Quicklook - Meeting

NAWDEX Campaign

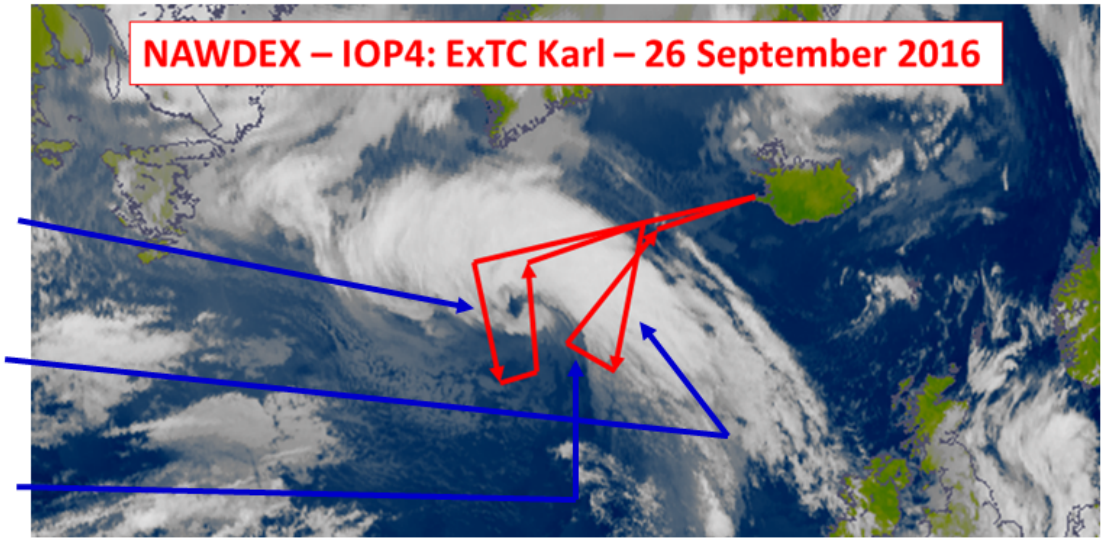
October 1, 2016

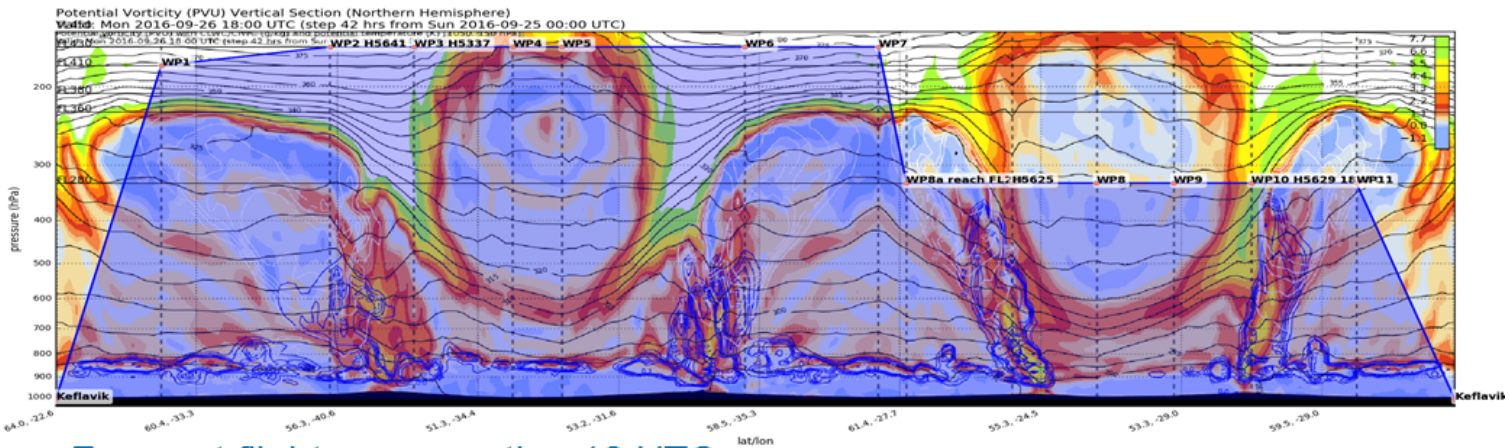
HALO RF4 - Monday, 26.09.2016, Meteorolgical Situation

IOP4 Objectives

Rapid development of ex-TC Karl:

1. Descent of tropopause fold during intensification
2. Mixed-phase cloud along WCB
3. Structure of dry intrusion at deepest point

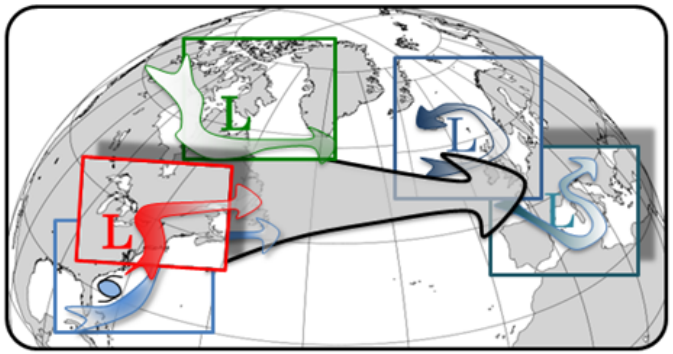




Forecast flight cross section 18 UTC

WALES

NAWDEX: WALES Quicklooks



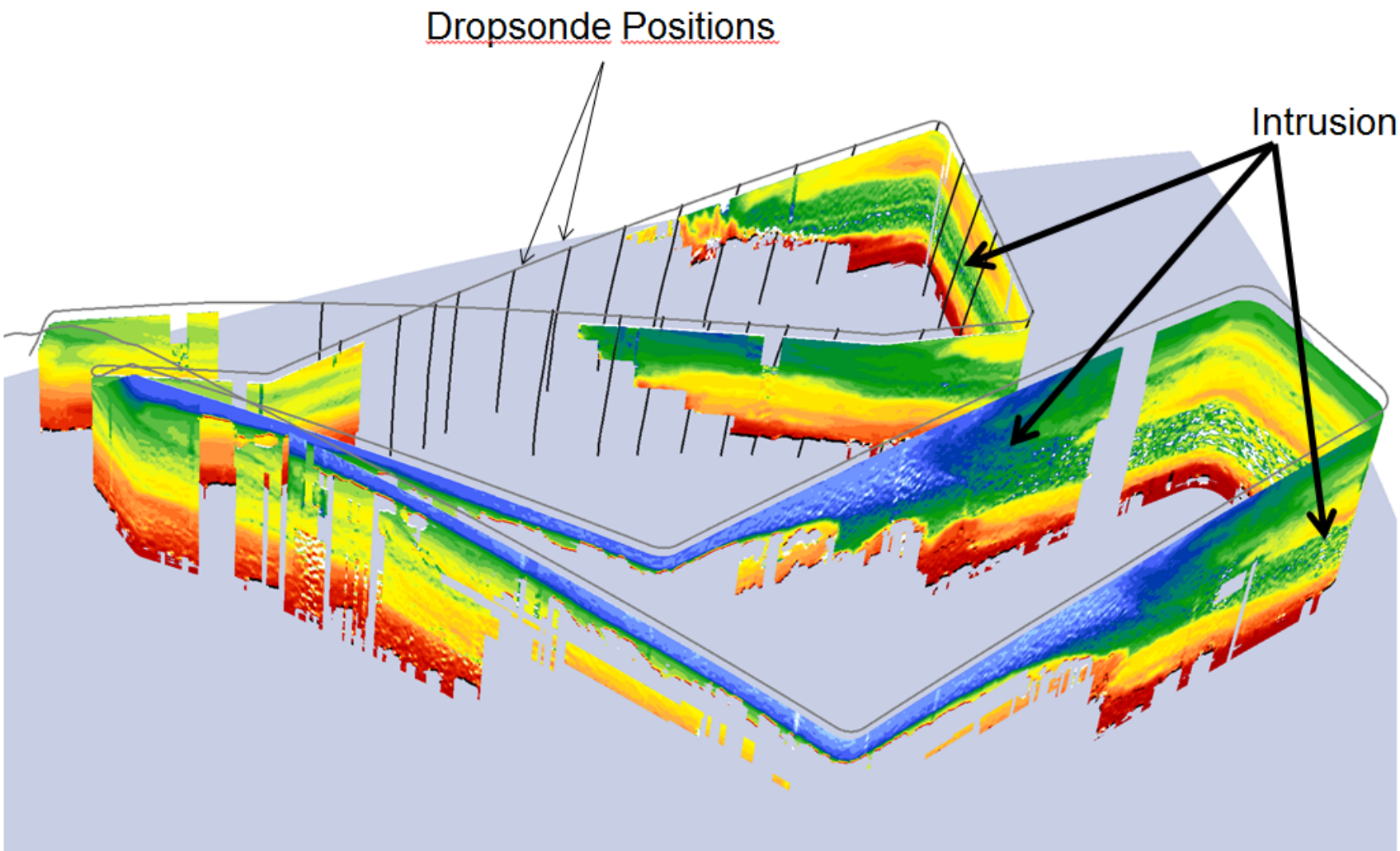
HALO-WALES:
H_2O and Aerosol Lidar

Team:

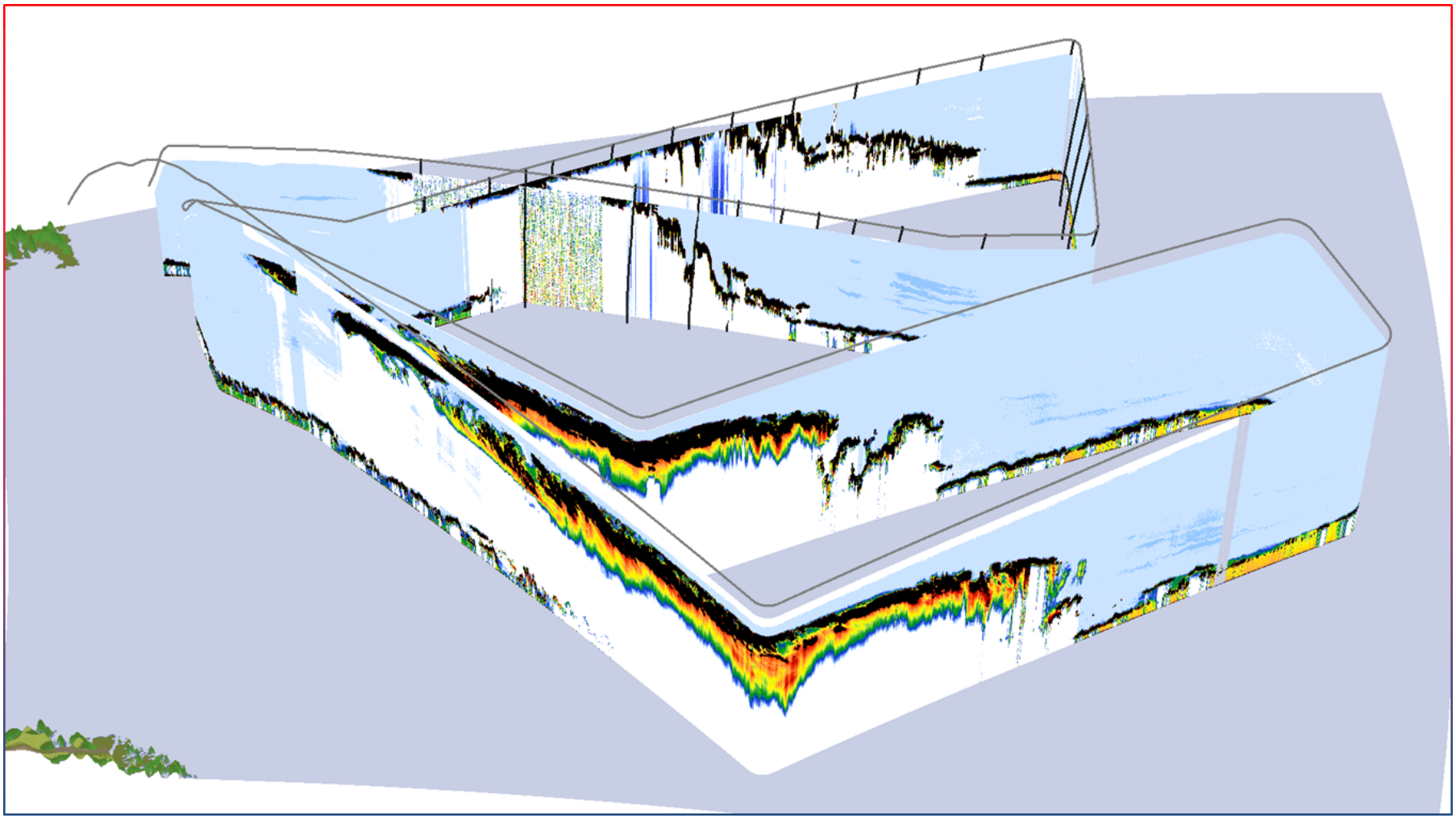
Martin Wirth
Andreas Fix
Axel Amediek
Manuel Gutleben
Silke Groß
Florian Ewald
Andreas Schäfler
.....

