

# Weather Technology in the Cockpit

## MOVING AHEAD

Presented by  
Captain Jean-Michel ROY/ Airbus Test Pilot

# PRESENT SITUATION: From classic....

WPT	FLT	WIND	TAS	ITT	IMT	DST	NAM	E.T.	E.TA	ECBO	EFOB.	
AWY	MSA	OAT	S	GS	OTT	OMT	RDST	RNAM	C.T.	A.TA	ACBO	AFOB.
LFBO	ELEV	00499FT				000	000	00:00	.....	000.6	154.9	
						5906	5648	00:00	.....			

AMOI/O	SPN LOG	DOT	ACID	STOCHTY	027.078	060	00:00	00:09	007.8	147.7
									008.5	147.0
									008.8	146.7
									010.1	145.4

++ SIGMET ++  
 LIRR ROME FIR/UIR

SIGMET 03 VALID 161320/161920 LIRM-  
 ROMA FIR FBL VA LAST OBS (150540Z BY LICZ) EXT 10 NM ESE OF  
 ETNA BTN FL090/130 MOV NE 15 KT=

SIGMET 02 VALID 160720/161320 LIRM-  
 ROMA FIR FBL VA LAST OBS (150540Z BY LICZ) EXT 10 NM ESE OF  
 ETNA BTN FL090/130 MOV SE 15 KT=

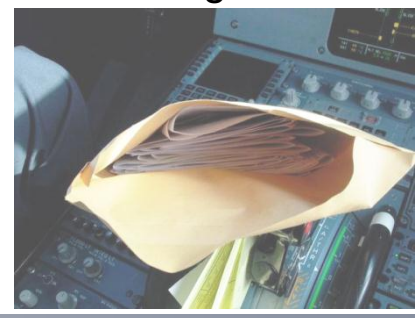
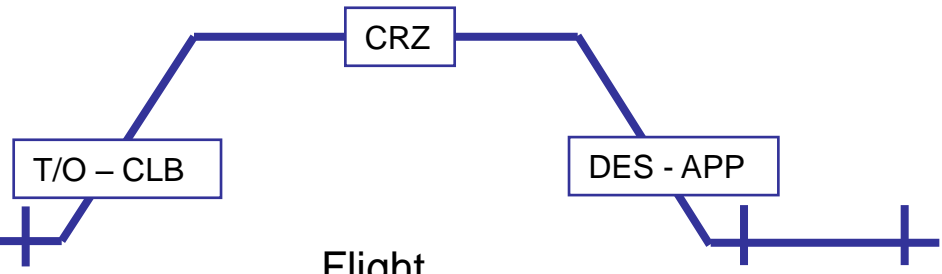
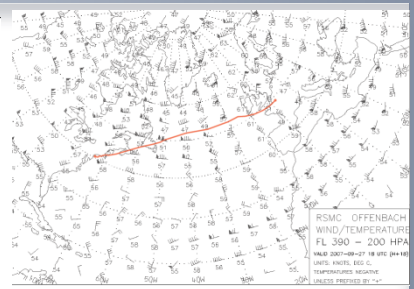
SIGMET 01 VALID 160520/160720 LIRM-  
 ROMA FIR FBL VA LAST OBS (150540Z BY LICZ) EXT 10 NM ESE OF  
 ETNA BTN FL090/130 MOV SE 15 KT=

STMPET 05 VALID 160520/160530 LIRM

1A539/07  
 HEATHROW NOISE RESTRICTIONS NOTICE 2007 AIP

1A3210/06  
 MULTIPLE CRANES IN TERMINAL 5 CONSTRUCTION S  
 AND 09R THR UP TO 417FT AMSL. ALL CRANES INF

```
(FPL-411-
-A388/ -RY
-LFBO2200
-N0490F390 GAI UT24 STP UL127 SODRI UM728 KISTO/N0486F400
UP160 OST/N0485F390 DCT LAT UZ803 TEA UL995 LUXIL UM872
LUPAL/N0484F410 UM872 LATAN DCT KFN DCT TRL DCT MIL DCT RDS
UM60L EVENO UR19 LCA UM601 BALMA/N0488F410 R655 CAK J222
BASEM R785 ZELAF UR785 RASLI UP559 LOTIT A791 DESDI
-OMDB0553 OMAA
-EET/LFMM0010 LIRR0050 LIBB0121 LGGG0147 LCCC0255 OLBB0324
OSTT0332 QJAC0345 OEJD0353 OBBD0443 OMAE0533]
REG/OISEFF
-E/0700 )
```

