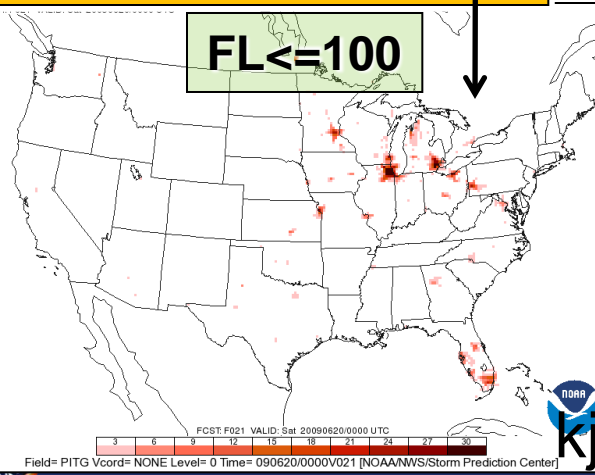
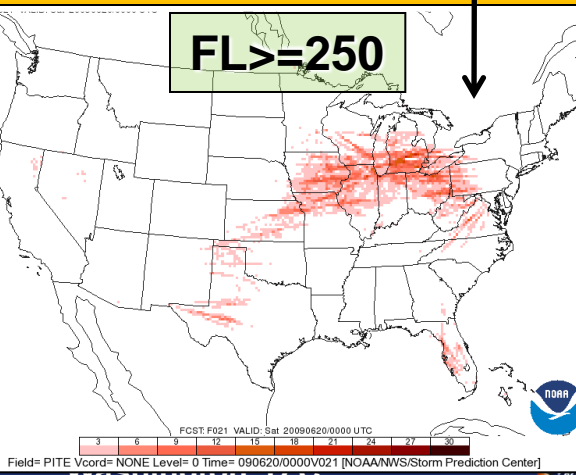
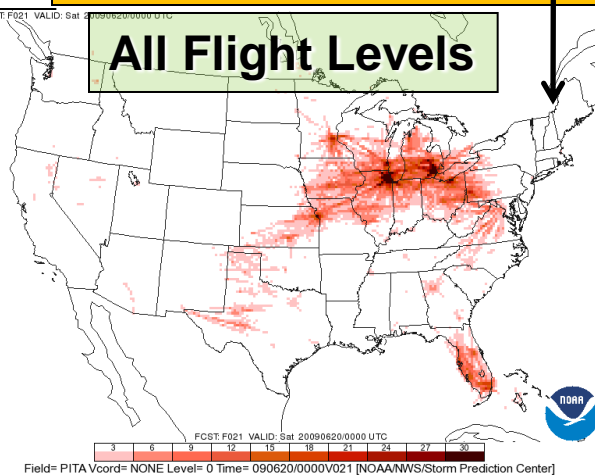