DLR

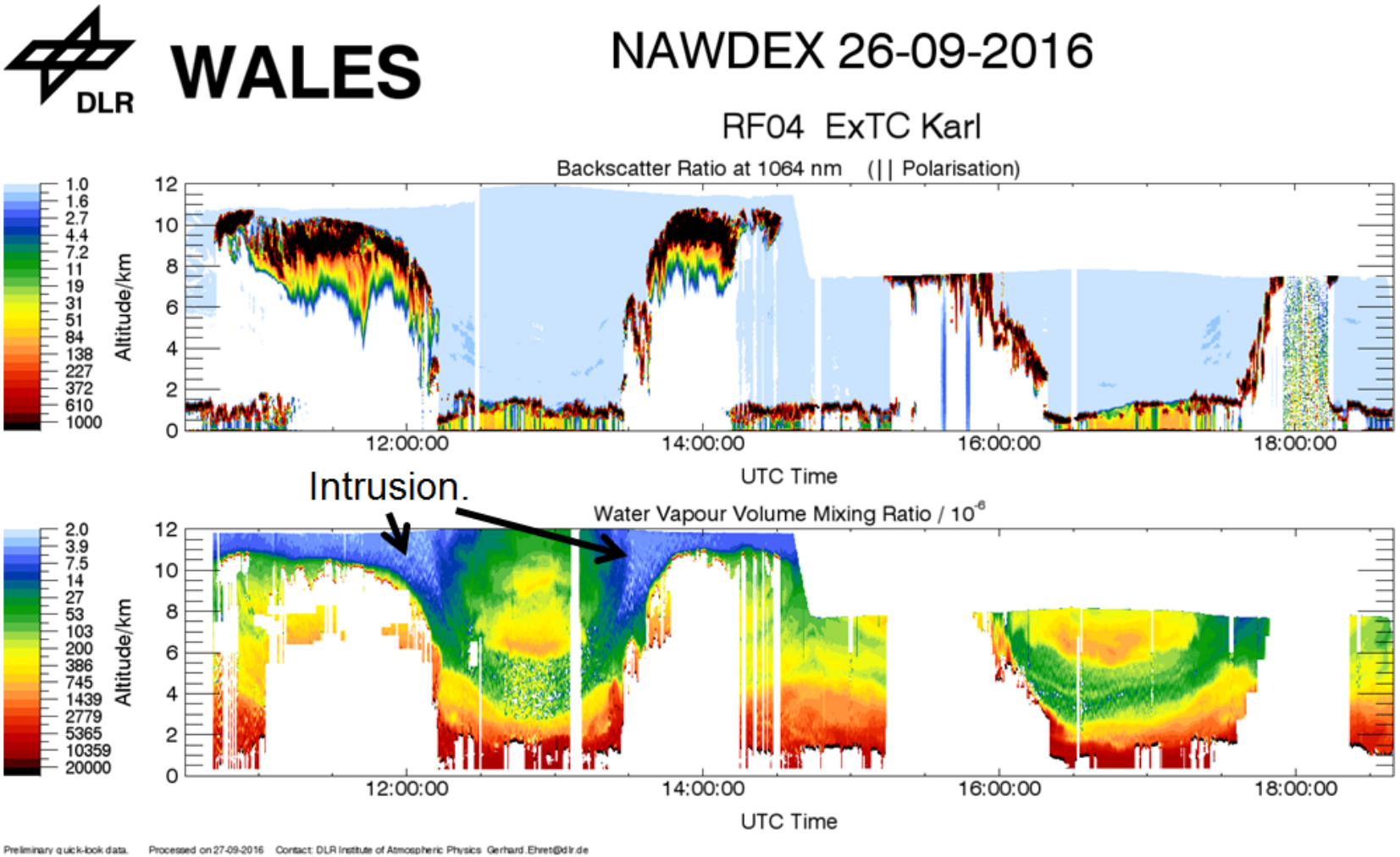
WALES



WALES

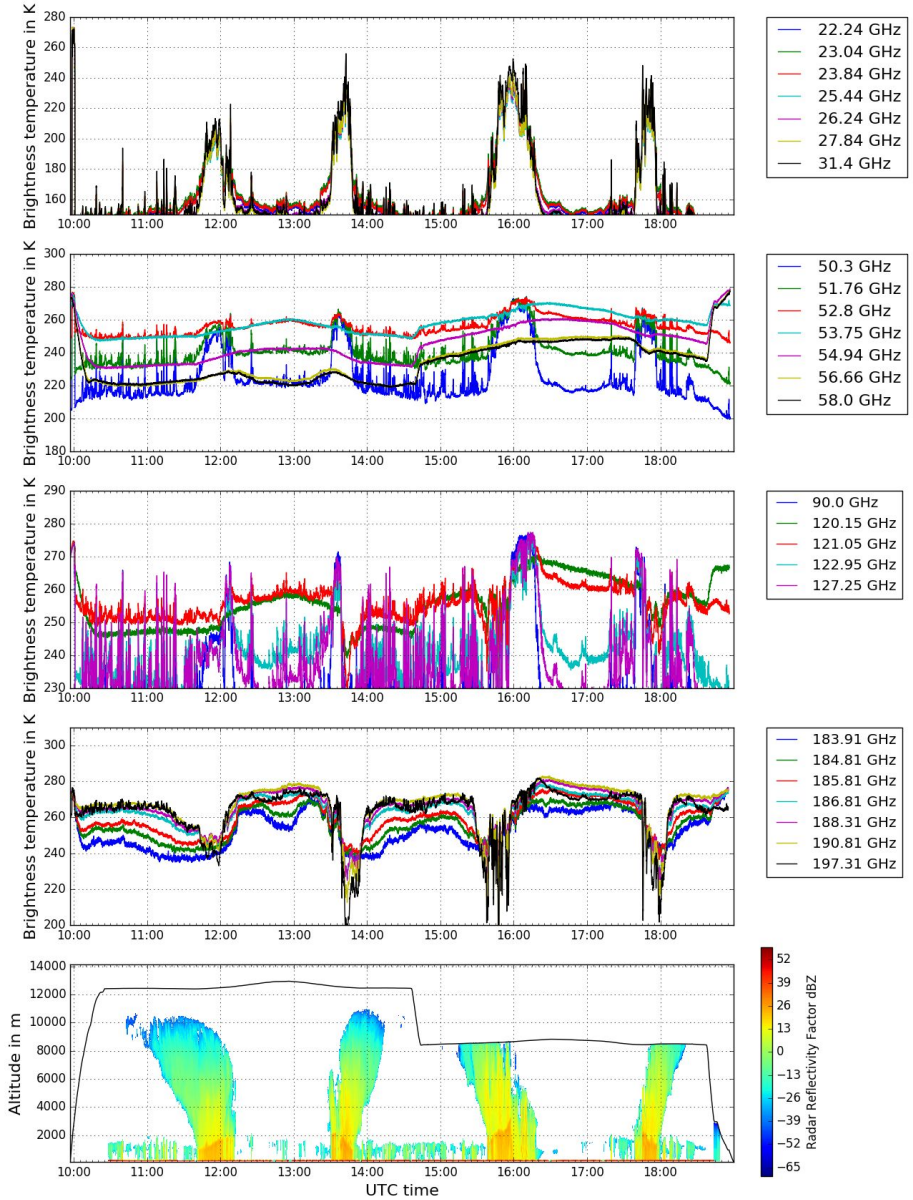


WALES

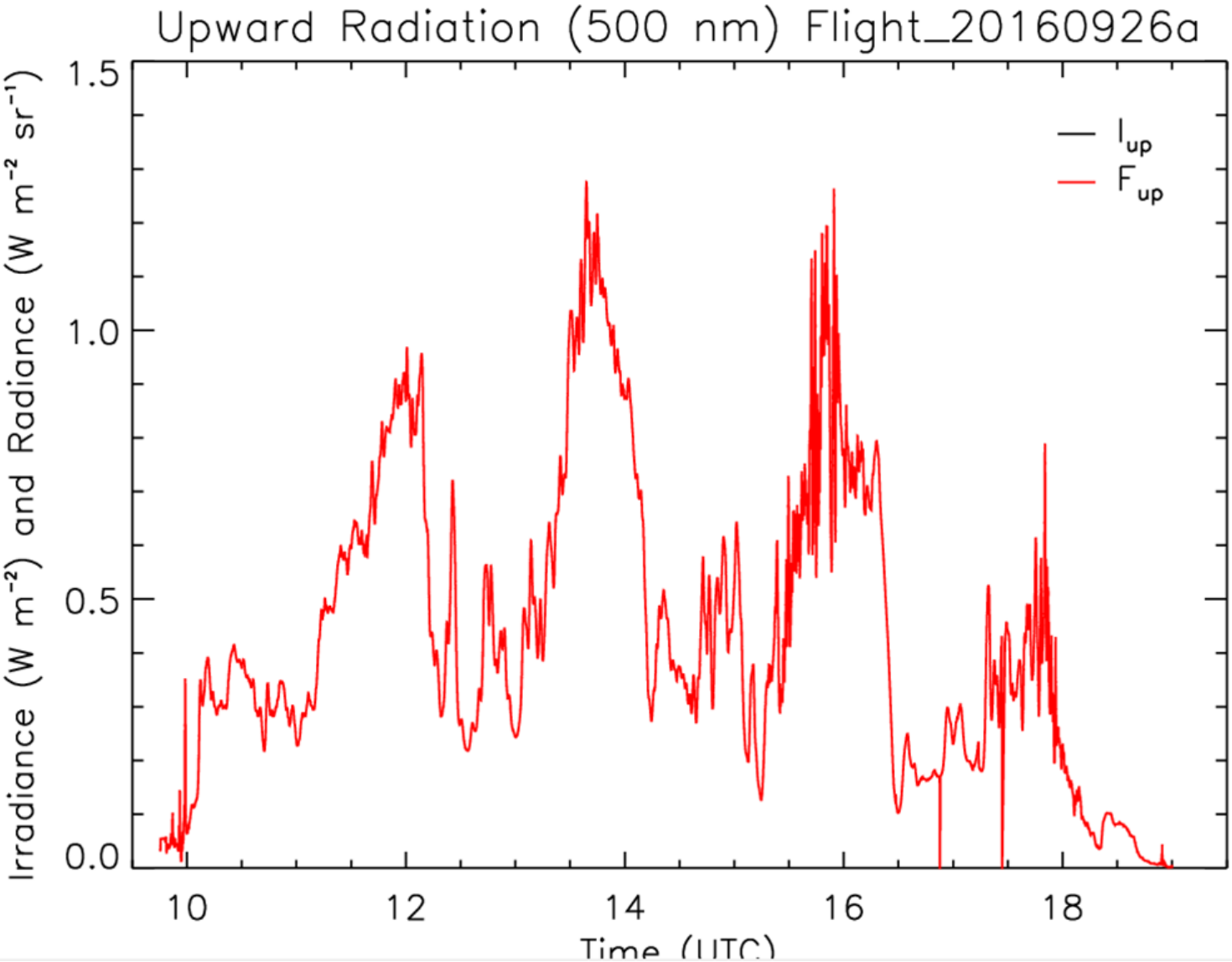

DLR
WALES
NAWDEX 26-09-2016
RF04 ExTC Karl
Backscatter Ratio at 1064 nm (|| Polarisation)
1.0
1.6
2.7
4.4
7.2
11
19
31
51
84
138
227
372
610
1000
Altitude/km
12
10
8
6
4
2
0
12:00:00
14:00:00
16:00:00
18:00:00
UTC Time
Intrusion.
Water Vapour Volume Mixing Ratio / 10-6
2.0
3.9
7.5
14
27
53
103
200
386
745
1439
2779
5365
10359
20000
Altitude/km
12
10
8
6
4
2
0
12:00:00
14:00:00
16:00:00
18:00:00
UTC Time
Preliminary quick-look data. Processed on 27-09-2016 Contact: DLR Institute of Atmospheric Physics Gerhard.Ehret@dlr.de

HAMP

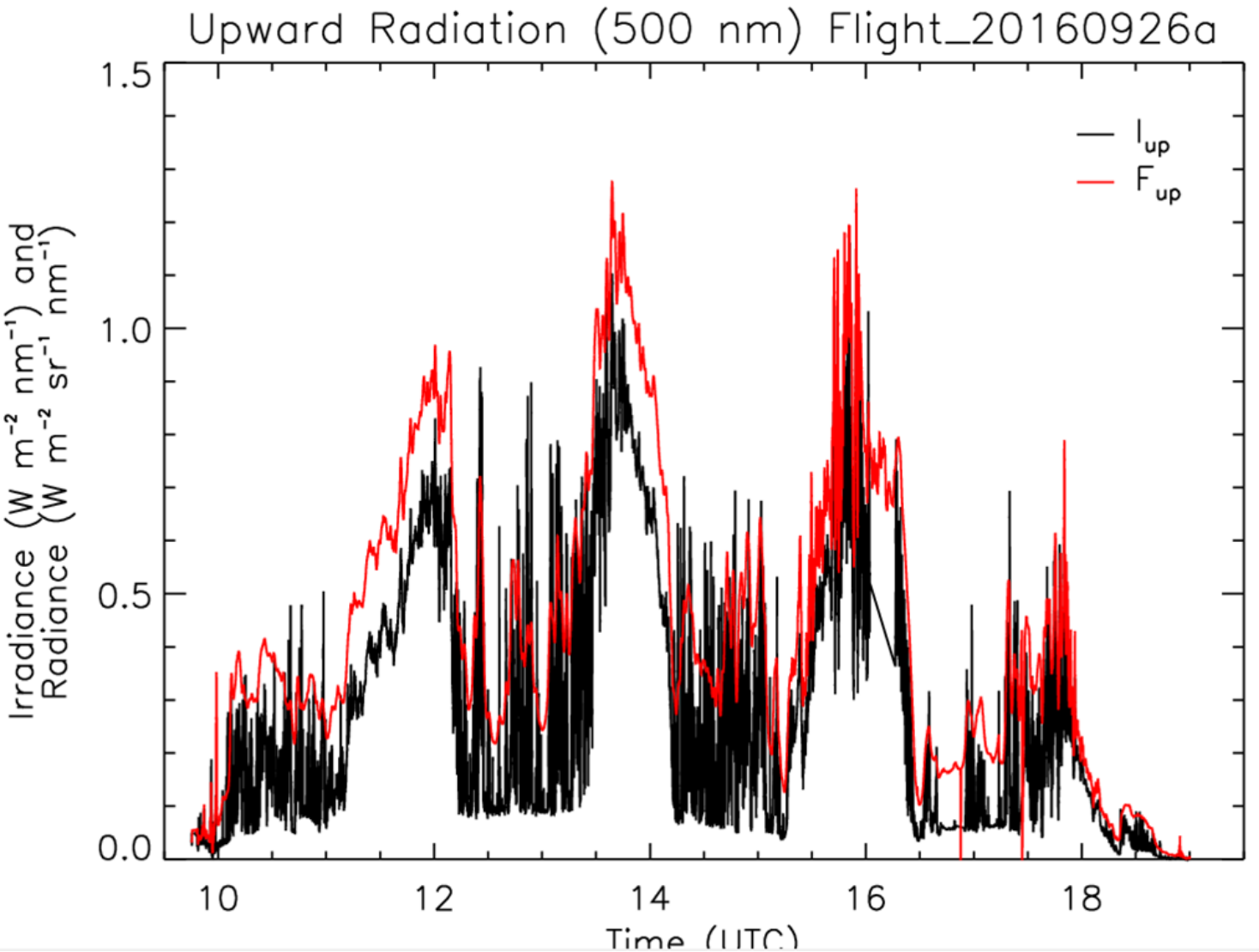
NAWDEX, Radiometer + Radar, 26.09.2016



SMART


Upward Radiation (500 nm) Flight_20160926a
Irradiance (W m⁻²) and Radiance (W m⁻² sr⁻¹)
1.5
1.0
0.5
0.0
10
12
14
16
18
Time (UTC)
I up
F up

SMART


Upward Radiation (500 nm) Flight_20160926a
Irradiance (W m-2 nm-1) and
Radiance (W m-2 sr-1 nm-1)
1.5
1.0
0.5
0.0
10
12
14
16
18
Time (UTC)
Iup
Fup

SMART

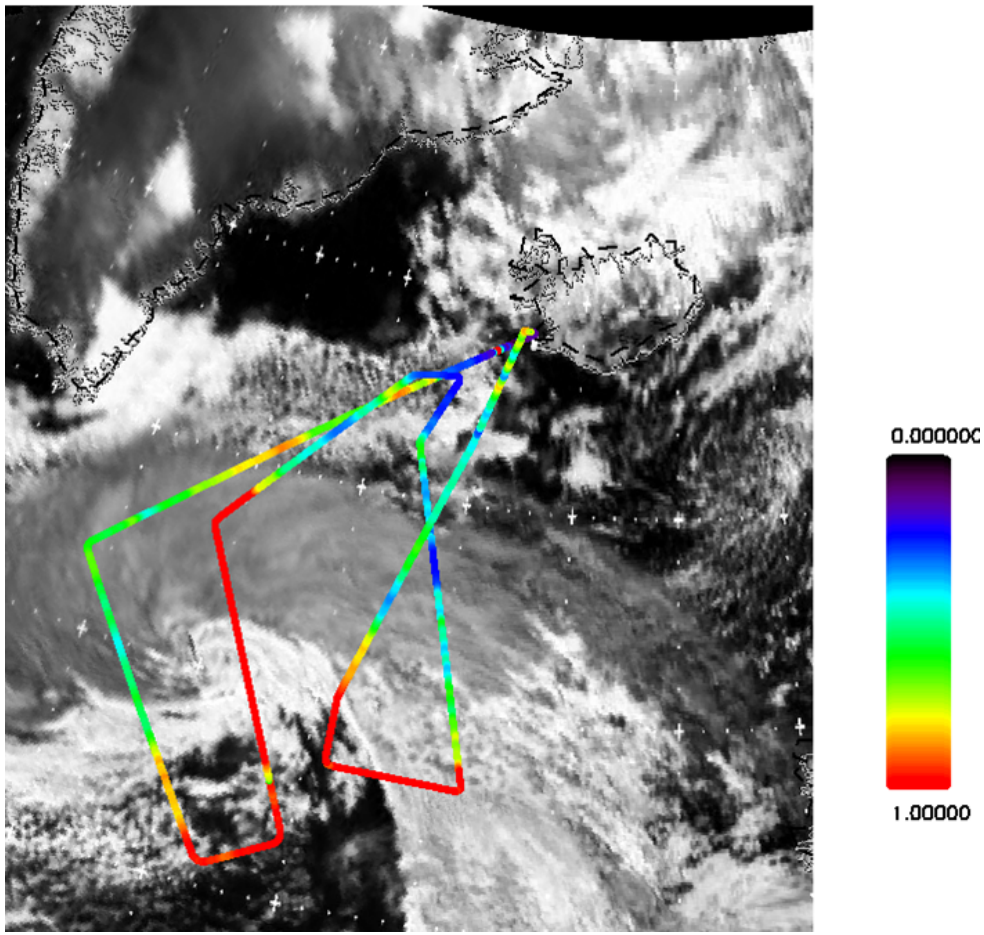
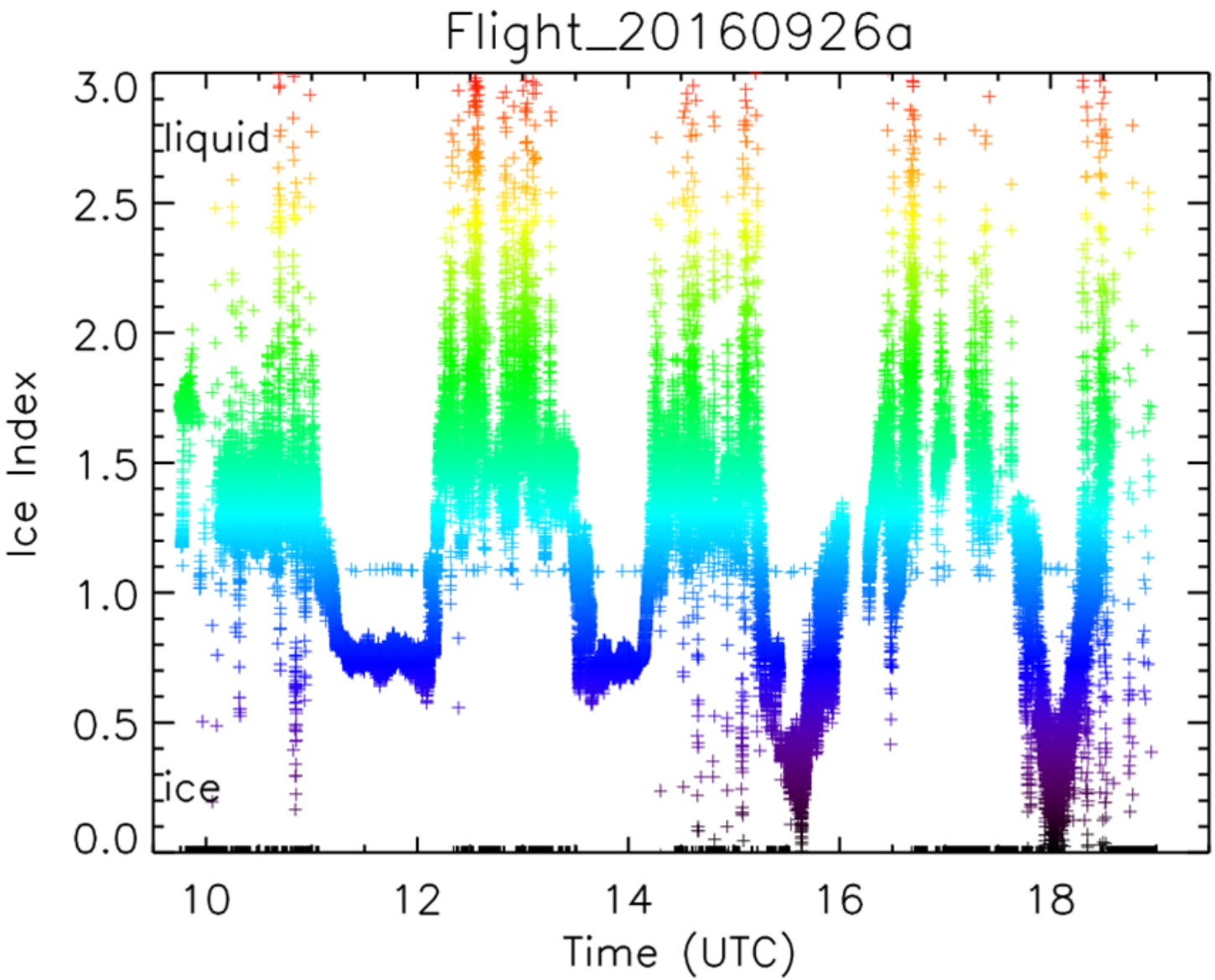


Figure: Cloud Top Albedo on Satellite Image from 26.09.2016 14:30 UTC.

