

WX Information at the Flight Deck

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Overview

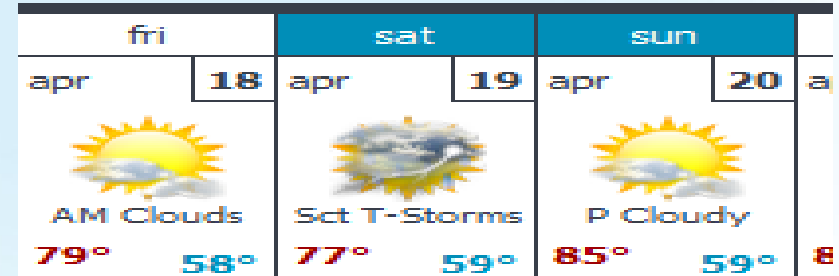
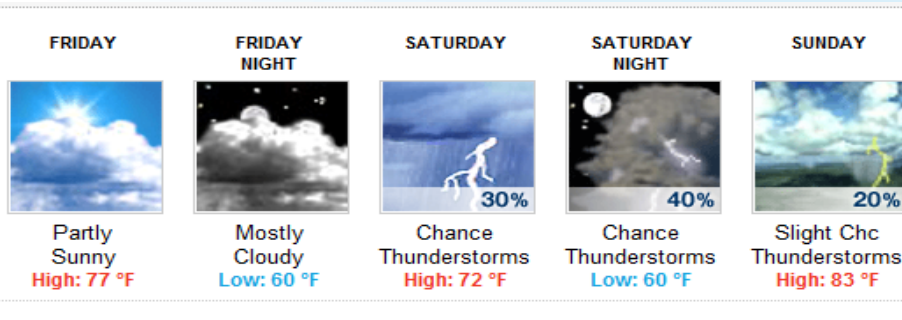
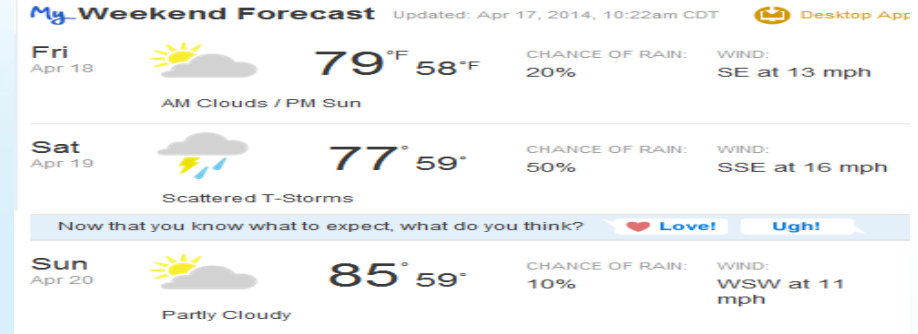
- Weather Information Source
- Ground Solution
- Flight Deck Application – EFB
- Flight Deck Application – Avionics
- Challenges



