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Human factors in using Satellite Pictures

EASA Workshop: Weather information provided to pilots

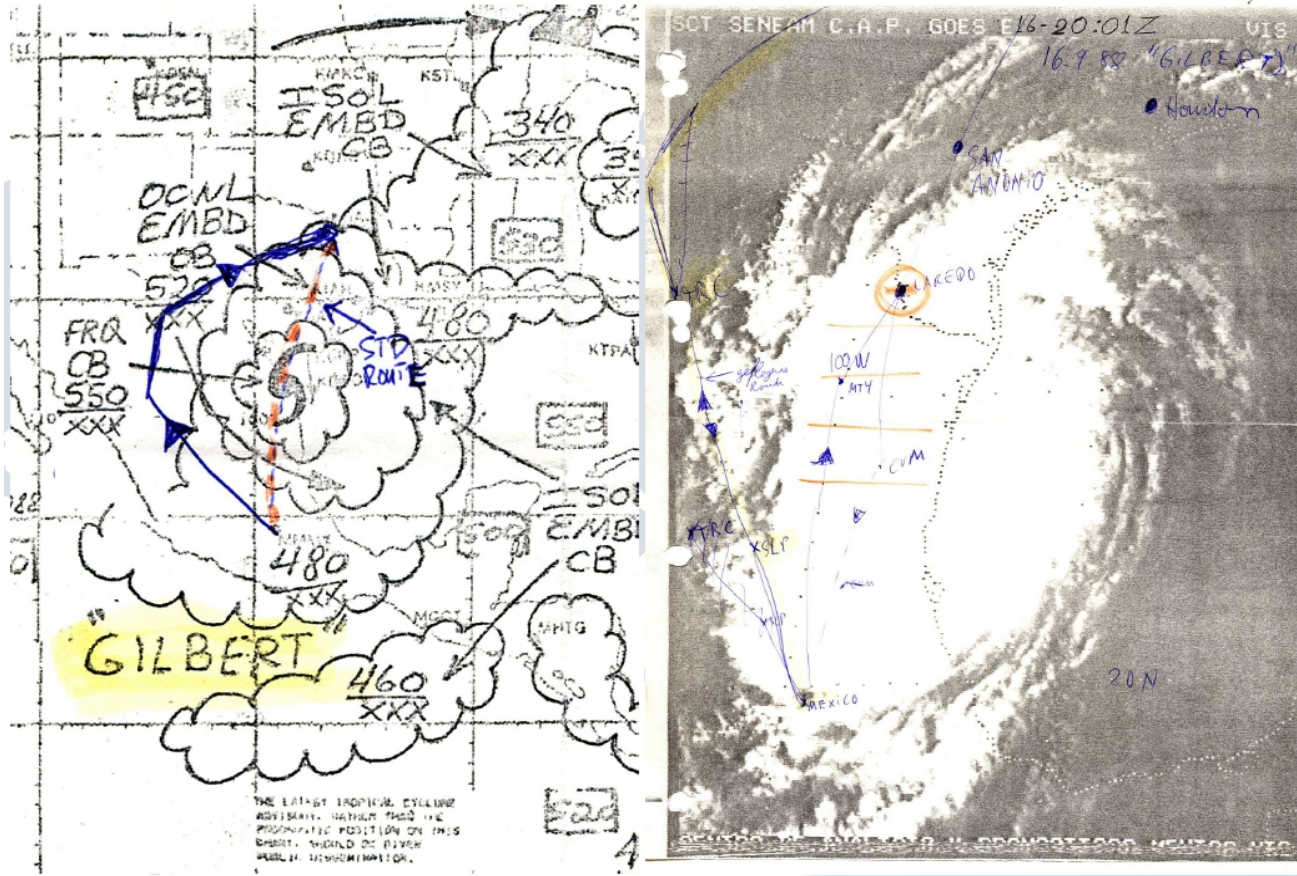
Klaus Sievers
ECA, 10 / 2015



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Interpretation of satellite pictures:
a human factors problem in the cockpit ?