Equates to probability of convection & % time aircraft are in the same grid

All Flight Levels

FL  $\geq$  250

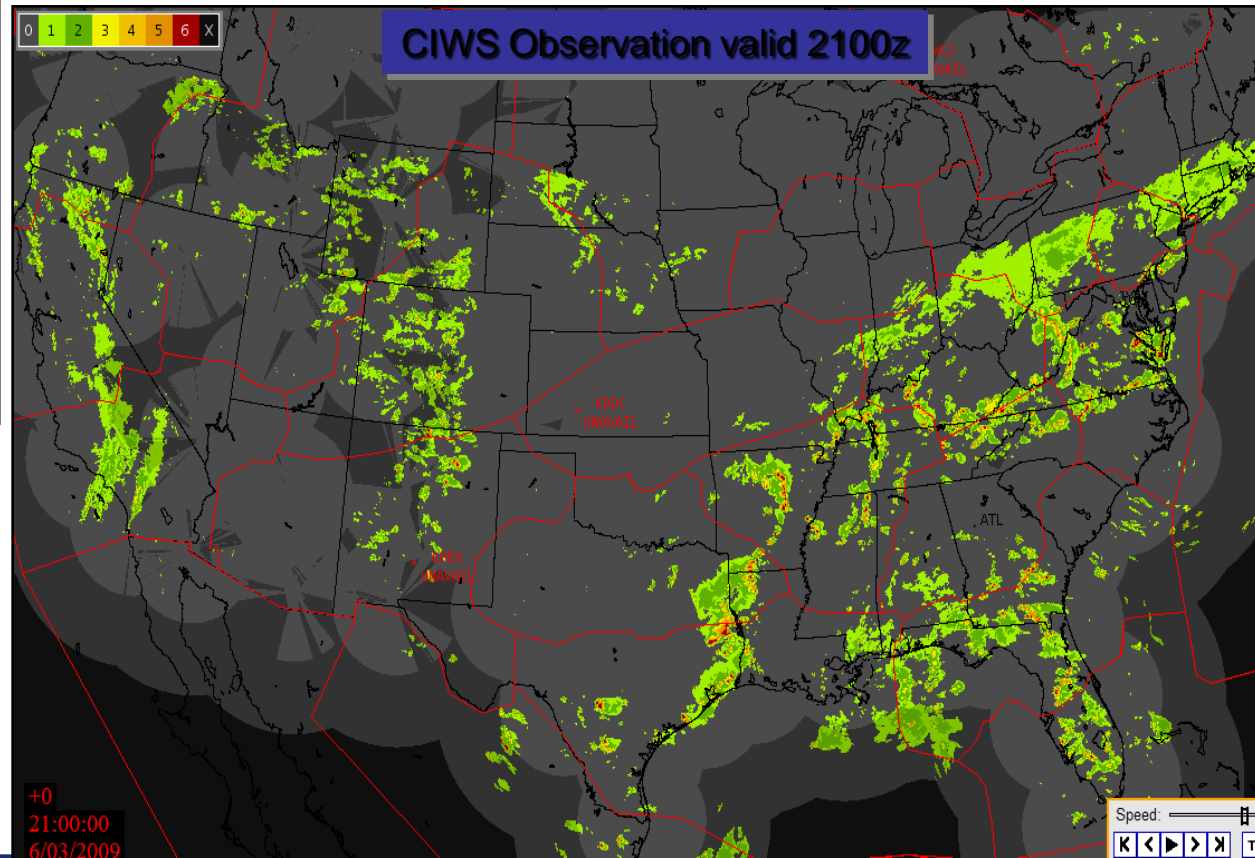
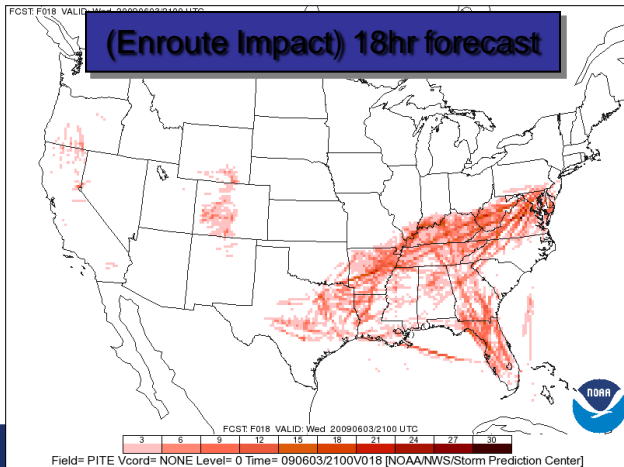
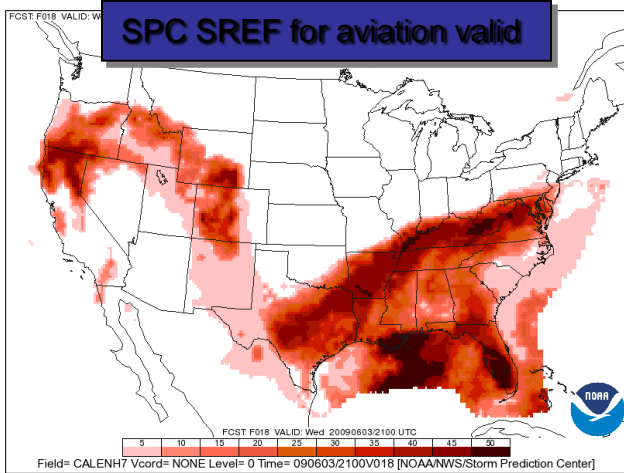
FL  $\leq$  100



# AIGCW: Large Scale case example 03 June '09

(all images valid 2100z)

The weather synopsis on this day was for thunderstorms to develop along the southern edge of a stationary frontal boundary extending southwest from the Mid Atlantic region to Texas.