SMART


Flight_20160926a
liquid
ice
Ice Index
3.0
2.5
2.0
1.5
1.0
0.5
0.0
10
12
14
16
18
Time (UTC)

SMART

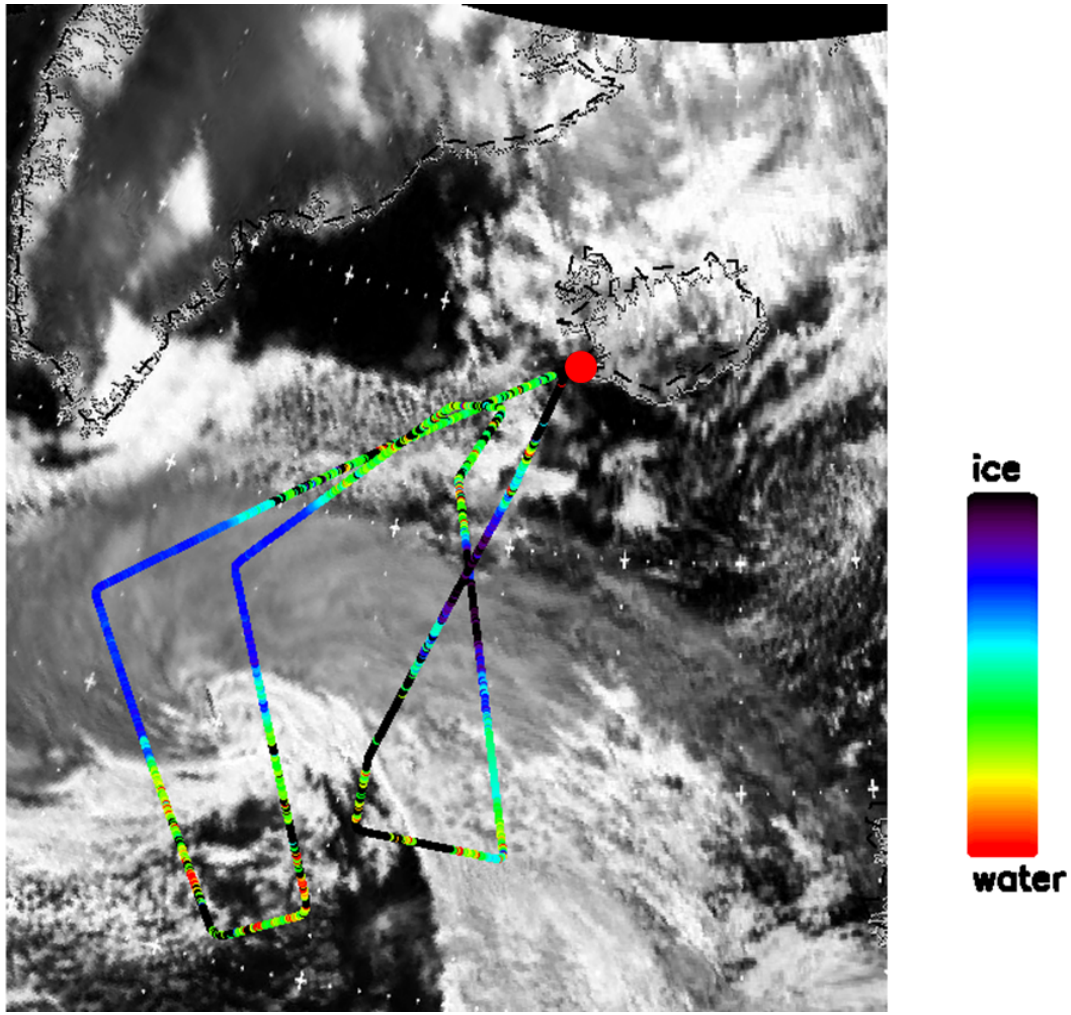
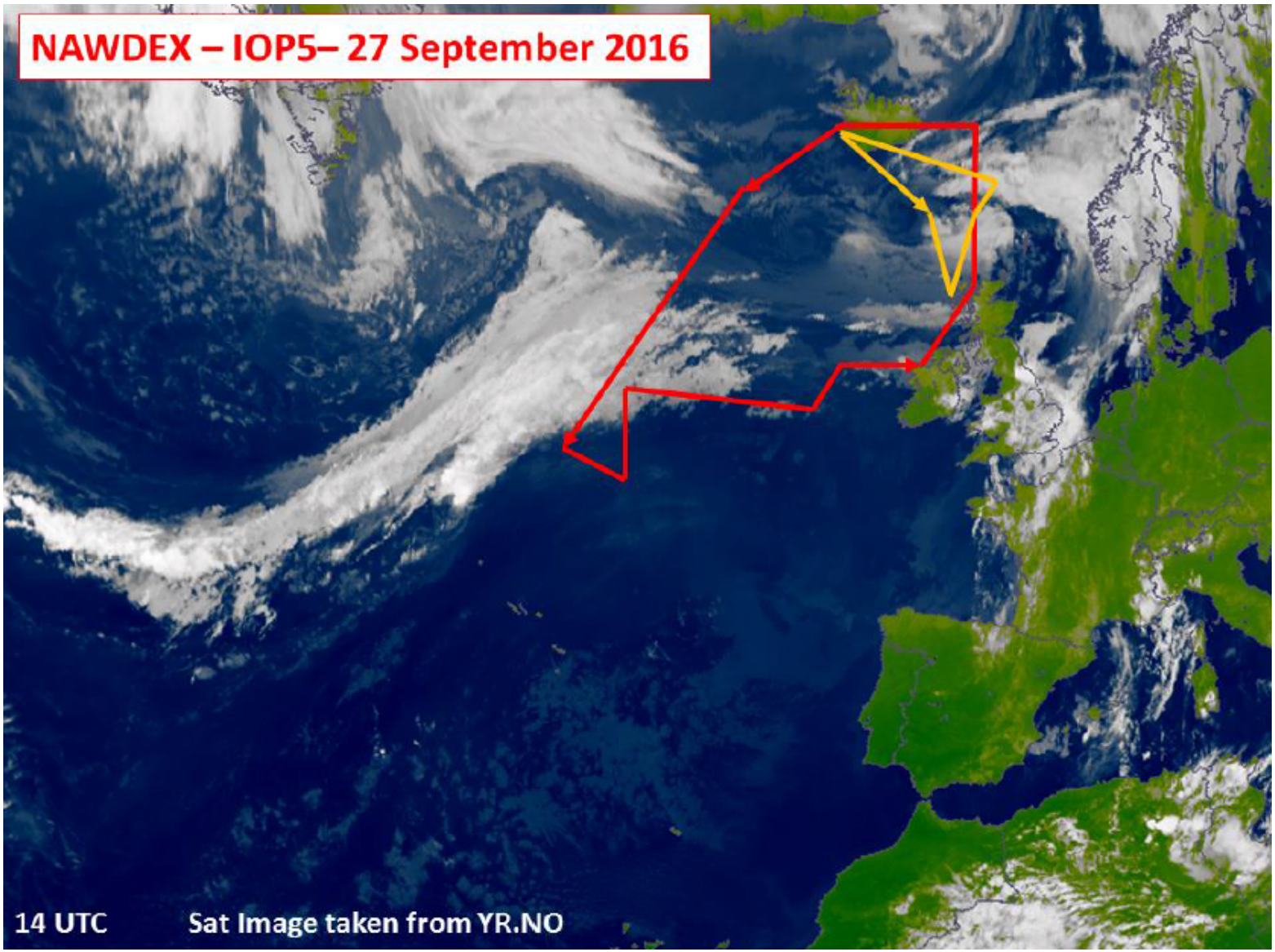


Figure: Ice Index on Satellite Image from 26.09.2016 14:30 UTC.

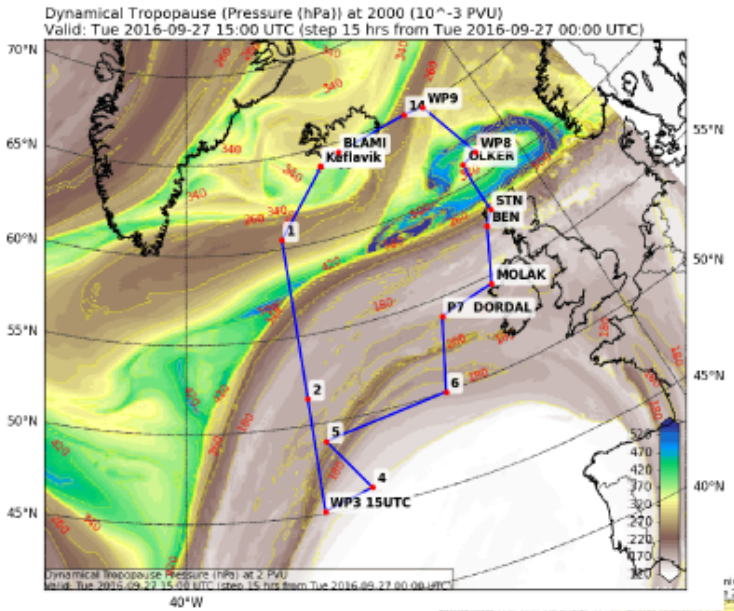
SpecMacs

HALO RF4 - Tuesday, 27.09.2016, Meteorolgical Situation



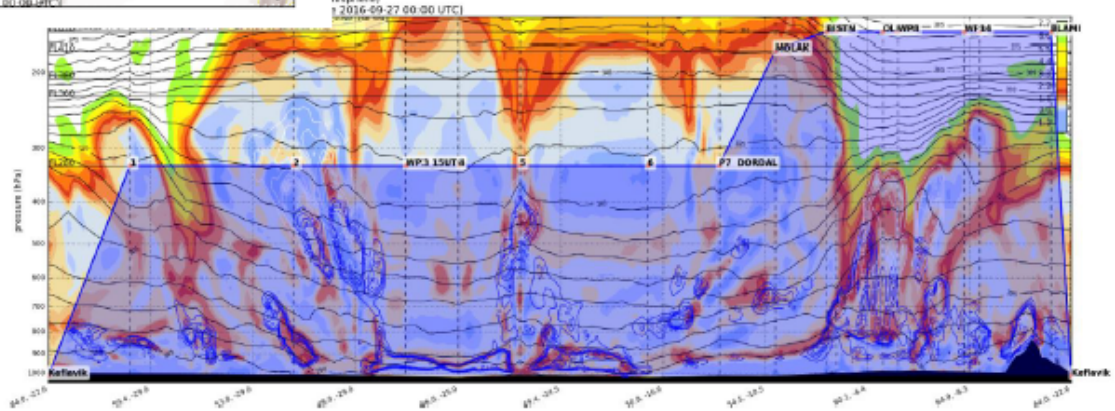
HALO RF4 - Tuesday, 27.09.2016, Meteorolgical Situation

IOP5 overview



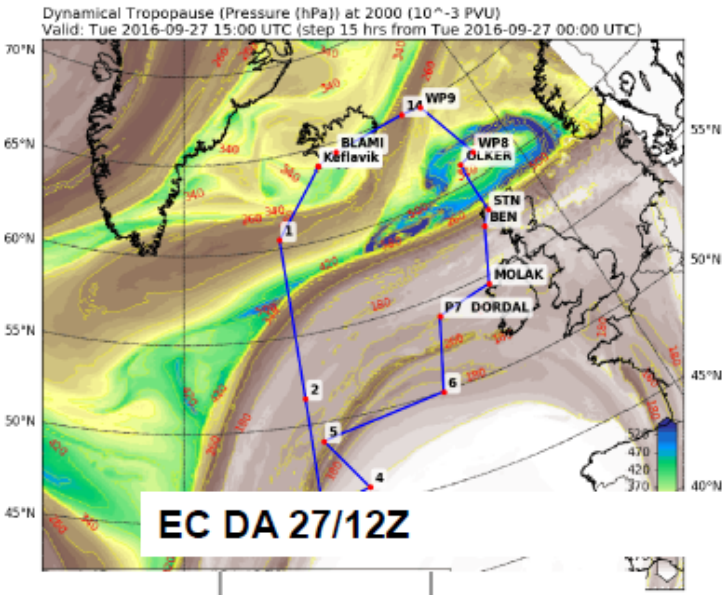
15 UTC 27 Sep 2016 BT 27/00Z

- remnant WCB outflow by Ex-Karl
- Capture TP step/fault where PV cut-off is ongoing
- Forming WCB inflow / atmospheric river in developing cyclone "Walpurga"
- Crossing PV cut-off Ex-Karl
- 20 dropsondes



HALO RF4 - Tuesday, 27.09.2016, Meteorolgical Situation

IOP5 overview



15 UTC 27 Sep 2016 BT 27/00Z

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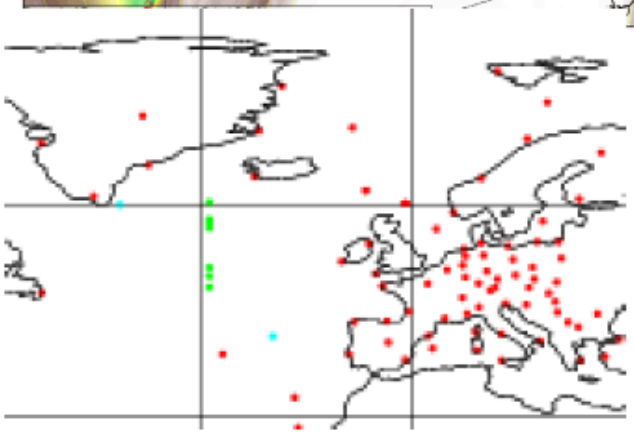
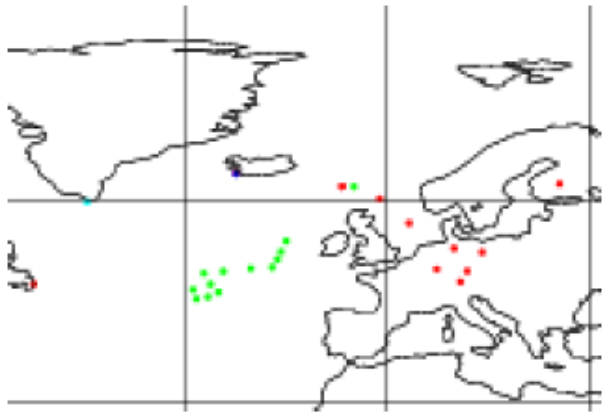


