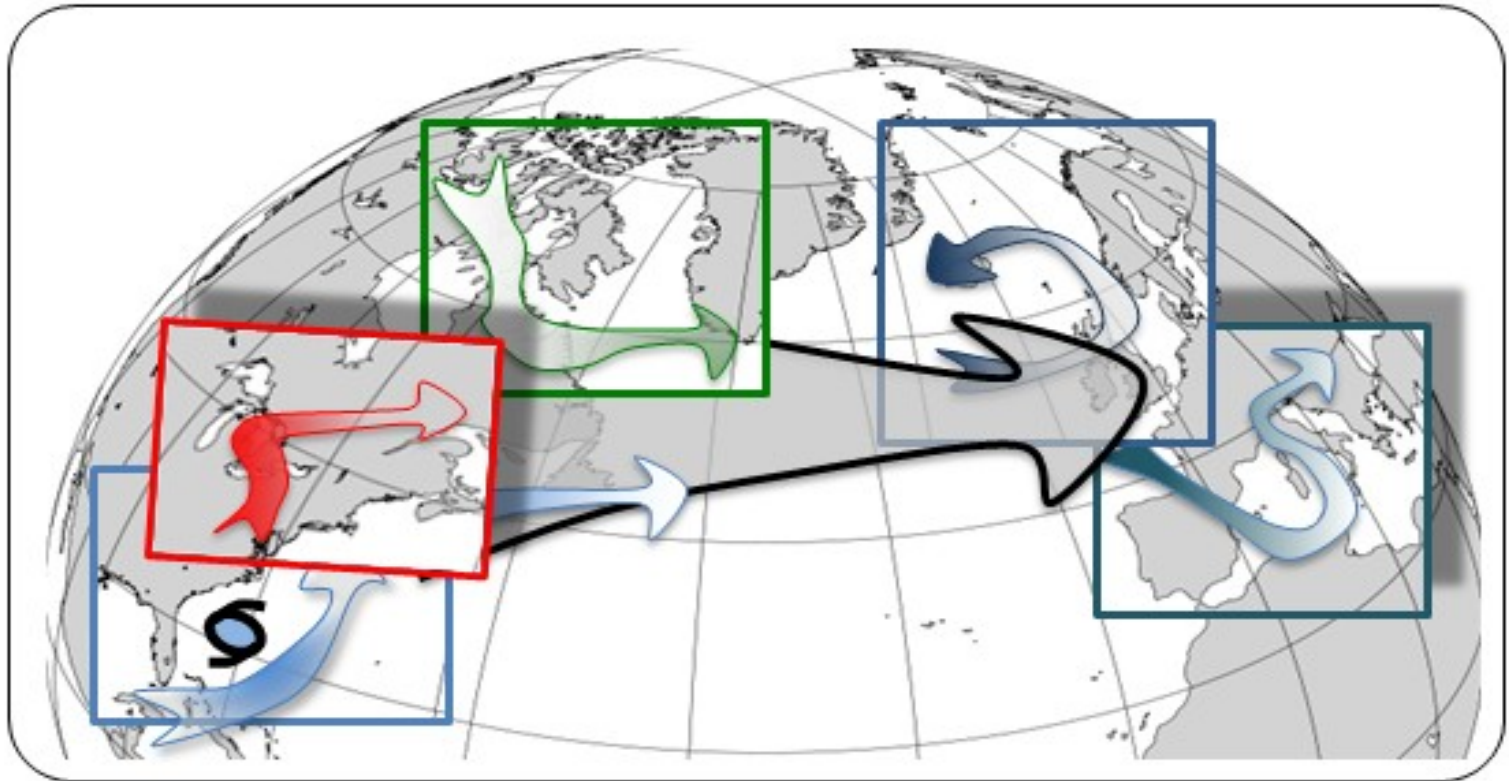


NAWDEX – Weather discussion

25 September 2016, Keflavik, Iceland



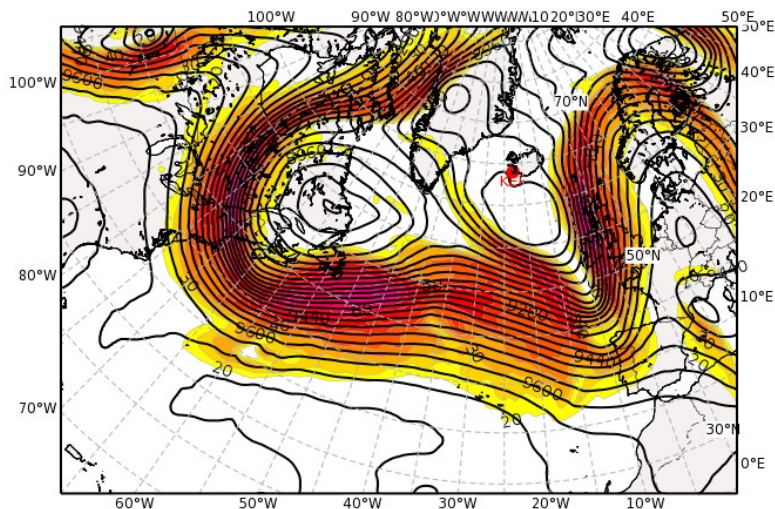
Agenda

- Current synoptic situation
- HALO flight Monday
- Forecast until Thursday
- DLR-Falcon/UK FAAM coordinated flight Tuesday
- HALO mission Tuesday
- Outlook
- Quicklooks IOP 3

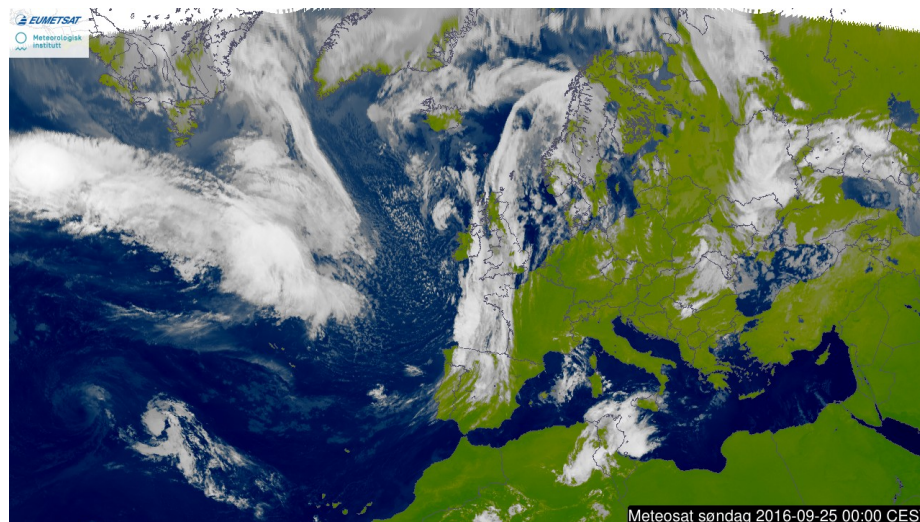
Analysis – 25 Sep 2016, 00 UTC

Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa

Valid: Sun, 25 Sep 2016, 00 UTC (step 000 h from Sun, 25 Sep 2016, 00 UTC)

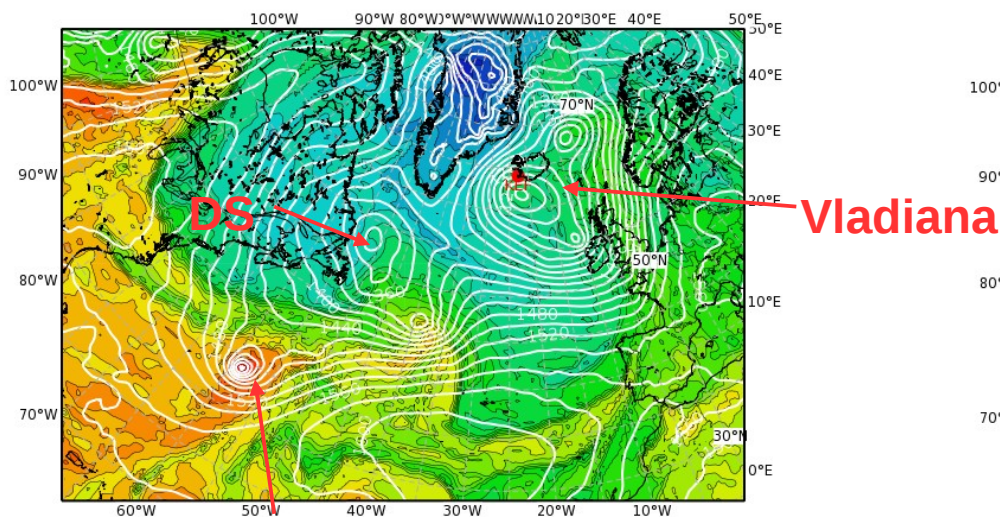


Z300, SAT
THE850, RH700



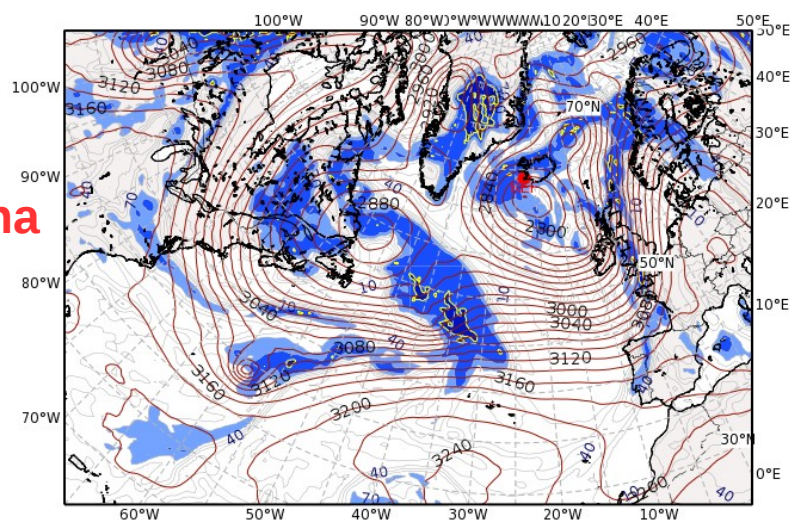
Equivalent Potential Temperature (degC) & Streamlines at 850 hPa

Valid: Sun, 25 Sep 2016, 00 UTC (step 000 h from Sun, 25 Sep 2016, 00 UTC)



Relative Humidity (%) and Z (m) at 700 hPa

Valid: Sun, 25 Sep 2016, 00 UTC (step 000 h from Sun, 25 Sep 2016, 00 UTC)



Karl

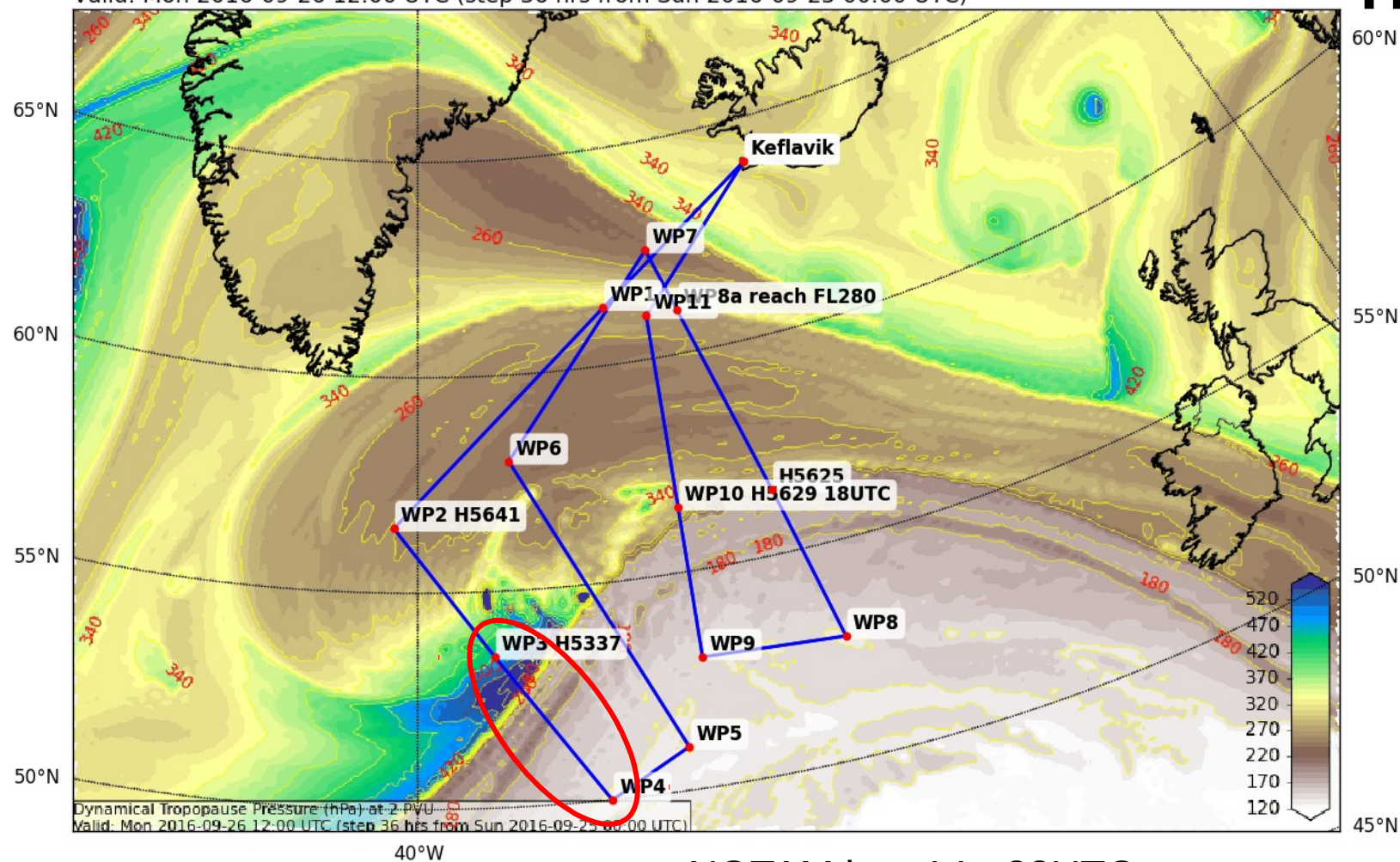
HALO flight on Monday

Planned flight track for Mon, 26 Sep 2016 10:00-18:45 UTC

Dynamical Tropopause (Pressure (hPa)) at 2000 (10^{-3} PVU)

Valid: Mon 2016-09-26 12:00 UTC (step 36 hrs from Sun 2016-09-25 00:00 UTC)