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# WET 2010 Priorities - Priority #3

## •Terminal/TRACON Winds & Compression

### –Two Part Task

- Common situational awareness of available wind info;

*CDM community viewing “common operational picture”  
(NextGen theme) of wind info to base TFM impact decision.  
(similar to CCFP for convective weather)*

- Translation of wind information into impact

*Answer the question: When will we see compression?*

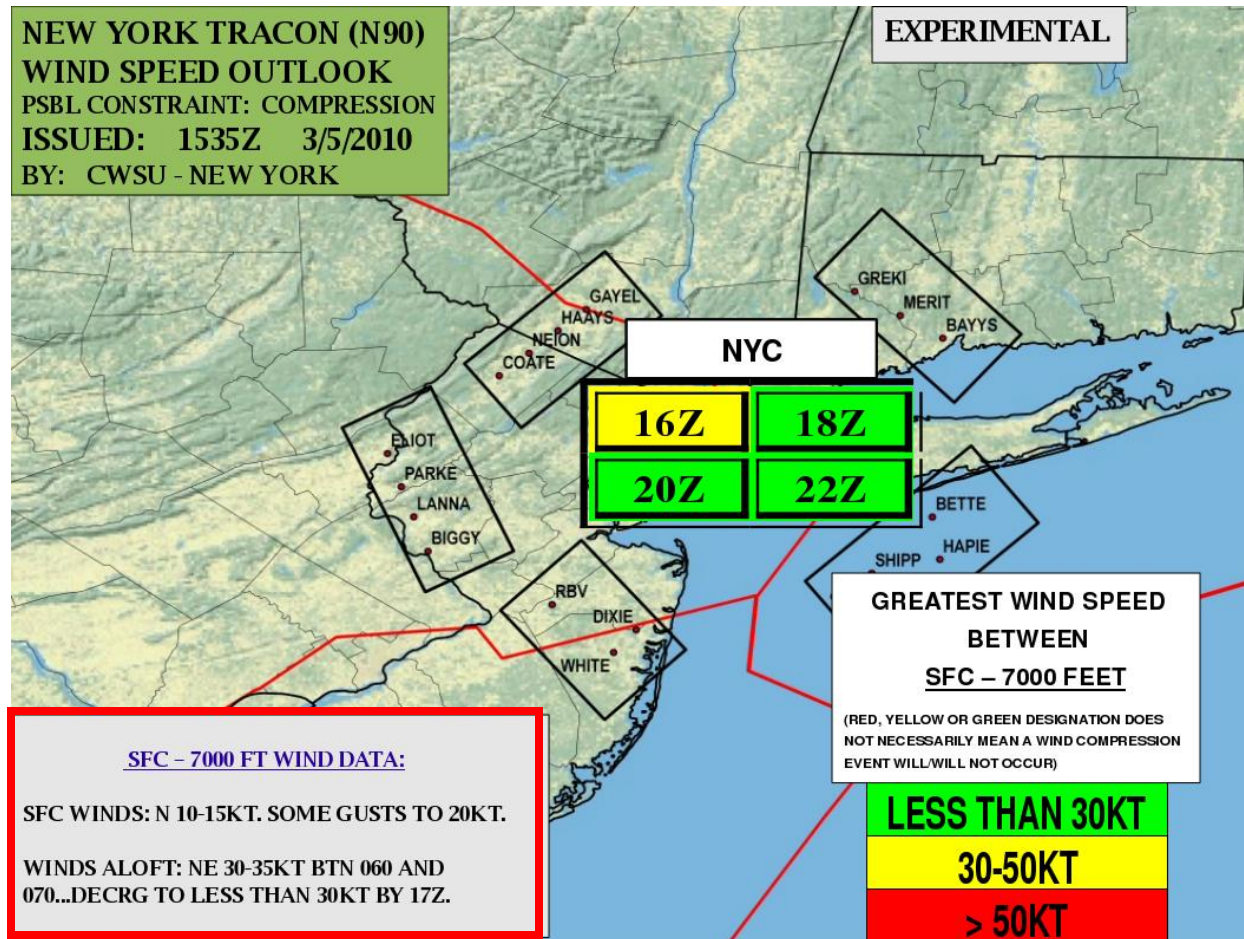
# Status - Terminal/TRACON Winds

- **WET Coordinated w/ NWS on a Web Based Wind display**
  - Uses hourly Rapid Update Cycle (weather model) wind forecasts
  - Uses Colors to Highlight when winds forecast to exceed a threshold
  - Example on next slide of the “Wind Speed Outlook”
- **“Translation” of winds to impact**
  - An MIT LL Path Based Shear product is being investigated

# Wind Speed Outlook

## Psbl Constraint: Terminal Area Compression

(currently available for experimental use and evaluation on ZNY CWSU web site)