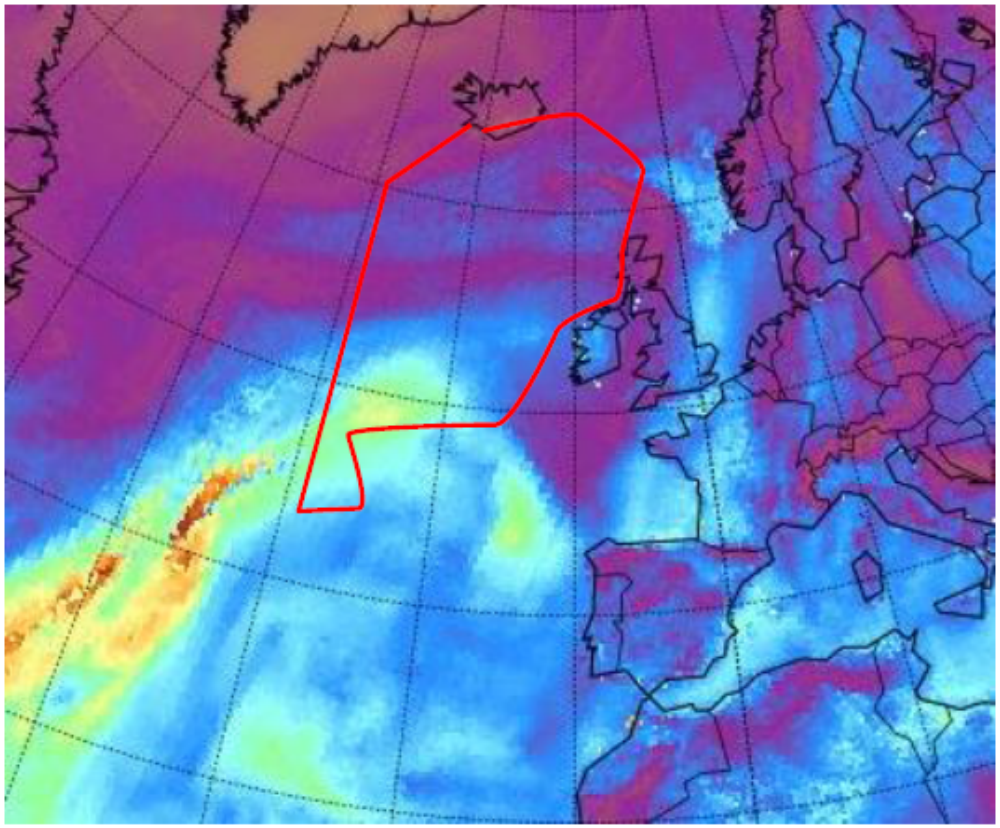
EC DA 27/18Z

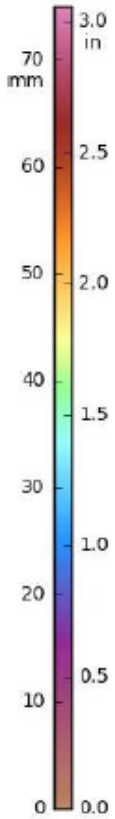


HALO RF4 - Tuesday, 27.09.2016, Meteorolgical Situation

CIMSS TPW Mimic V2 product

20160927_12



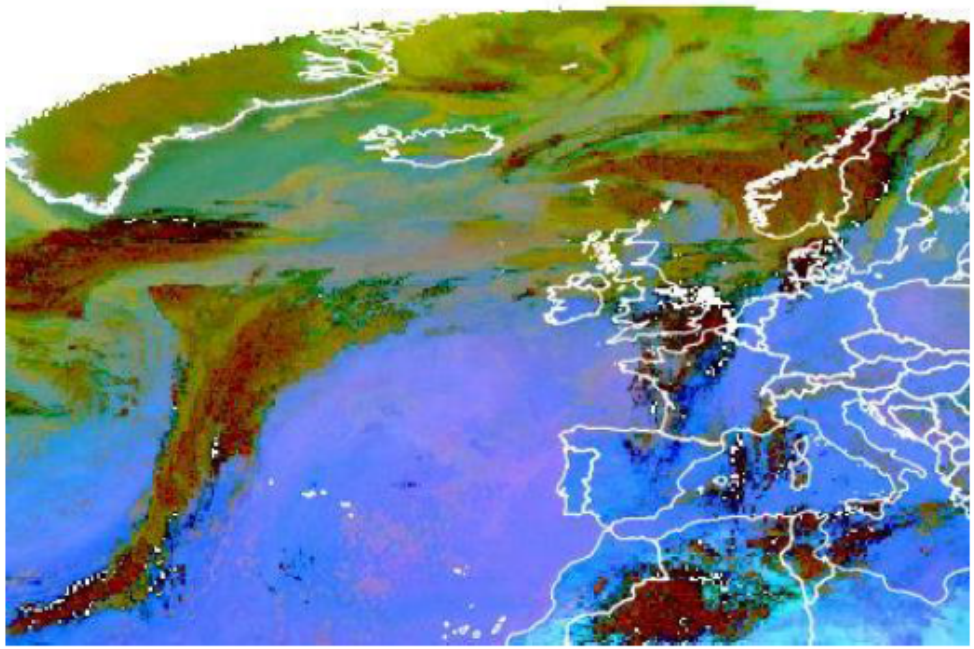


http://tropic.ssec.wisc.edu/real-time/mtpw2/product.php?color_type=tpw_nrl_colors&prod=europe&timespan=72hrs

Approximate flight track

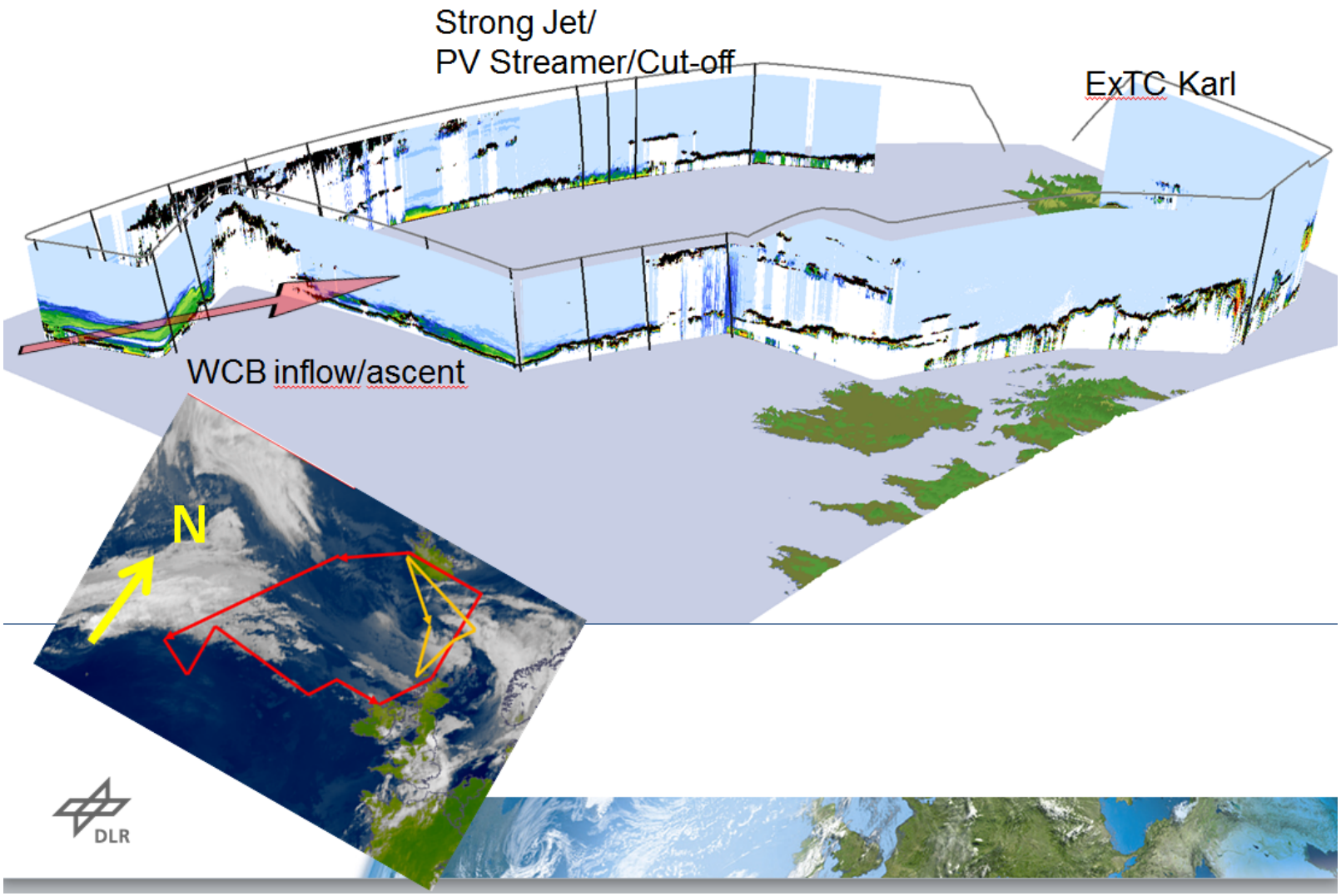
HALO RF4 - Tuesday, 27.09.2016, Meteorolgical Situation