HALO



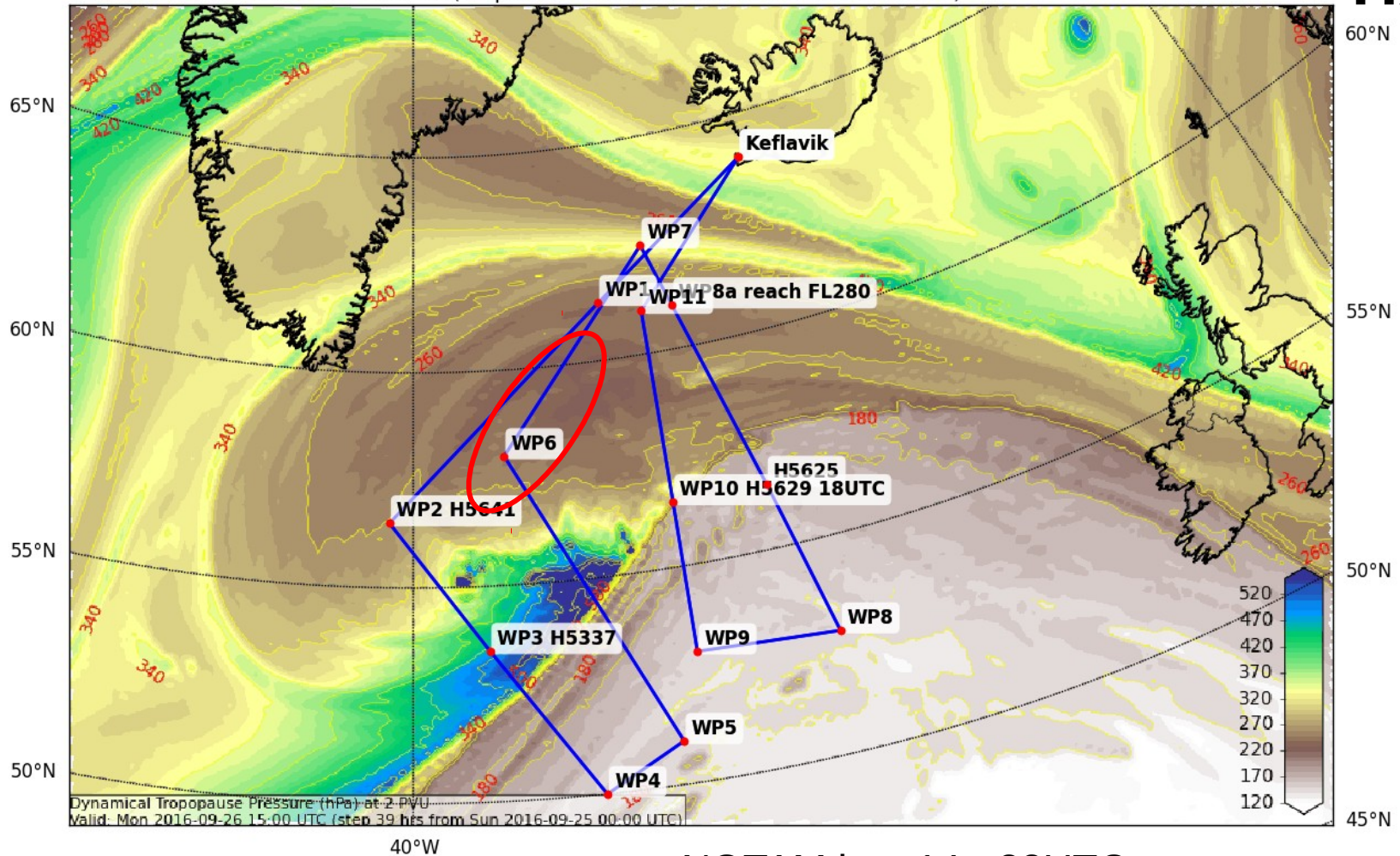
Mon 26, 12UTC

- NOTAM box 14 - 22UTC
- Up to 23 Dropsondes P-7 to P-8 and P-9 to P-11
- Sat overpass not convenient

Planned flight track for Mon, 26 Sep 2016 10:00-18:45 UTC

Dynamical Tropopause (Pressure (hPa)) at 2000 (10^{-3} PVU)
Valid: Mon 2016-09-26 15:00 UTC (step 39 hrs from Sun 2016-09-25 00:00 UTC)

HALO



Mon 26, 15UTC

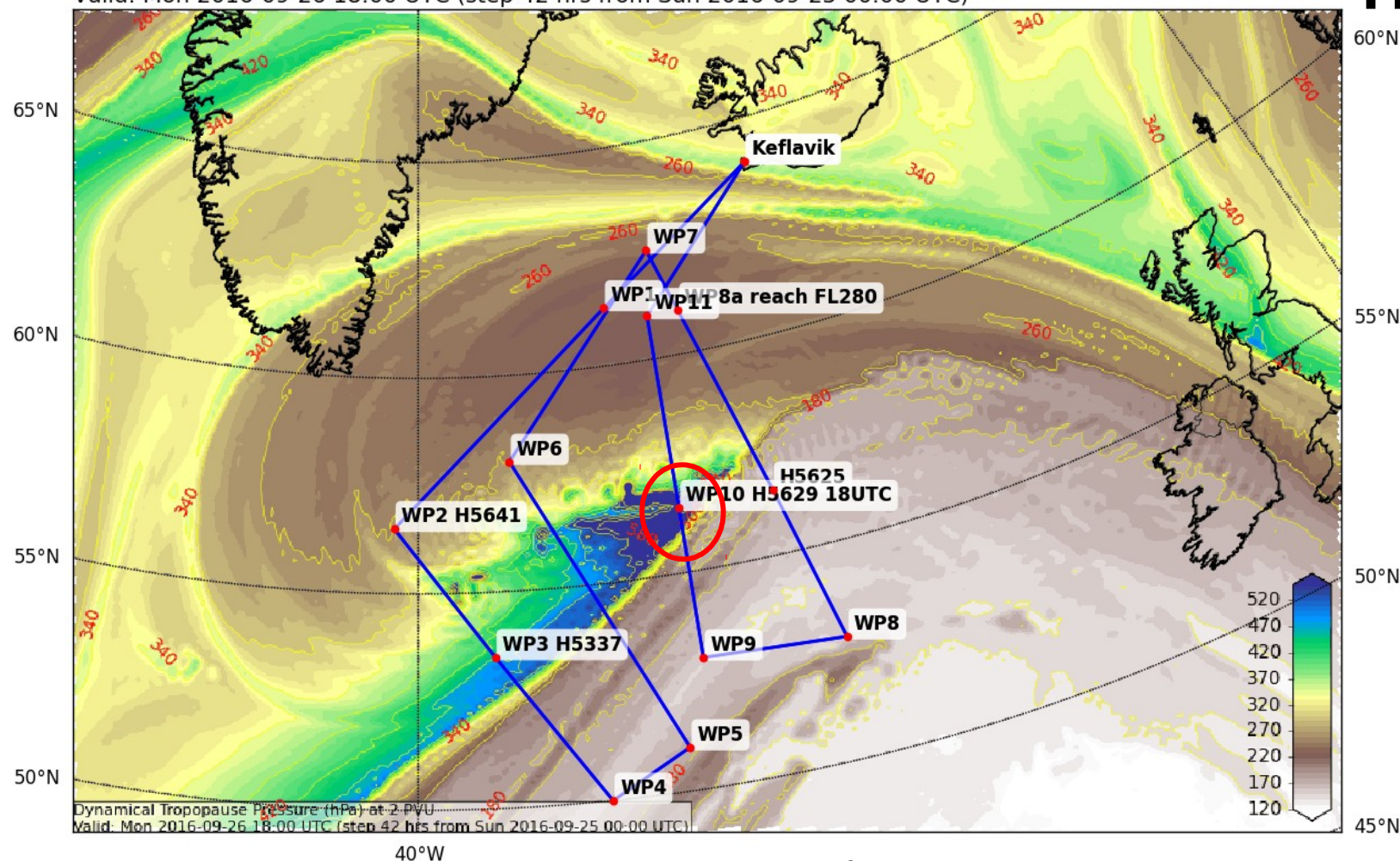
- NOTAM box 14 - 22UTC
- Up to 23 Dropsondes P-7 to P-8 and P-9 to P-11
- Sat overpass not convenient

Planned flight track for Mon, 26 Sep 2016 10:00-18:45 UTC

Dynamical Tropopause (Pressure (hPa)) at 2000 (10^{-3} PVU)

Valid: Mon 2016-09-26 18:00 UTC (step 42 hrs from Sun 2016-09-25 00:00 UTC)

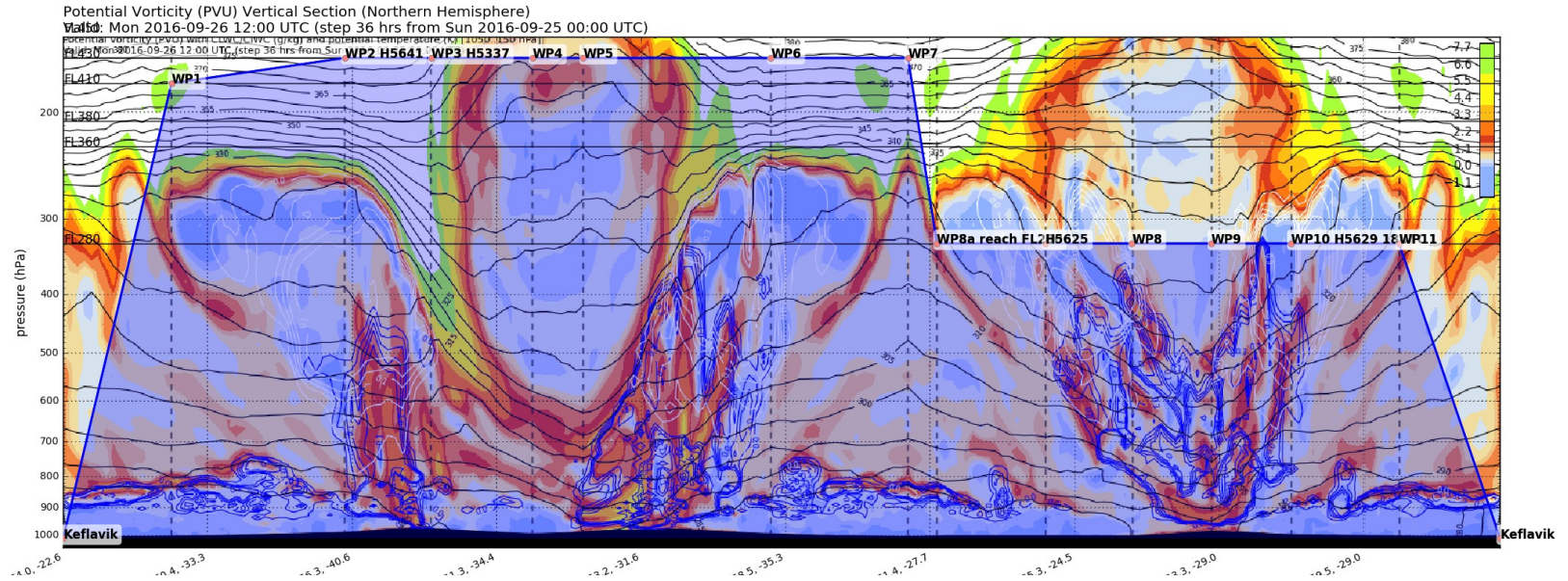
HALO



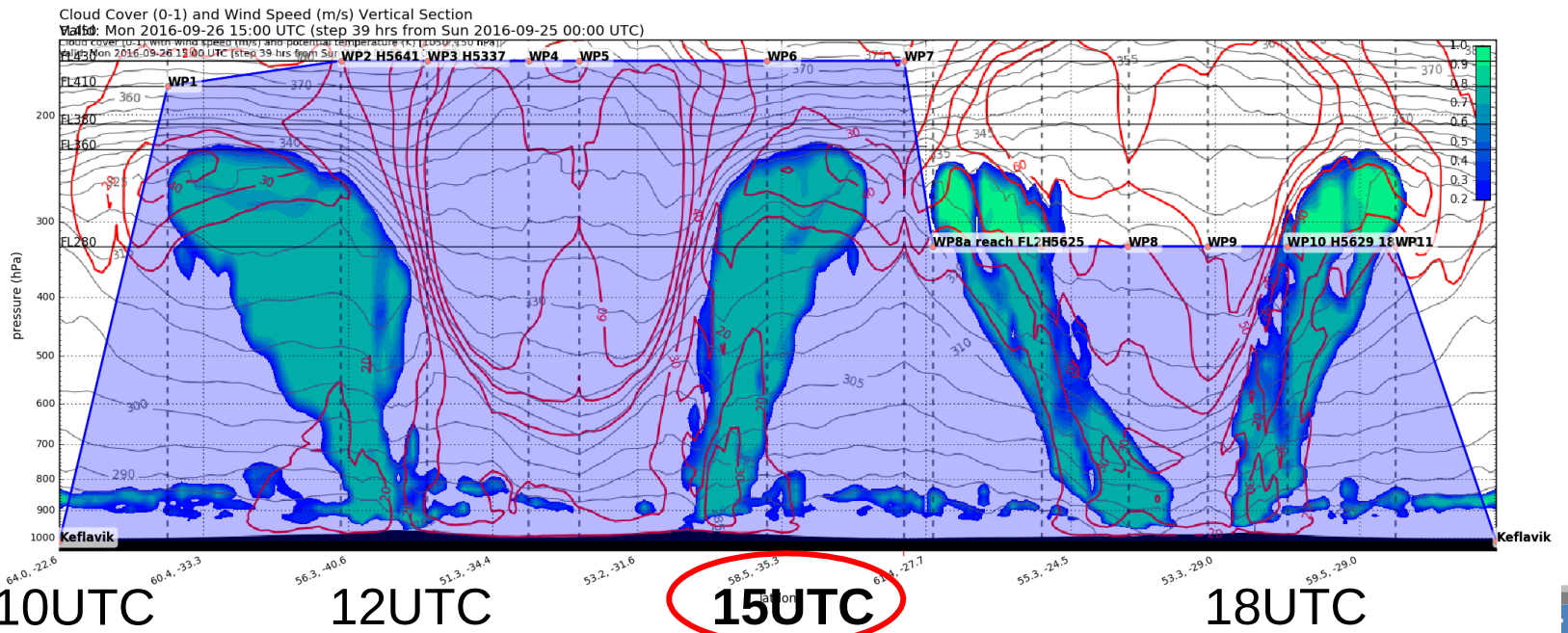
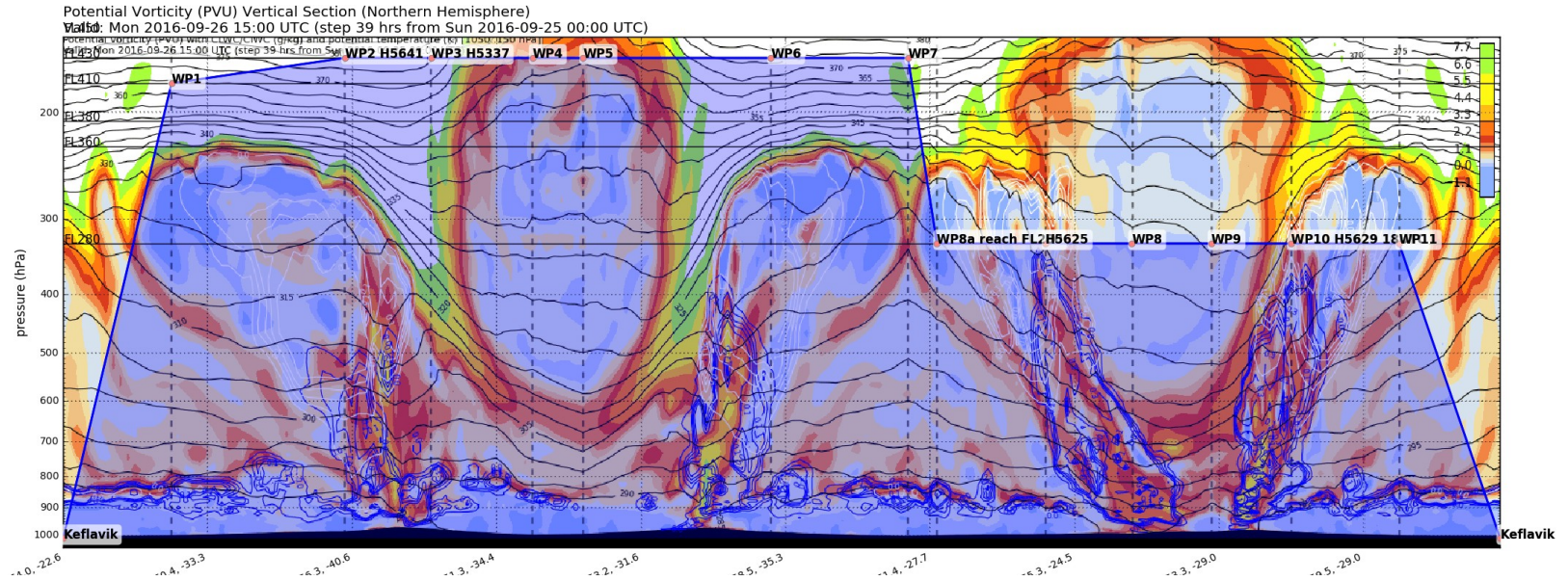
Mon 26, 18UTC