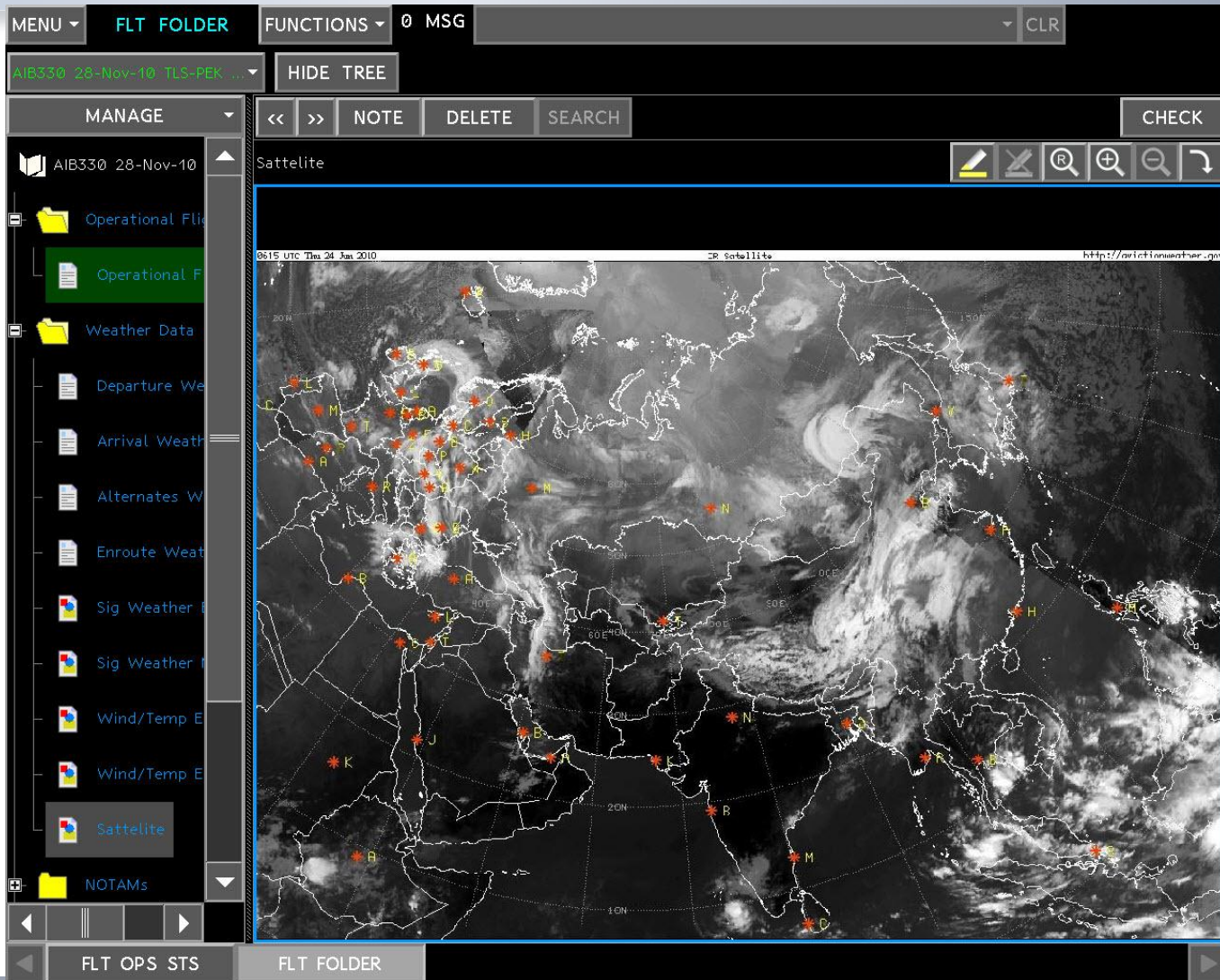


# .....to Digital: EFBs class 2+



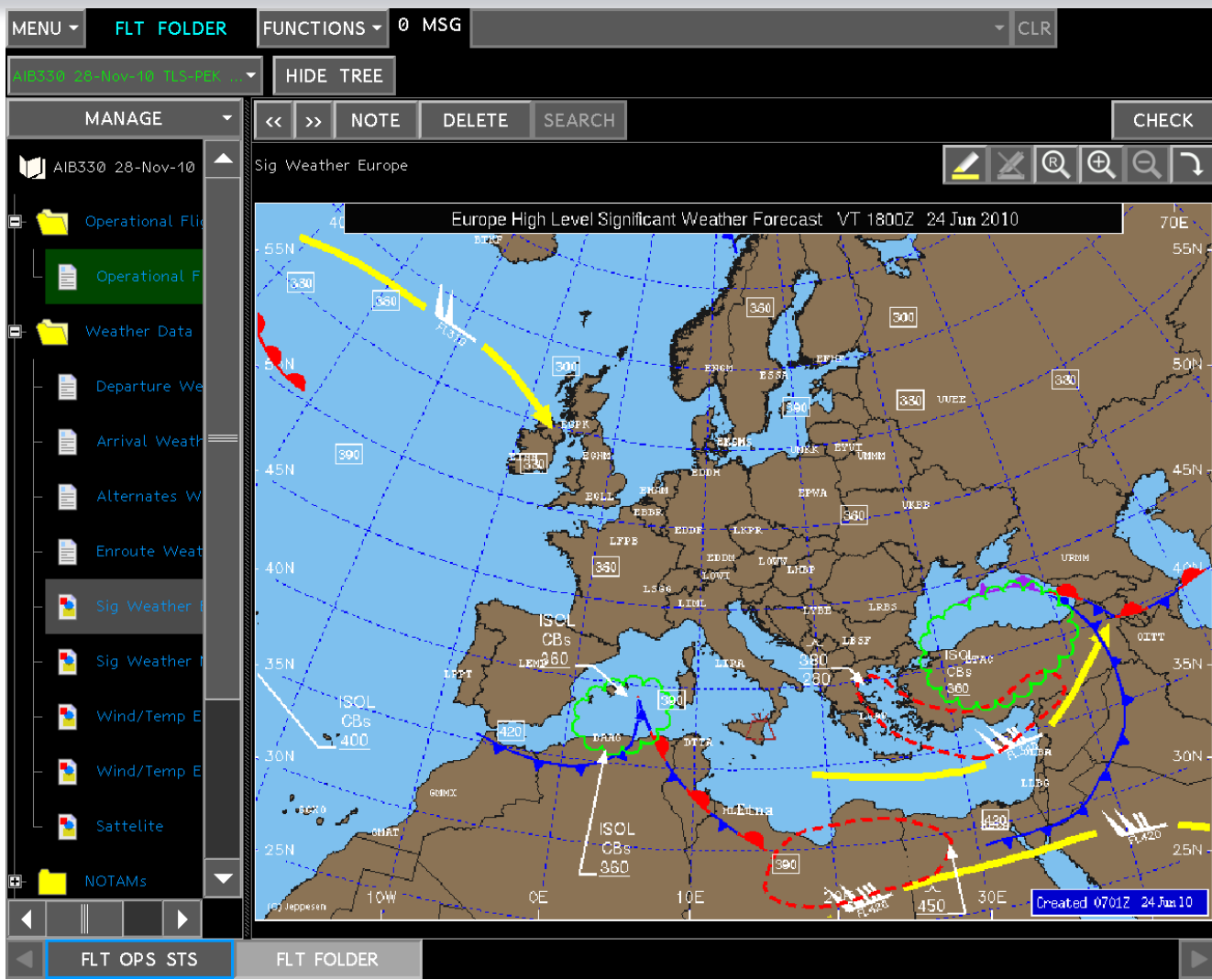
# EFB: Electronic Flight Folder (static pictures)