1988: GILBERT

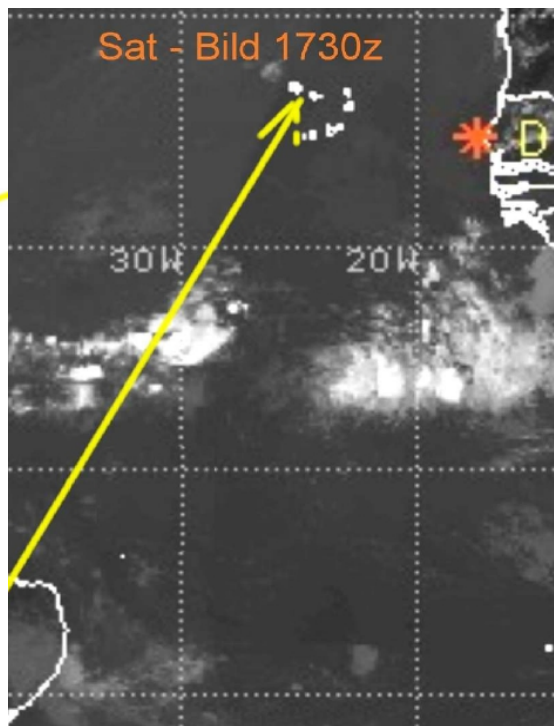
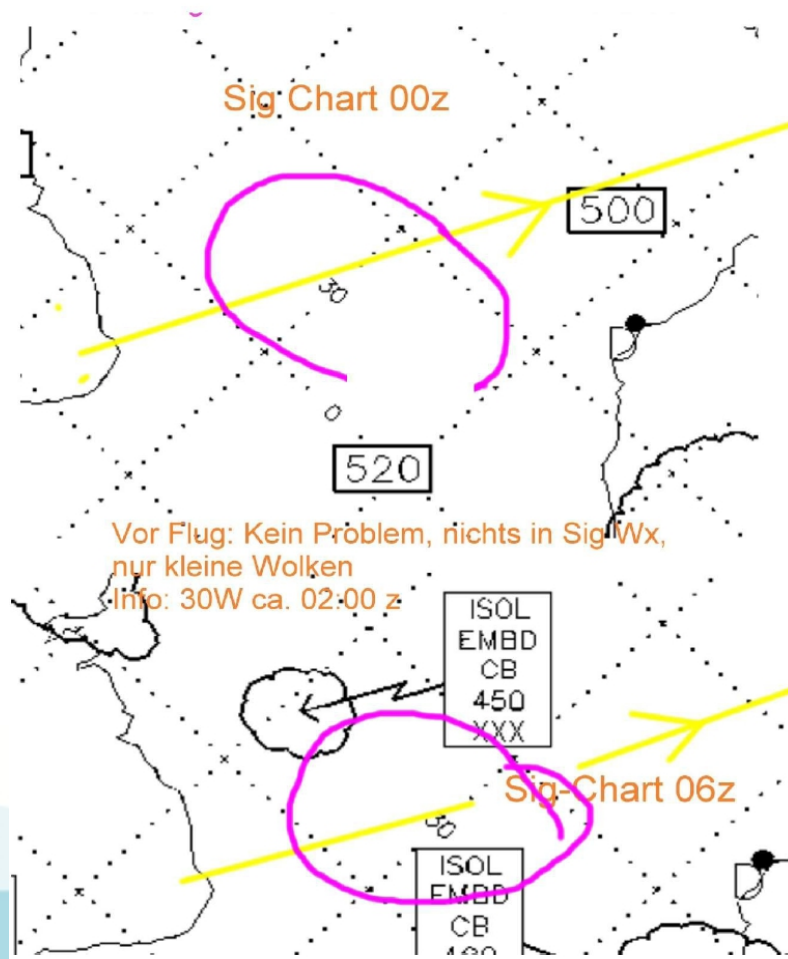
simple black+
white picture
enhanced
appreciation
for size + power
of storm.



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Interpretation of satellite pictures:
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Even simple B&W satellite picture from before the flight shows cloud-heap that will be encountered hours into the flight quite clearly.

HF ? Ok, as message, warning is clear, cabin service done well before cloud-field.



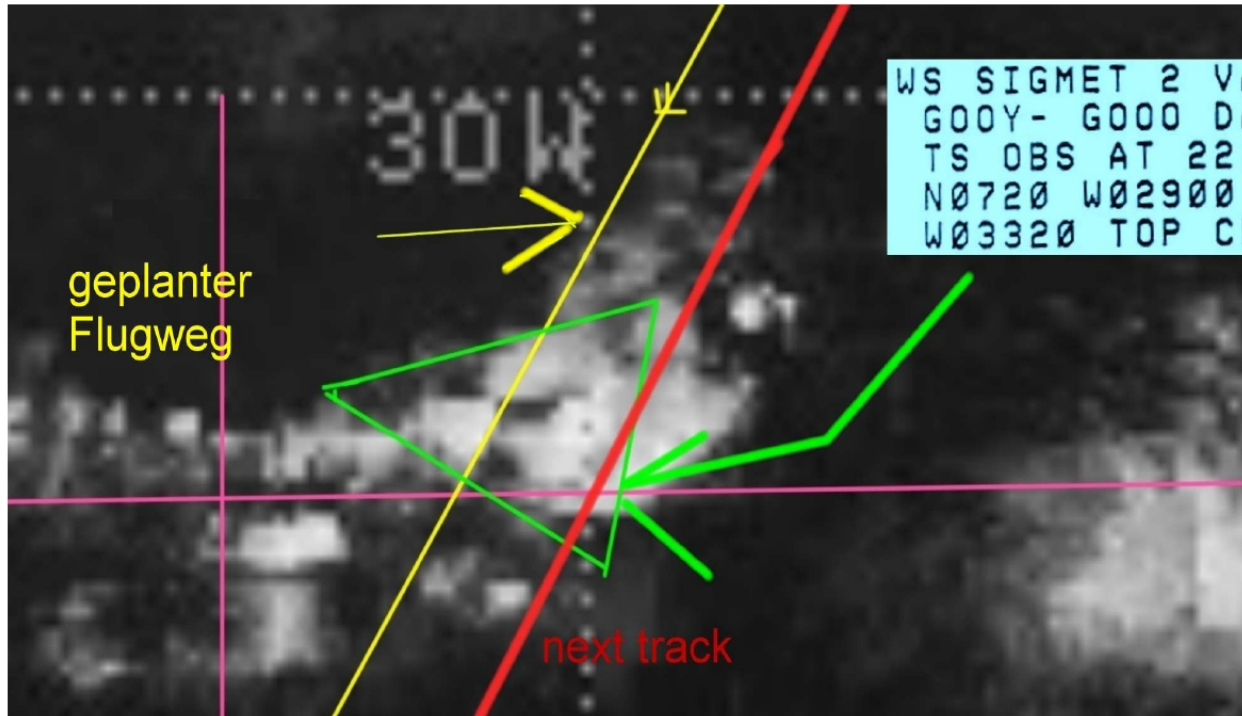
Ref. 2



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```
WS SIGMET 2 VALID 2230/010230  
GOOY- G000 DAKAR OCEANIC FIR/UIR EMBD  
TS OBS AT 2215Z BTN N0630 W03320 -  
N0720 W02900 - N0350 W02940 - N0630  
W03320 TOP CB FL500 MOV W 10KT NC
```

Enroute Sigmet is no surprise, however, it is not clear that the old sat-picture is still valid.