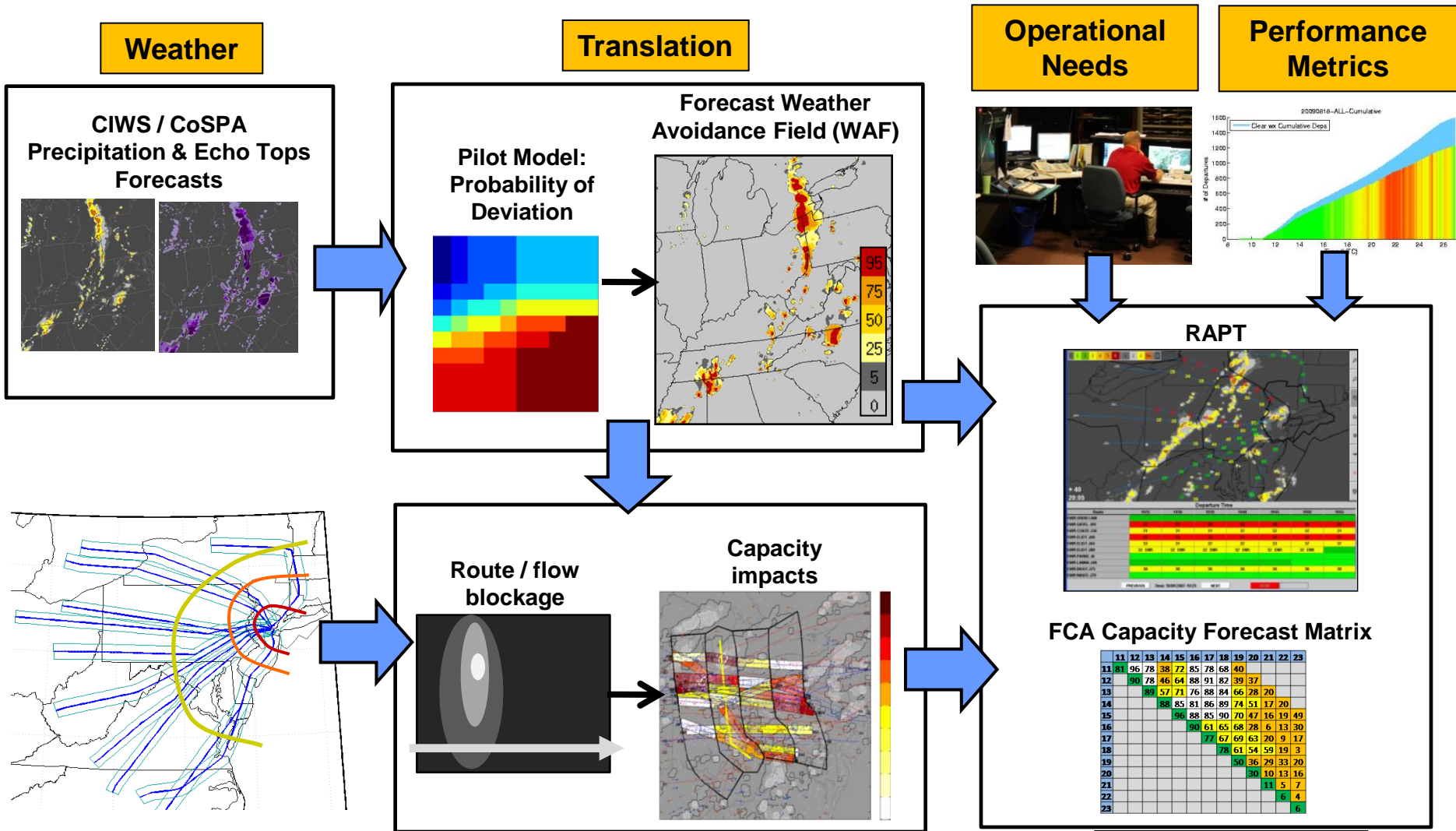


# WET 2010 Priorities - Priority #4

- **Weather Integration & Decision Support Tools**
  - Convection Forecasts and “Operational Bridging” between Strategic to Tactical domains
  - Weather Impact Traffic Index (WITI)



# Framework for Weather Impacts in Decision Support