Eumetsat dust product

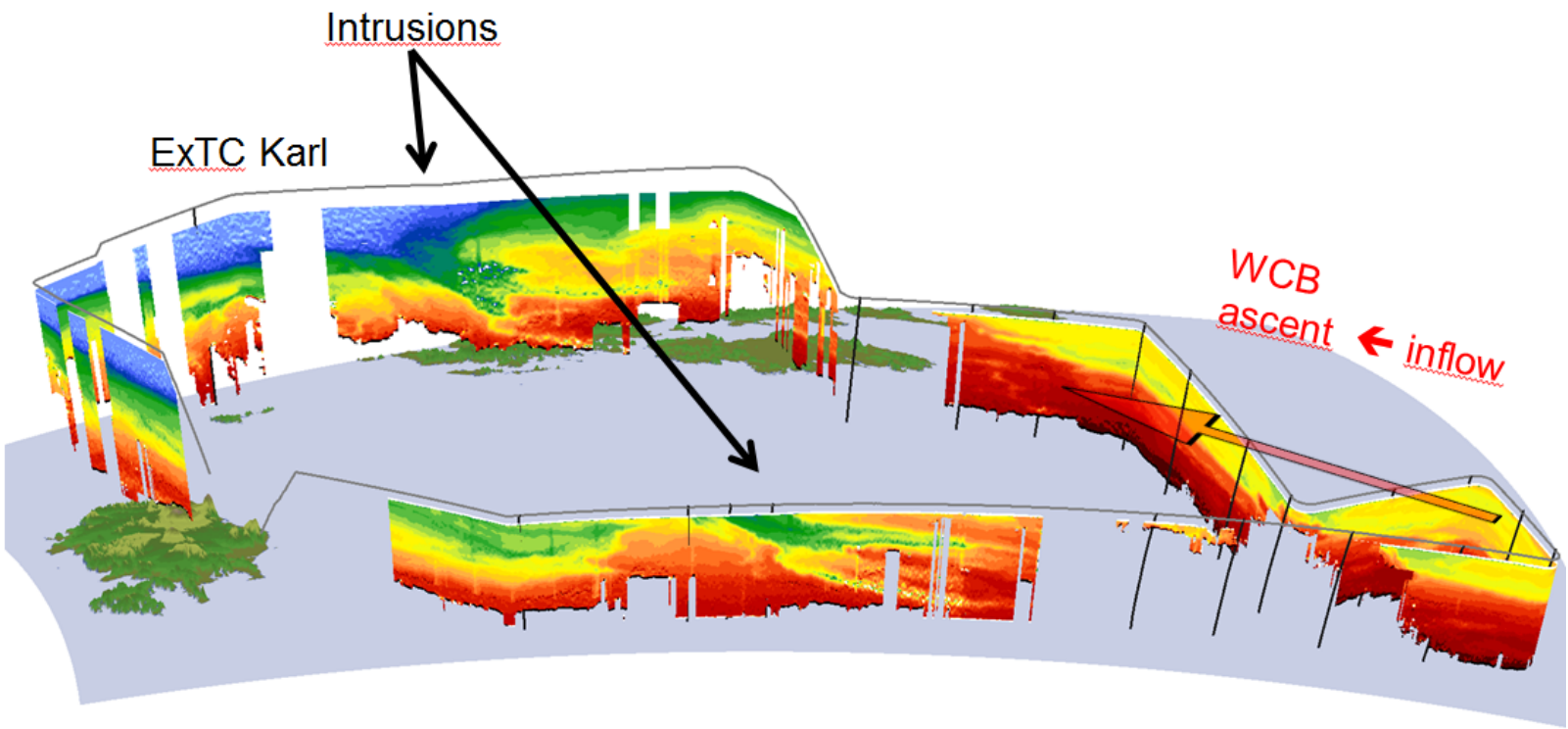


20160927_15

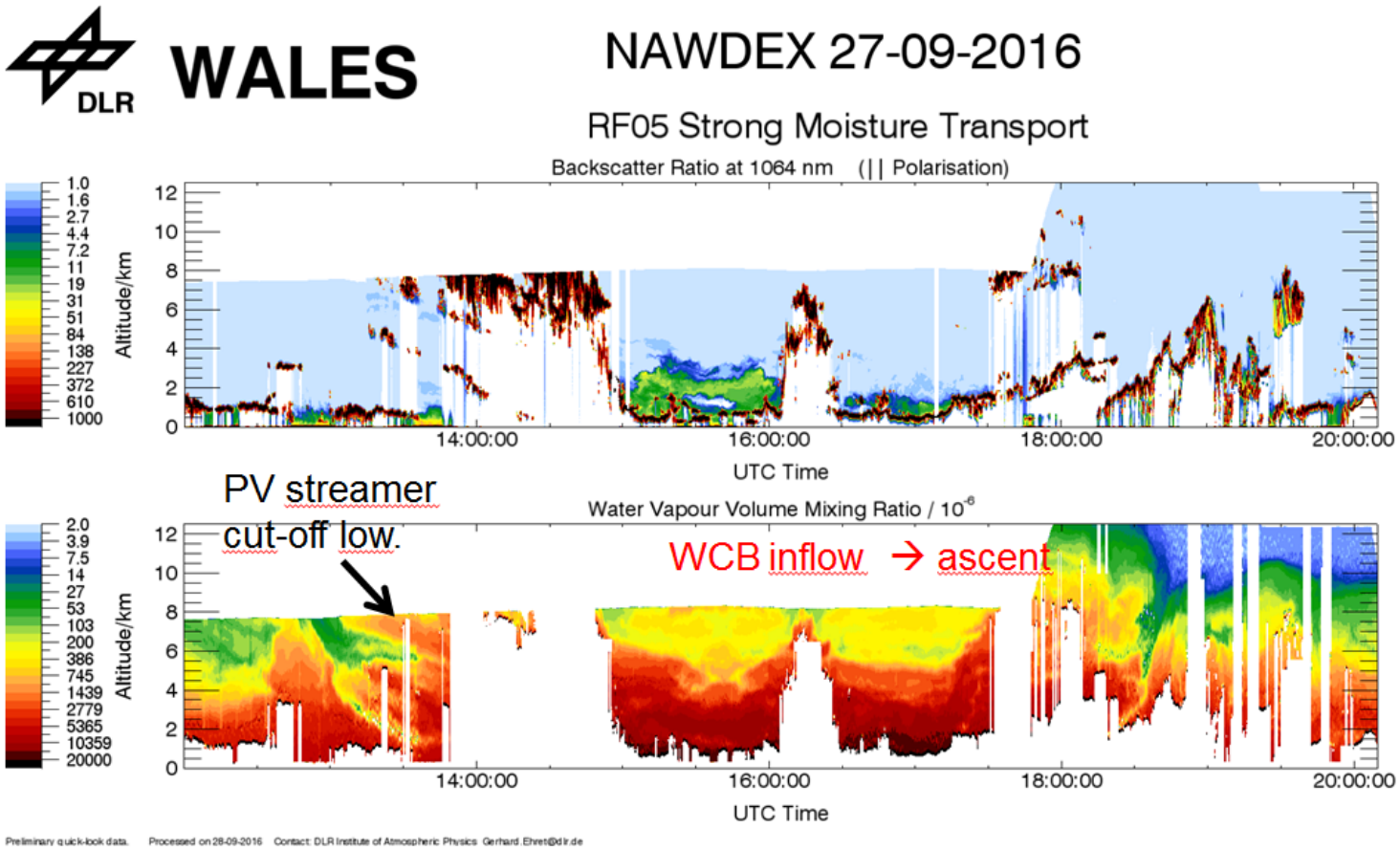
WALES


Strong Jet/
PV Streamer/Cut-off
ExTC Karl
WCB inflow/ascent
N
DLR

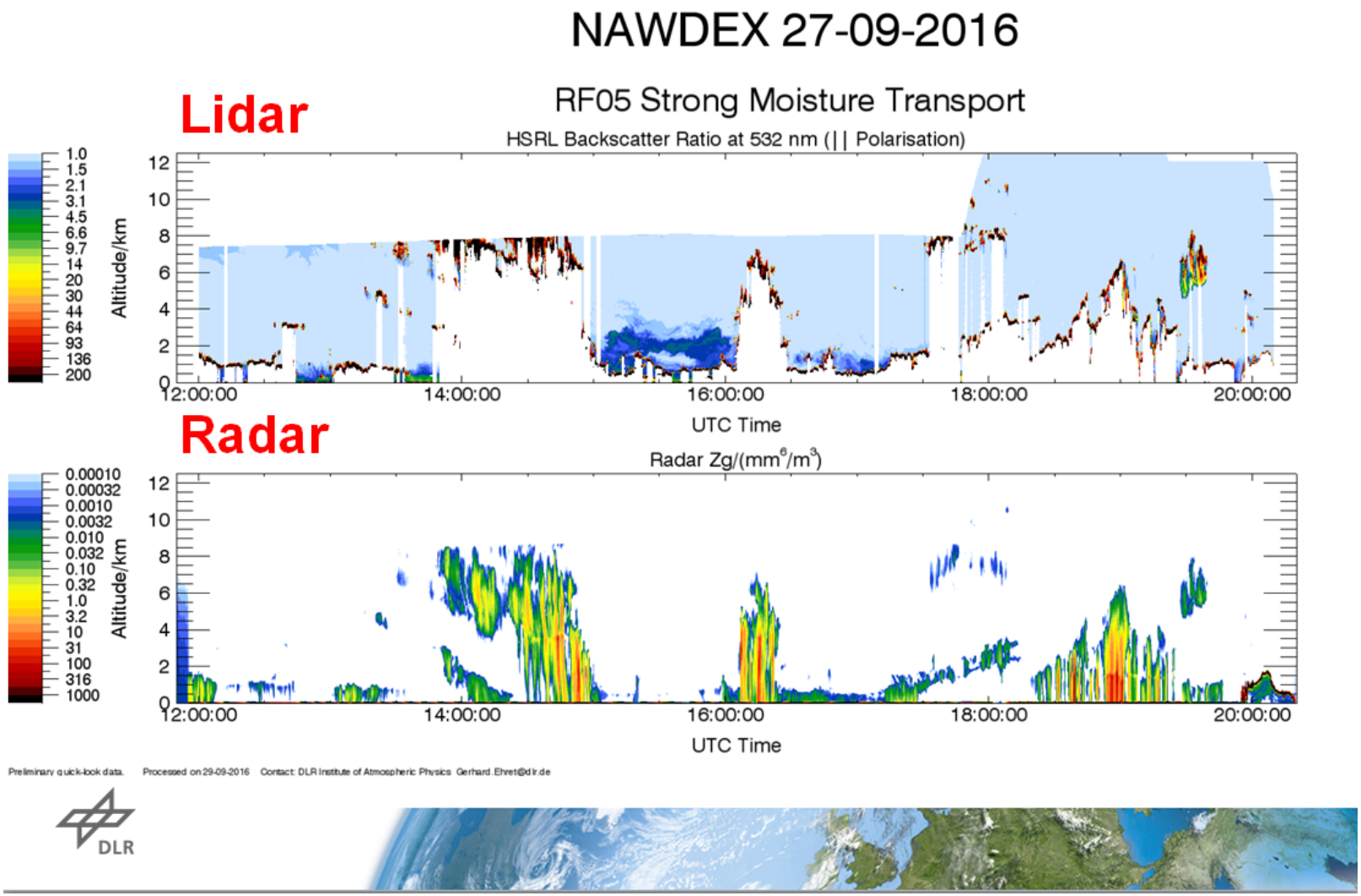
WALES



WALES

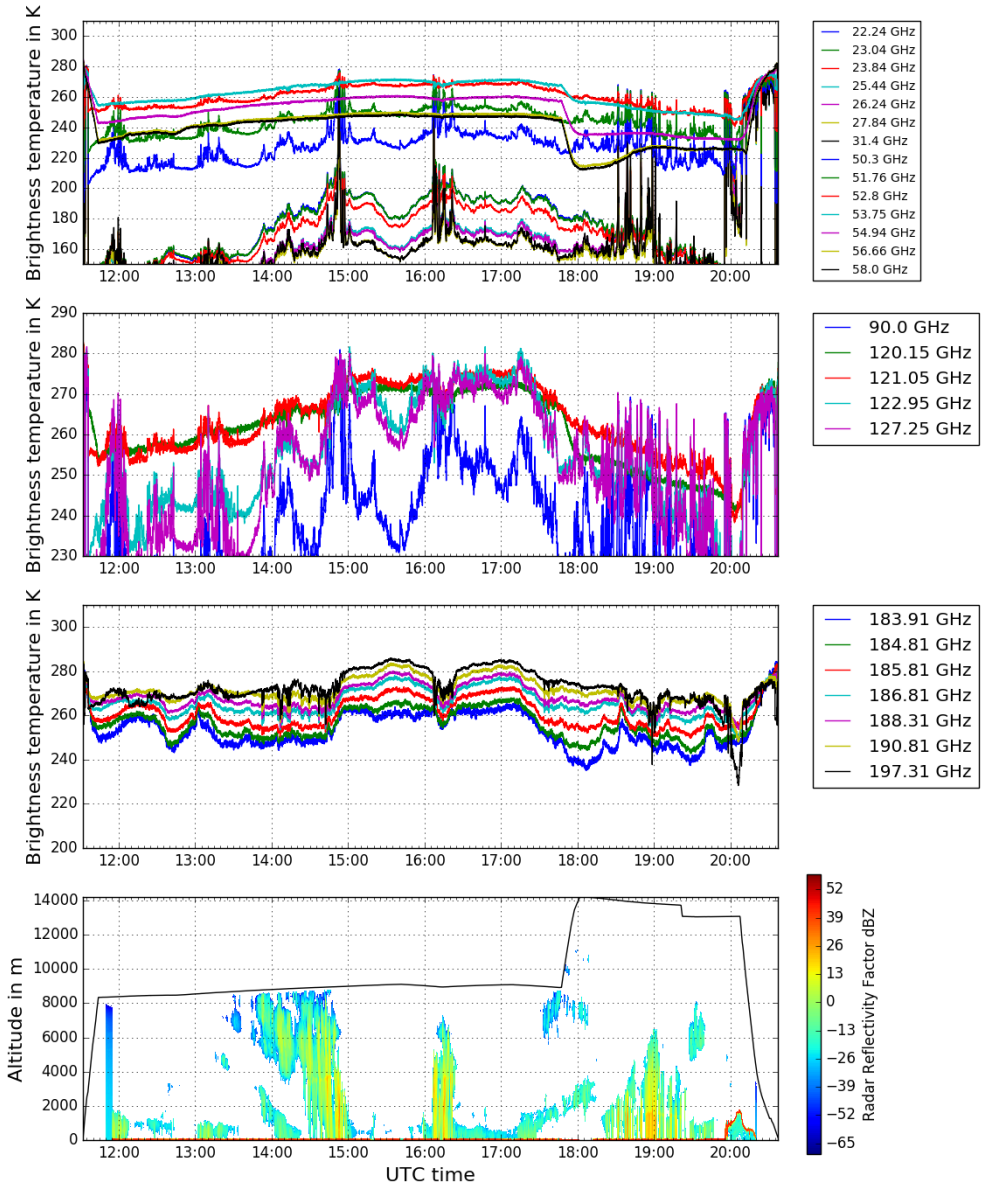

DLR
WALES
NAWDEX 27-09-2016
RF05 Strong Moisture Transport
Backscatter Ratio at 1064 nm (|| Polarisation)
1.0
1.6
2.7
4.4
7.2
11
19
31
51
84
138
227
372
610
1000
Altitude/km
12
10
8
6
4
2
0
14:00:00
16:00:00
18:00:00
20:00:00
UTC Time
PV streamer
cut-off low.
Water Vapour Volume Mixing Ratio / 10-6
WCB inflow → ascent
2.0
3.9
7.5
14
27
53
103
200
386
745
1439
2779
5365
10359
20000
Altitude/km
12
10
8
6
4
2
0
14:00:00
16:00:00
18:00:00
20:00:00
UTC Time
Preliminary quick-look data. Processed on 28-09-2016 Contact: DLR Institute of Atmospheric Physics Gerhard.Ehret@dlr.de

RADAR and Lidar



HAMP

NAWDEX, Radiometer + Radar, 27.09.2016



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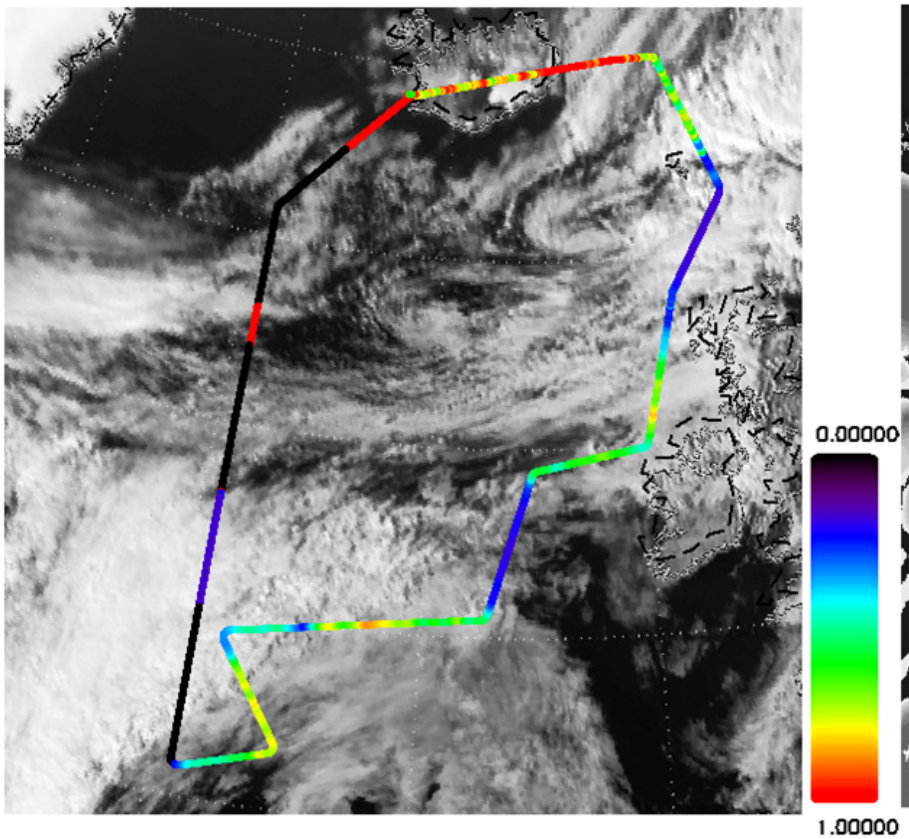
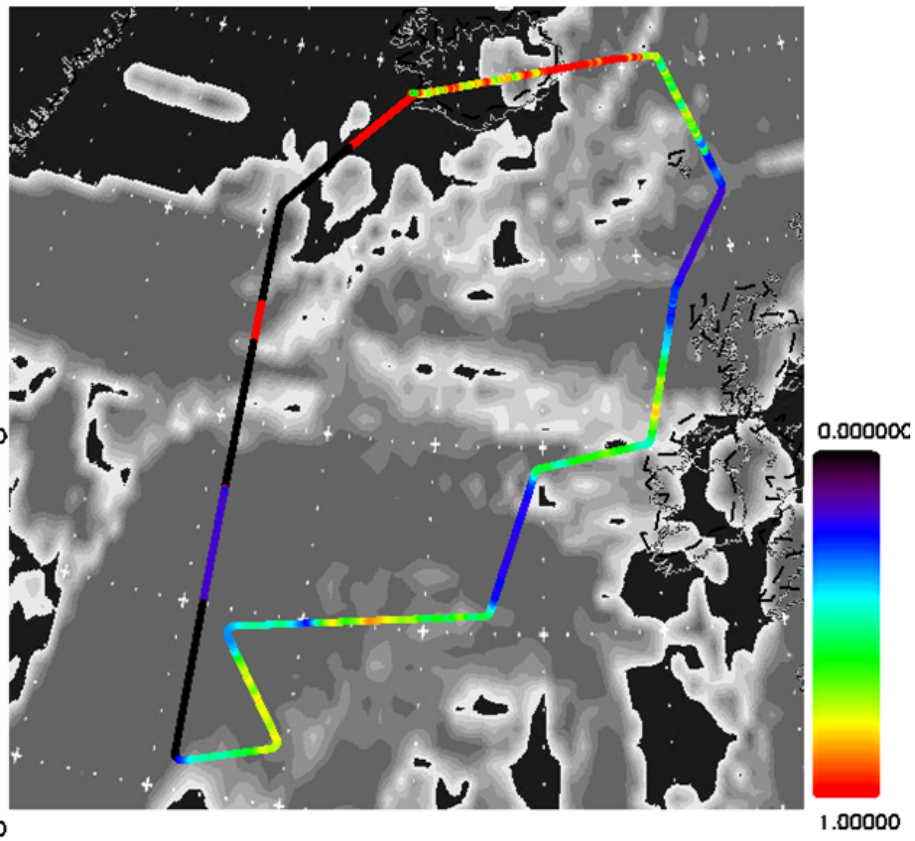
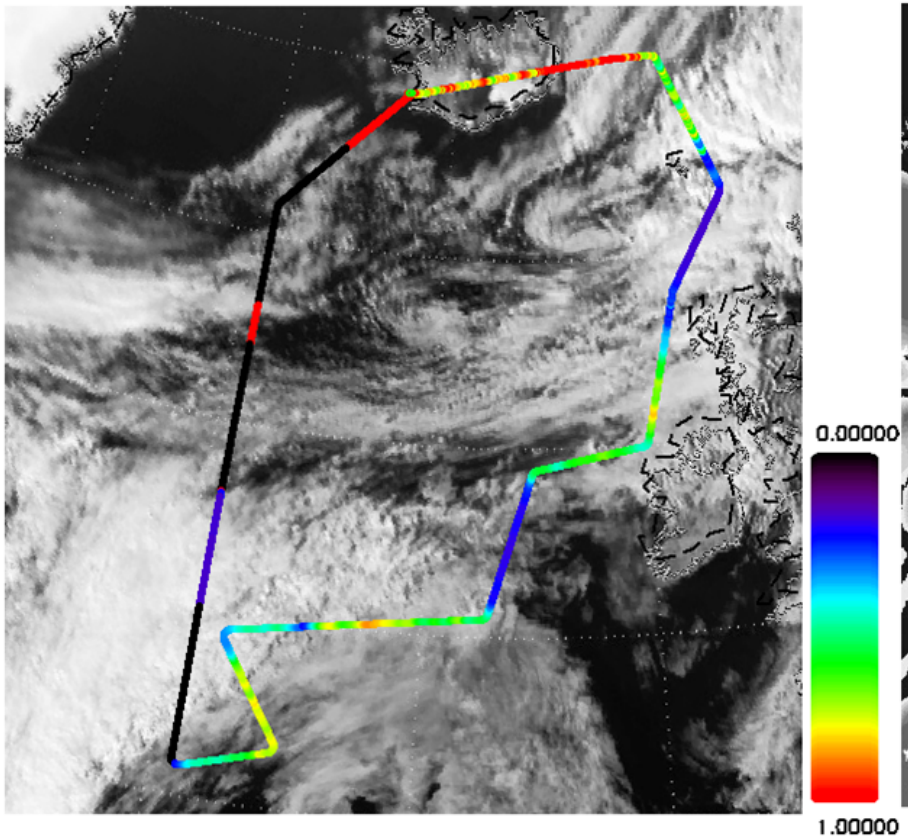