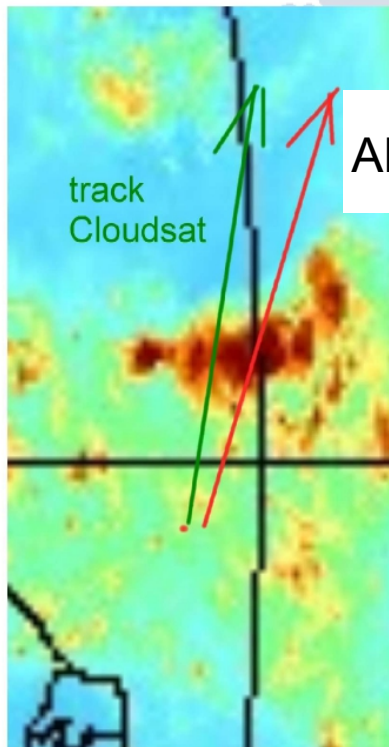
HF ? Problem, as age of satellite picture should be clearly shown.



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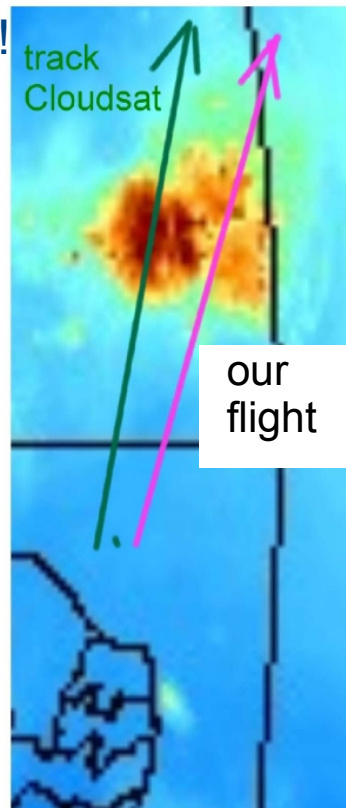
Interpretation of satellite pictures:
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We were lucky !

AF 447

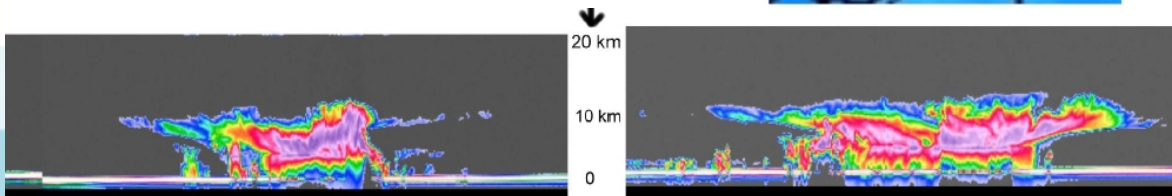
approx. cloud
height