- NOTAM box 14 - 22UTC
- Up to 23 Dropsondes P-7 to P-8 and P-9 to P-11
- Sat overpass not convenient

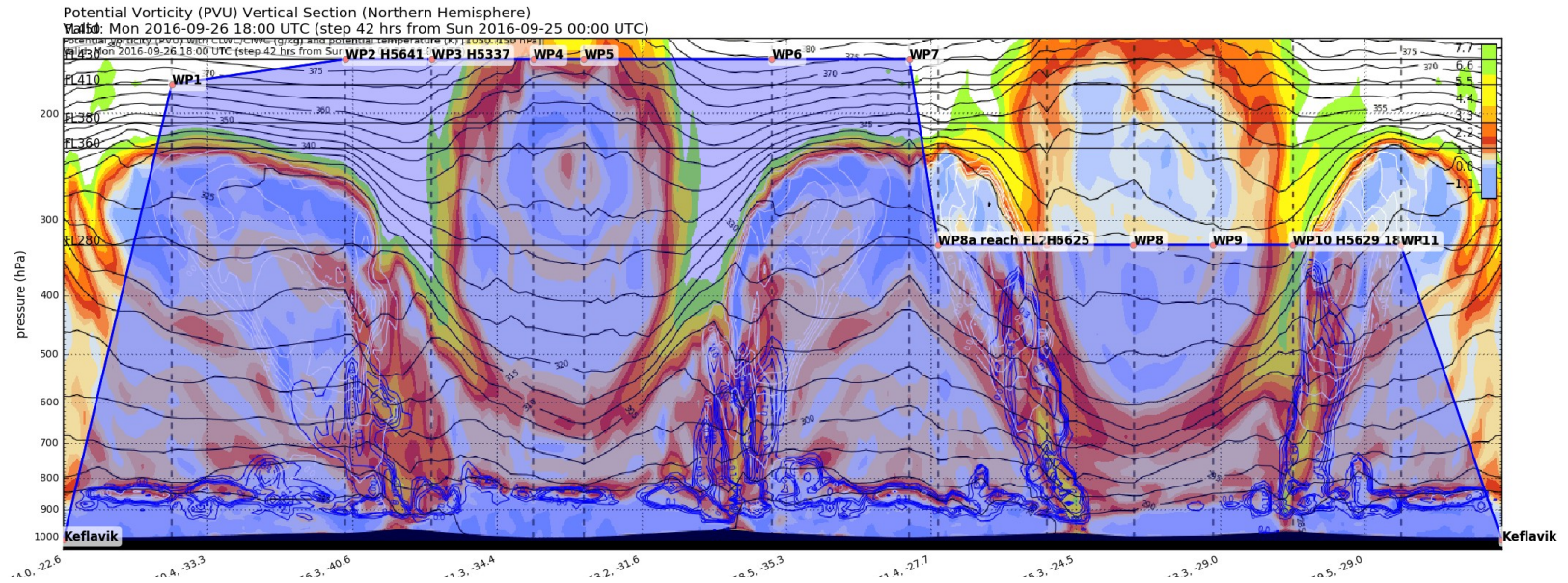
Flight cross section for Mon, 26 Sep 2016 12 UTC



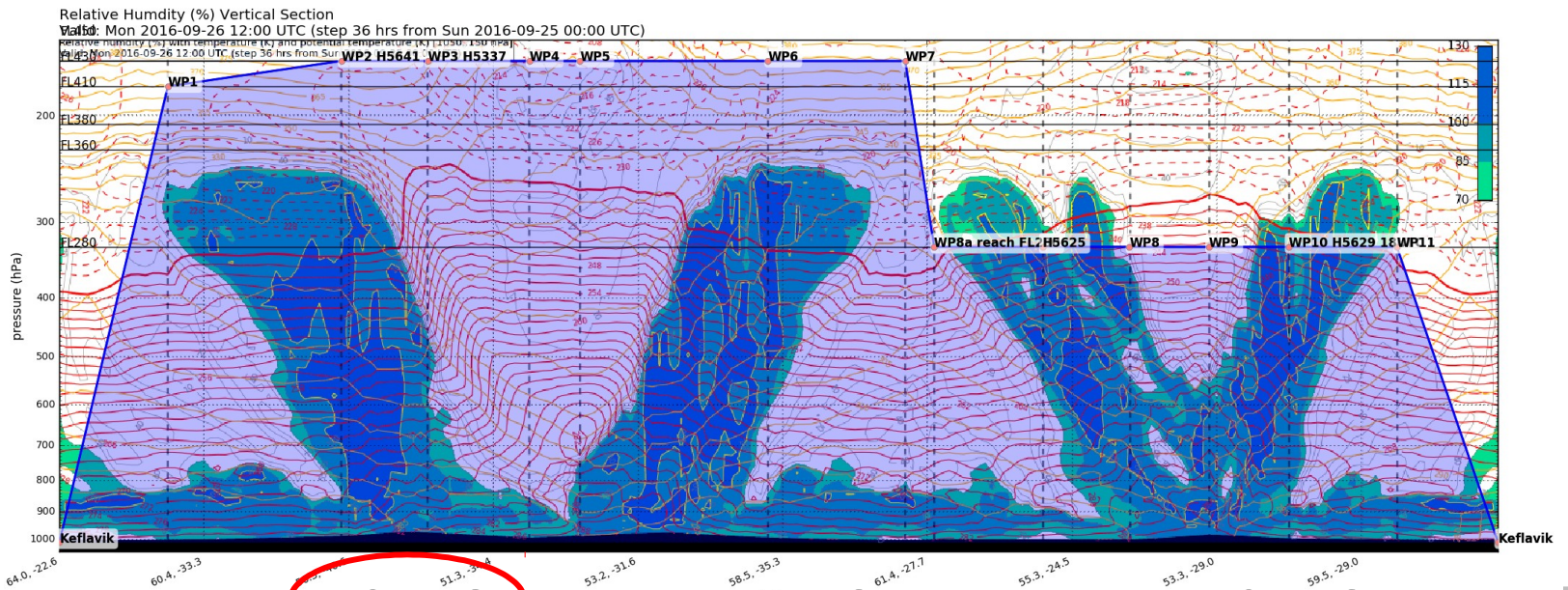
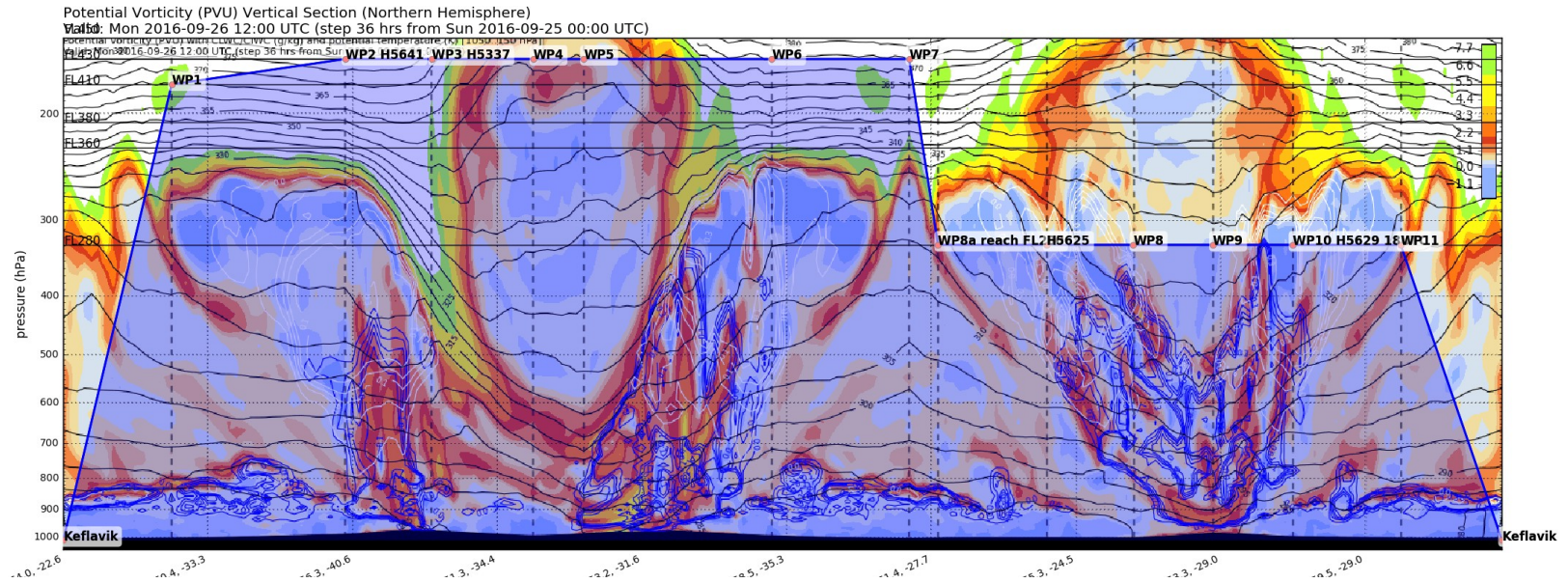
Flight cross section for Mon, 26 Sep 2016 15 UTC



Flight cross section for Mon, 26 Sep 2016 18 UTC



Flight cross section for Mon, 26 Sep 2016 12 UTC



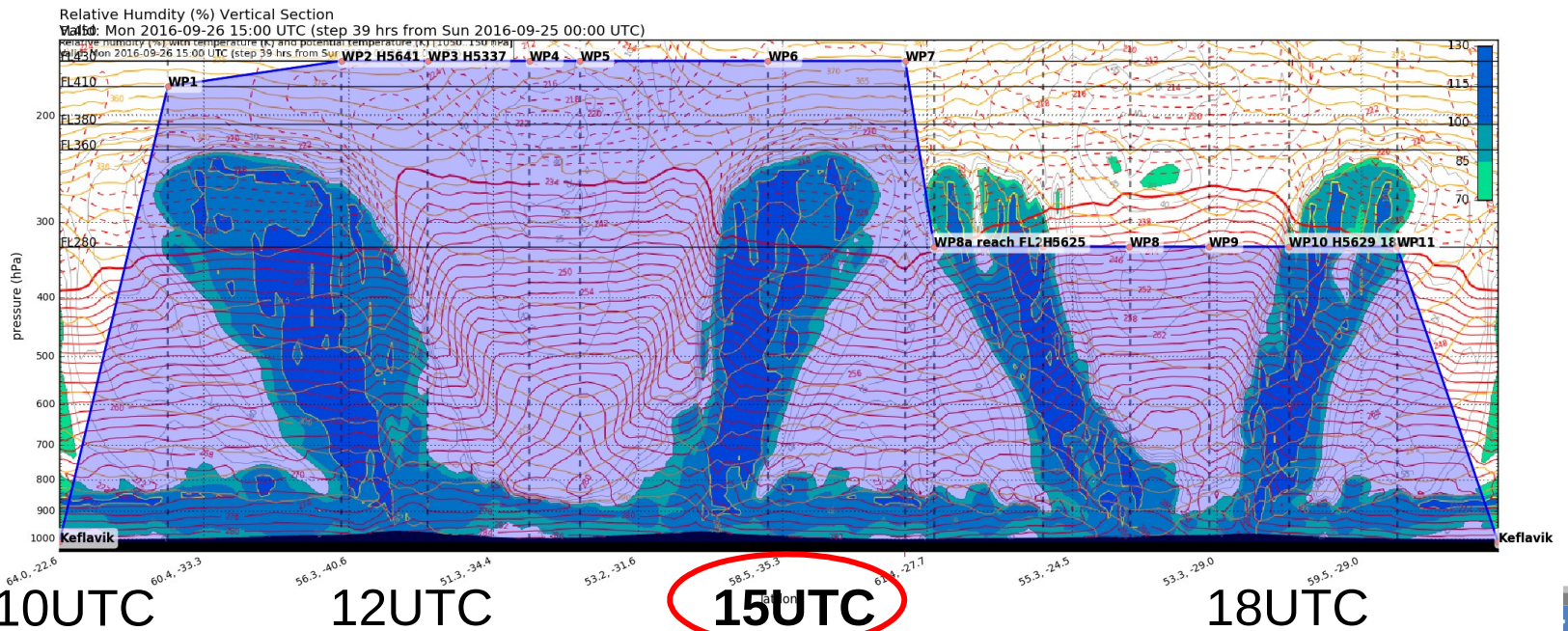
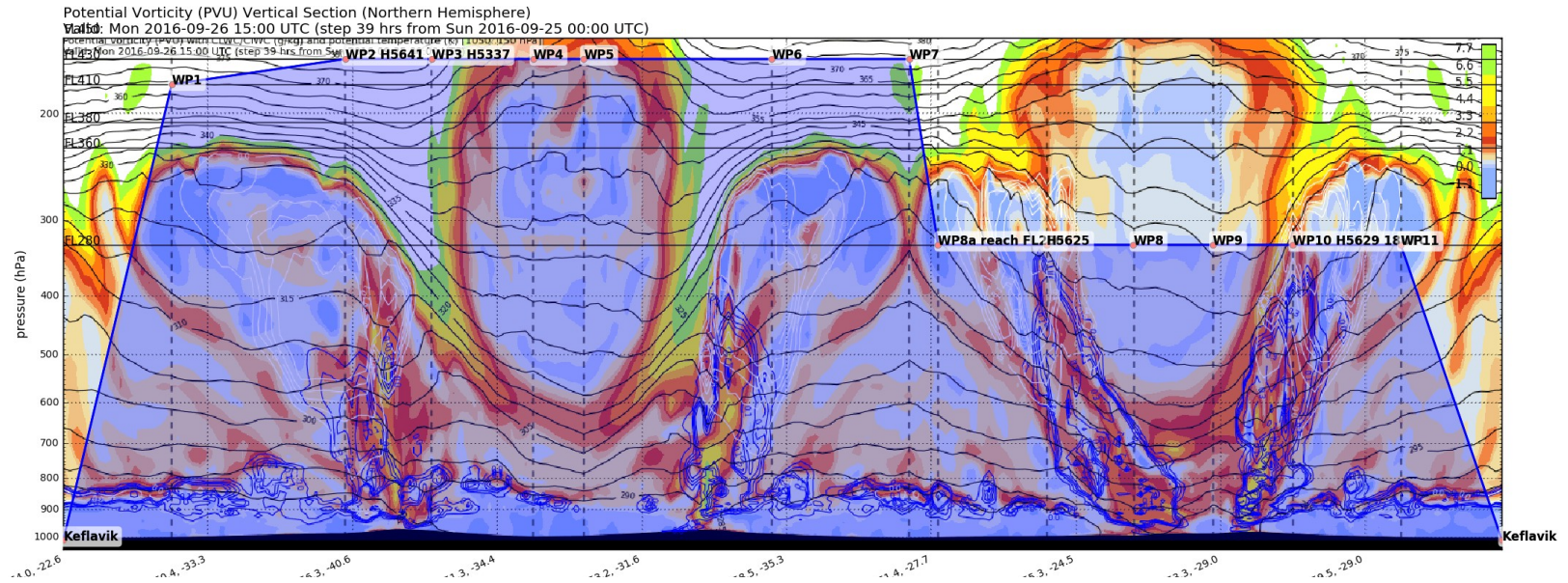
10UTC