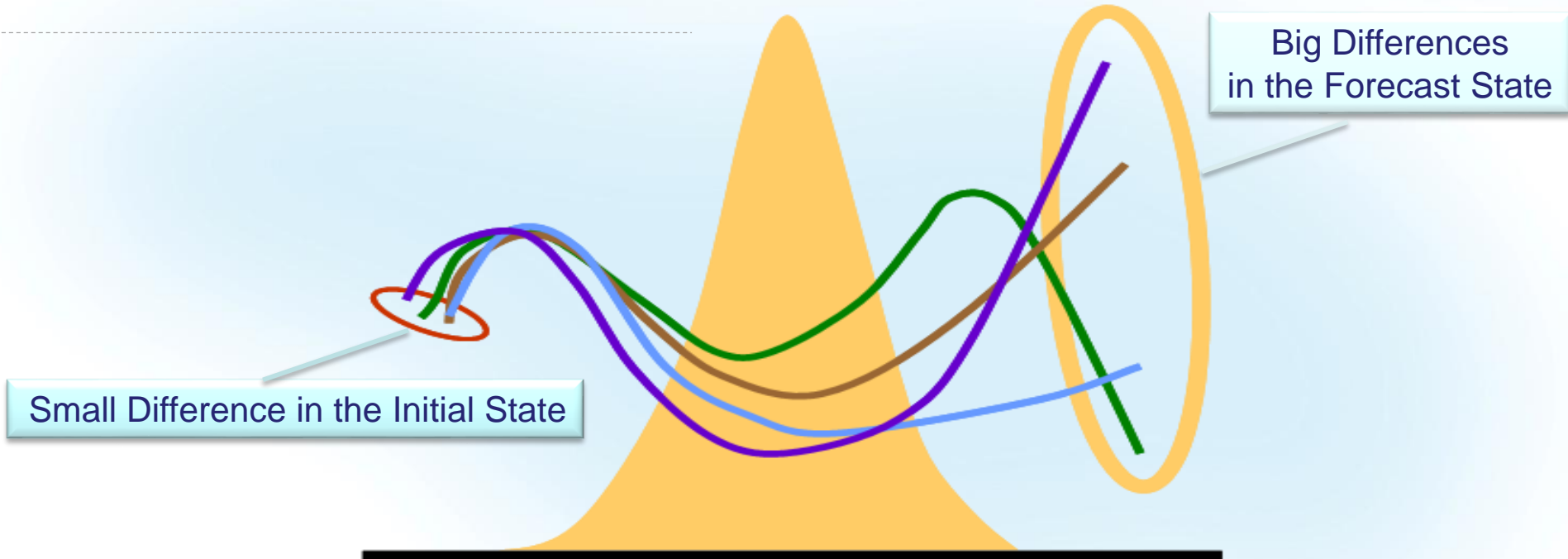
... Managing mission risk in disruptive weather situations ...