Cloudfield was traversed
using WX-radar for avoidance
of convection-cores (red).

Lessons:

1. satellite-pictures age.
2. near real-time updates are
not a luxury but a necessity



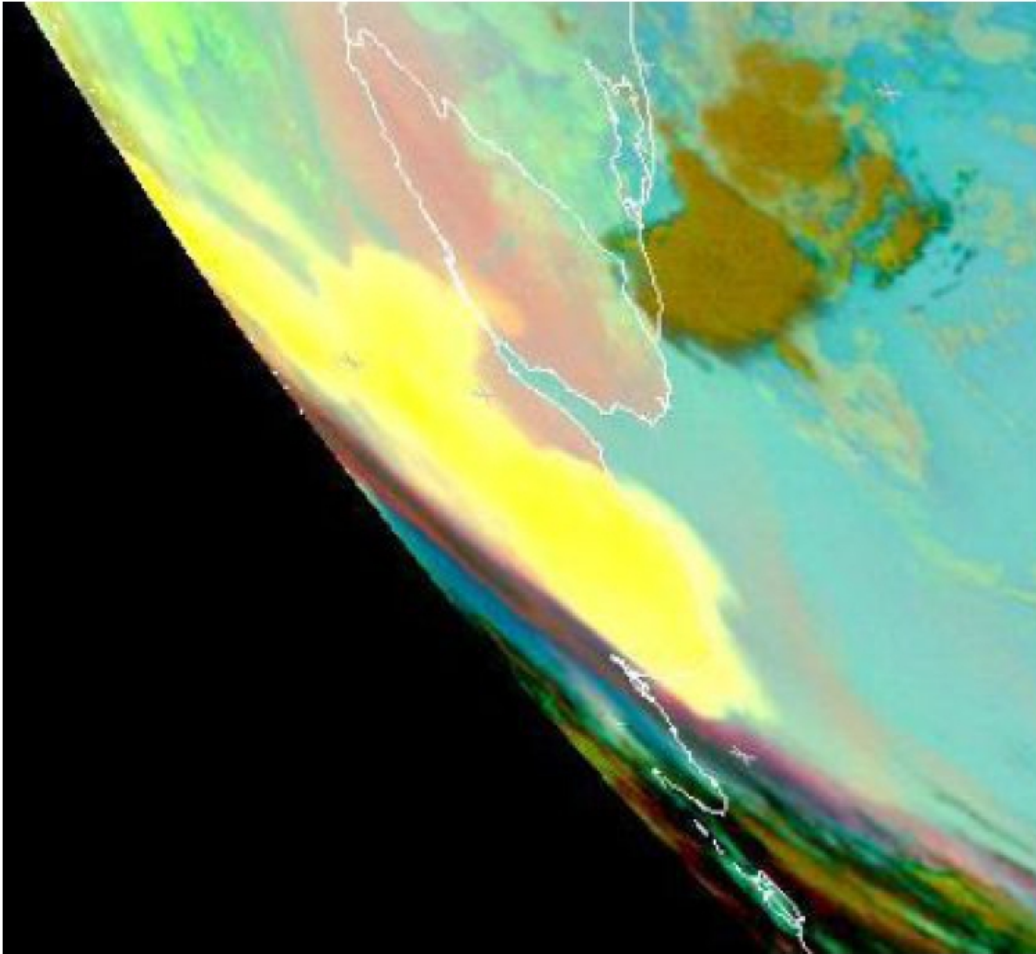
Ref. 4



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HF-Challenge:

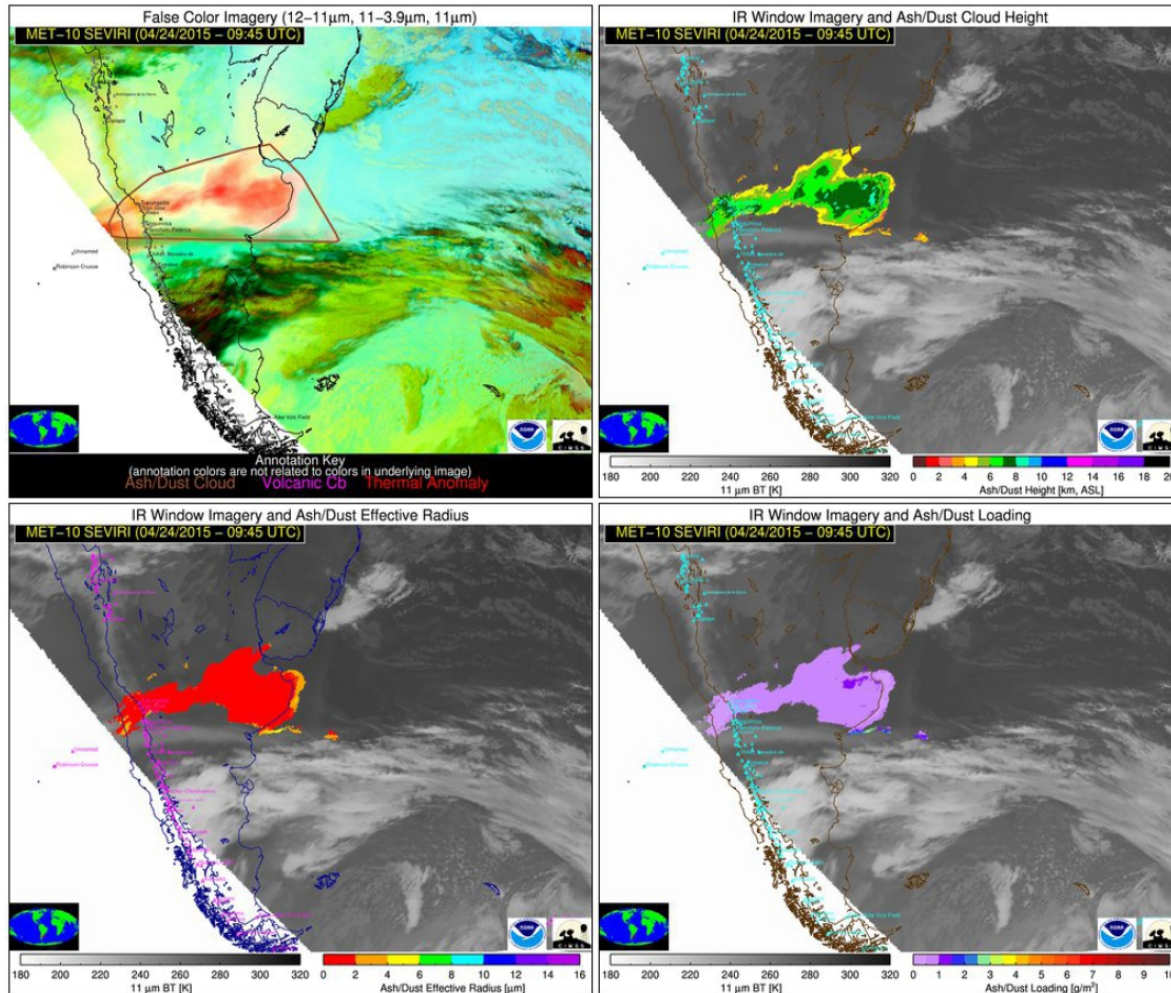
Sat-picture
that needs
clear interpretation
guidance.