**Airspace**

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**Impact Forecasts**

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**Decision Support**

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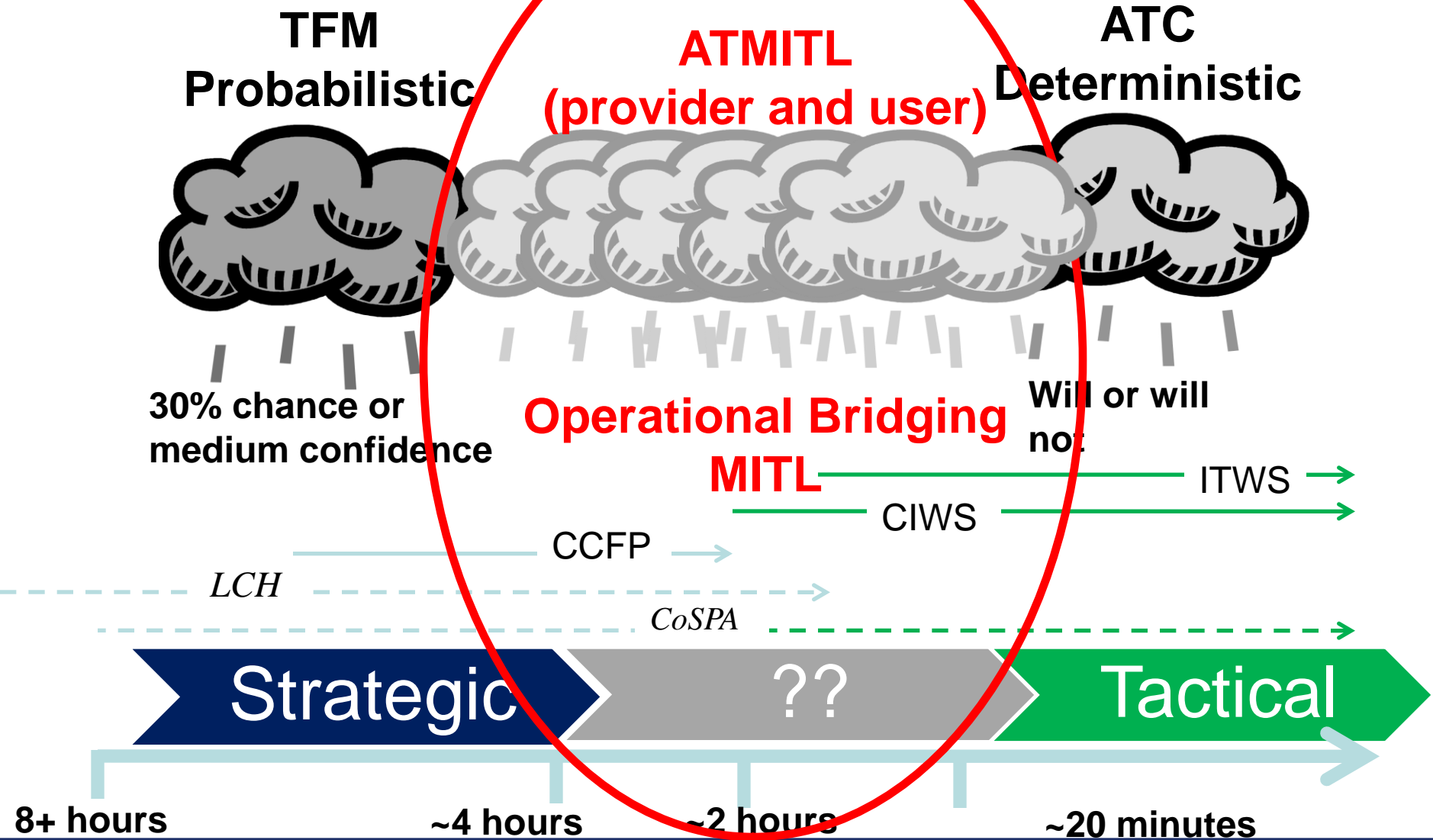
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# Status:

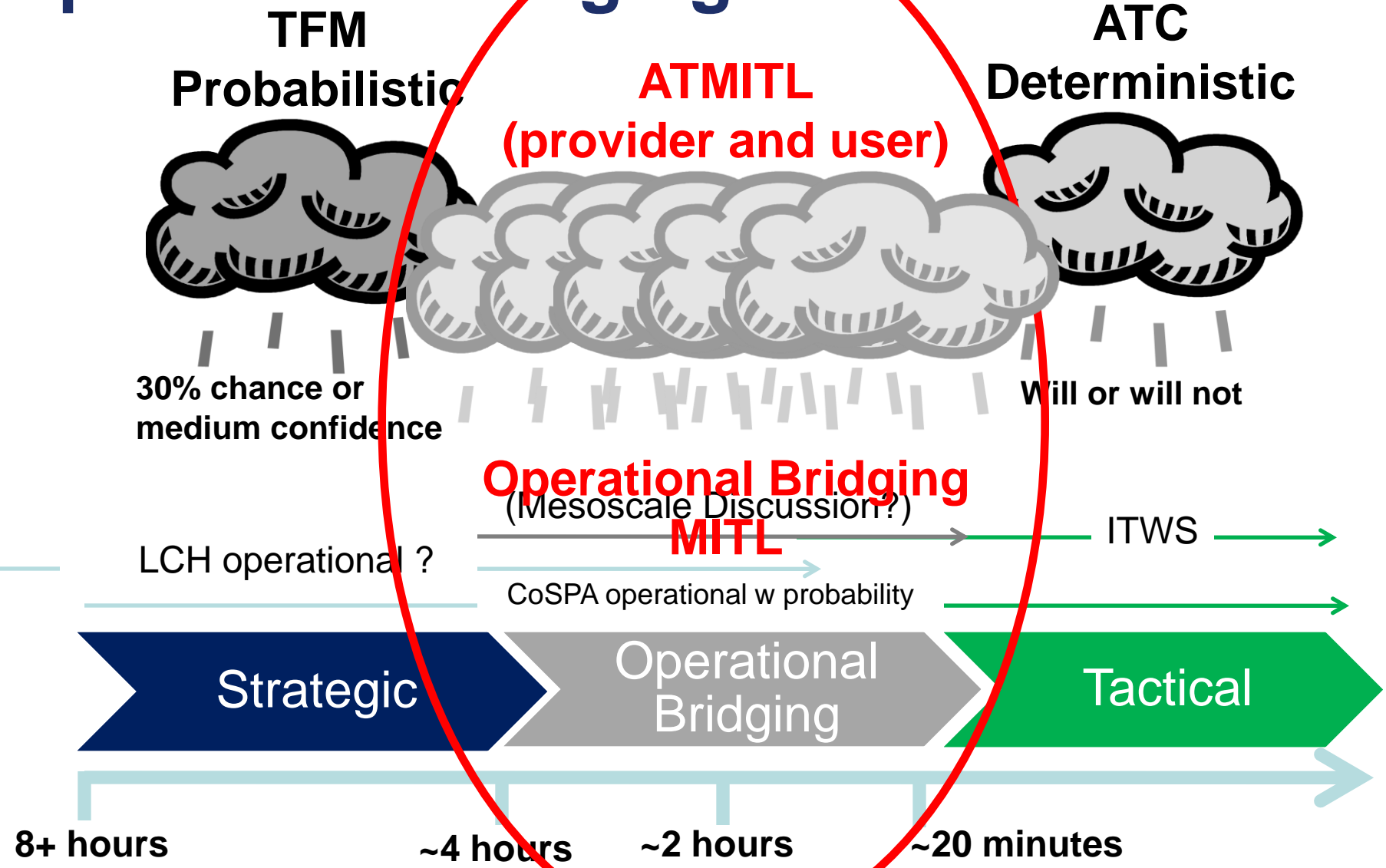
## Wx Integration & Decision Support Tools