Cloud Top Albedo on Satellite Image from 27.09.2016 16:00 UTC

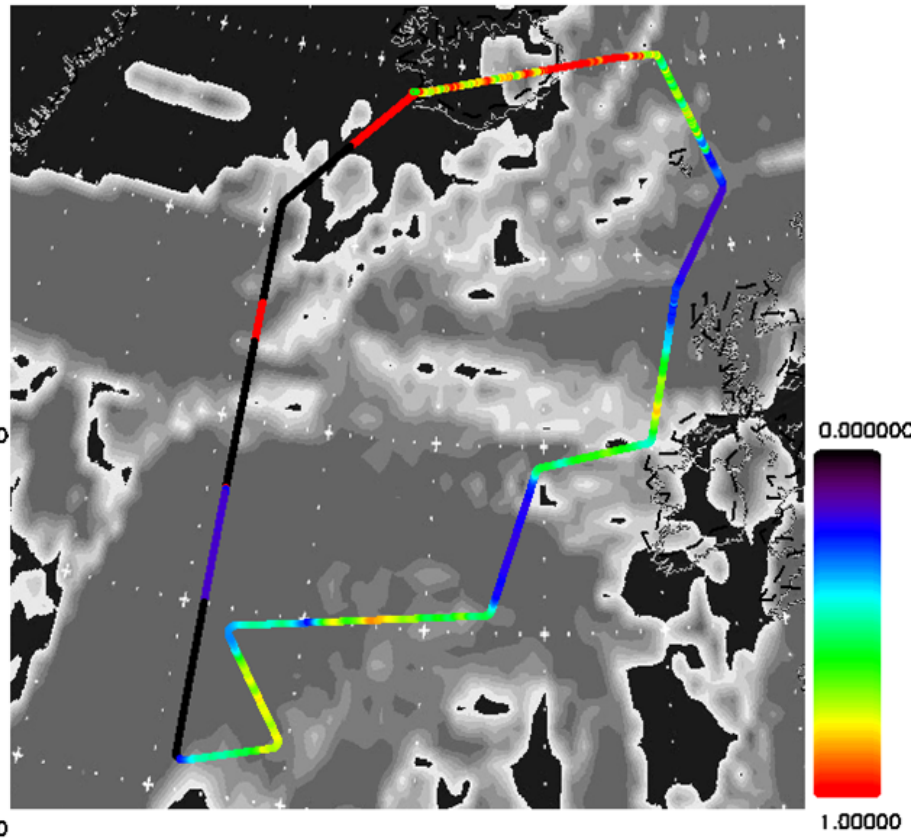


Cloud Top Albedo on ICON Model output 2.09.2016 18:00 UTC

SMART

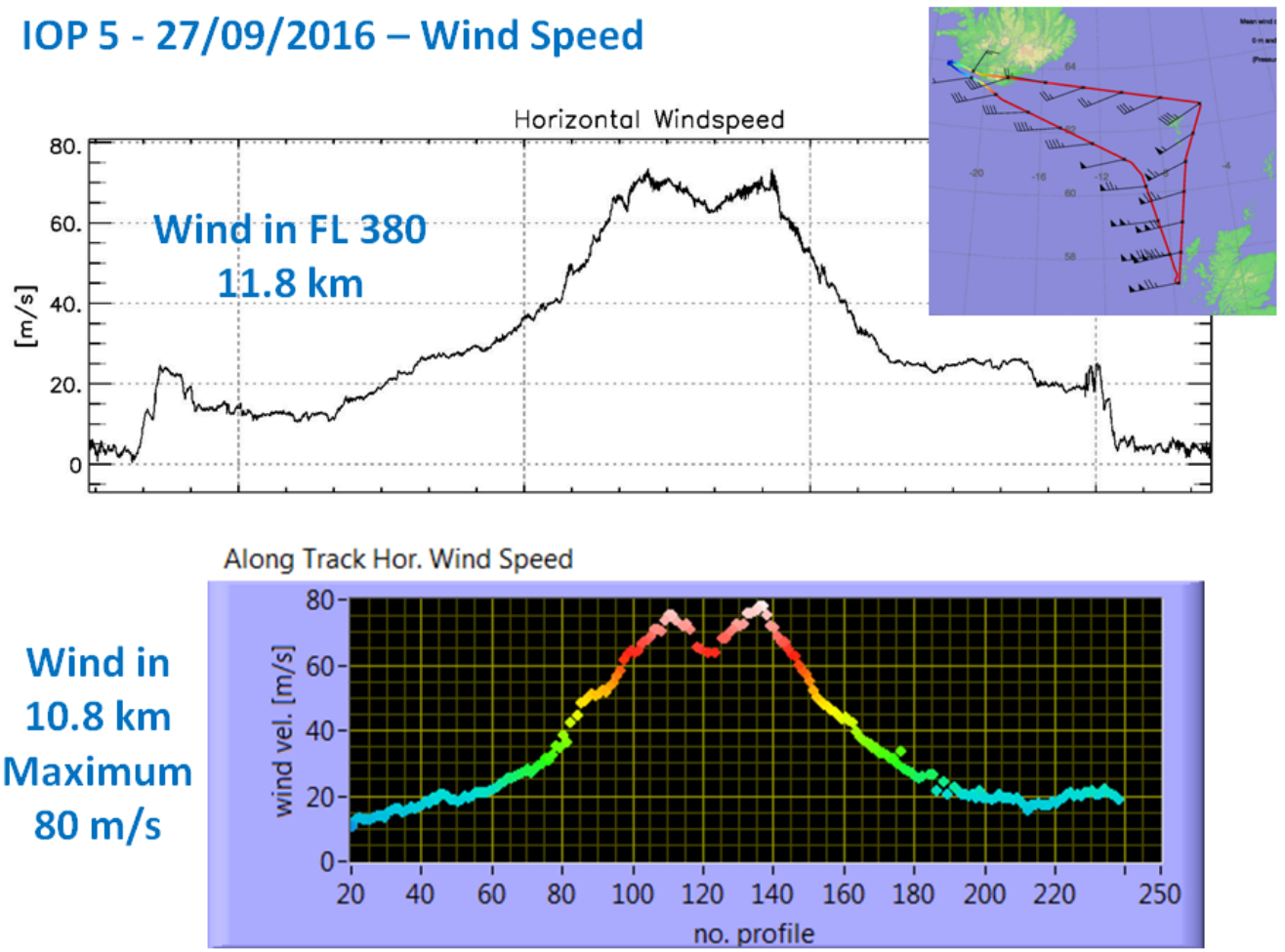


Cloud Top Albedo on Satellite Image from 27.09.2016 16:00 UTC

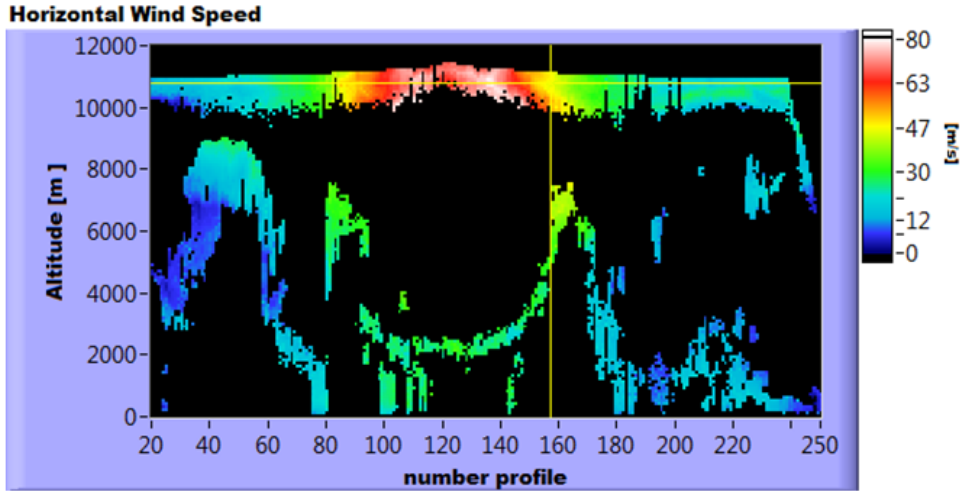


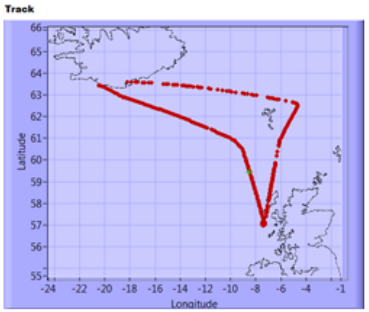
Cloud Top Albedo on ICON Model output 2.09.2016 18:00 UTC

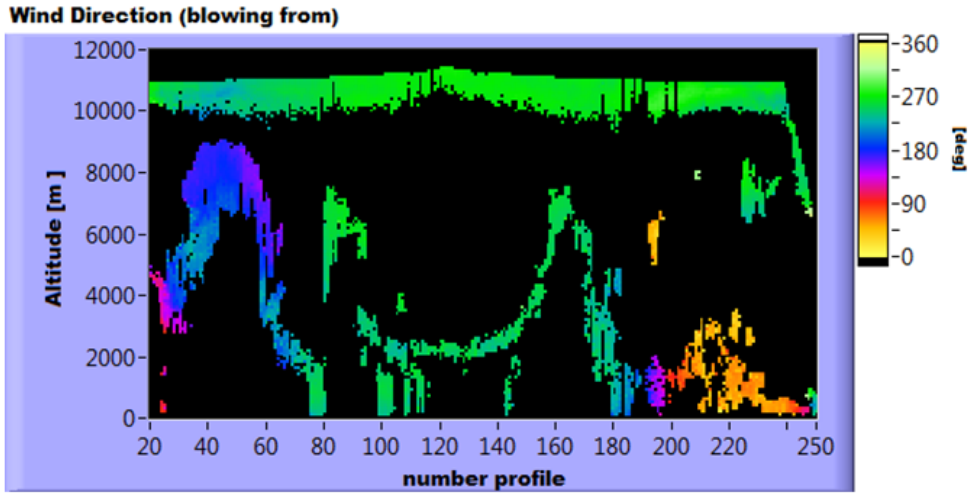
Falcon RF - Tuesday, 27.09.2016, Meteorolgical Situation



Falcon RF - Tuesday, 27.09.2016, Meteorolgical Situation





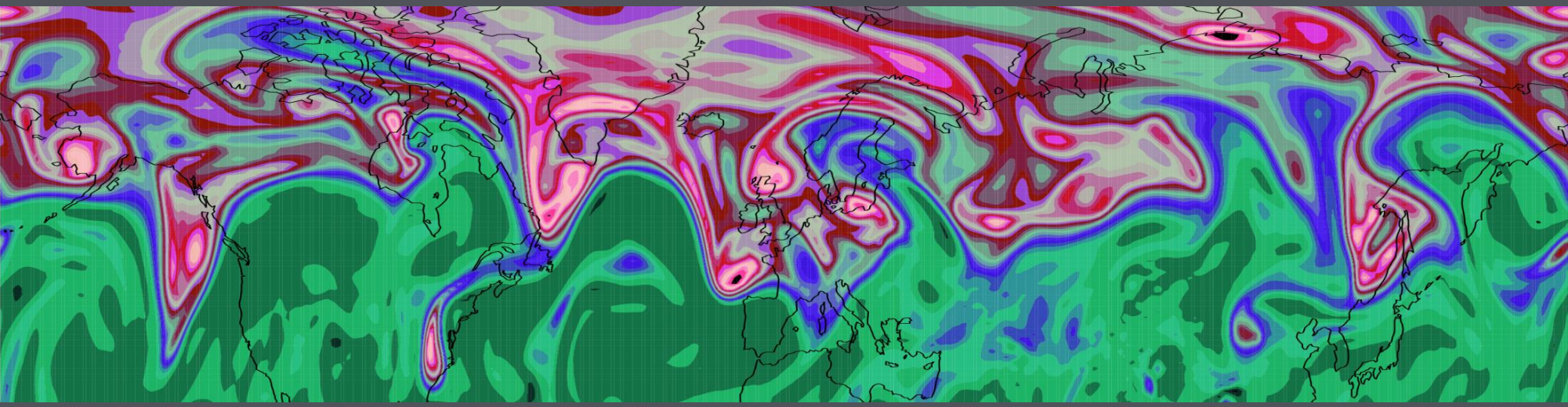


IOP 5
27/09/2016 –
Jet Stream
Southeast
Iceland

Department of Meteorology

University of Reading

NORTH ATLANTIC WAVEGUIDE AND DOWNSTREAM IMPACTS EXPERIMENT



FAAM BAe146 flight: Tuesday 27/9/16

John Methven,

Department of Meteorology,

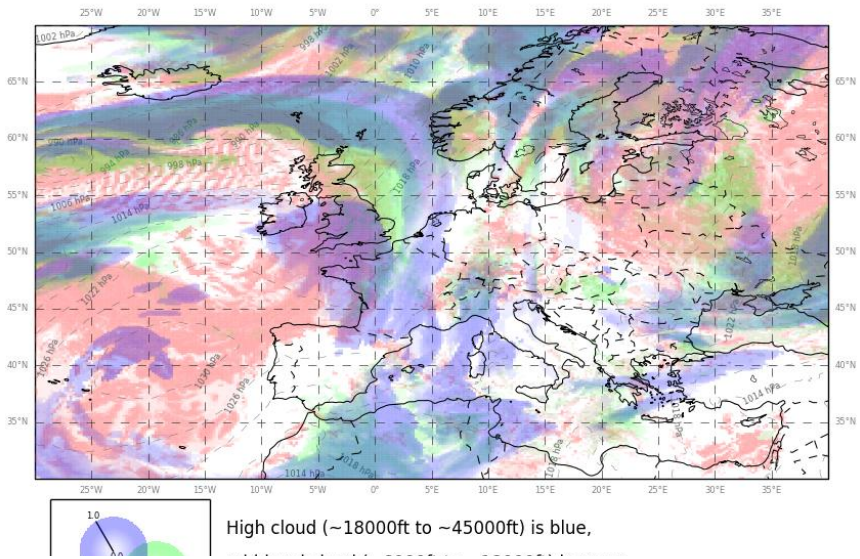
University of Reading

T+33 forecasts

09UT 27/9/16

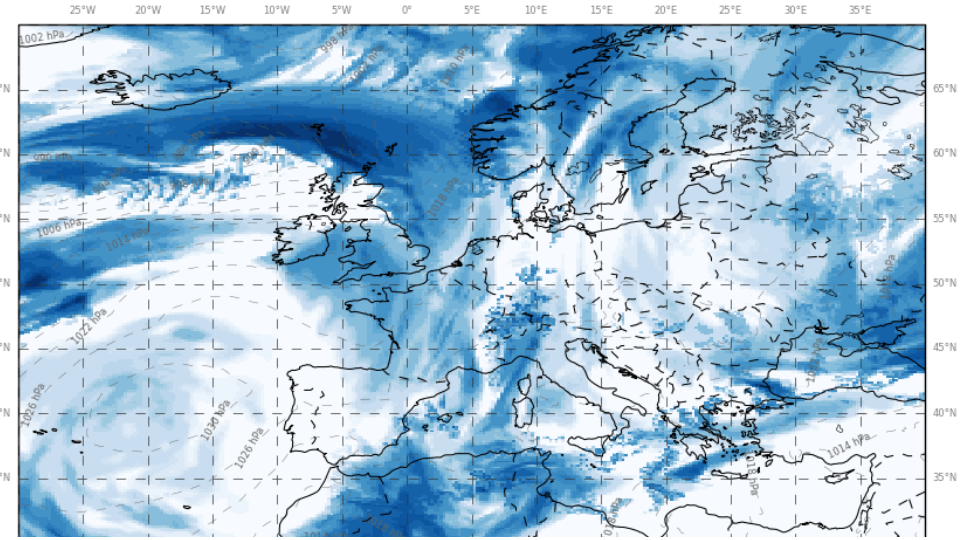
University of Reading

Met Office Oper. Global: Cloud: Low, Medium, High
2016/09/27 09Z T+33 from 2016/09/26 00Z

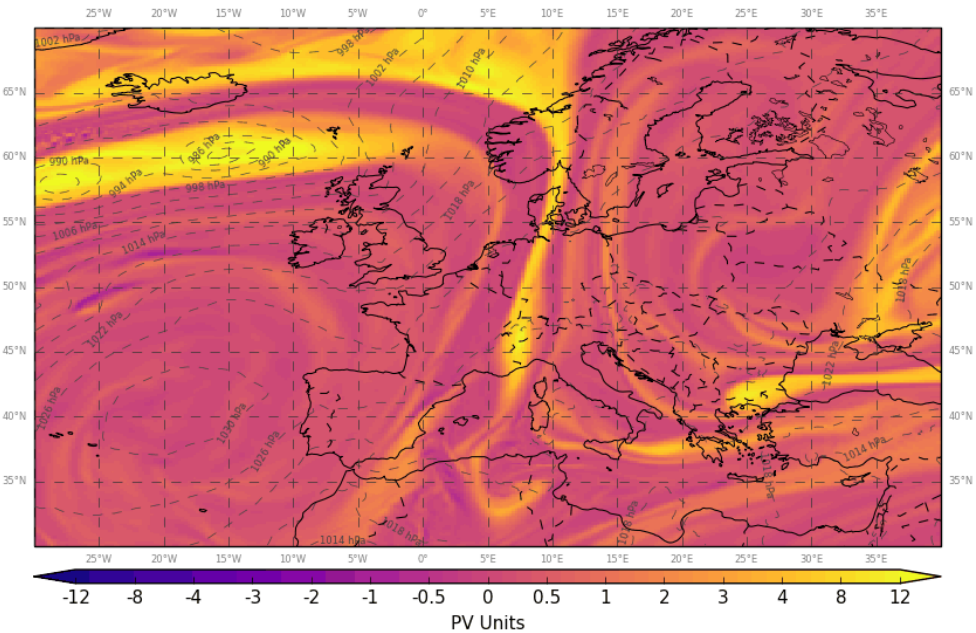


High cloud (~18000ft to ~45000ft) is blue,

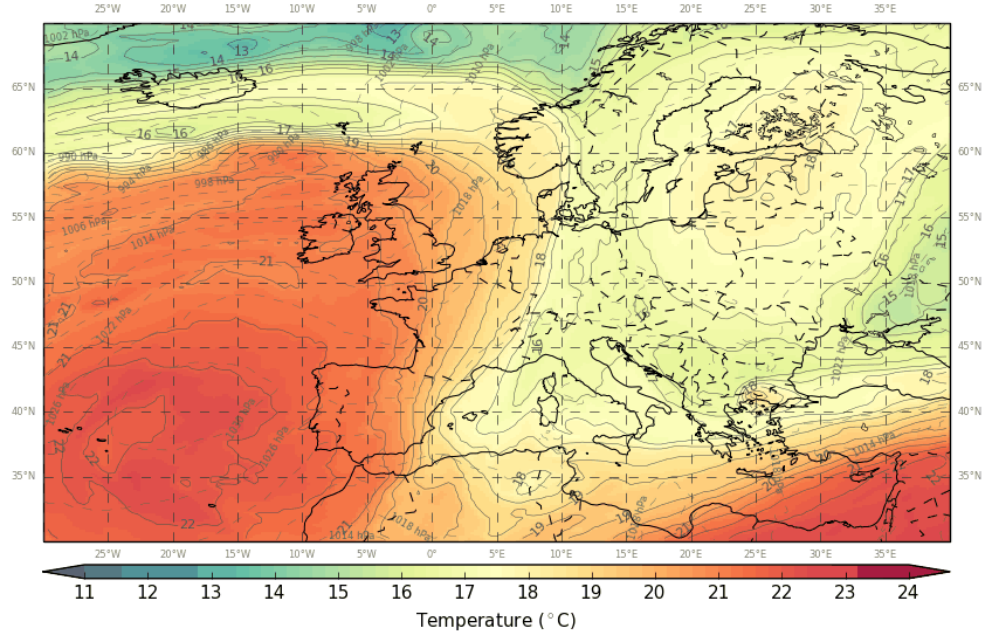
Met Office Oper. Global: Total Column LS Frozen Water (mm water (kg m^{-2}))
2016/09/27 09Z T+33 from 2016/09/26 00Z



Met Office Oper. Global: Potential Vorticity (10^6 m^2 kg^{-1} $K\,s^{-1}$) at 300 hPa
2016/09/27 09Z T+33 from 2016/09/26 00Z



Met Office Oper. Global: Wet Bulb Potential Temperature (°C) at 300 hPa
2016/09/27 09Z T+33 from 2016/09/26 00Z

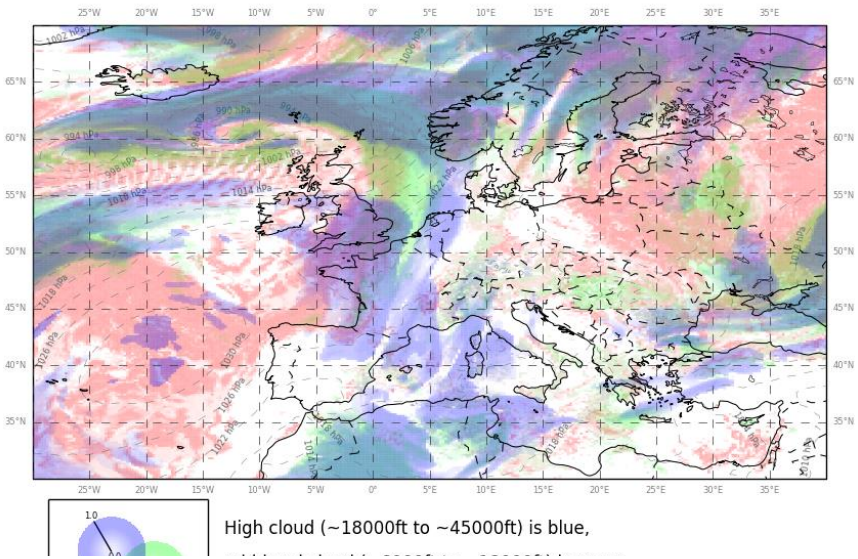


T+36 forecasts

12UT 27/9/16

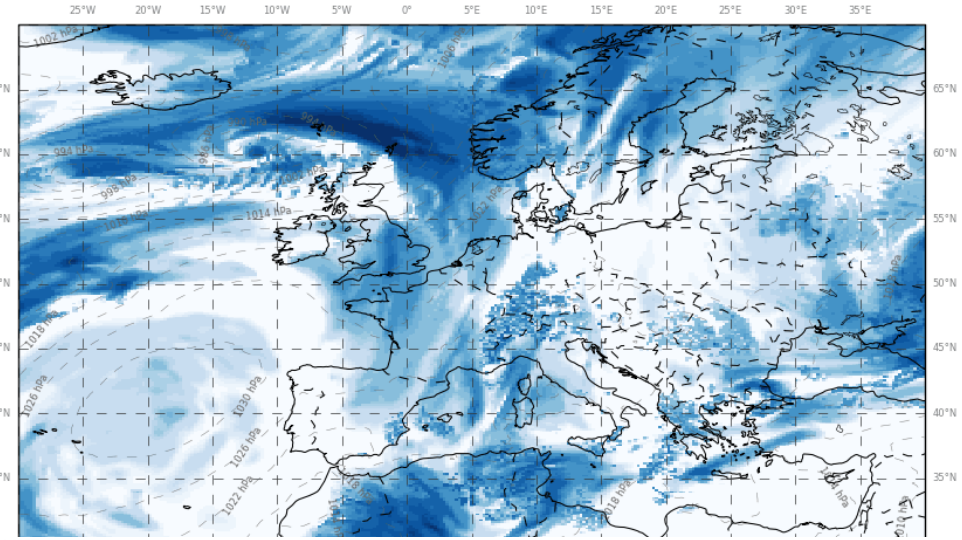
University of Reading

Met Office Oper. Global: Cloud: Low, Medium, High
2016/09/27 12Z T+36 from 2016/09/26 00Z