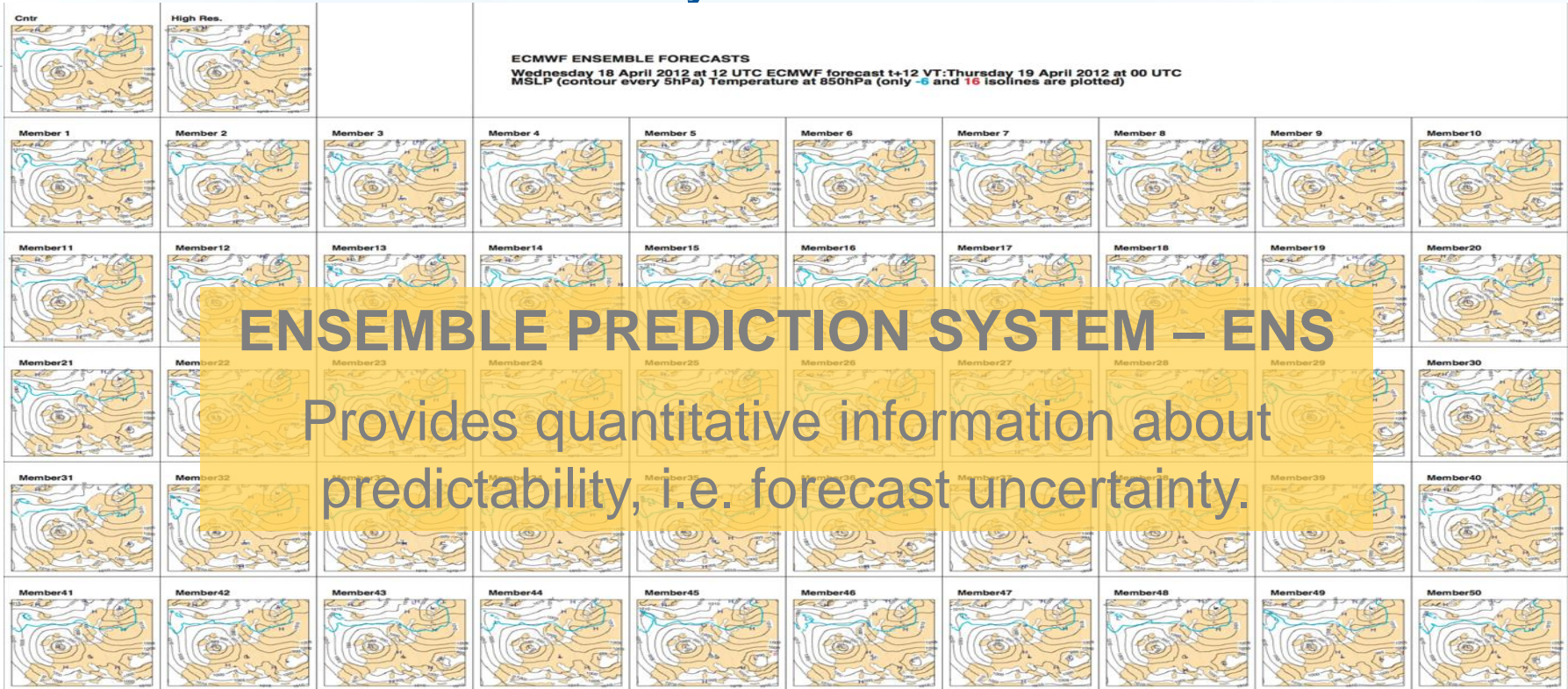
Forecast Uncertainty



Forecast Uncertainty



Ensemble Prediction System



ECMWF ENS

ENS uses 50 members (models runs) that slightly perturb the initial state

A range of forecast solutions emerge from the ensemble

Forecast uncertainty can then be measured

From this, the probability of an occurring event can be determined

The Ground Solution

Weather Alerting System



✈ JWA



Jeppesen Weather Alerts

Risk Levels

Green:
None

Yellow:
Slight

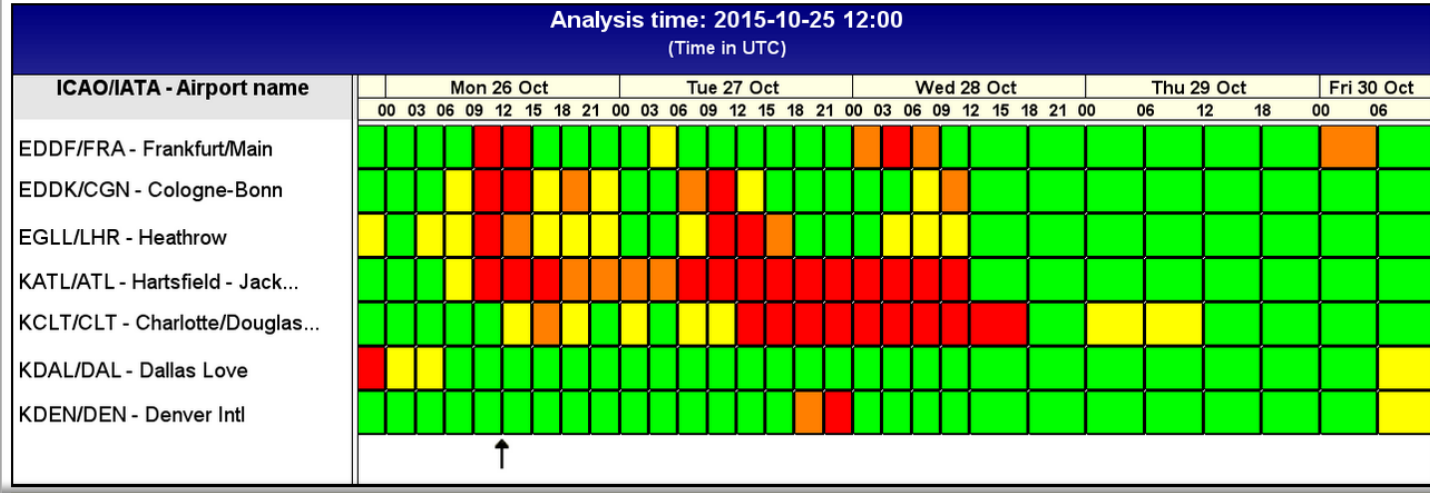
Orange:
High

Red:
Severe

Grey:
No data

☐ Min. threshold alerts ☐ 24-h snow ☐ Nearby hazards (<35 mi.) ☐ Remove non-alert airports