12UTC

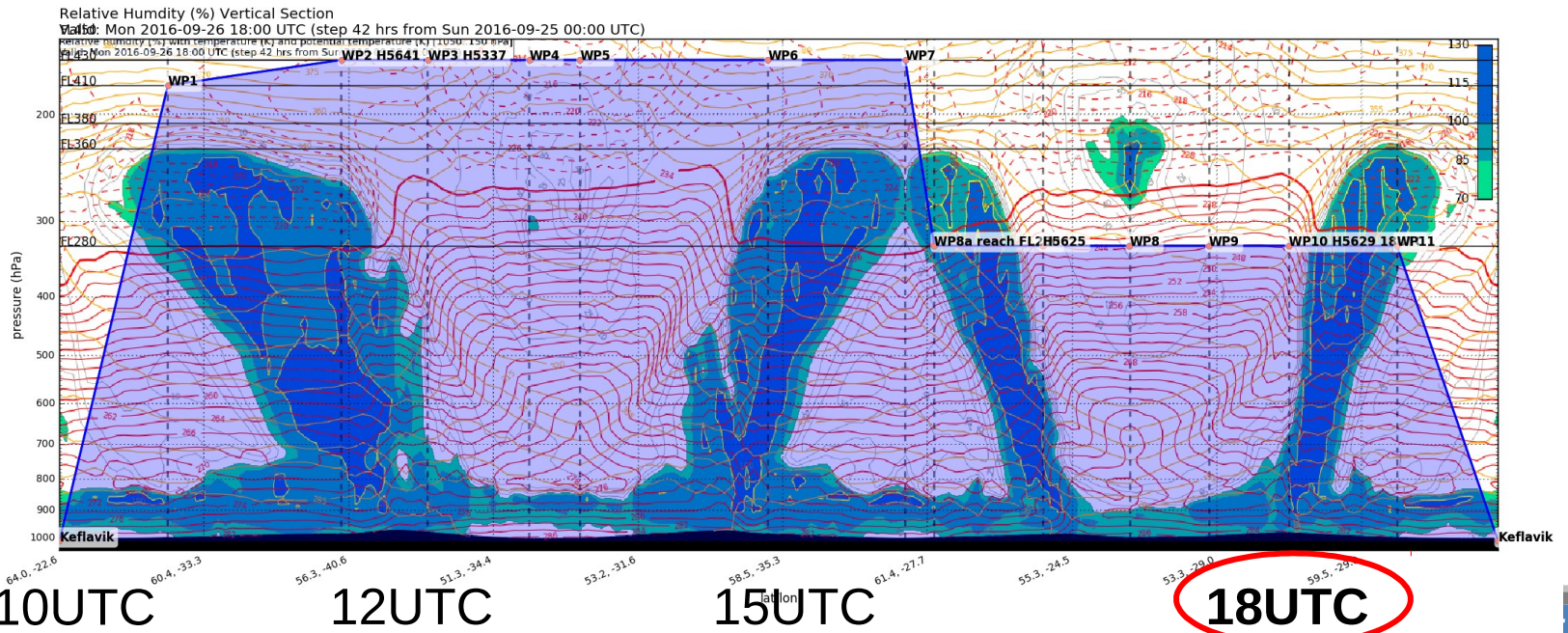
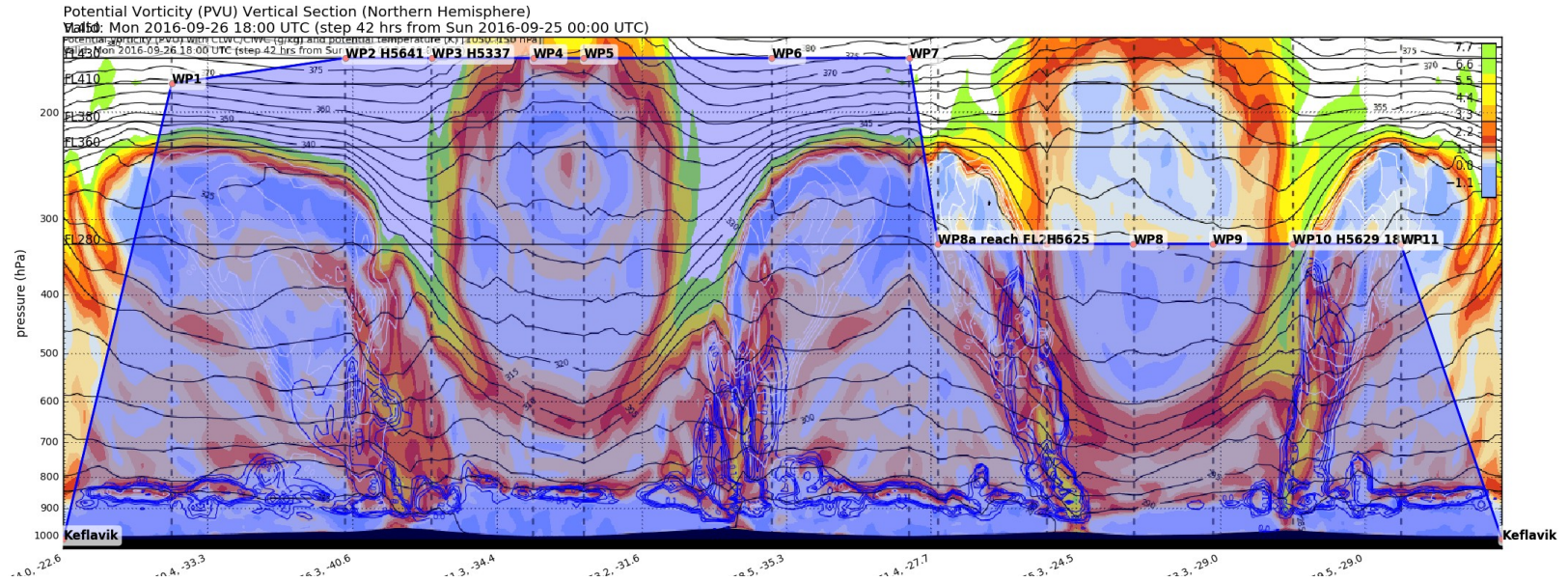
15UTC

18UTC

Flight cross section for Mon, 26 Sep 2016 15 UTC

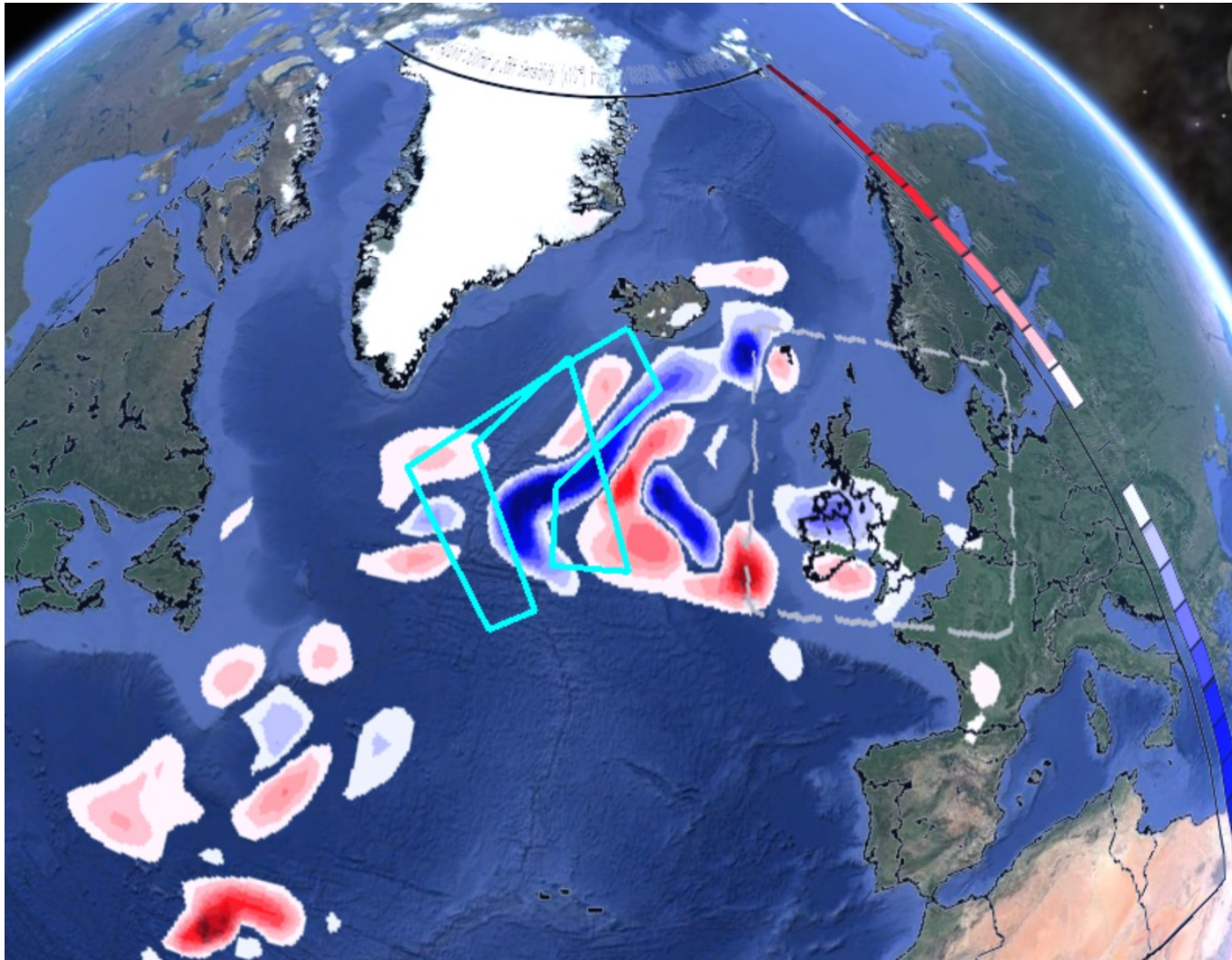


Flight cross section for Mon, 26 Sep 2016 18 UTC



COAMPS Sensitivity Valid 12Z 26 SEP (Mon) 26 Sep HALO Flight

500-hPa 24-h Water Vapor Sen 12Z 26 Sep



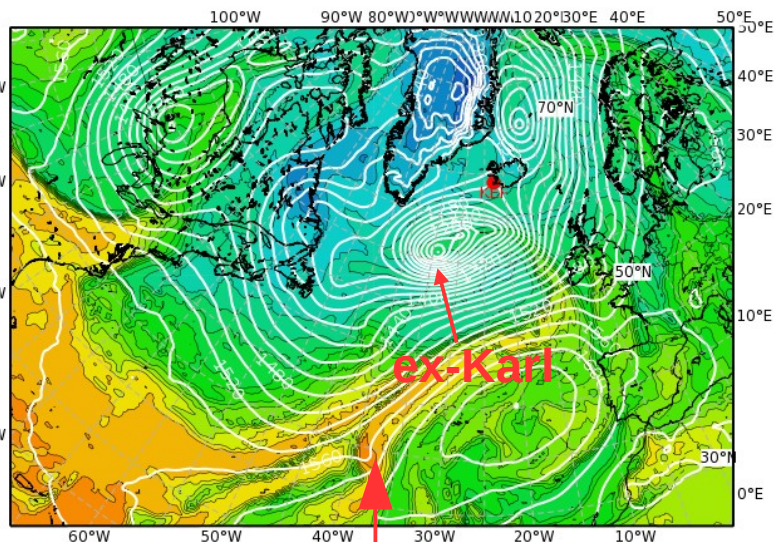
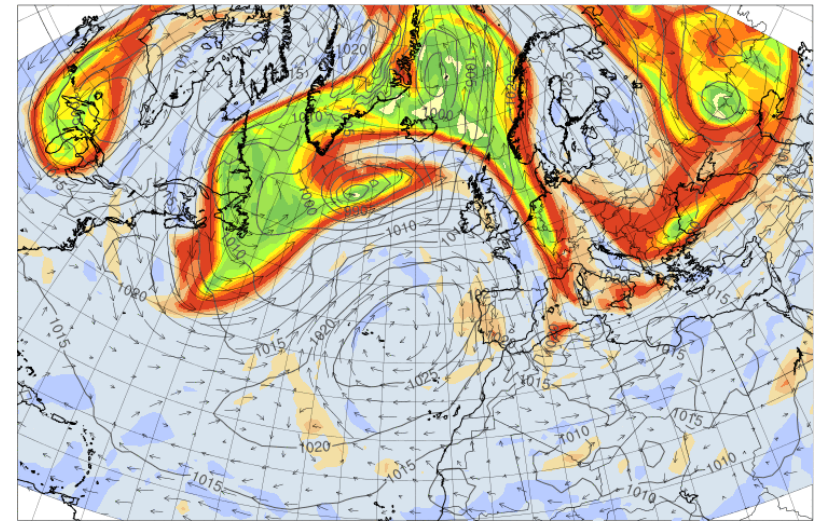
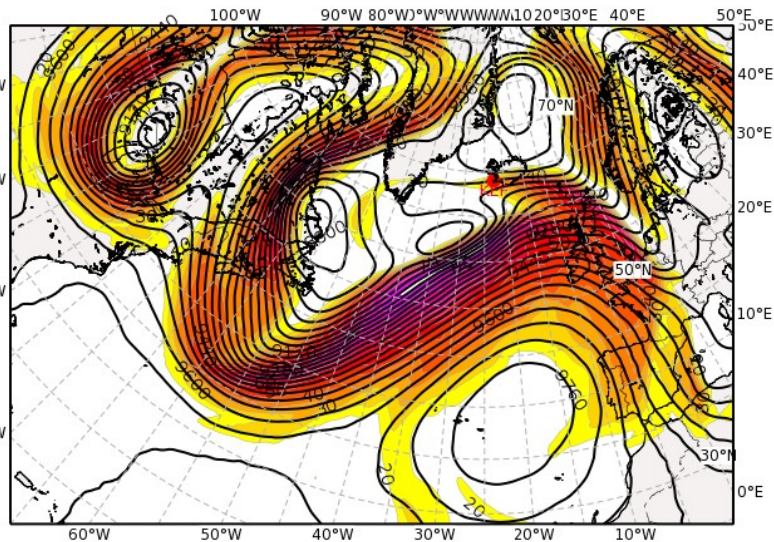
- HALO Samples Key Regions of Mid-Level Moisture Sensitivity