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HF-Challenge:

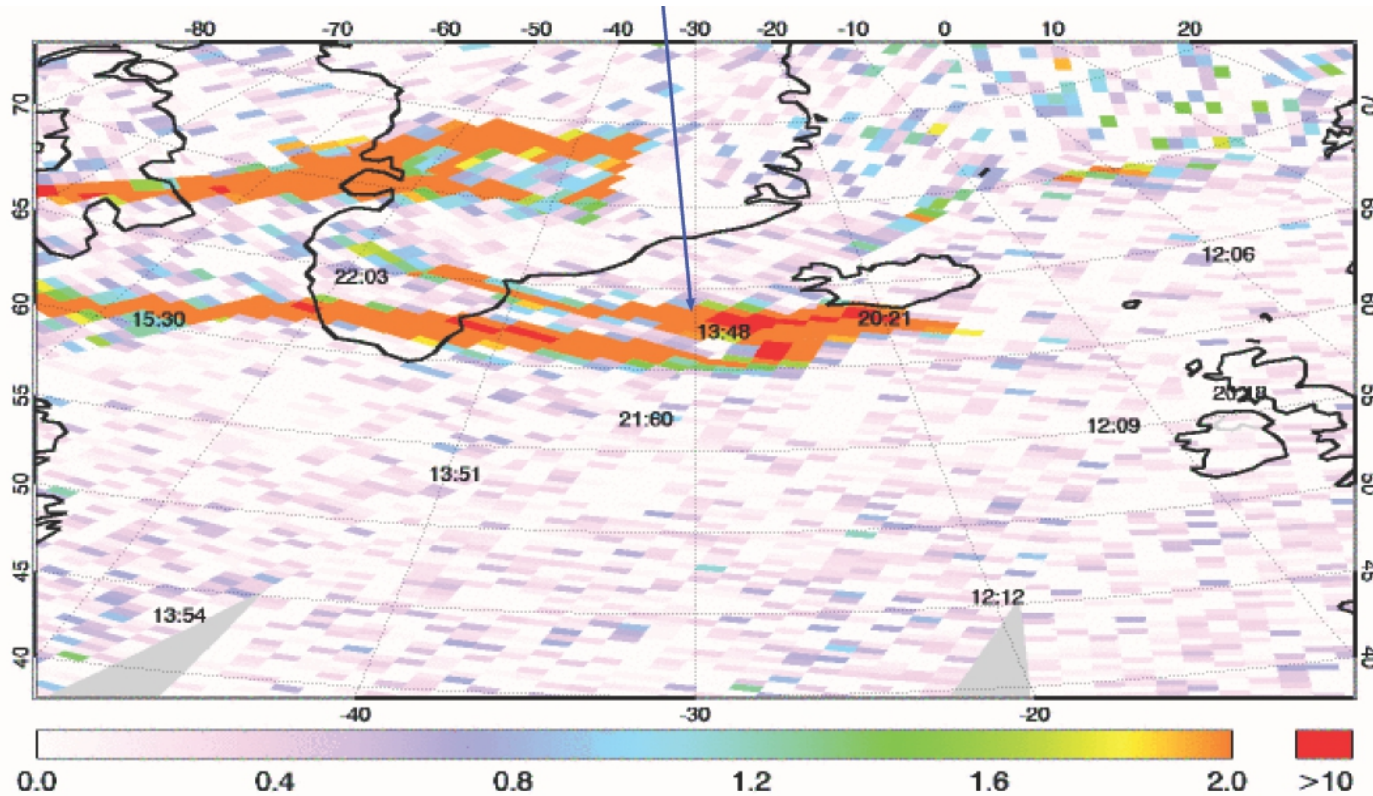
Sat-picture
that needs
clear interpretation
guidance.



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HF-Challenge:

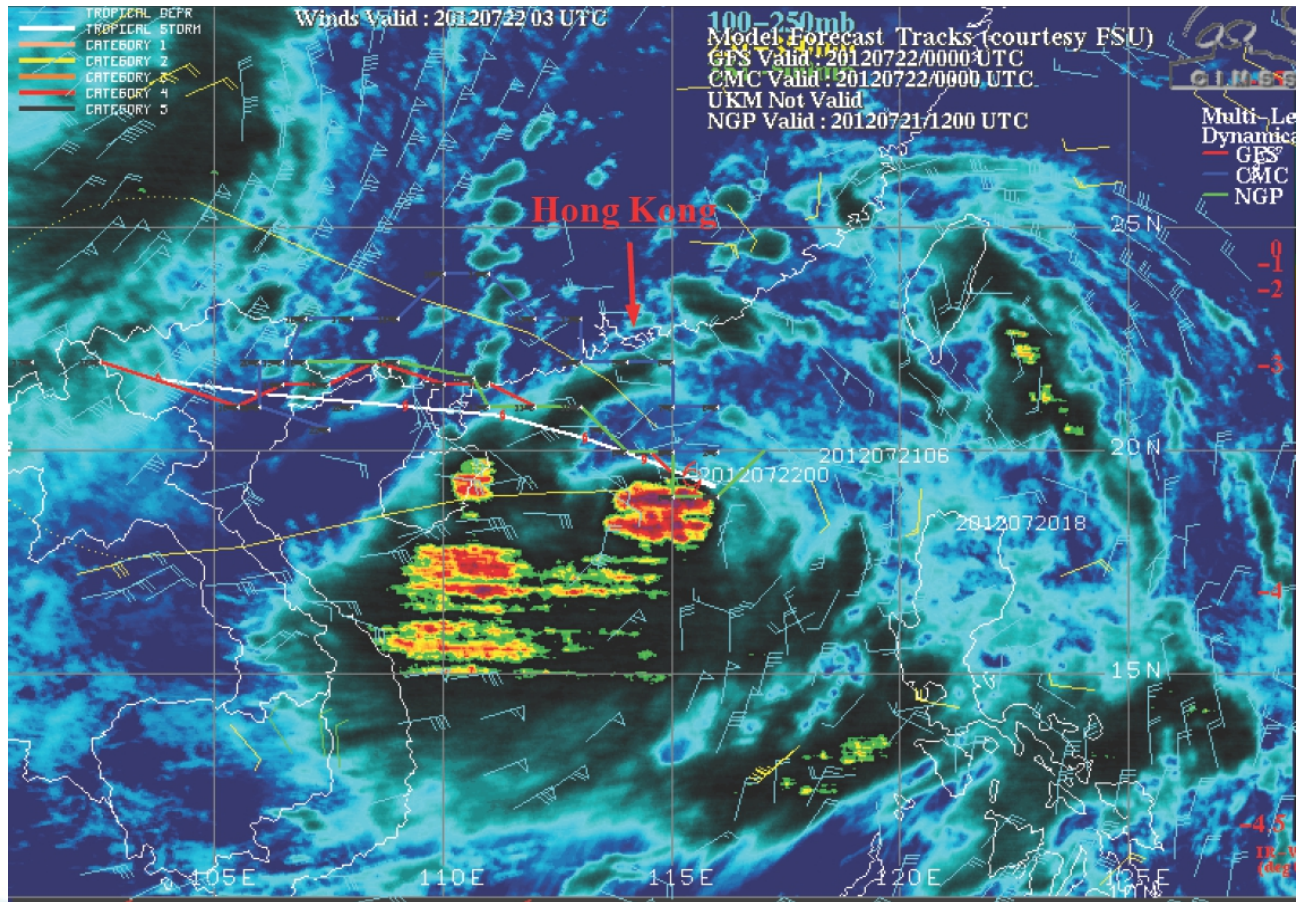
Sat-picture
that needs