## Satellite pictures



# EFB: Electronic Flight Folder (static pictures)

## Significant WX



# EFB: Electronic Flight Folder (static pictures)

## Winds Temperature

MENU ▾ **FLT FOLDER** FUNCTIONS ▾ 0 MSG ▾ CLR

AIB330 28-Nov-10 HIDE TREE

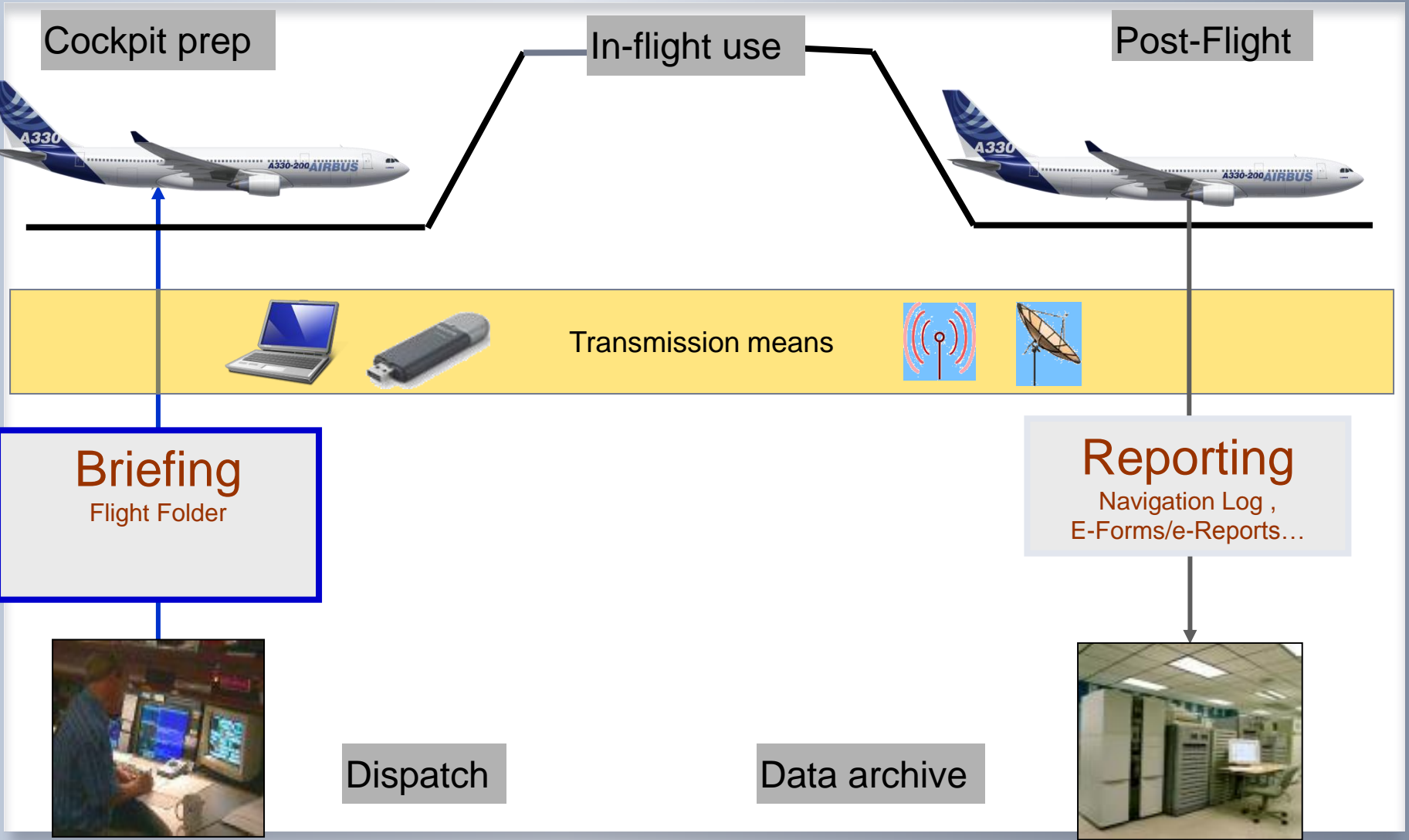
MANAGE ▾ << >> NOTE DELETE SEARCH CHECK

Wind/Temp Enroute

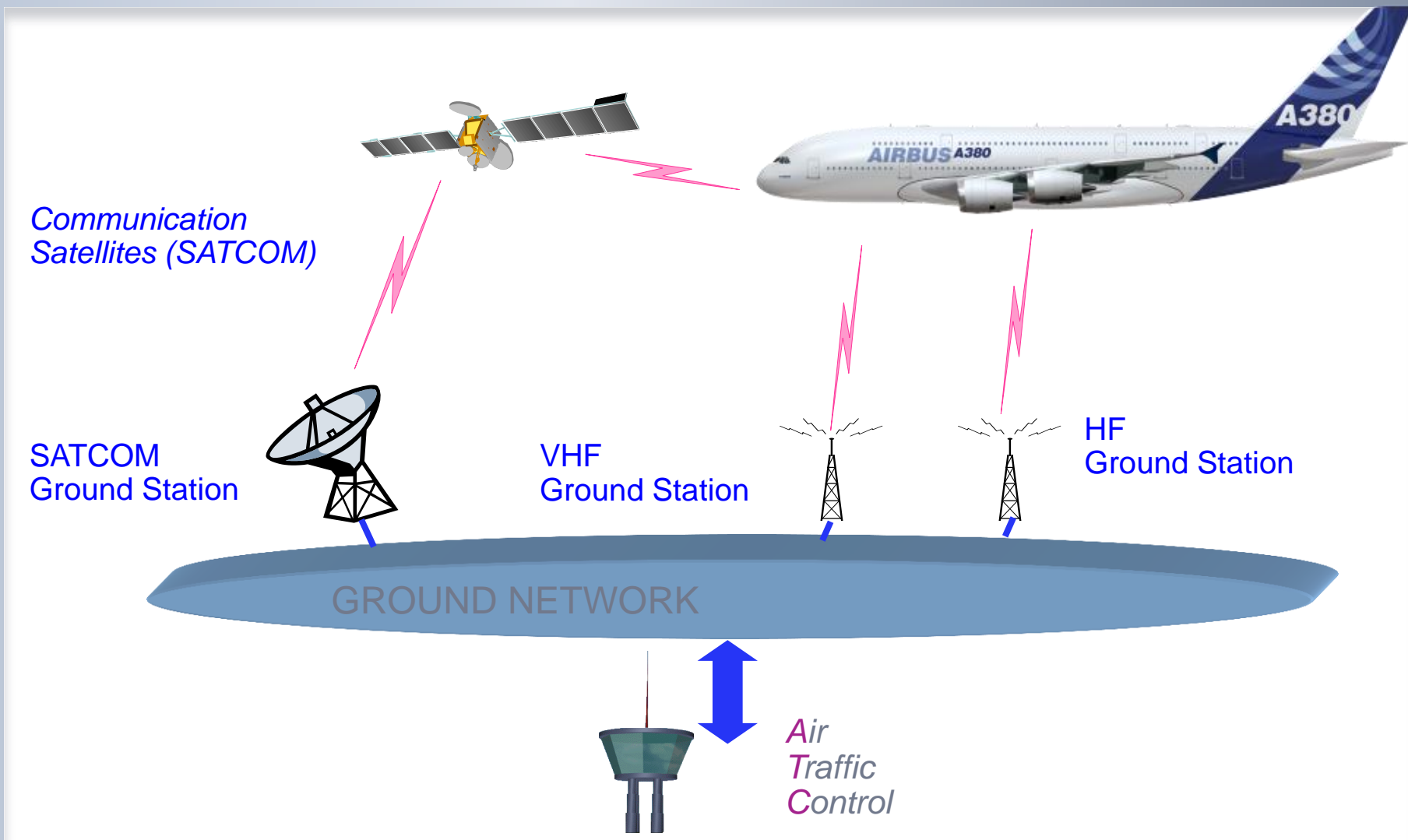
Operational Flt  
Operational F  
Weather Data  
Departure We  
Arrival Weat  
Alternates W  
Enroute Weat  
Sig Weather  
Sig Weather  
Wind/Temp E  
Wind/Temp E  
Sattelite  
NOTAMs

FLT OPS STS FLT FOLDER

# EFB: Digital Ground Process



# COMMUNICATE – ATC datalink





# COMMUNICATE – ATC datalink

- D-ATIS

ATC COM ▾

CONNECT
REQUEST
REPORT & MODIFY ▾
MSG RECORD
D-ATIS
EMER

D-ATIS/LIST

LFBO

DEP ▾

H 0845Z

UPDATE & PRINT ▾

RWY IN USE 32L FOR DEP 32R FOR LDG WIND 31  
0/10 CAVOK T 15 DP09 QNH 1013

>>>

LFPG

ARR ▾

B 0905Z G

UPDATE & PRINT ▾

RWY IN USE 26 R/L 27R/L EXPECT 26R/27L FOR  
TO ILS 26L/27R FOR LDG TRANSITION LEVEL 40  
WIND CALM RVR 500 FG LOW VISIBILITY PR  
OCEDURES IN FORCE OVC 003 T4 DP5 QNH 1013