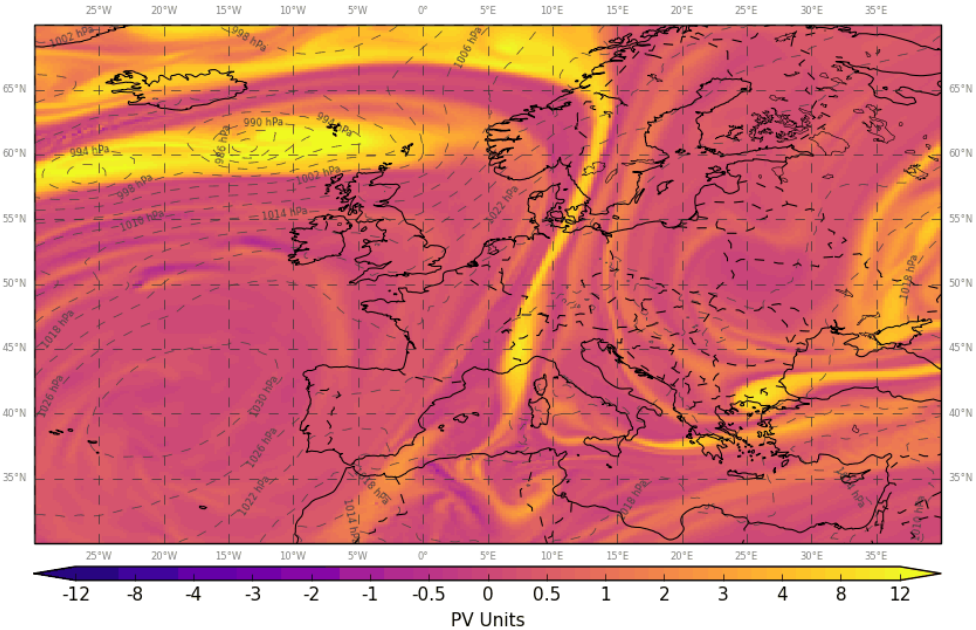


High cloud (~18000ft to ~45000ft) is blue,

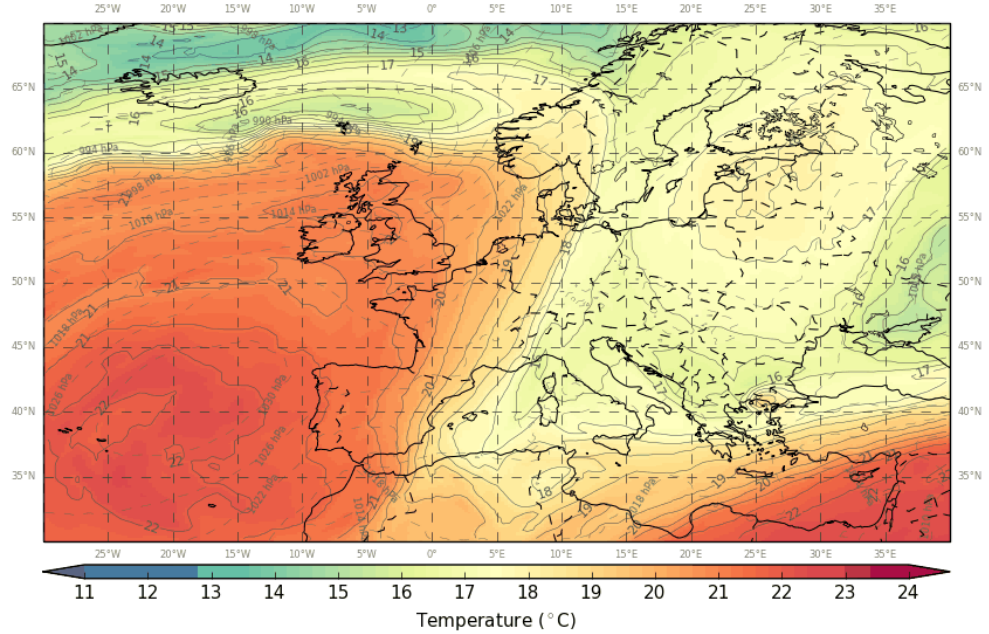
Met Office Oper. Global: Total Column LS Frozen Water (mm water (kg m^{-2}))
2016/09/27 12Z T+36 from 2016/09/26 00Z



Met Office Oper. Global: Potential Vorticity (10^6 m^2 kg^{-1} $K\,s^{-1}$) at 300 hPa
2016/09/27 12Z T+36 from 2016/09/26 00Z



Met Office Oper. Global: Wet Bulb Potential Temperature (°C) at 300 hPa
2016/09/27 12Z T+36 from 2016/09/26 00Z

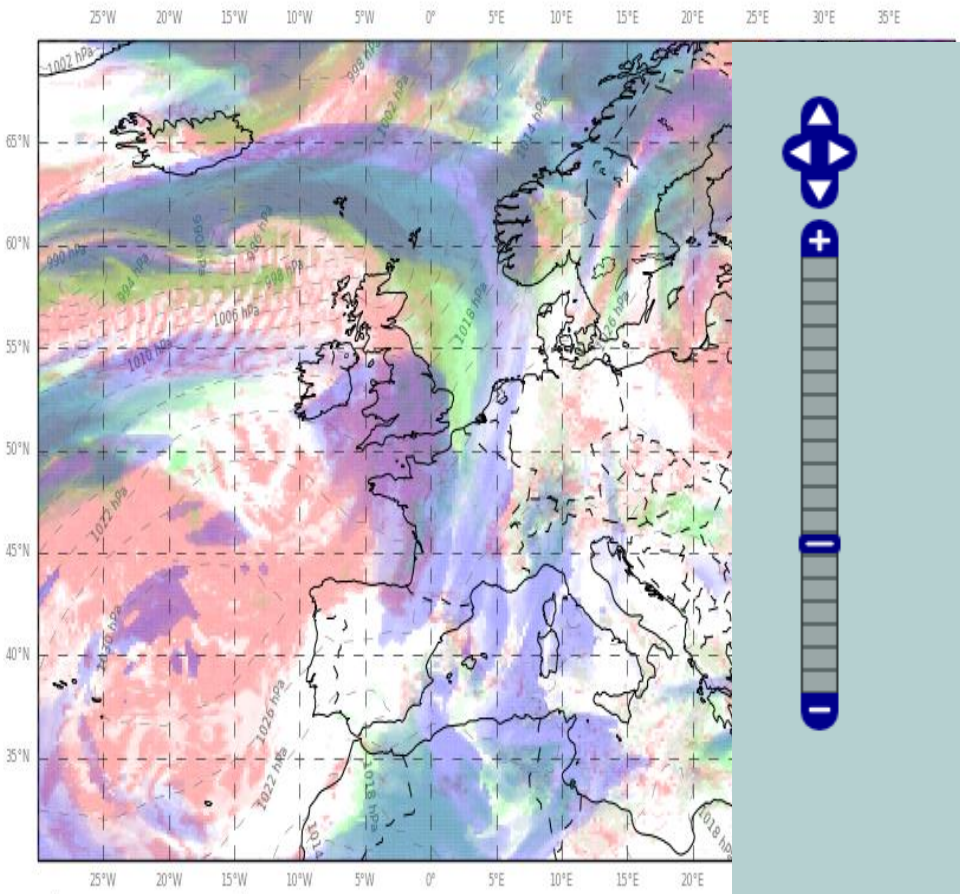


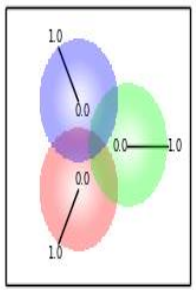
Flight track

Met Office

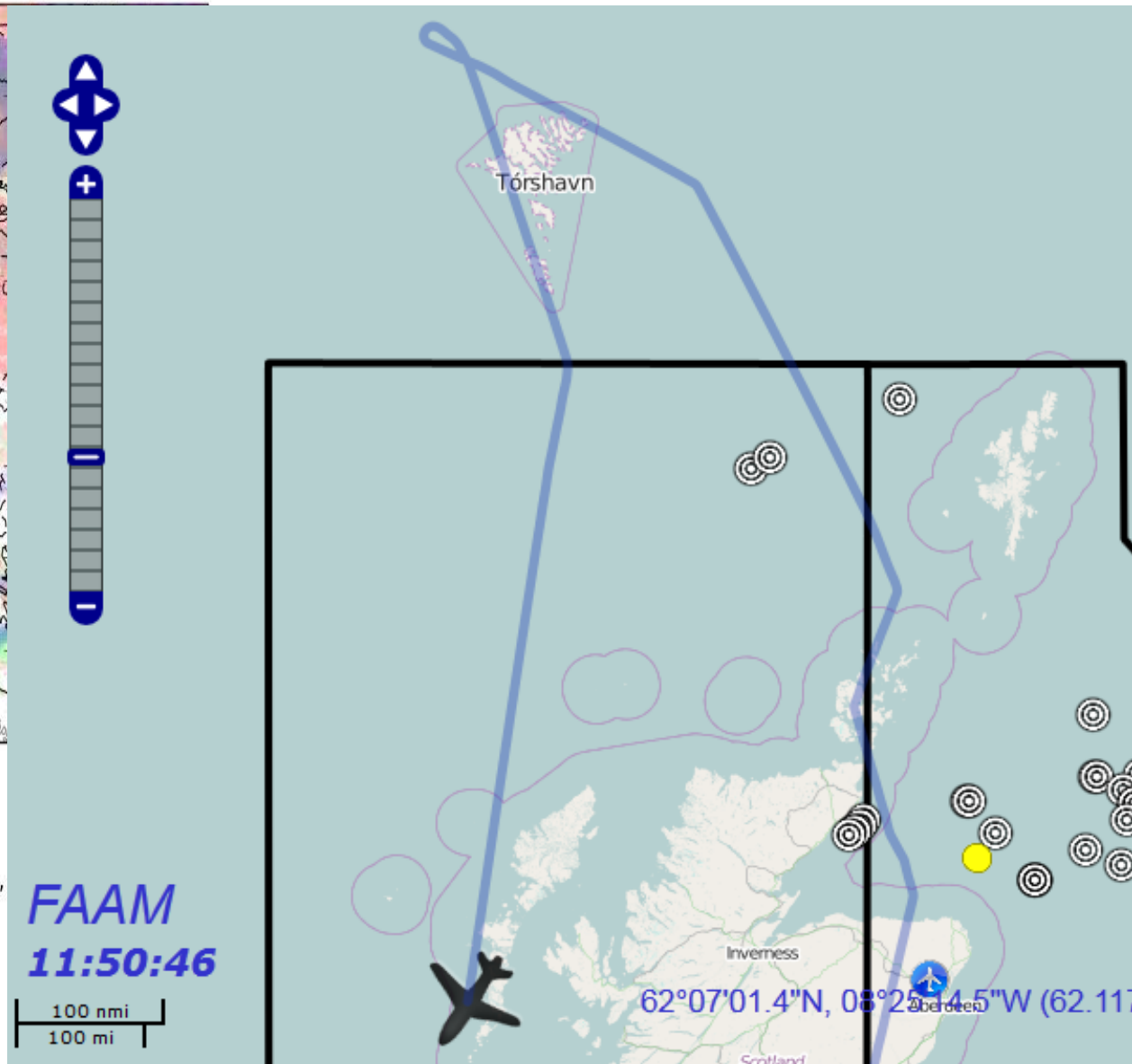
University of Reading

Met Office Oper. Global: Cloud: Low, Medium, High
2016/09/27 10Z T+34 from 2016/09/26 00Z



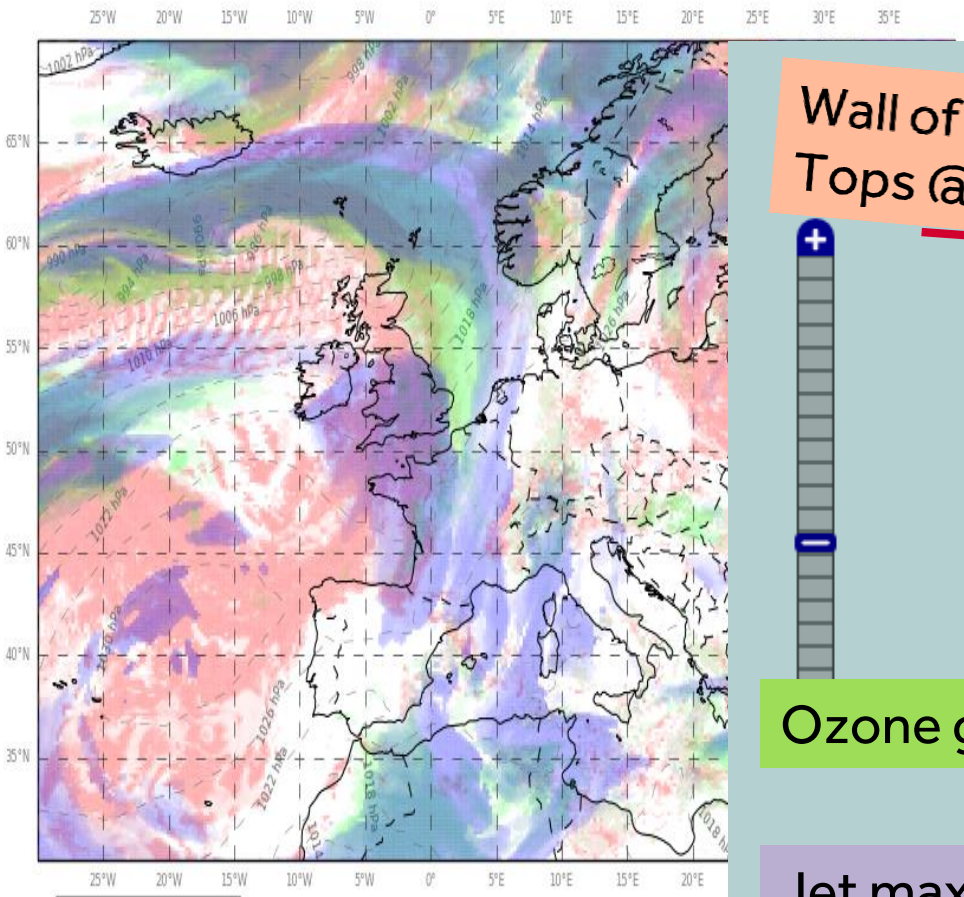


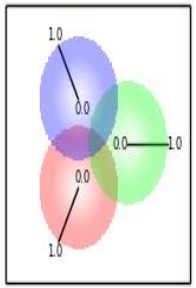
High cloud (~18000ft to ~45000ft) is blue,
mid-level cloud (~6000ft to ~18000ft) is green,
low cloud (surface to ~6000ft) is red
and the cloud types are combined as shown.



Flight track

Met Office Oper. Global: Cloud: Low, Medium, High
2016/09/27 10Z T+34 from 2016/09/26 00Z





High cloud (~18000ft to ~45000ft) is blue,
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low cloud (surface to ~6000ft) is red
and the cloud types are combined as shown.