Current time: 10/26/2015 12:32 UTC (The arrow points to the current hour.)



Threshold Settings

Airport summary

Variables

Aircrafts

Modify variable threshold levels for:

KTEB

Submit modifications

Variable name	Minimum threshold	Warning threshold	Maximum threshold
Wind gust	<div>25</div> 25 kts	<div>30</div> 30 kts	<div>35</div> 35 kts
Wind speed	<div>20</div> 20 kts	<div>25</div> 25 kts	<div>30</div> 30 kts
Visibility	<div>2</div> 2 mi	<div>1</div> 1 mi	<div>0.5</div> 0.5 mi
Ceiling	<div>1000</div> 1000 ft	<div>500</div> 500 ft	<div>200</div> 200 ft
Max temperature	<div>95</div> 95 °F	<div>100</div> 100 °F	<div>105</div> 105 °F
Min temperature	<div>20</div> 20 °F	<div>10</div> 10 °F	<div>0</div> 0 °F
Snowfall (3h acc.)	<div>0.1</div> 0.1 in	<div>0.25</div> 0.25 in	<div>0.5</div> 0.5 in
Snowfall (6h acc.)	<div>0.25</div> 0.25 in	<div>0.5</div> 0.5 in	<div>0.75</div> 0.75 in
Snowfall (24h acc.)			<div>2</div> 2 in
Rainfall (3h acc.)	<div>0.25</div> 0.25 in	<div>0.5</div> 0.5 in	<div>0.75</div> 0.75 in
Rainfall (6h acc.)	<div>0.5</div> 0.5 in	<div>0.75</div> 0.75 in	<div>1</div> 1 in