>>>

LFPO

ARR ▾

A 0908Z G ✉

UPDATE & PRINT ▾

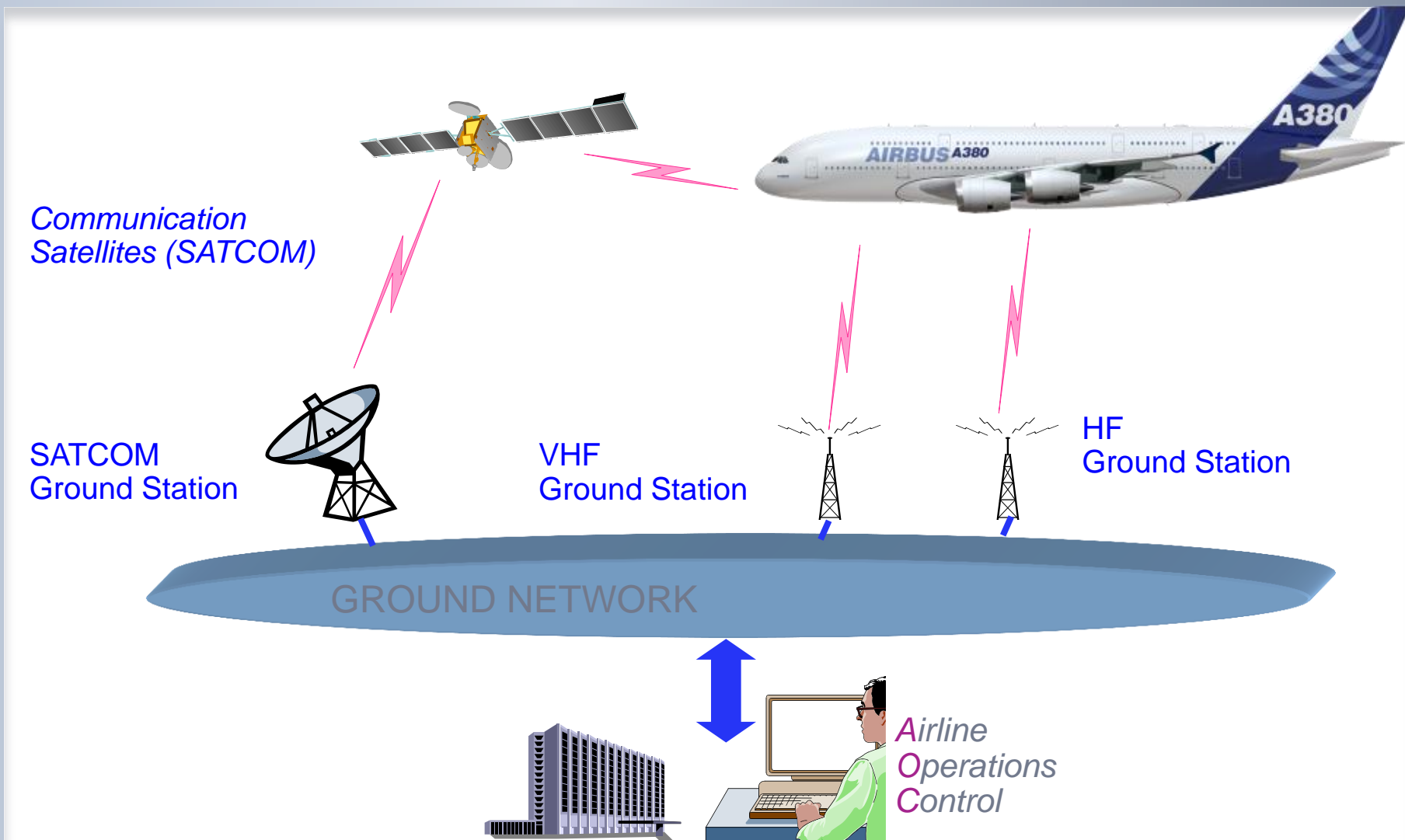
RWY IN USE 24/26 EXPECT 24 FOR TO ILS 26 F  
OR LDG TRANSITION LEVEL 40 WIND CALM RVR  
500 BCFG LOW VISIBILITY PROCEDURES IN FOR  
CE OVC 003 T4 DP5 QNH 1013

>>>

PRINT ALL

UPDATE ALL

# COMMUNICATE – AOC datalink



# COMMUNICATE – AOC datalink

OIS 
Day 4 msg
'Weather report received' 09:30
Clear ... A10642

COMPANY COM

Home
←
→
Print
Store
Upd...
Zoo...
Undo
Redo
Help
Close

- [-] Company Com
  - [+] Pre-flight
  - [+] In flight
  - [+] Post-flight
  - [+] Miscellaneous
  - [-] Messages
    - Received m...
    - Sent msg
    - UnSent msg
    - Archived msg

Received msg
Sent msg
UnSent msg
Archived msg

Status	Prior...	Send...	Time	Type	Title
		send...	Wed Dec 08 09:30	W/B report	Final loadsheet
		send...	Wed Dec 08 09:30	Weather report	METAR LFPG
		send...	Wed Dec 08 09:30	Free report	New T/O time ...
		send	Wed Dec 08 09:30	Weather report	METAR

LFPG METAR  
 011920Z 02011KT 6000  
 SCT022 BKN028 03/M03  
 Q1023 NOSIG

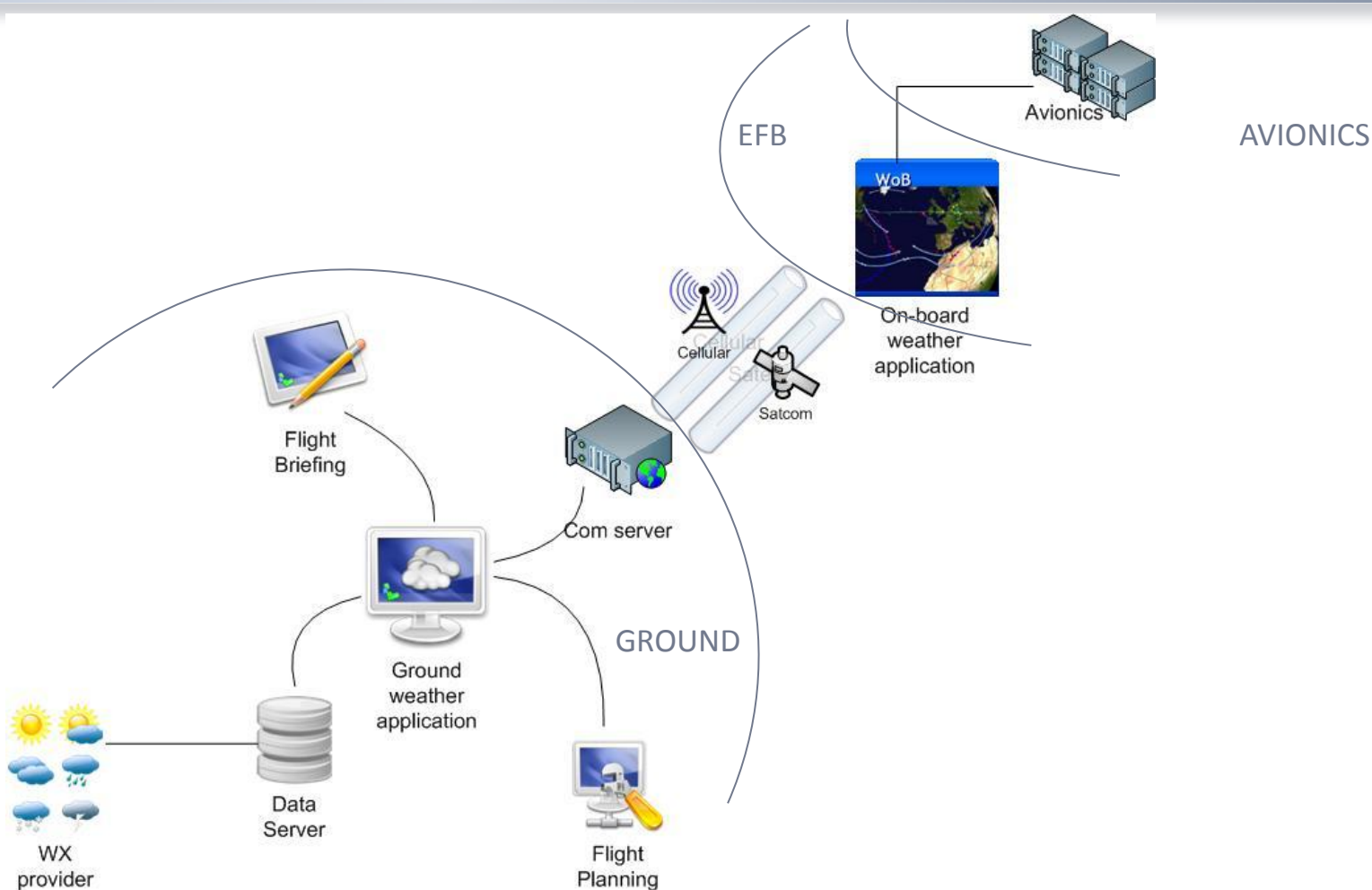
Archive
New Weather

COMPAN...