Forecast until Thursday

Forecast – Tue, 27 Sep 2016, 00 UTC

Z300, PV330, THE850, WCB

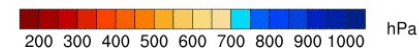
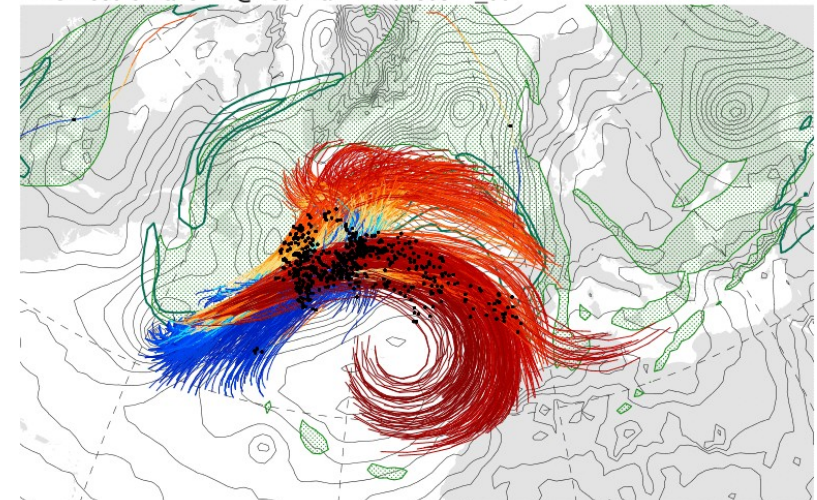
PV@325K at 20160927_00



Lisa

Trajectory start and SLP VT: 20160925_00

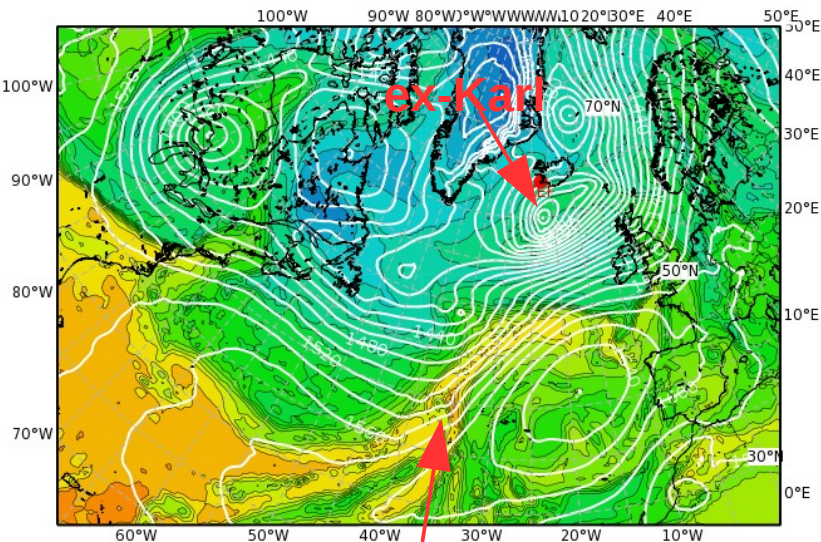
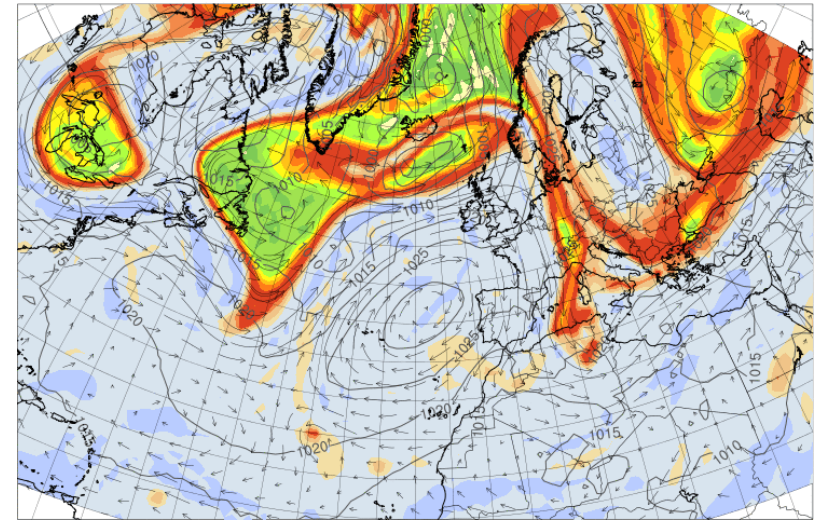
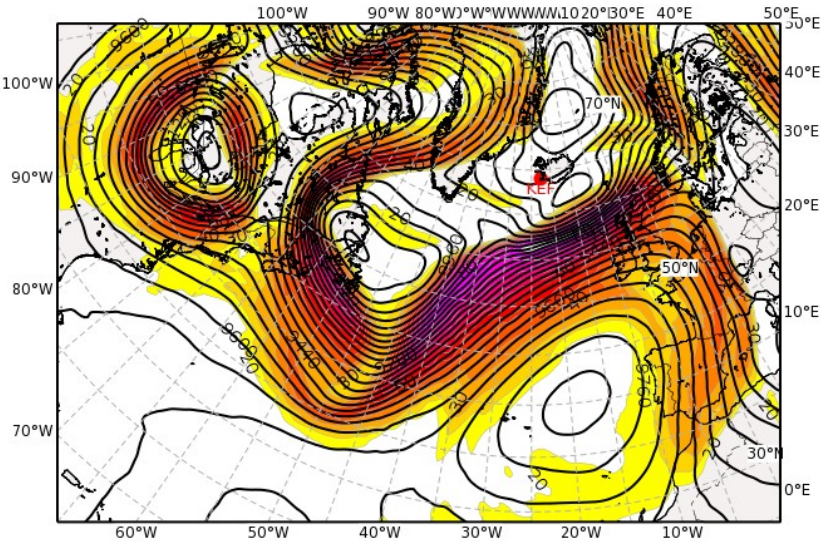
WCB outflow and PV@250hPa VT: 20160927_00



Forecast – Tue, 27 Sep 2016, 12 UTC

Z300, PV330, THE850, WCB

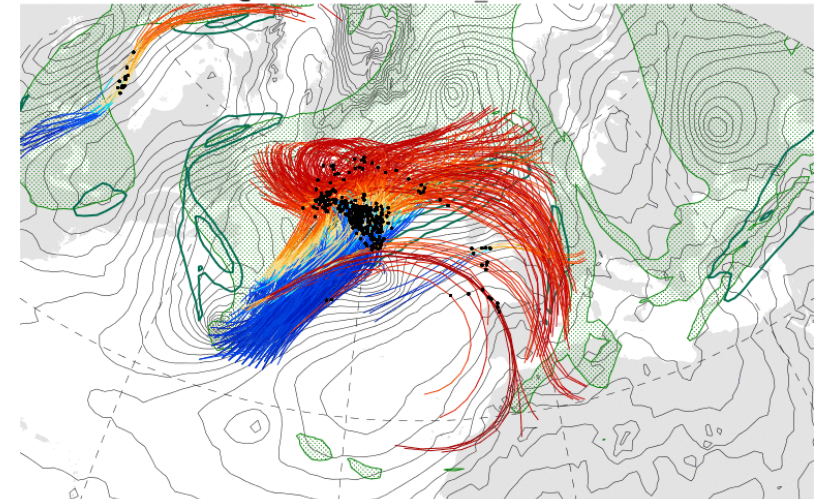
PV@325K at 20160927_12



Lisa

Trajectory start and SLP VT: 20160925_12

WCB outflow and PV@250hPa VT: 20160927_12

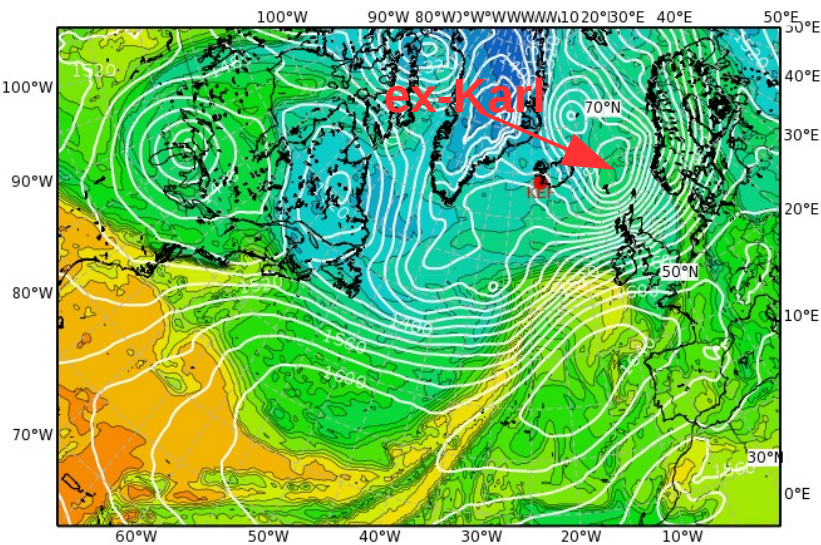
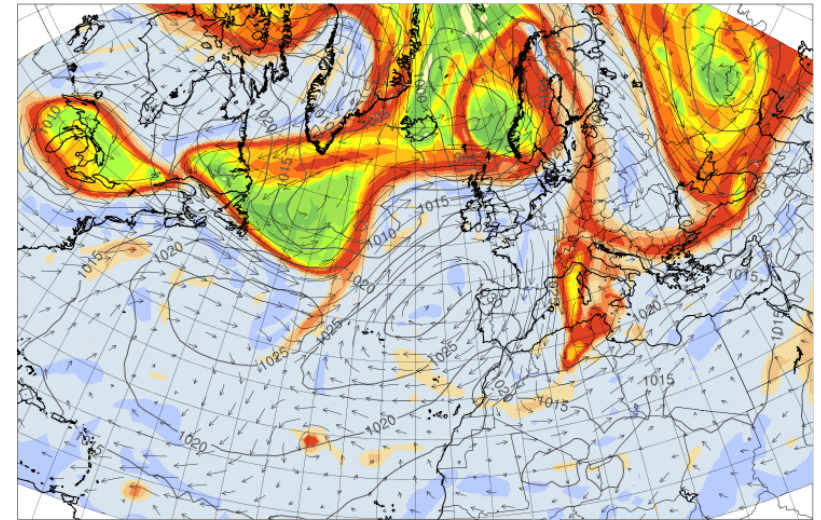
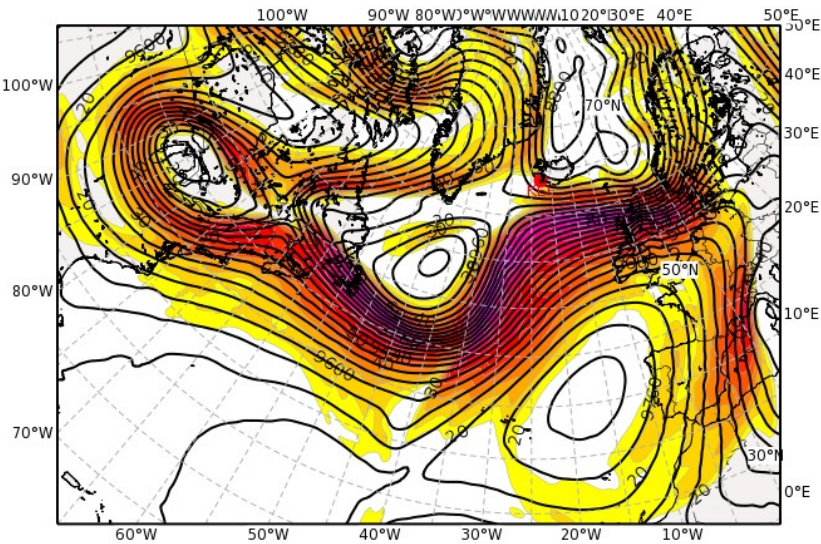


200 300 400 500 600 700 800 900 1000 hPa

Forecast – Wed, 28 Sep 2016, 00 UTC

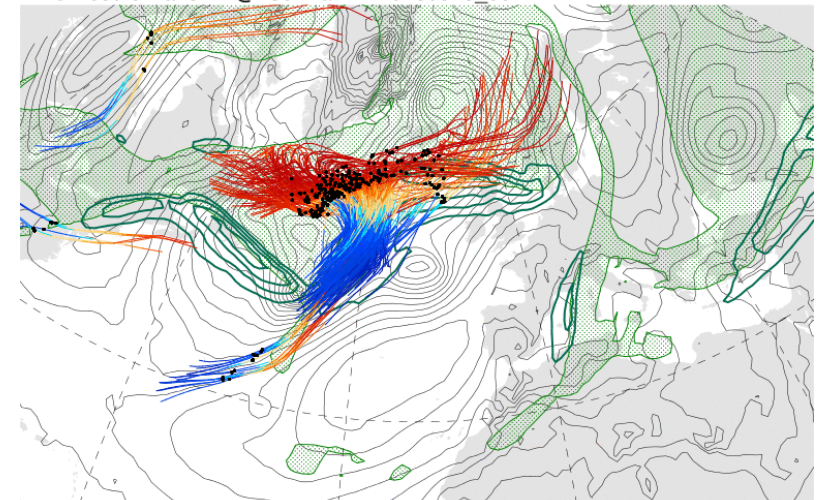
Z300, PV330, THE850, WCB

PV@325K at 20160928_00



Trajectory start and SLP VT: 20160926_00

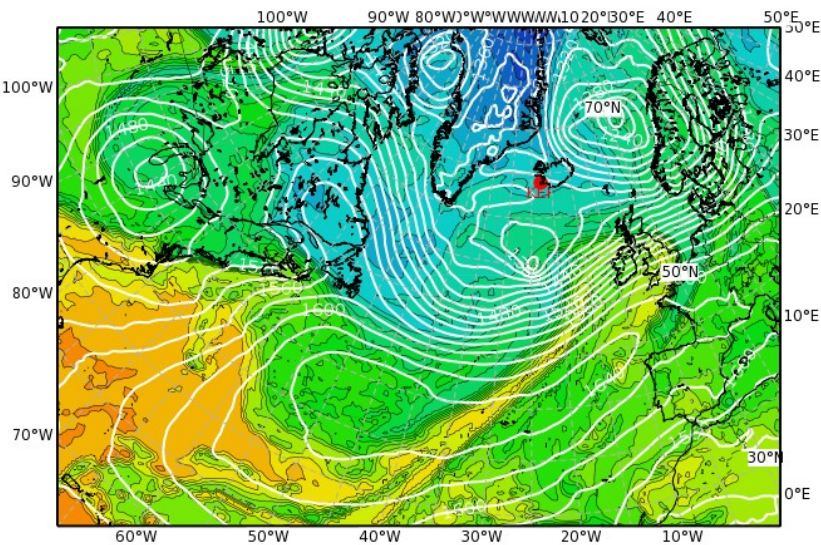
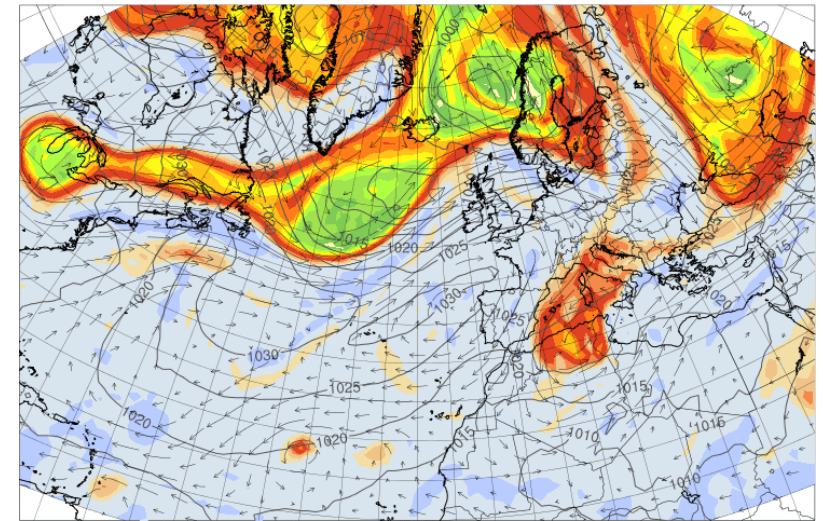
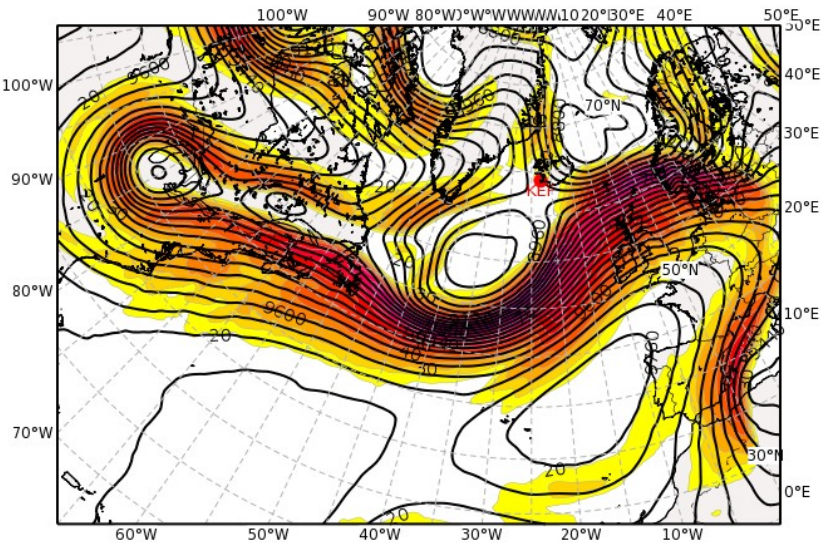
WCB outflow and PV@250hPa VT: 20160928_00