Aircraft Crosswind Settings



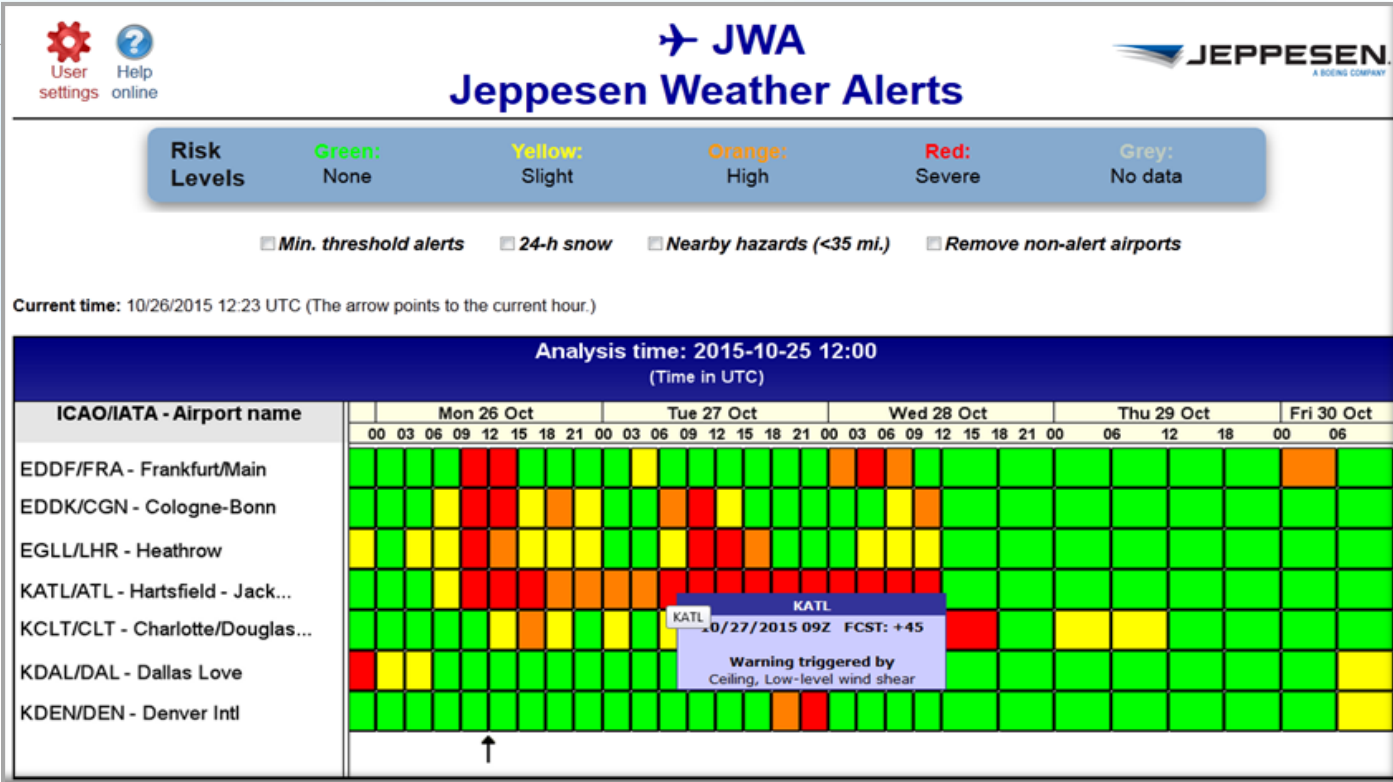
JWA Variable and aircraft settings

[Return to JWA settings](#)[Return to Main dashboard](#)[Airport