clear interpretation
guidance.



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HF-Challenge:

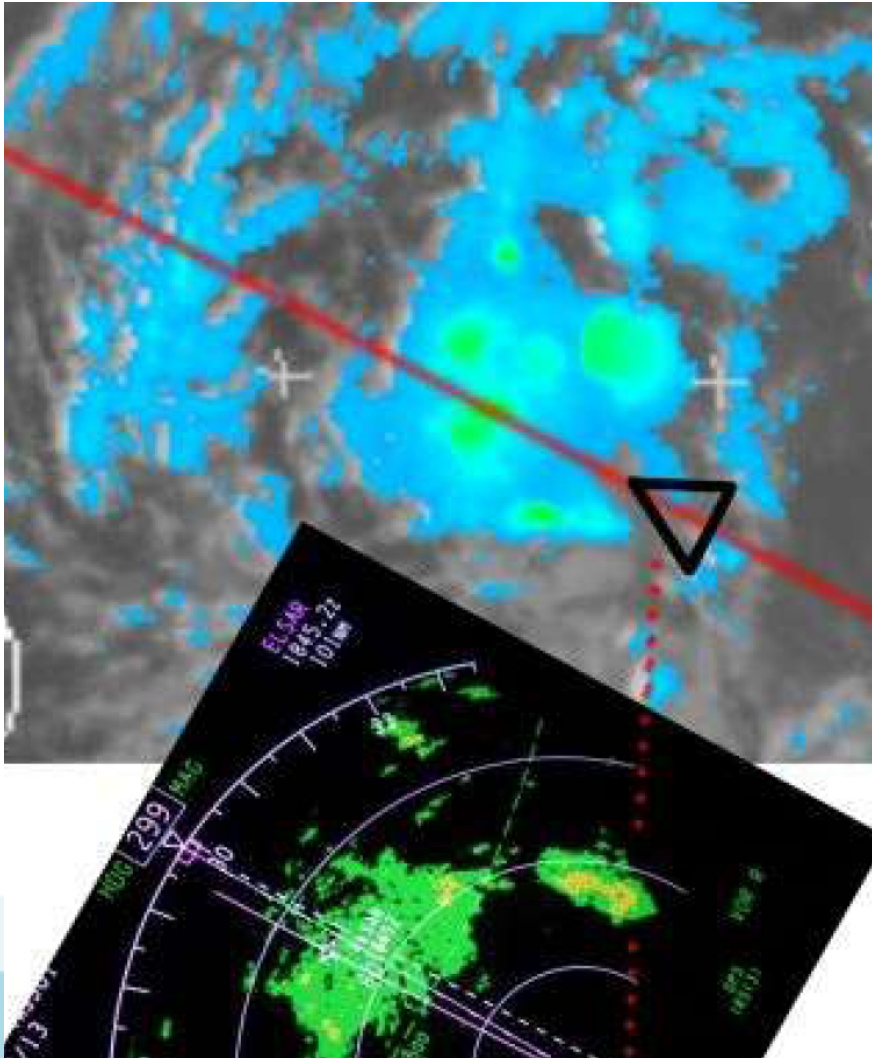
Sat-picture
that needs
clear interpretation
guidance.



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HF ?

Sat-picture above
corresponds to radar
picture below.