200 300 400 500 600 700 800 900 1000 hPa

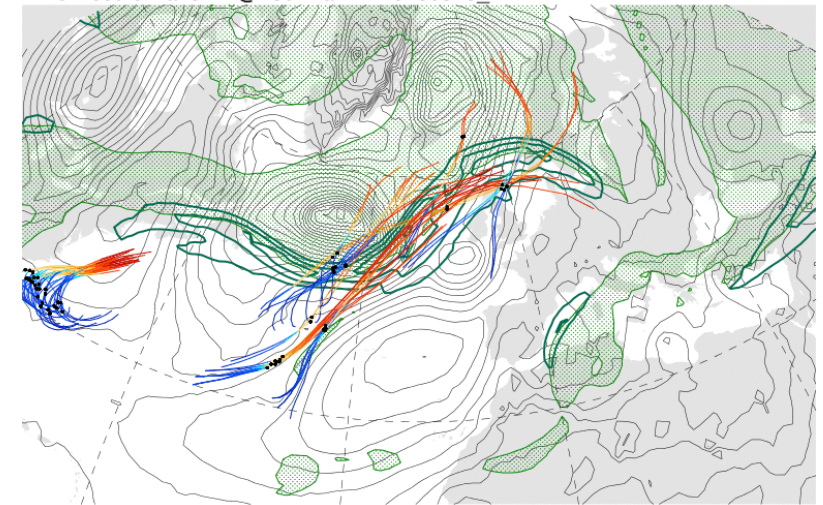
Z300, PV330, THE850, WCB

PV@325K at 20160928_12

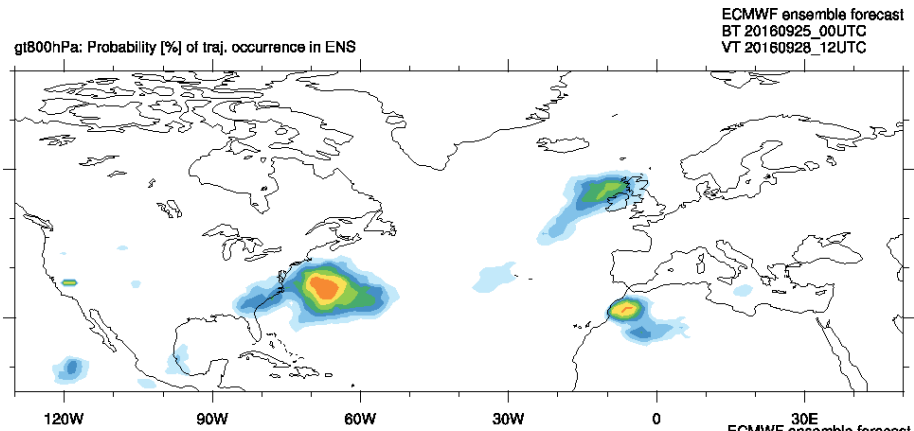


Trajectory start and SLP VT: 20160926_12

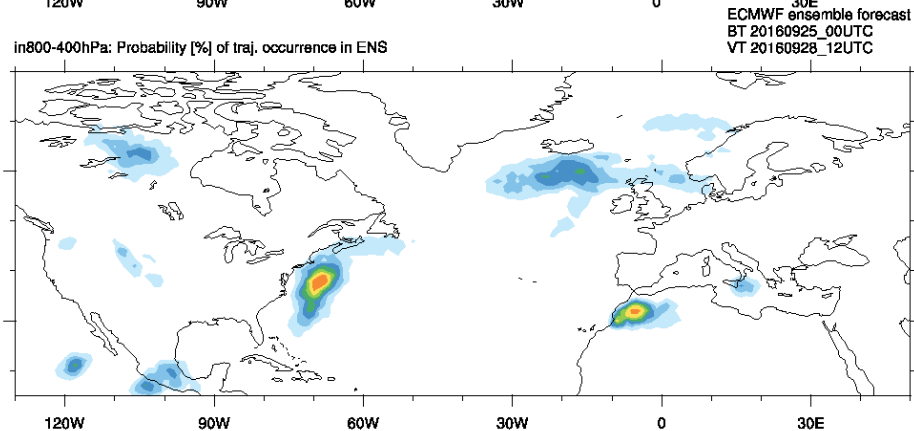
WCB outflow and PV@250hPa VT: 20160928_12



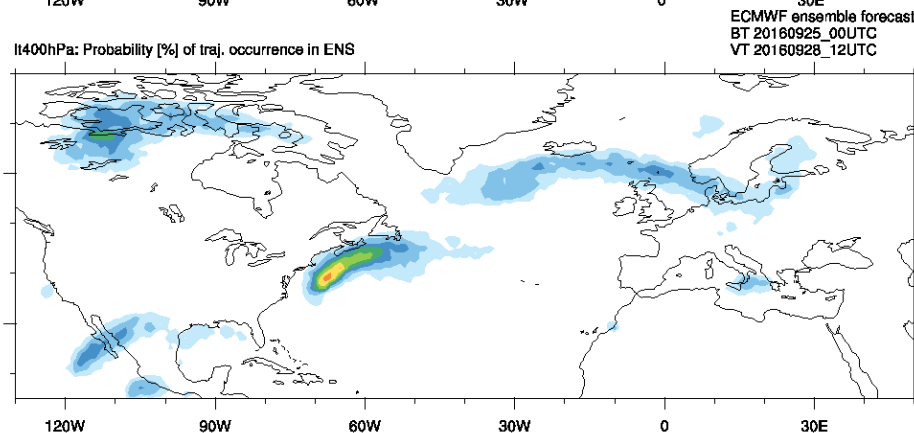
Forecast – Wed, 28 Sep 2016, 12 UTC



WCB inflow



WCB ascent



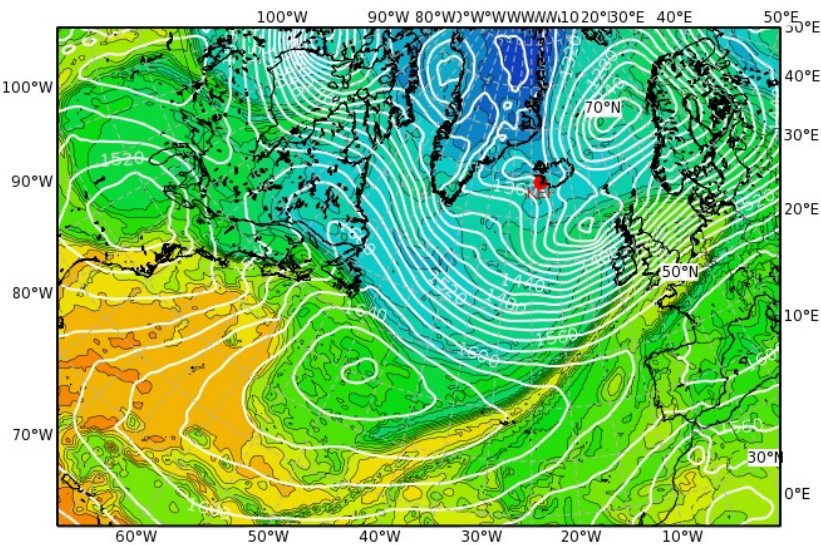
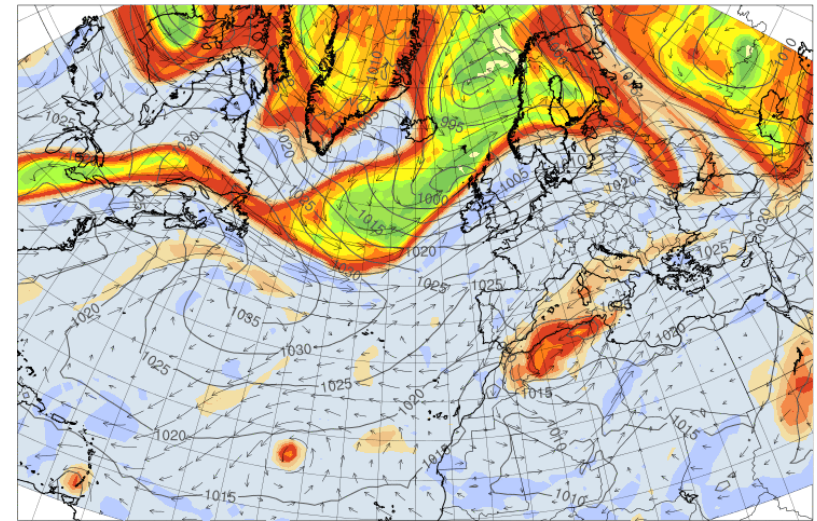
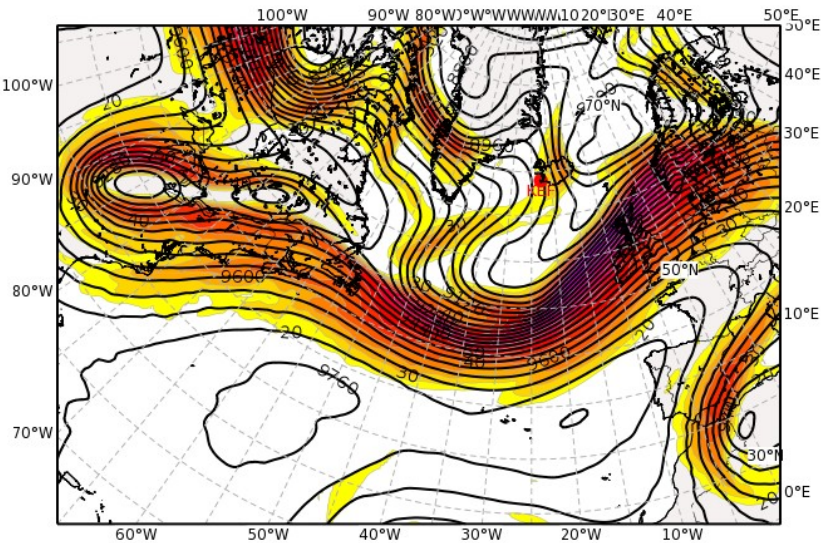
WCB outflow

→ gravity wave IOP

Forecast – Thu, 29 Sep 2016, 00 UTC

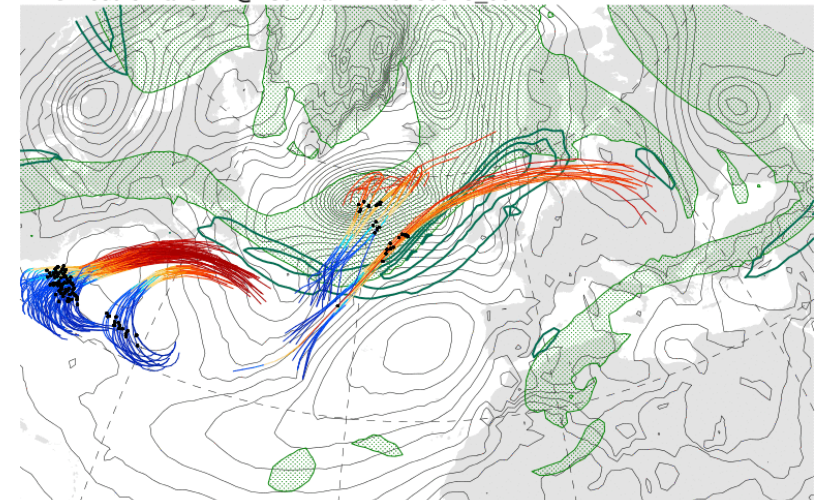
Z300, PV330, THE850, WCB

PV@325K at 20160929_00



Trajectory start and SLP VT: 20160927_00

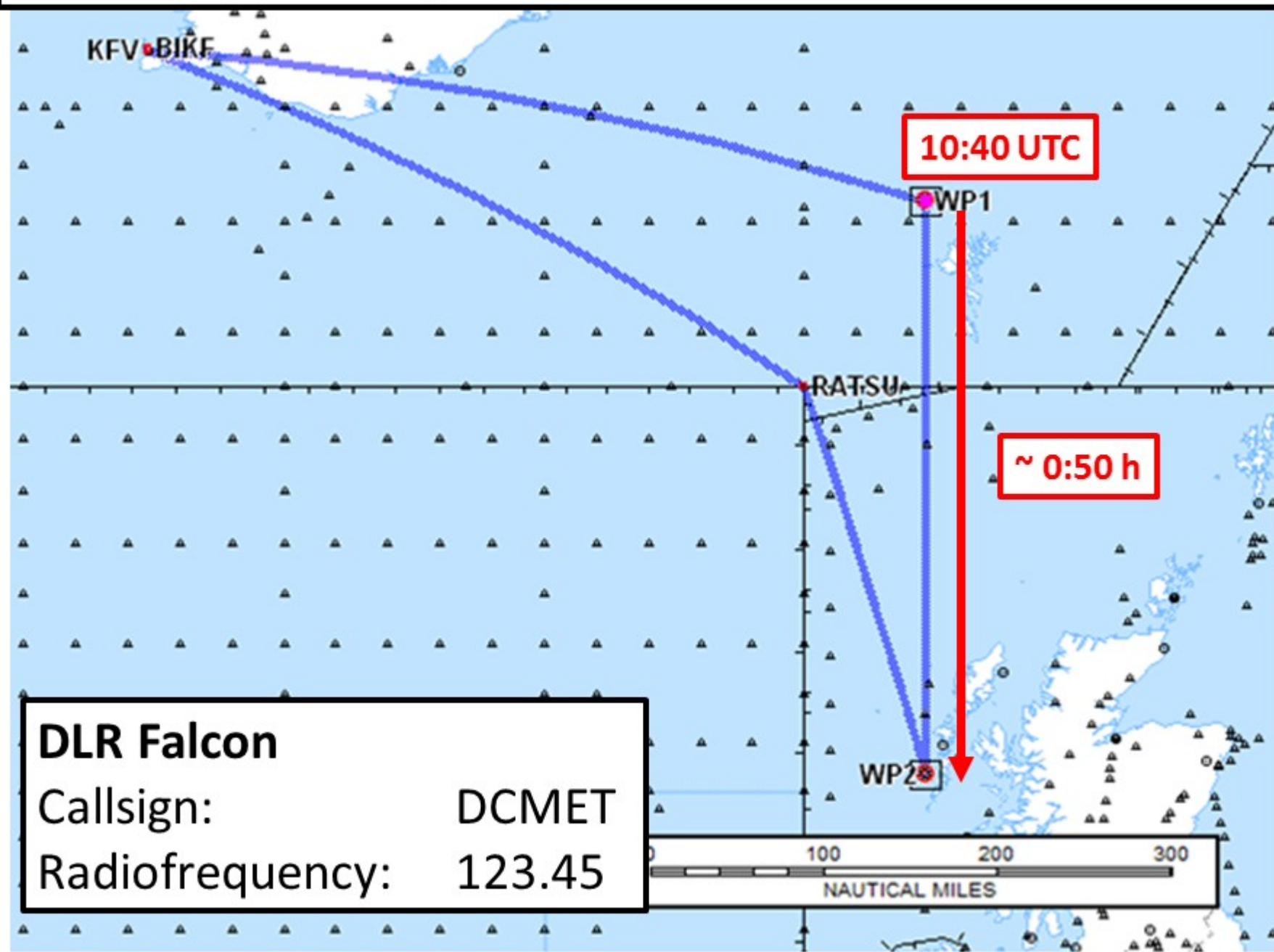
WCB outflow and PV@250hPa VT: 20160929_00