summary](#)[Variables](#)[Aircrafts](#)

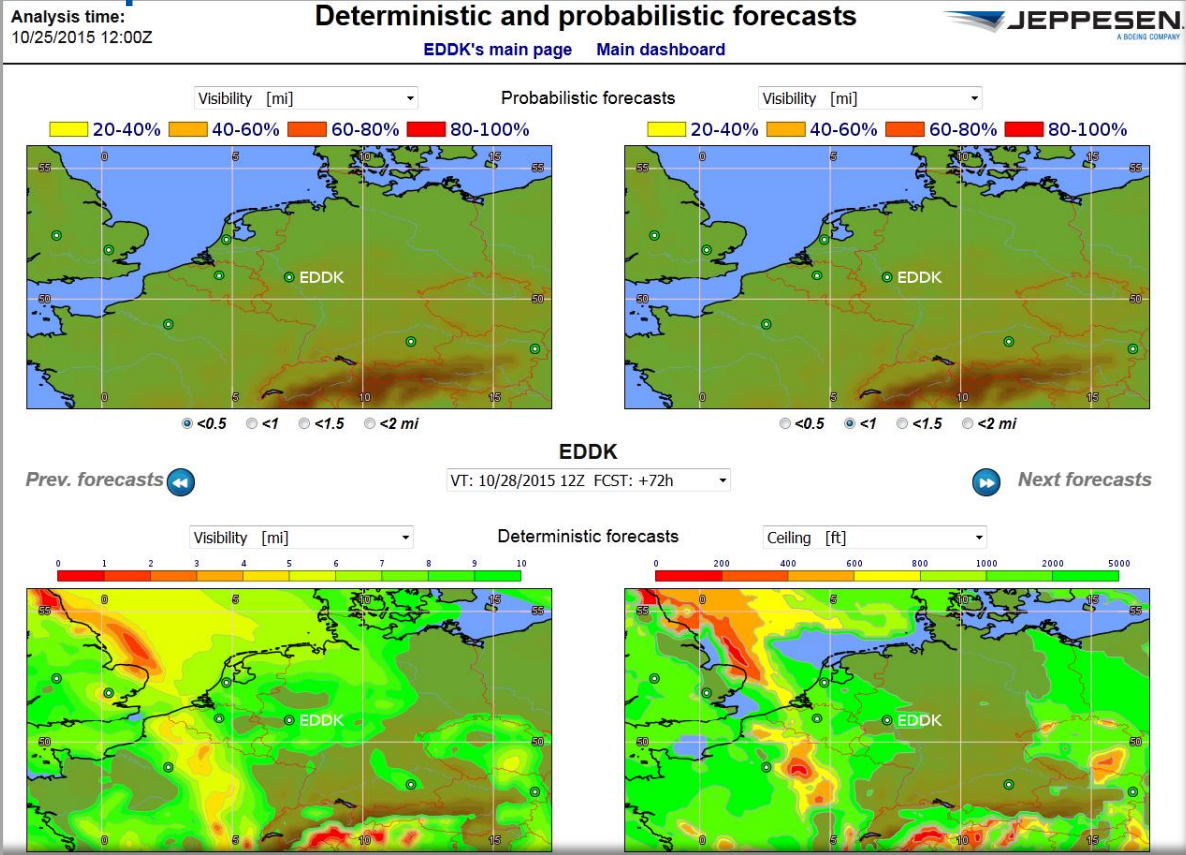
Aircraft cross-wind thresholds and selection summary. Use buttons to add/remove aircrafts in JWA.