# WAY FORWARD

- Avionics connection
  - A/C position & direction
  - F-PLN
- Enhanced datalink:
  - From Static Graphic to Dynamic Graphic
  - Visio conference

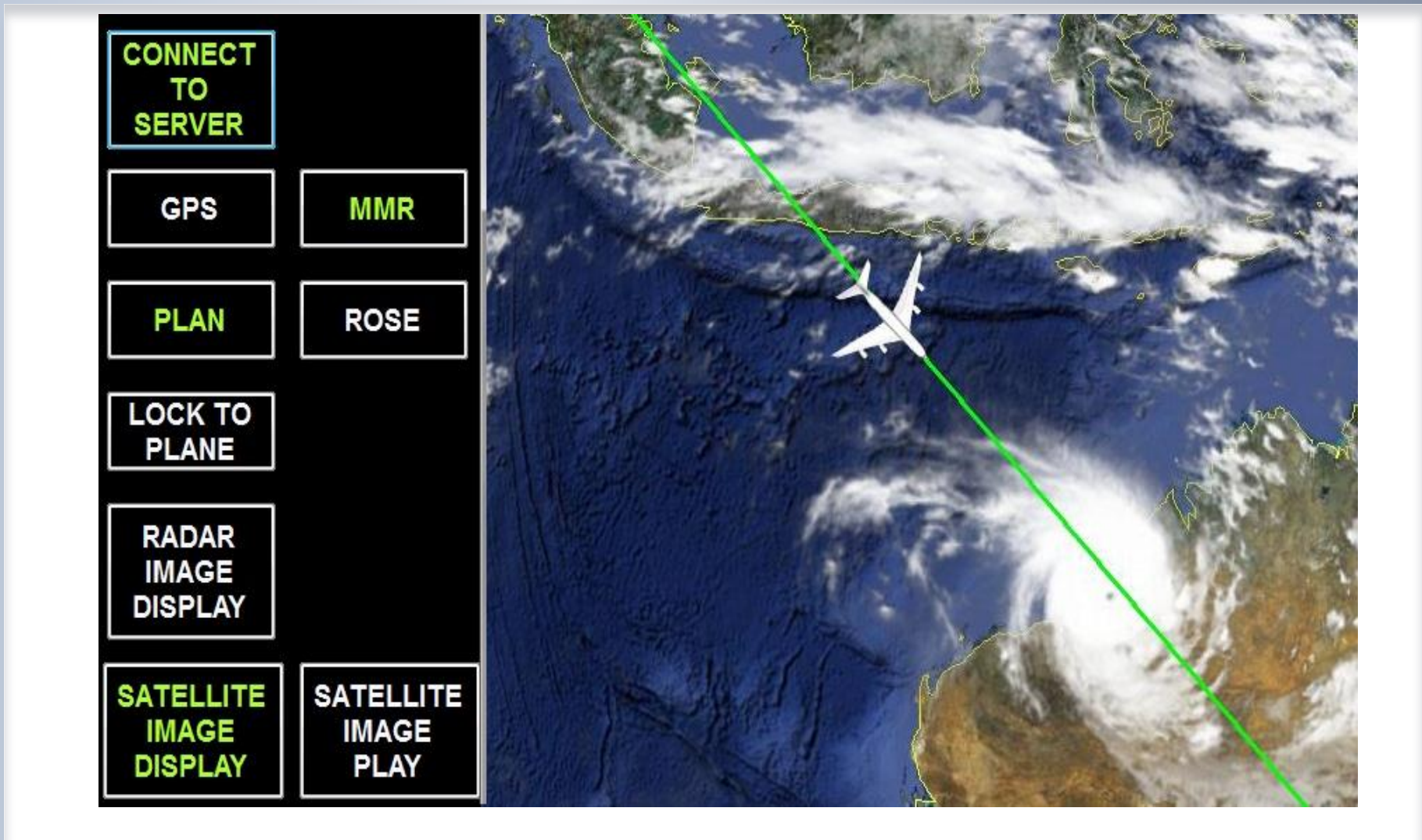
# Weather on Board – Functional chain



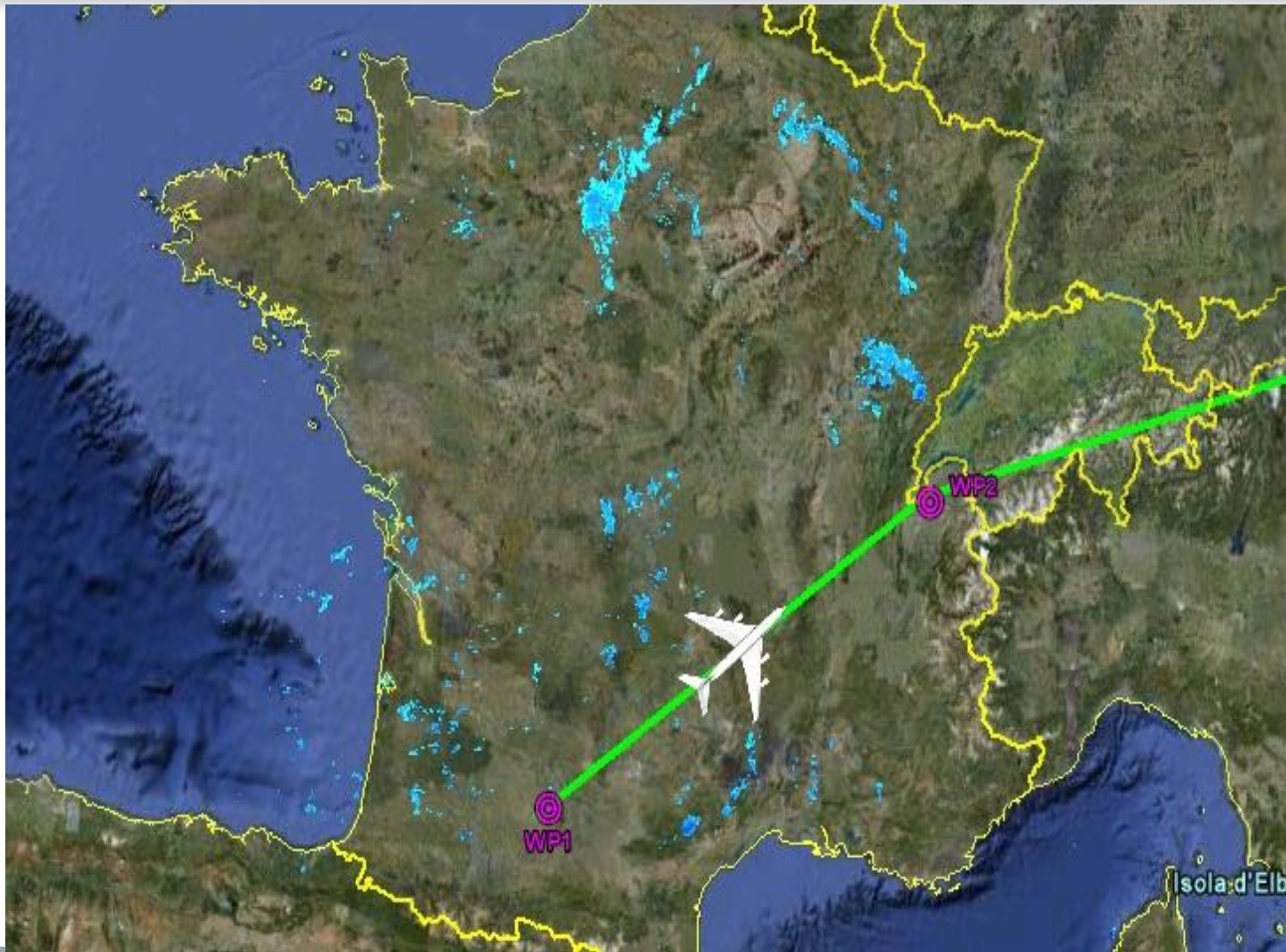
# Updated Weather on Board



# EN ROUTE UPDATED SATELLITE PICTURE

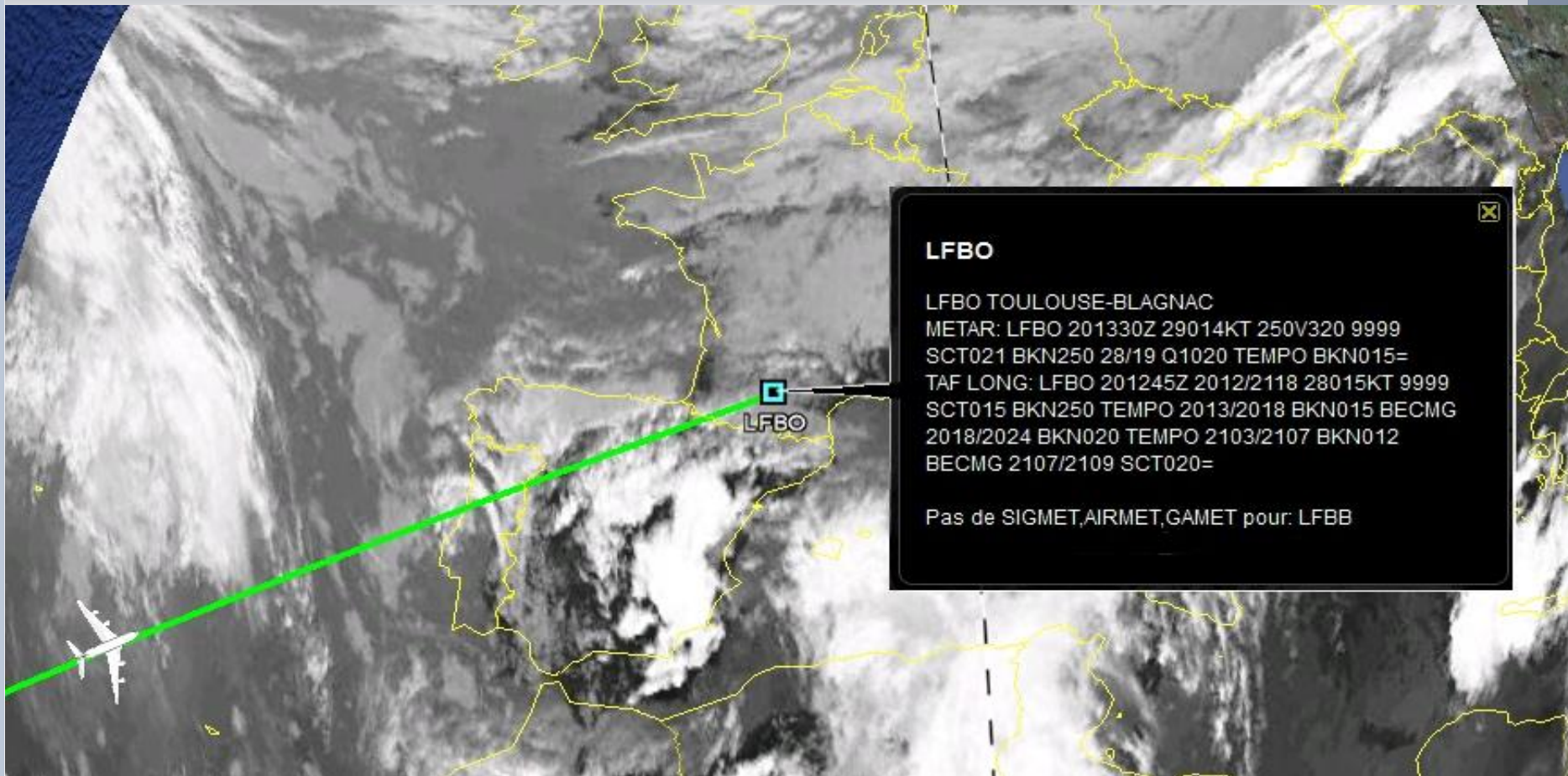