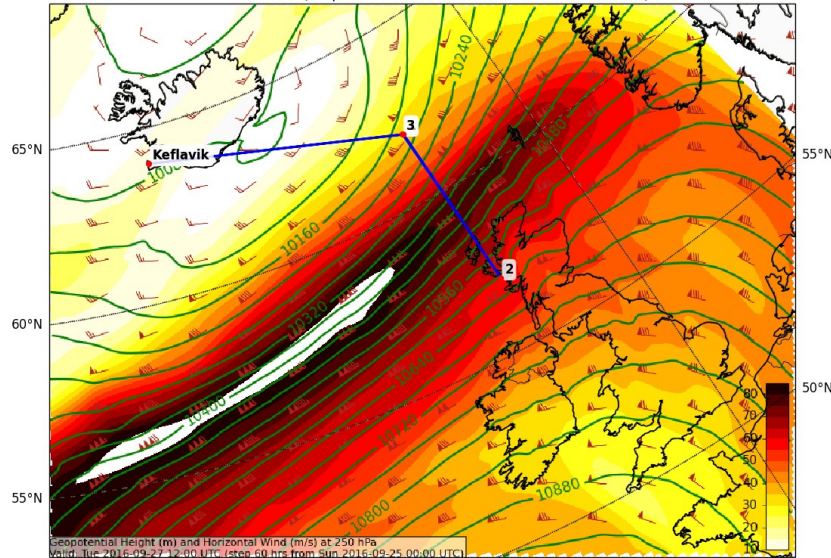
200 300 400 500 600 700 800 900 1000 hPa

DLR-Falcon/UK FAAM BAE 146 flight on Tuesday

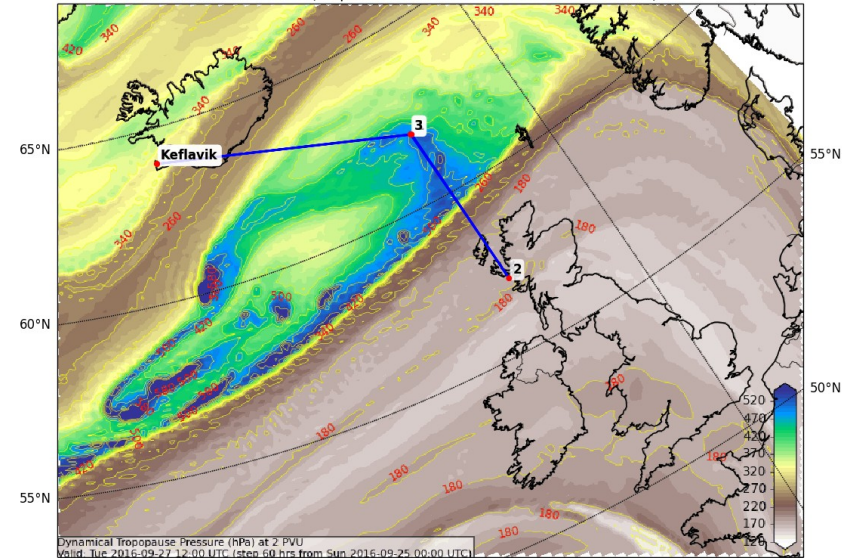
Tuesday: Falcon flight coordinated with FAAM BAE-146



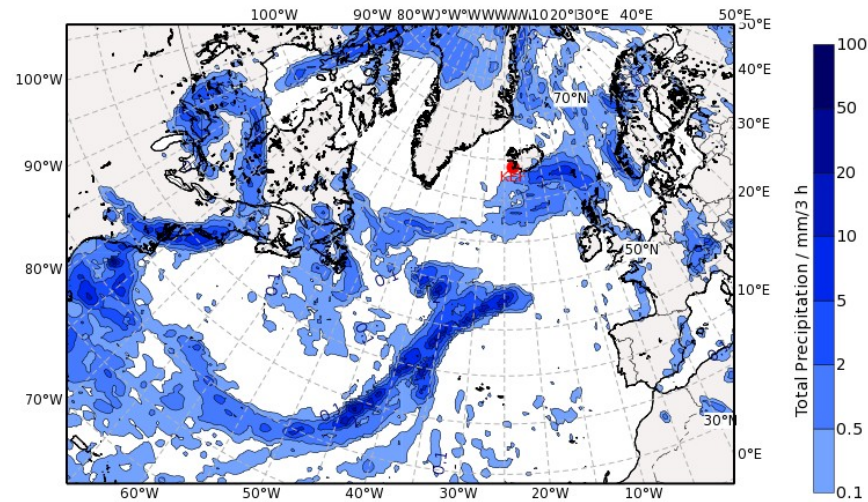
Geopotential Height (m) and Horizontal Wind (m/s) (Wind Speed 10-85 m/s) at 250 (hPa)
Valid: Tue 2016-09-27 12:00 UTC (step 60 hrs from Sun 2016-09-25 00:00 UTC)



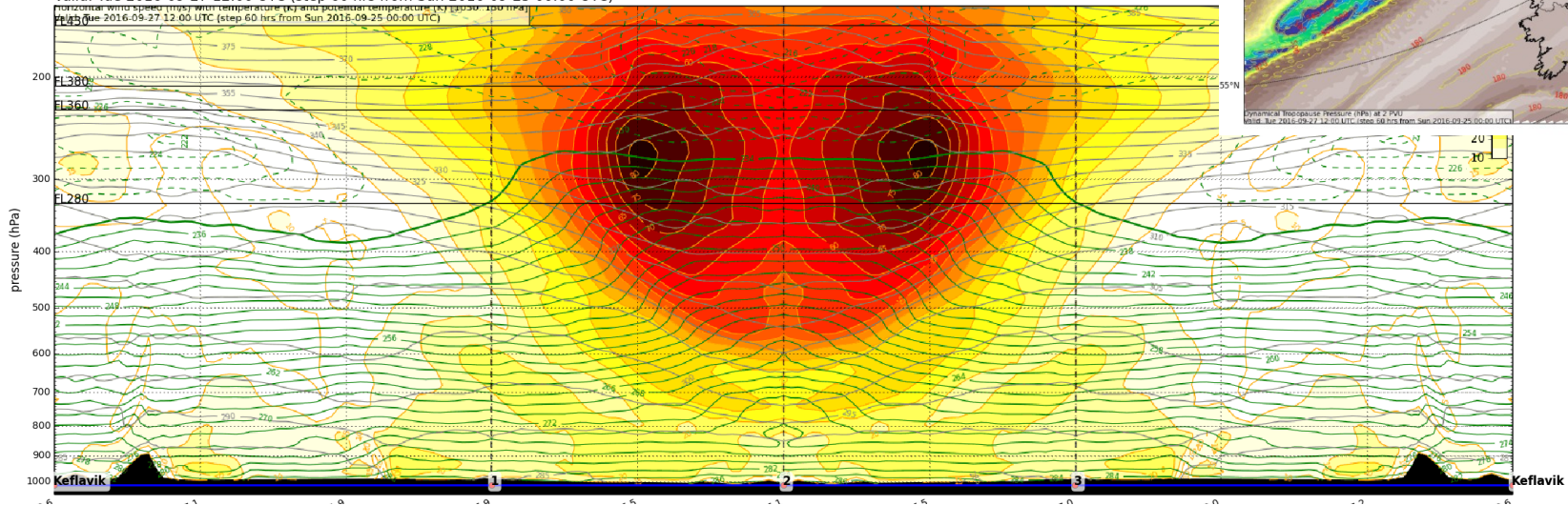
Dynamical Tropopause (Pressure (hPa)) at 2000 (10^{-3} PVU)
Valid: Tue 2016-09-27 12:00 UTC (step 60 hrs from Sun 2016-09-25 00:00 UTC)



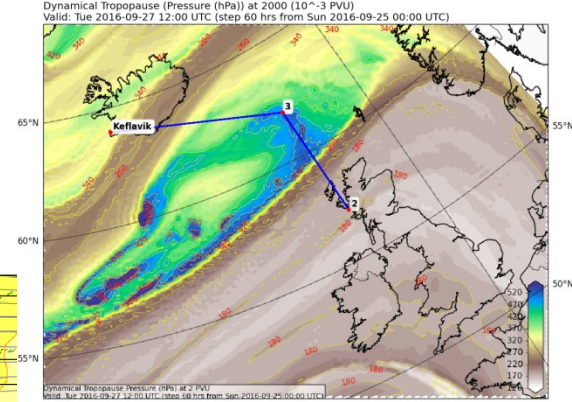
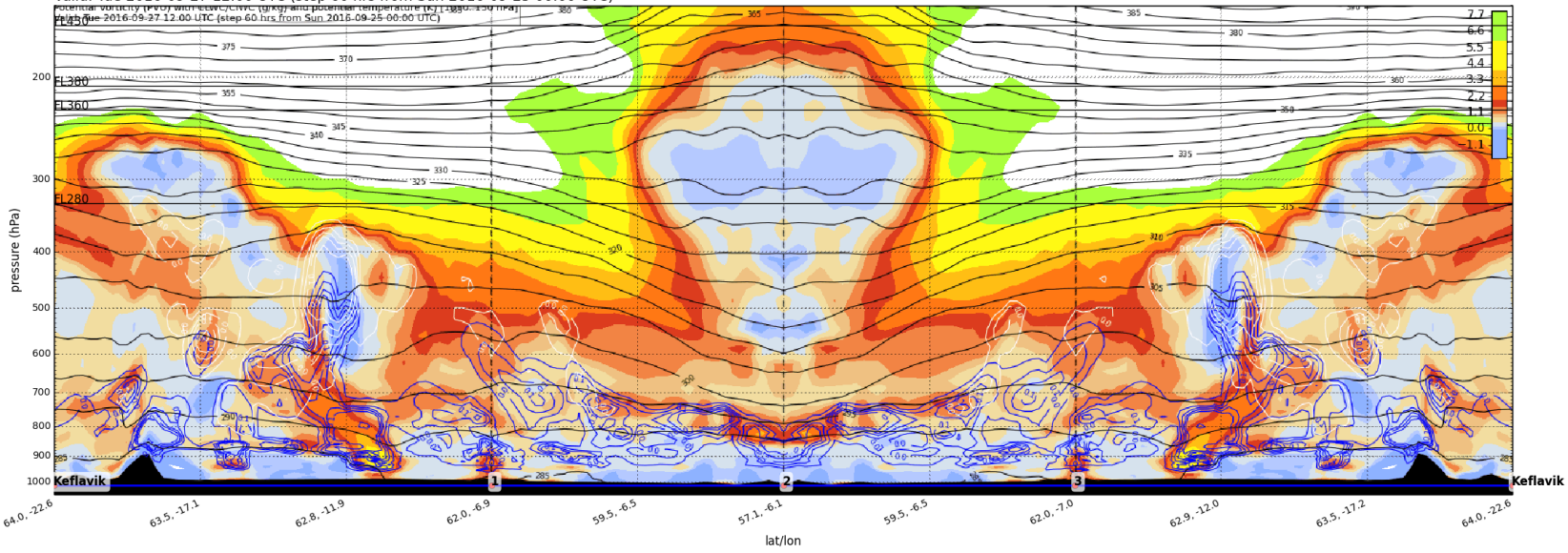
Total Precipitation, accumulated over 3 hours prior to valid time (mm)
Valid: Tue, 27 Sep 2016, 12 UTC (step 060 h from Sun, 25 Sep 2016, 00 UTC)



Horizontal Wind (m/s) Vertical Section
Valid: Tue 2016-09-27 12:00 UTC (step 60 hrs from Sun 2016-09-25 00:00 UTC)

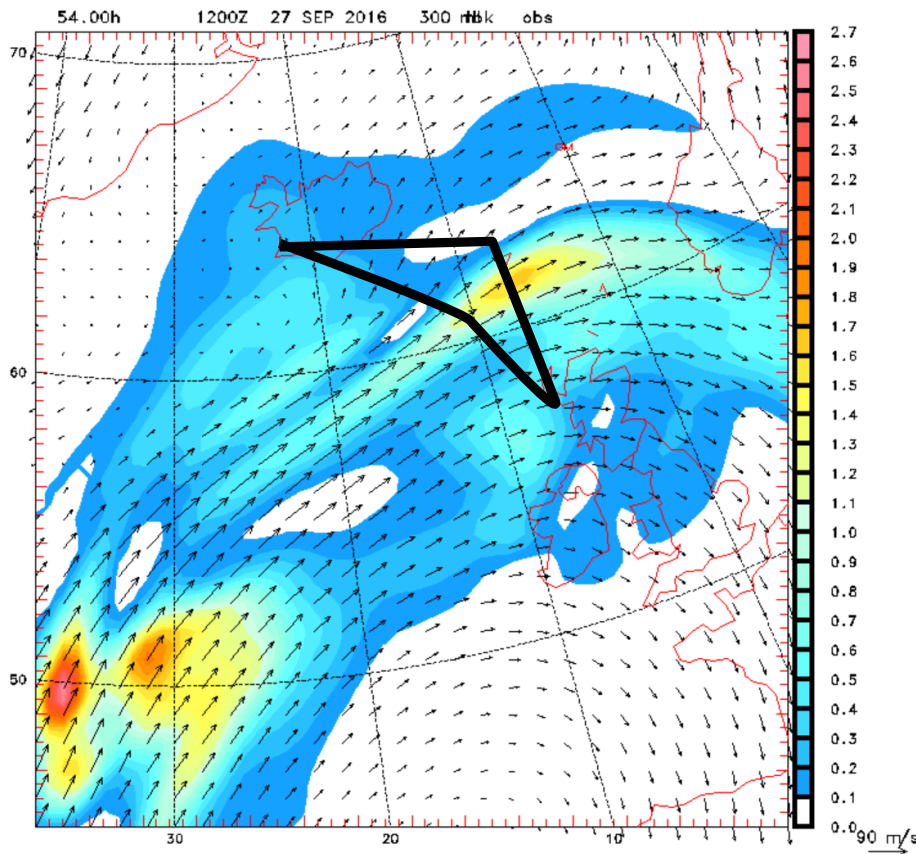


Potential Vorticity (PVU) Vertical Section (Northern Hemisphere)
Valid: Tue 2016-09-27 12:00 UTC (step 60 hrs from Sun 2016-09-25 00:00 UTC)