List of aircrafts	Min xwnd threshold	Warning xwnd threshold	Max xwnd threshold (kts)	Activated	
B777	15	33	38	Yes	<button>Remove</button>
B757	10	25	30	Yes	<button>Remove</button>
B737	10	24	29	Yes	<button>Remove</button>
B727	10	24	29	Yes	<button>Remove</button>
MD11	10	30	35	Yes	<button>Remove</button>
MD10	10	26	31	Yes	<button>Remove</button>
A300	15	27	32	Yes	<button>Remove</button>
A310	15	23	28	Yes	<button>Remove</button>
C172	10	14	15	Yes	<button>Remove</button>
B787	25	33	35	Yes	<button>Remove</button>

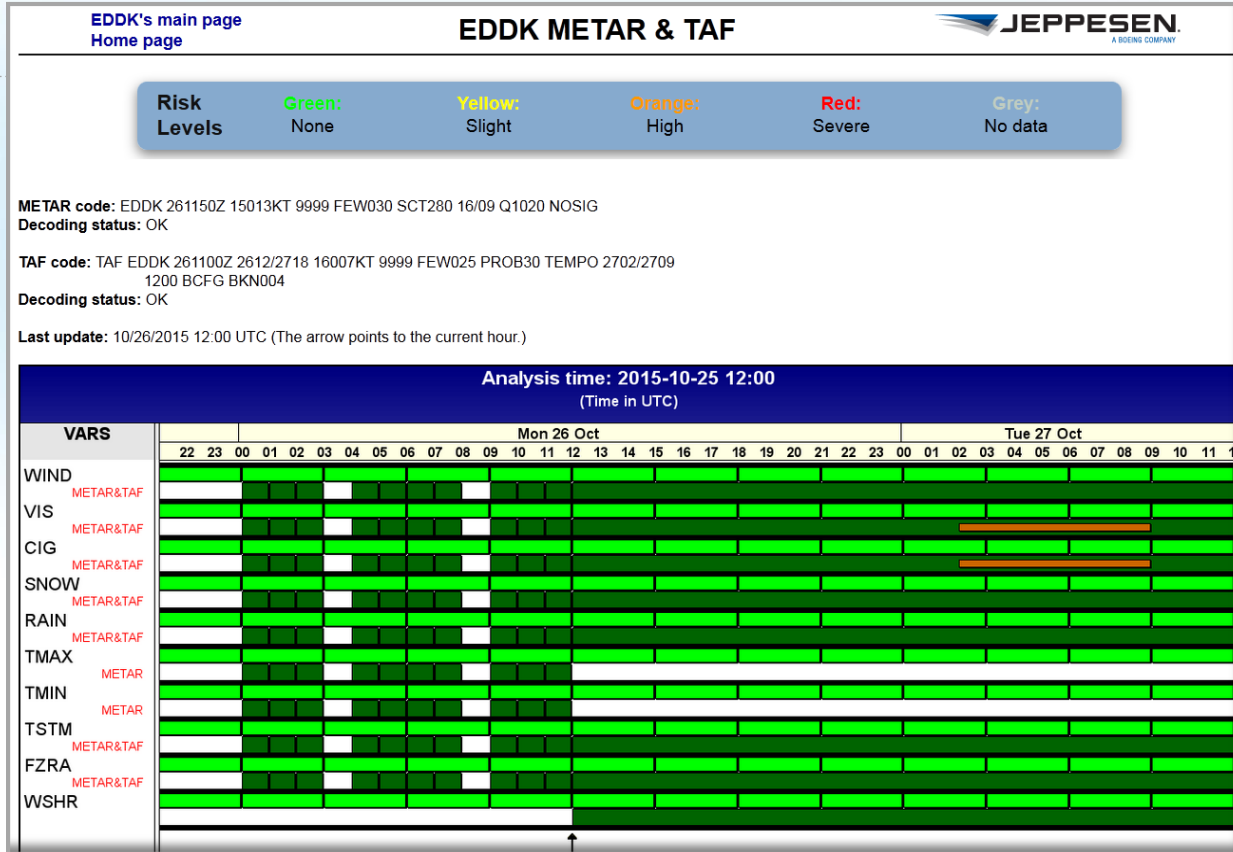
Weather Alerting Dashboard



EDDK Graphical Forecasts

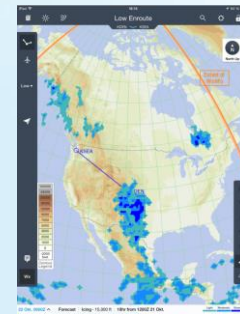


METAR & TAF Validation



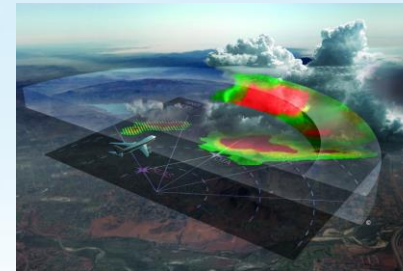
Solutions used today - EFB

- Transposition of ground tool views into cockpit
- Human factors considerations
 - determination 'essential info'
 - 'Translations' for the pilot
 - Symbology; Color
 - Sim and inflight test (Alaska, Virgin America, CFM, BOE)
 - Visualization of data validity
- Issues
 - Data size vs. data granularity
 - Communication costs
 - Data age
 - No radar images
 - ADS-B weather network limited; no interface standards

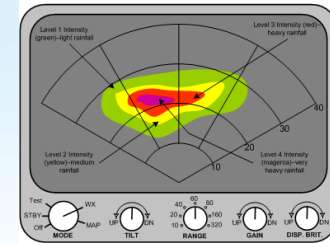


Solutions used today - Avionics

- Certified avionics
- Human factor tested
- More reliable than X hours old WX briefing
- Issues
 - Certified avionics (innovation cycle very long)
 - Range
 - No data of what is 'behind the cloud'
 - No strategic planning (tactical only)
 - No harmonized view with Ops Center



Weather Radar Display (Typical)



Challenges

- Data size
- Communication costs
- Authorized WX source (some airlines and/or ANSPs insist on domestic WX source)
- Feature set (minimum features)
- Depiction standards (SAE-G10; ARP 5740 - Cockpit Display of Data Linked Weather Information)
- Avionics innovation cycle > WX depiction on EFB in-flight; Type B application
- Business Case
- Liability



Thank you