# UPDATED GROUND RADAR PICTURE

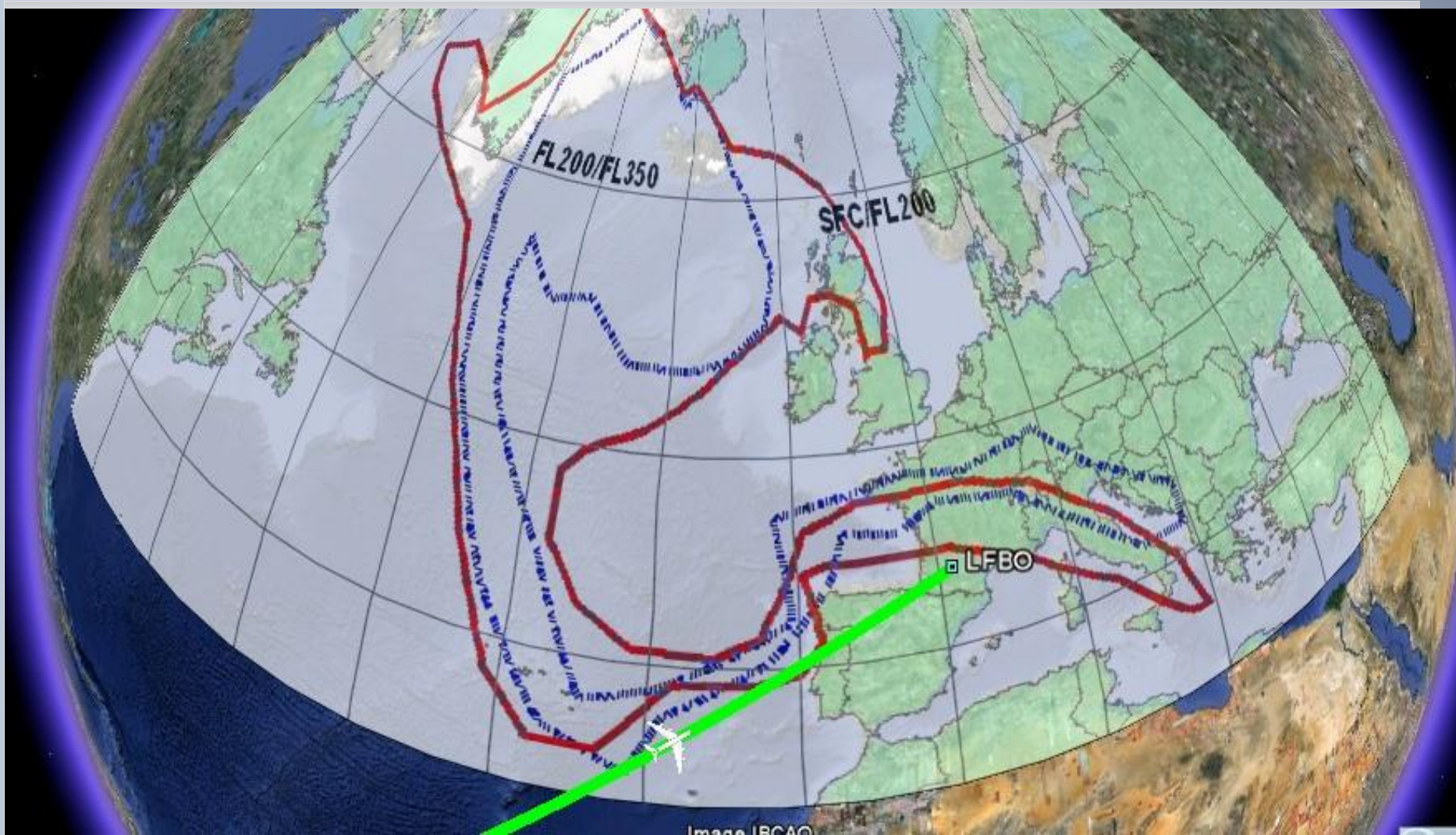




# UPDATED AIRPORT WEATHER DATA



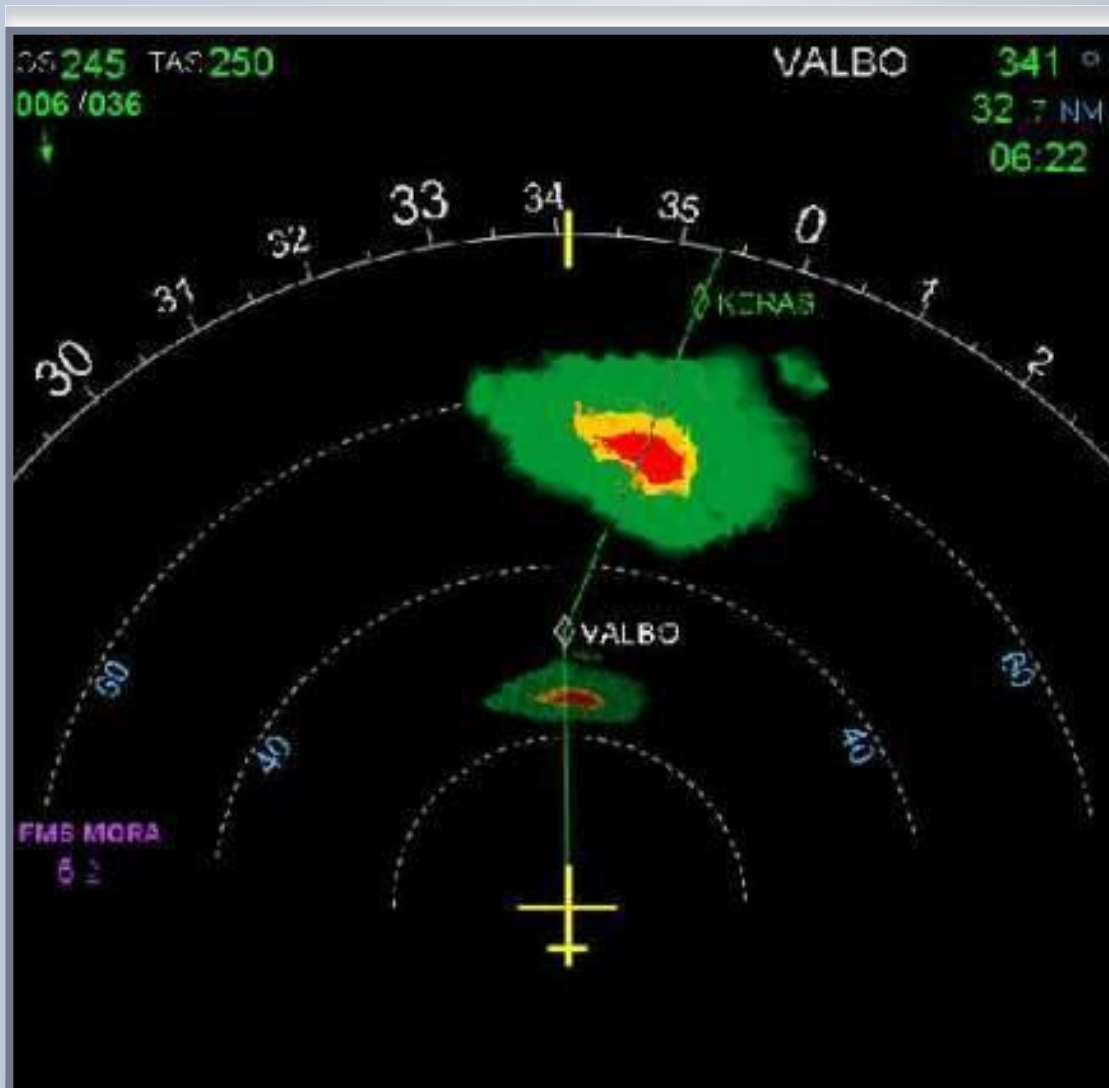
# UPDATED VOLCANIC ASH CLOUD



# ISSUE: A/C POSITION

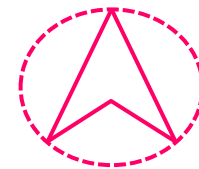
- AC 120-76B
  - “**Class 1 or Class 2 EFBs must not display own-ship position while in flight.**”
- Proposed solution:  
Clear differentiation between ND and EFB symbology:
  - Different screen
  - Different a/c symbol