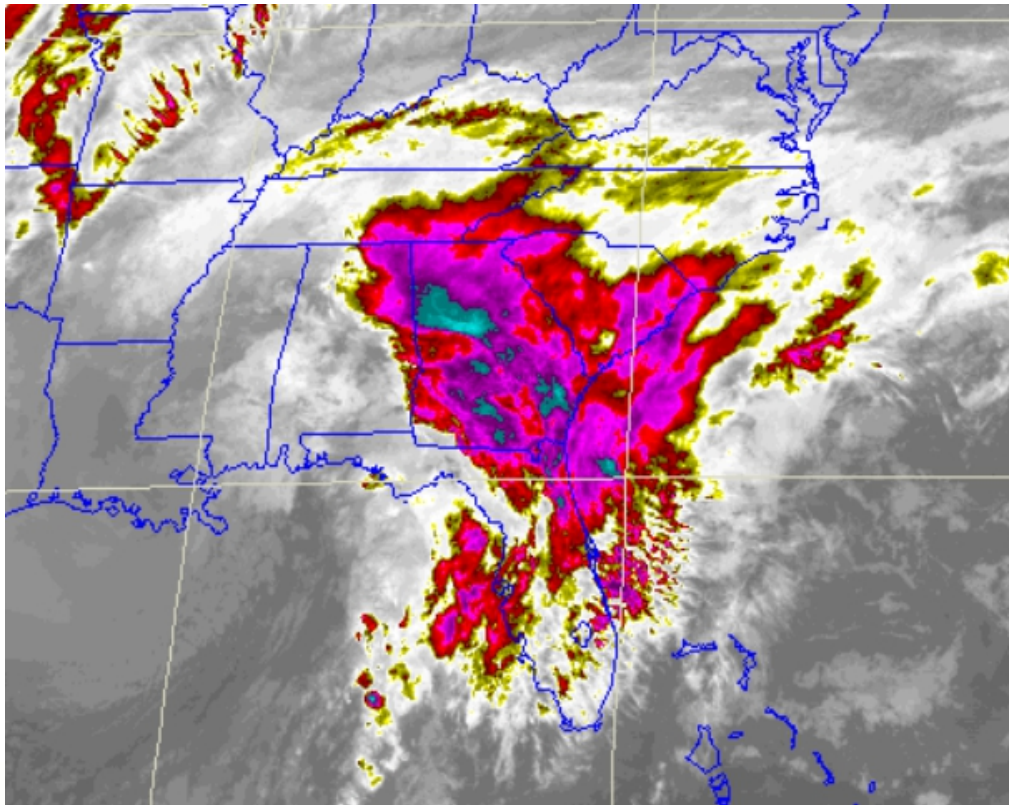
Interpretation should
be reliable and easy.



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HF ?

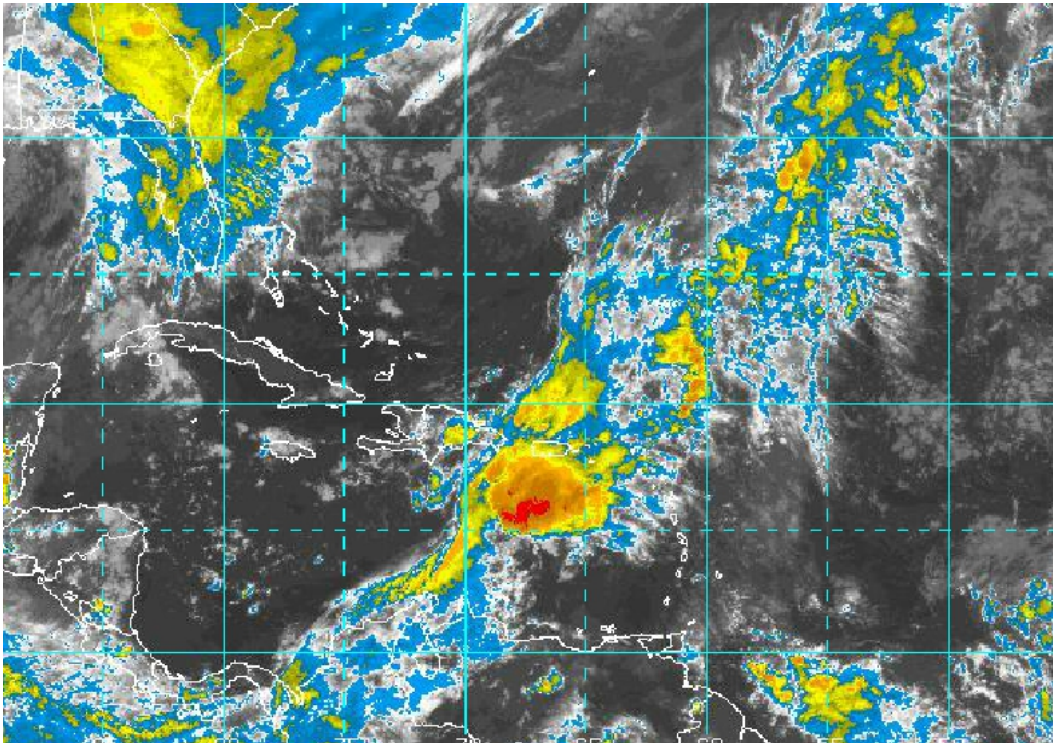
First-look interpretation
is easy, but cloud-height
determination requires
guidance



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HF ?