Wall of cloud
Tops @FL270

Bent-back
frontal precip

Ozone gradient

Jet maximum
89 m/s

FAAM
11:50:46

100 nmi
100 mi

Tórshavn

Inverness

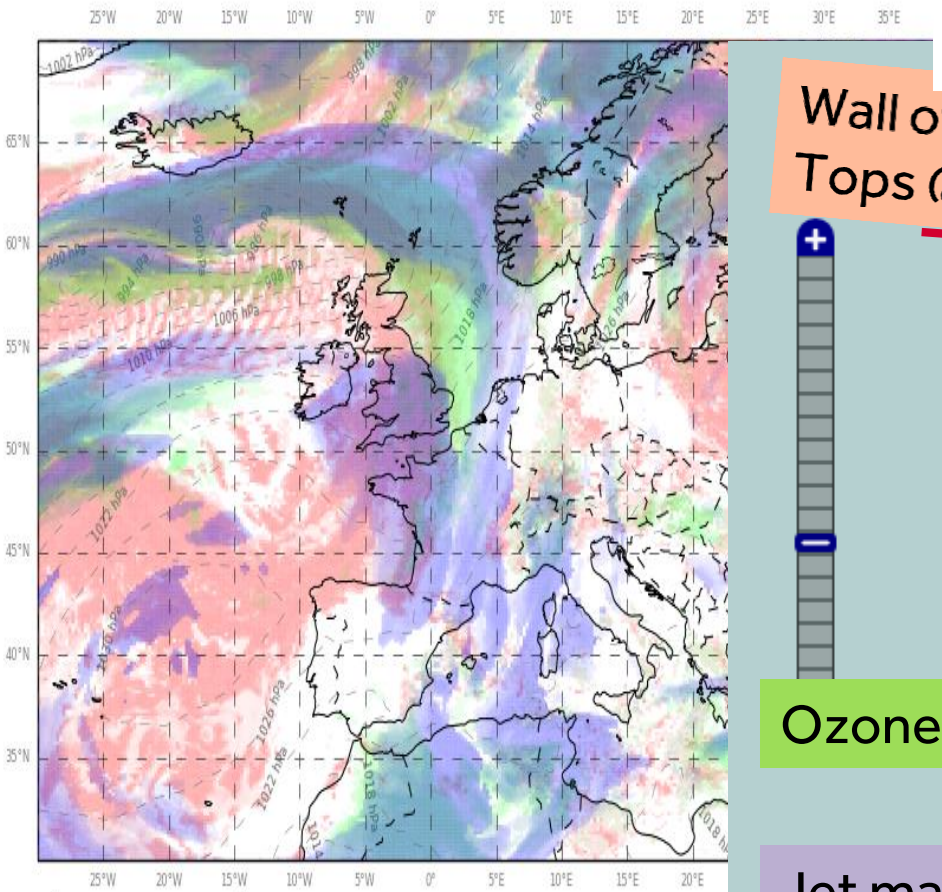
62°07'01.4"N, 08°25'14.5"W (62.117

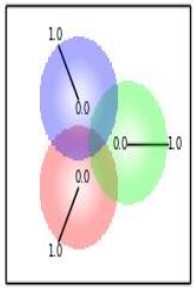
Flight track

Met Office

University of Reading

Met Office Oper. Global: Cloud: Low, Medium, High
2016/09/27 10Z T+34 from 2016/09/26 00Z





High cloud (~18000ft to ~45000ft) is blue,
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and the cloud types are combined as shown.

1035 UT

Wall of cloud
Tops @FL270

Tórshavn

Bent-back
frontal precip

1100 UT

0940 UT

Ozone gradient

Jet maximum
89 m/s

FAAM
11:50:46

0915 UT

100 nmi
100 mi

1153 UT

Inverness

62°07'01.4"N, 08°25'14.5"W (62.117

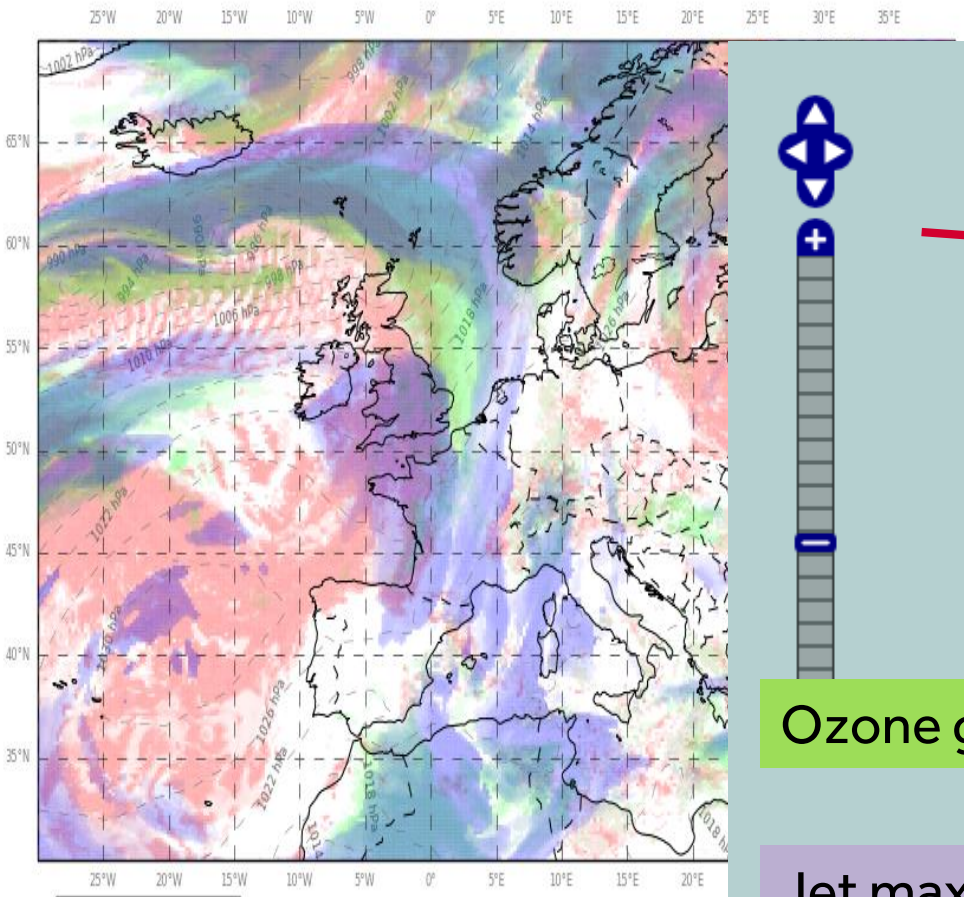
Scotland

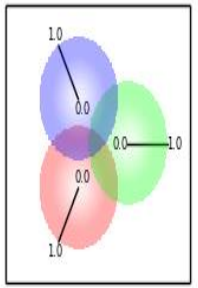
Flight track

University of Reading

Met Office

Met Office Oper. Global: Cloud: Low, Medium, High
2016/09/27 10Z T+34 from 2016/09/26 00Z





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and the cloud types are combined as shown.

DLR Falcon

sonde 1

Tórshavn

Bent-back frontal precip

Ozone gradient

Jet maximum
89 m/s

FAAM
11:50:46

100 nmi
100 mi

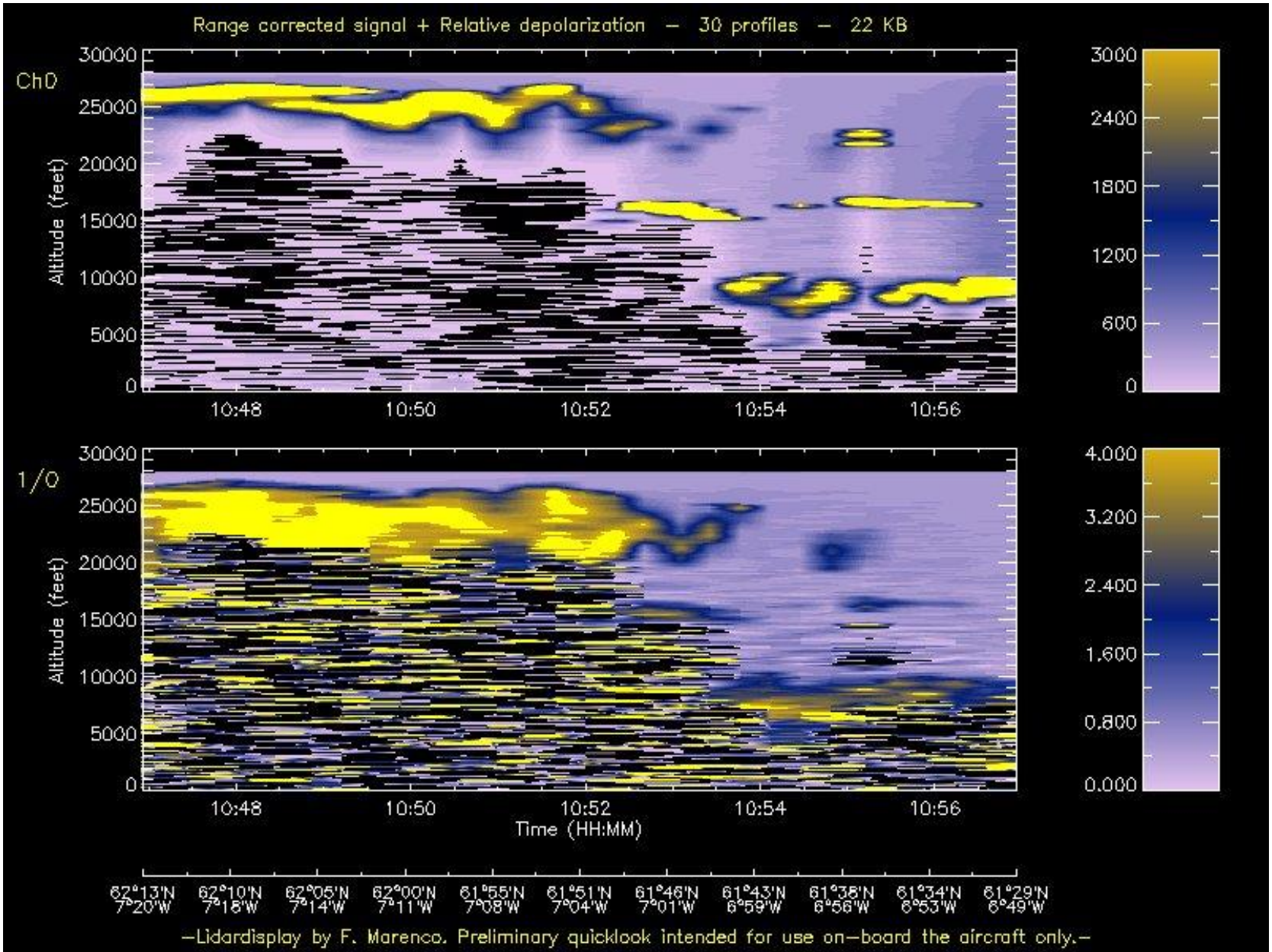
sonde 22

Inverness

62°07'01.4"N, 08°25'14.5"W (62.117

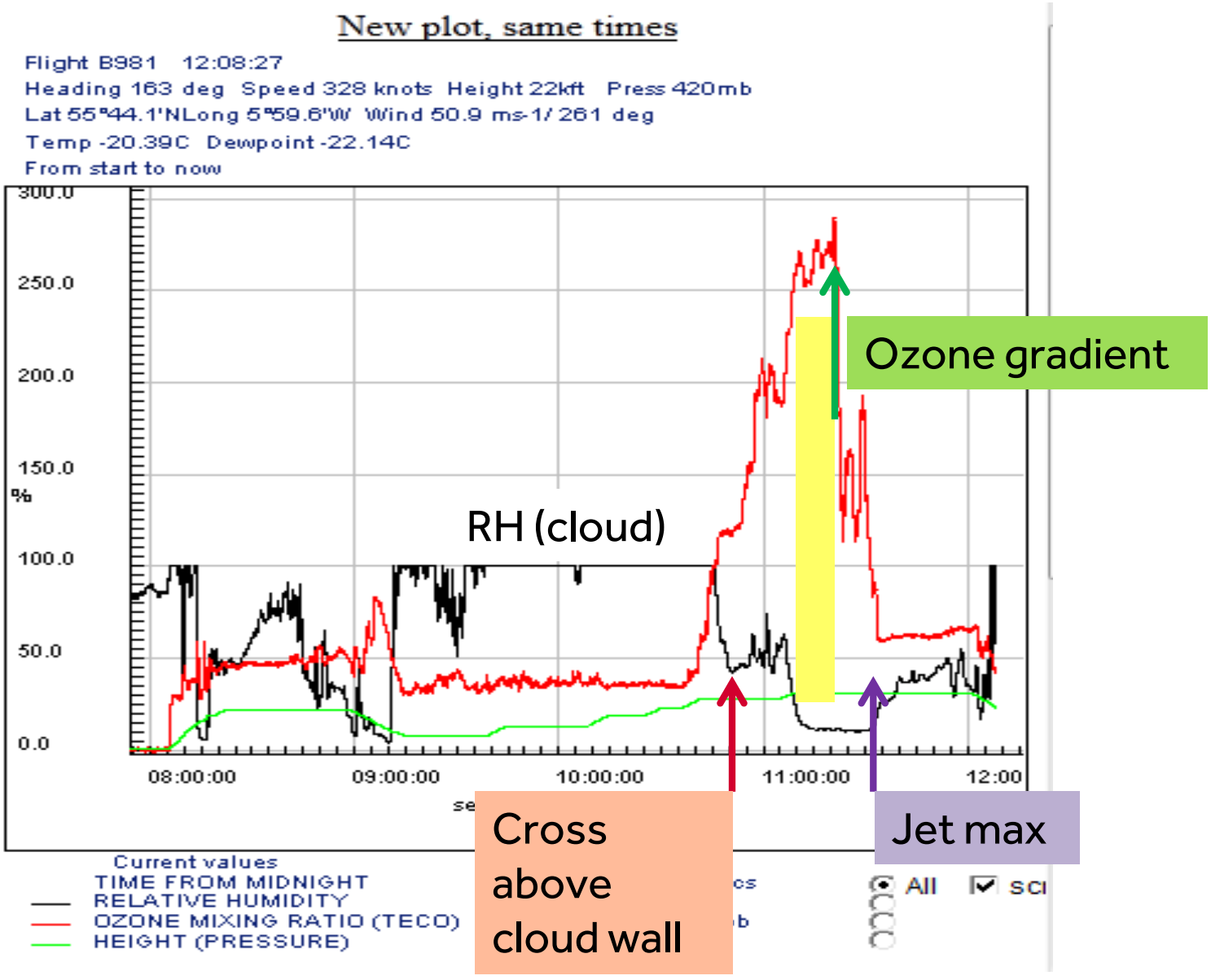
Lidar crossing wall of cloud north of jet stream

University of Reading



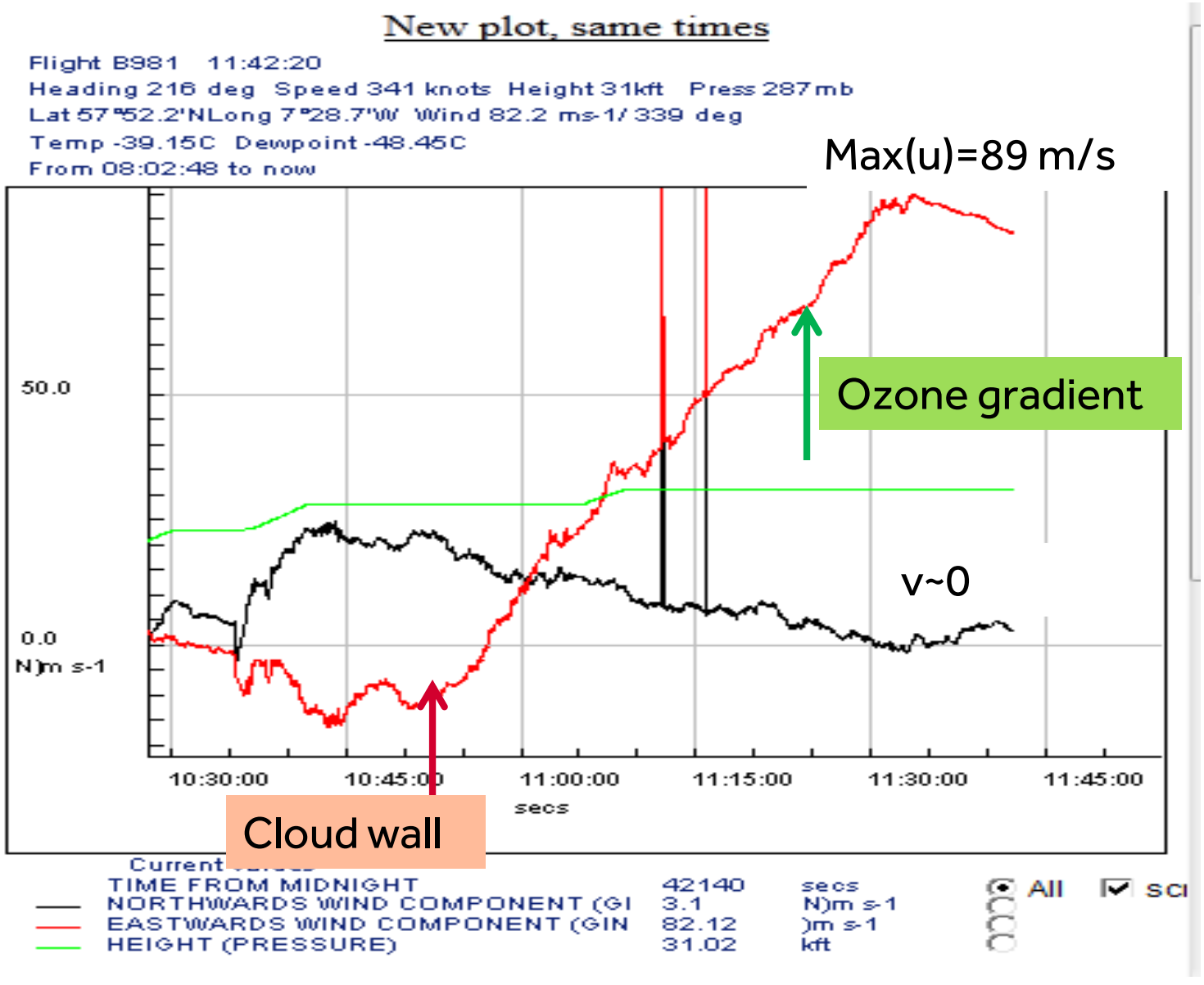
Humidity and ozone along flight

University of Reading



Wind components heading southwards on dropsonde leg

University of Reading



Caveat: earlier icing of turbulence probe needs examination including comparison with heated AIMMS turbulence probe.