# ISSUE: A/C POSITION



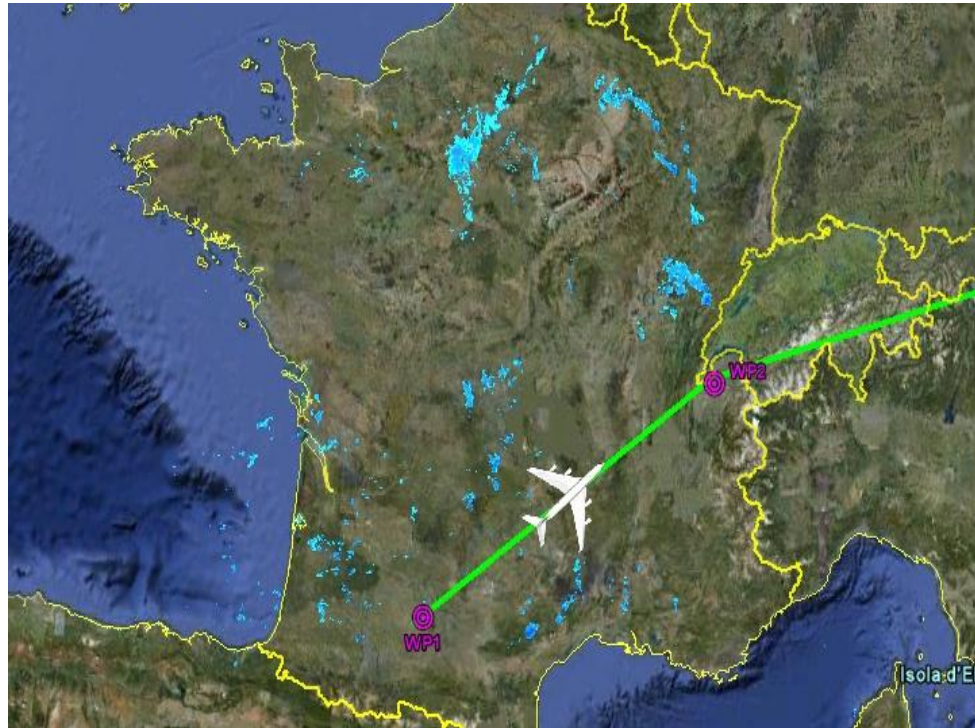
- Information from avionics to EFB

- Different shape
- Different color
- Including direction (track)



# ISSUE: FMS F-PLN

- FMS F-PLN output/copy to EFB
- Real time F-PLN update in case of diversion (ACTIVE and SEC)



# COCKPIT DISPLAYS

## • **TACTIC vs STRATEGIC**

### • **TACTIC DISPLAY**

- Short term
- ND with avionic information (radar)