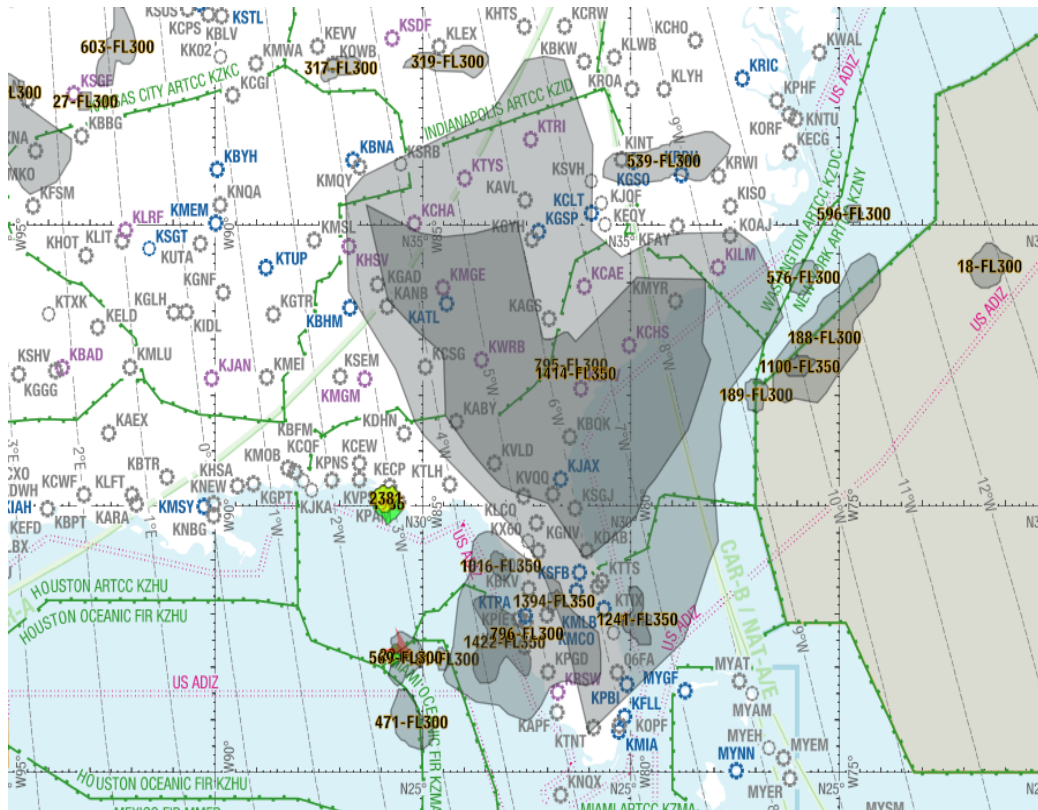
First-look interpretation
is easy, but cloud-height
determination requires
guidance



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Interpretation of satellite pictures:
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HF ?

First-look interpretation
is easy, location and cloud-
height are clear. Convection
and other features require
clear interpretation guidance



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No HF-Challenge:

clear & easy to interpret



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Interpretation of satellite pictures:
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no HF-Challenge:

clear & easy to interpret



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Interpretation of satellite pictures:
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No HF-Challenge:

clear & easy to interpret



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Conclusions:

- some satellite pictures are HF-friendly and give great basic information
- some satellite pictures provide added value information and require interpretative guidance
- all pictures need an unambiguous time-stamp
- near real-time updates are very useful, almost a necessity



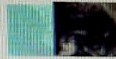

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Interpretative guidance: by expert dispatcher / meteorologist
and
clear scales / description with the picture

*Complimentary Weather Bulletin
Dispatch – Pilots – CCO*

- Amérique du Nord
*Numerous showers and thunderstorms expected around New Mexico and Western Texas IAH.
Showers & a few thunderstorms possible across the Midwest & Canada YYZ & YUL.
Misty YVR (1/2SM).*
Alerte Cyclone : Olaf 200300Z réseau LAX-PPT, 1100Nm Southeast of Hilo, moving West at 09Kts, strengthening. 
- Amérique du Sud
Brume : EZE & GRU.
Orages : CUN.
Alertes Volcaniques : Argentine COPAHUE, Equateur COTOPAXI, REVENTADOR.
TUNGURAHUA: sans conséquences. Mexique COLIMA 191945Z VA event ended : veille
- Asie
Brume : BLR.
Orages : DEL, BKK & SGN.
Alertes :
Tempête Koppu 200300Z 275Nm North of Manila, Philippines, moving Northwest at 15Kts weakening 

Cyclone Champi 200300Z 210Nm Southwest Iwo To, Japan, moving North at 04Kts, weakening. 

Volcaniques : Indonésie TARA BATU, DUKONO & Japon KARYMSKY, ASOSAN : sans conséquences.

Example of guidance
product, seen at the
Eurocontrol WX
resilience forum
(Air France)

Explain the valuable
information to pilots:
they need it for decisions !



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References / slide explanation

- 1 GOES E visible sat picture
- 2 GOES E IR sat picture BW and with temperature
- 3 GOES E IR satellite picture, Aviationweather.gov
- 4 Water vapor (US-Navy) and cloudsat
- 5 Eumetsat Ash
- 6 CIMSS ash retrieval, identification, height, radius and mass loading
- 7 SACS SO₂
- 8 CIMMS IR/WV experimental
- 9 Eumetsat MPE plus airplane weather radar
- 10 GOES E enhanced IR
- 11 NOAA AVN Colour
- 12 NCAR/VC/BCI/LH cloud-heights + convection
- 13 Eumetsat IR
- 14 MODIS high-resolution, visible
- 15 MODIS high resolution, visible



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