- **Dec09 - White paper sent to CDM Steering Group (CSG)**
  - Strategy: Avoid assigning specific wx fcst products to specific air traffic management (ATM) decision support processes or tools
  - Translate wx fcsts into aviation-centric weather constraints, which can then be converted to impacts on capacity
  - Does not require human interpretation of raw weather information
  - Well aligned with NextGen philosophies
- **July10 - Proposed first steps presented to CSG**
  - Operational Bridging btwn Strategic & Tactical Decision Making domains.
  - WITI [ psbly using LAMP-CCFP Hybrid (LCH) ]
  - Other Psbl efforts [ e.g. CoSPA + Weather Avoidance Field (WAF) ]

# Operational Bridging - Today



# Operational Bridging - Future



# WITI - Background/Purpose

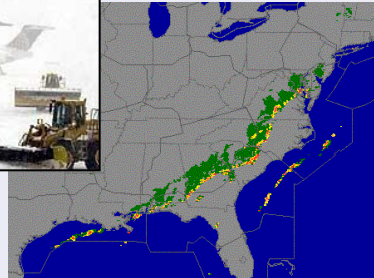
1. Follow up to April 2010 CSG meeting where WET briefed White Paper recommendation on weather integration task
2. WITI currently used as a post analysis tool to assess impact of weather on NAS
3. WITI run in real-time would allow TFM planners to objectively assess the impact of weather on the NAS and provide a tool set to make more effective decisions to mitigate weather impact
  - Not tied to any one weather product—can use multiple weather inputs

# WITI - Measuring Weather / Traffic Impact

*"The Hand the NAS Is Dealt Every Day"*



Local Airport Weather



En-route Convective Weather

The Weather Index (WITI) expresses severity of weather impact on the NAS, weighted by air transportation service demands

Traffic Demand



Capacity, Safety constraints



National Airspace System (NAS)

ATM, Airline Response Strategies

Flight	Origin	Airline	Arr. Time	Remarks	Gate
PK 123	ISTANBUL	DAM	20:10 20:10	ON TIME	8 1
BA 650	LONDON	BEV	20:15 20:15	ON TIME	6 1
RJ 202	VIENNA		20:30 20:30	ON TIME	7 2
RJ 112	LONDON		21:30 21:30	ON TIME	8 2
RJ 003	DUBAI	AUM	21:30 21:30	ON TIME	9 2
SD 180	KHARTOUM CAJ		21:30 21:30	ON TIME	10 2
RJ 801	KUWAIT		22:15 22:15	ON TIME	11 2
QP 972	DUBAI	AUM	22:15 22:15	ON TIME	12 2
RJ 436	LONDON		08:15 08:15	ON TIME	1 1
RJ 701	JEDDAH		13:15 13:15	ON TIME	
AF 888	DUBAI		19:30 19:30	ON TIME	
AF 677	VIENNA	BEY	20:00 20:00	ON TIME	
BA 670	LONDON	BEV	21:00 21:00	ON TIME	

Operational Outcomes



# WITI - Task Details

**Goals/Objective:** Reduce Weather Impact and delays in the NAS due to weather. For the CDM community, use the same information to formulate TFM decisions.

- 1) Develop the infrastructure required to run WITI on a next-day basis
- 2) Expand the infrastructure to develop the systems required for a real-time WITI analysis
- 3) CDM TFM Planners use WITI output to adjust demands on capacity within the NAS

# WET LEADS

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