### • **STRATEGIC DISPLAY**

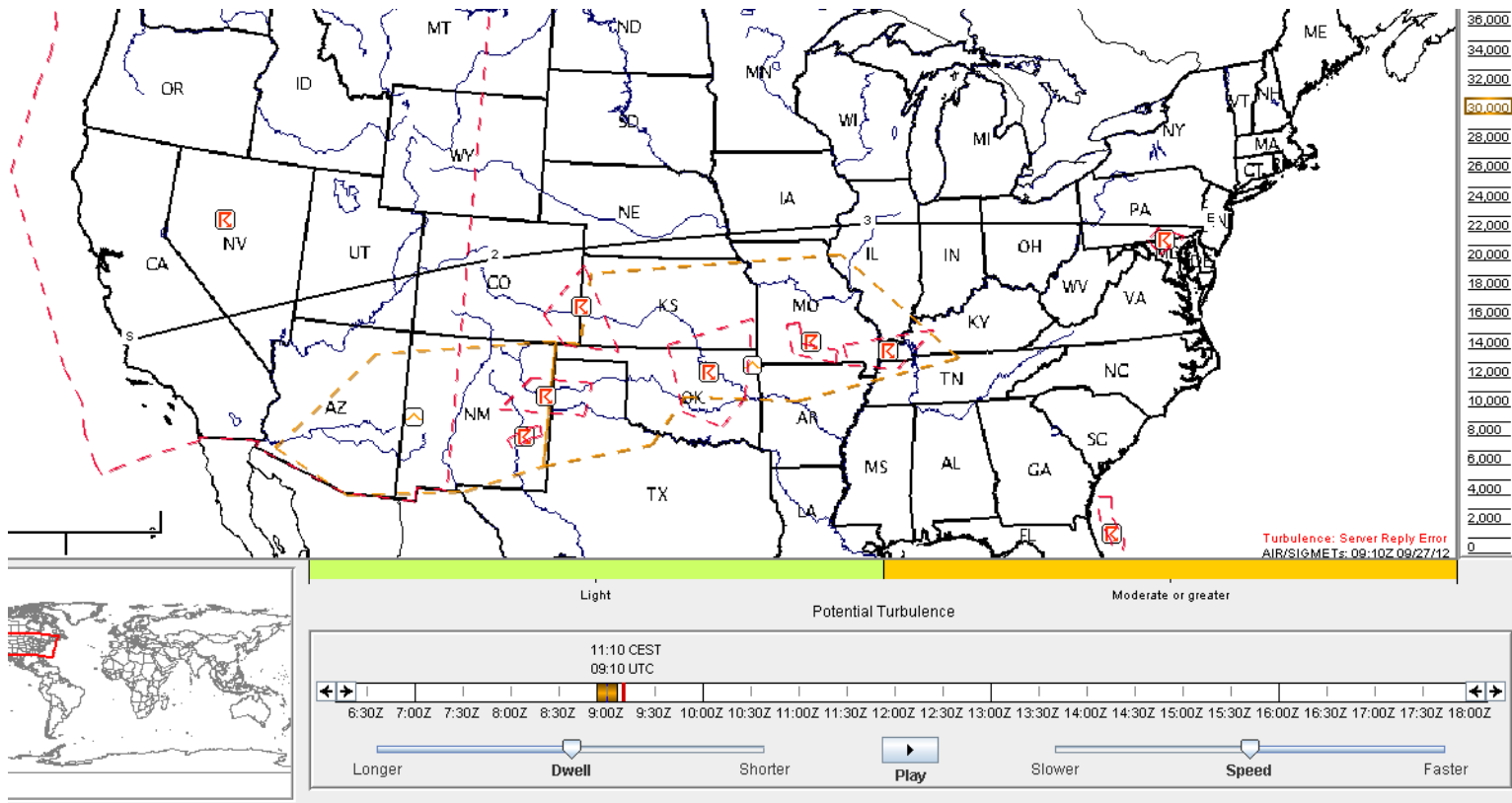
- Long term
- EFB with ground “back office” transmitted information

# ENHANCED DATALINK

- New type of operations such as SESAR I4D require Wind and Temperature data at 10 different levels from cruise to airport so as to match accuracy at a RTA waypoint in approach.
- Problem:  
How to uplink such data ? ATC / AOC ??

# ENHANCED DATALINK

- From static picture to **dynamic** vision
- Problem: How to display/manage Time (T) in such a representation





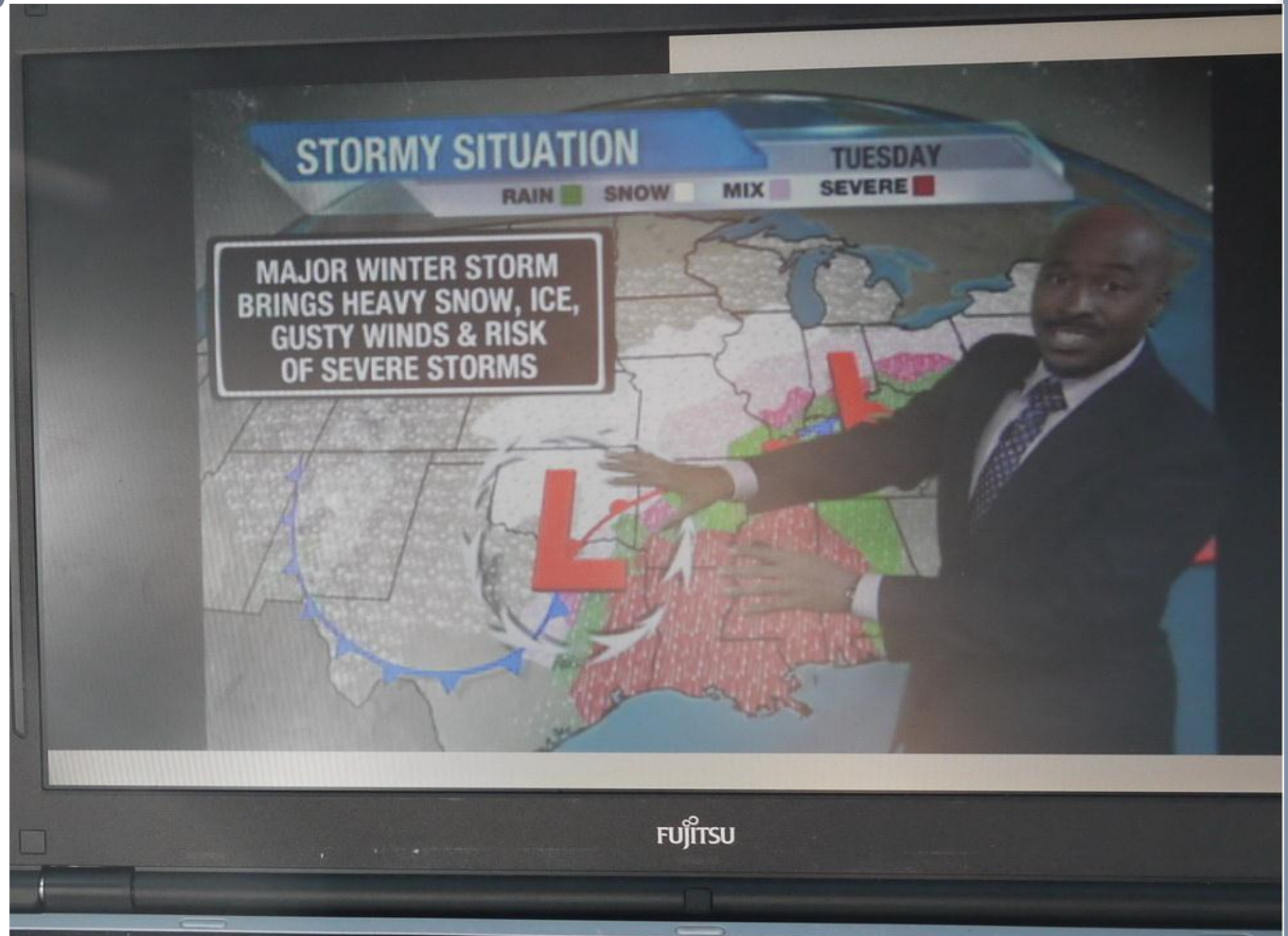
# ENHANCED DATALINK

- Enhanced **Collaborative** approach with ground support
- Visio conference



# ENHANCED DATALINK

- WX live briefing



# ENHANCED DATALINK

- Problem:

- Internet Protocol on a cockpit dedicated network
- WiFi in the cockpit
- Today it does exist already in the cabin:

**Is it acceptable that cabin com is better than cockpit com???**

# ISSUE

- SAFETY vs SECURITY

# LONG TERM FUTURE

- Merging of weather information in a centralized avionic unit:
  - Data sensed by a/c (radar)
  - Data sensed by other a/c (wind ,turbulence.....)
  - Data processed by ground support:
    - En route data
    - Airport data
    - .....



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