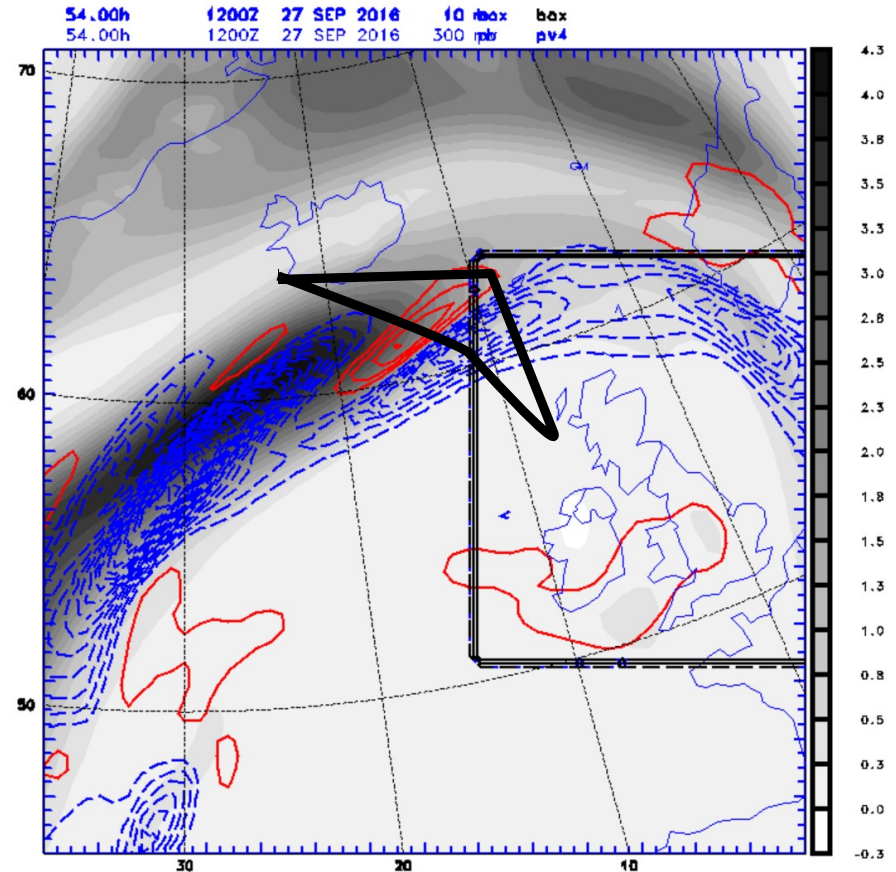


COAMPS Sensitivity (12h) Valid 12Z 27 Sep (Box over UK) Falcon Flight (Tue)

300-hPa Wind Sensitivity (Total KE)
300-hPa Winds



300-hPa PV Sensitivity (Blue/Red)
300-hPa PV (Gray)



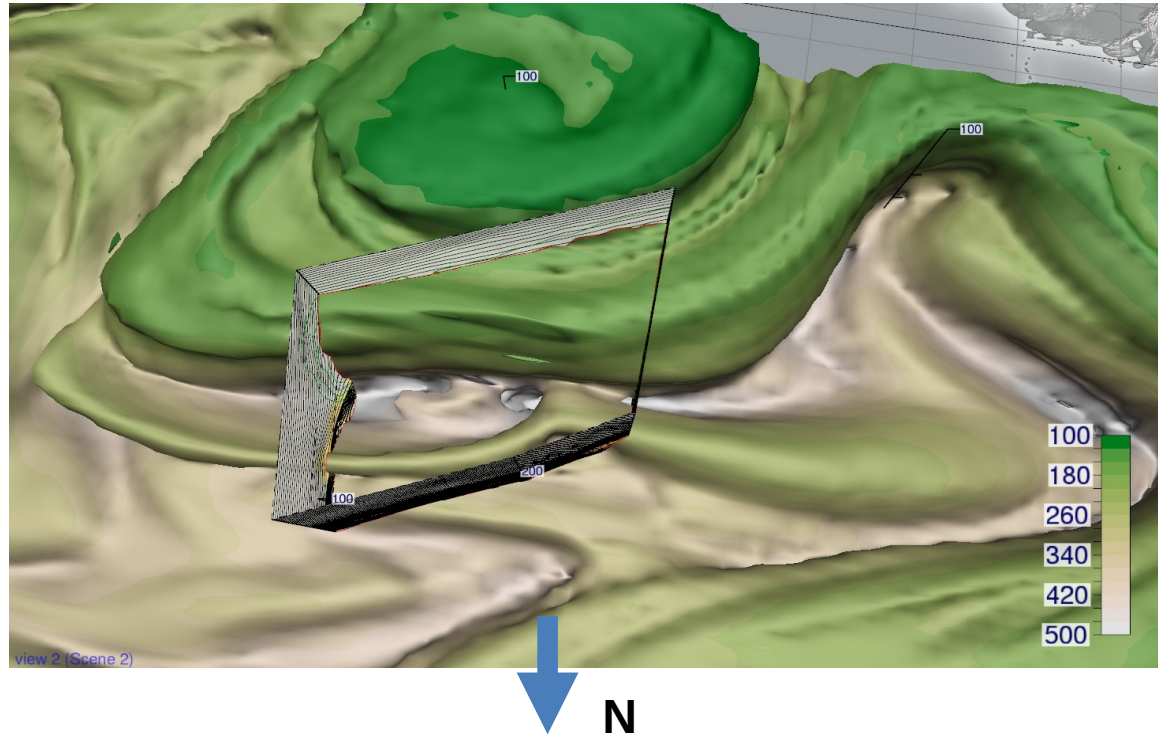
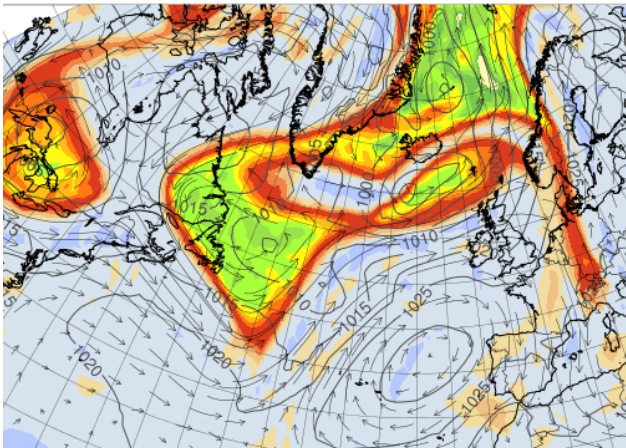
- 12-h Sensitivity focusing on winds over UK
- Wind and PV sensitivity maxima near jet axis.
- Falcon winds may be valuable crossing jet

HALO flight on Tuesday

Tentative flight track for Tue, 27 Sep 2016 12 UTC

HALO

PV@320K at 20160927_12

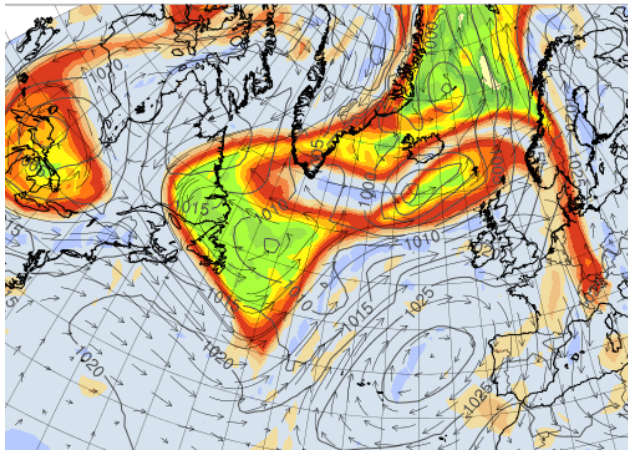


- Breaking up of PV streamer into a cutoff (P1)
- Strong moisture flux and WCB inflow/ascent between P1 and P2 (and between P2 and P3)
- Karl at mature stage and upper-level cutoff between P3 and P4

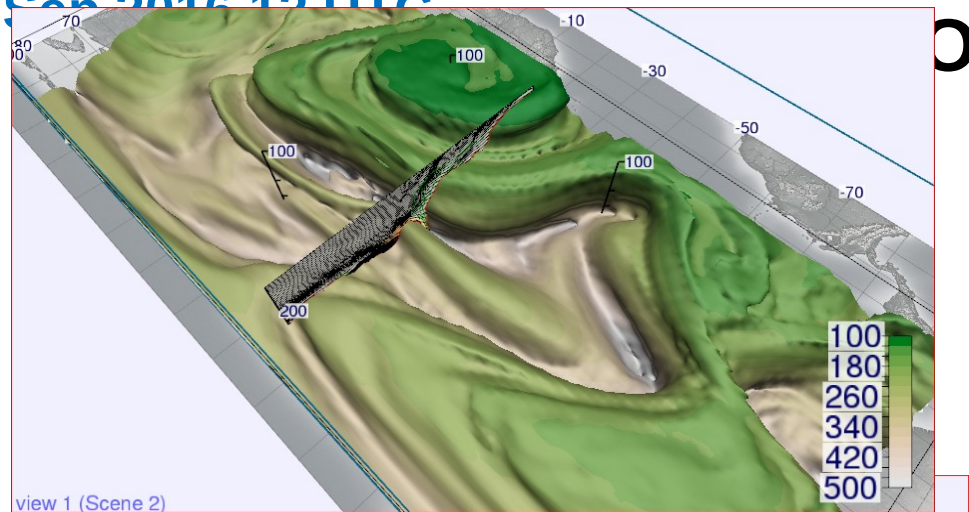
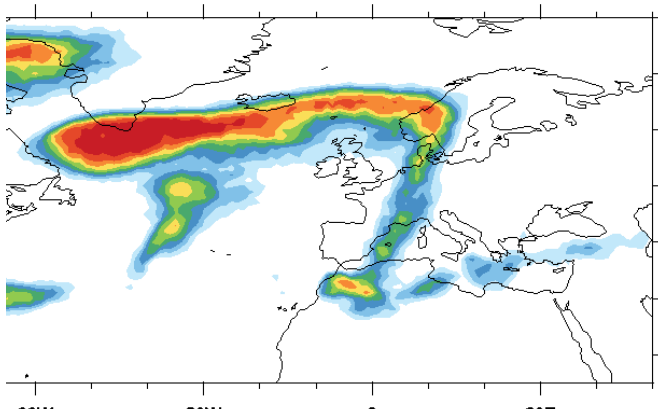
Tue 27, 12UTC

Tentative flight track for Tue, 27 Sep 2016 12 UTC

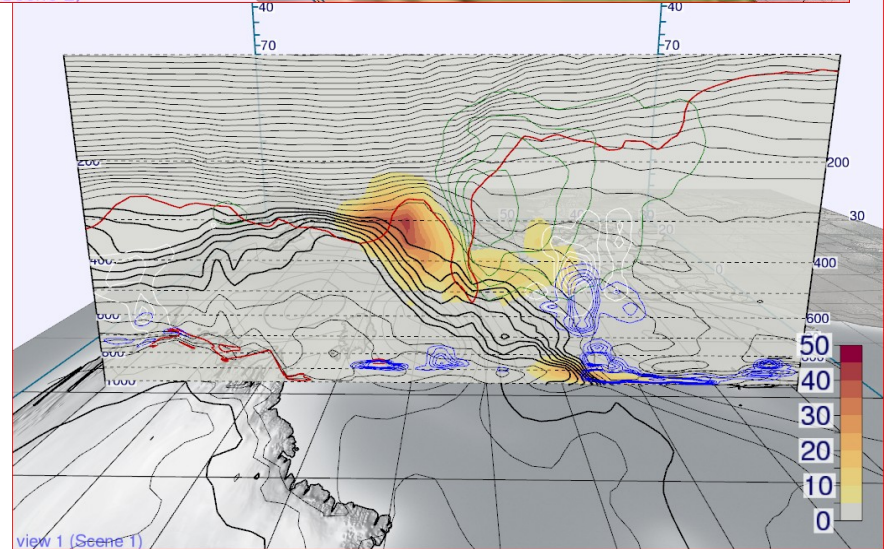
PV@320K at 20160927_12



ECMWF ensemble forecast
BT 20160925_00UTC
VT 20160927_12UTC



view 1 (Scene 2)



view 1 (Scene 1)

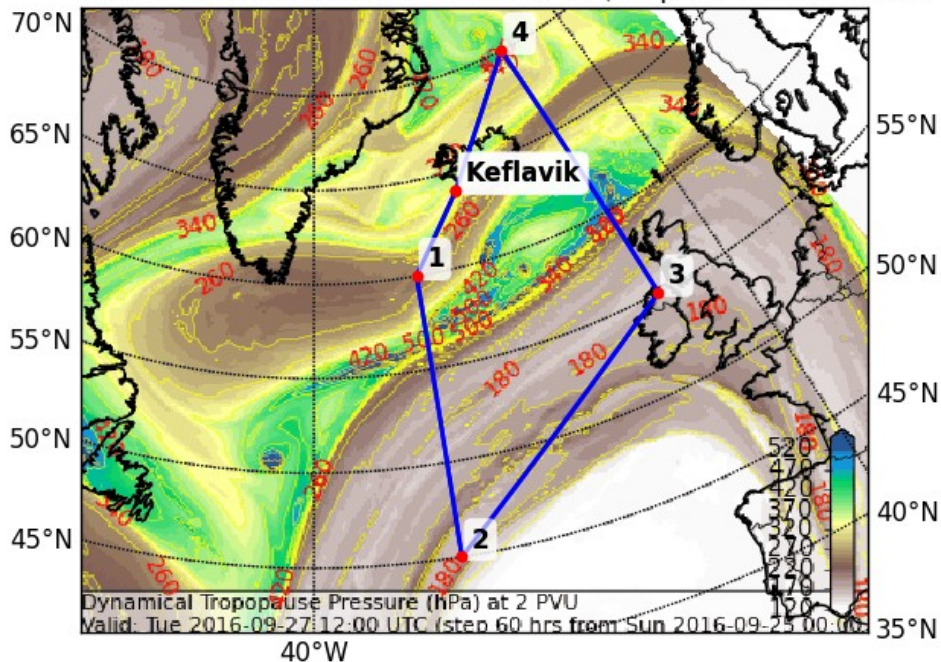
- Breaking up of PV streamer into a cutoff (P1)
- Strong moisture flux and WCB inflow/ascent between P1 and P2 (and between P2 and P3)
- Karl at mature stage and upper-level cutoff between P3 and P4

Tue 27, 12UTC

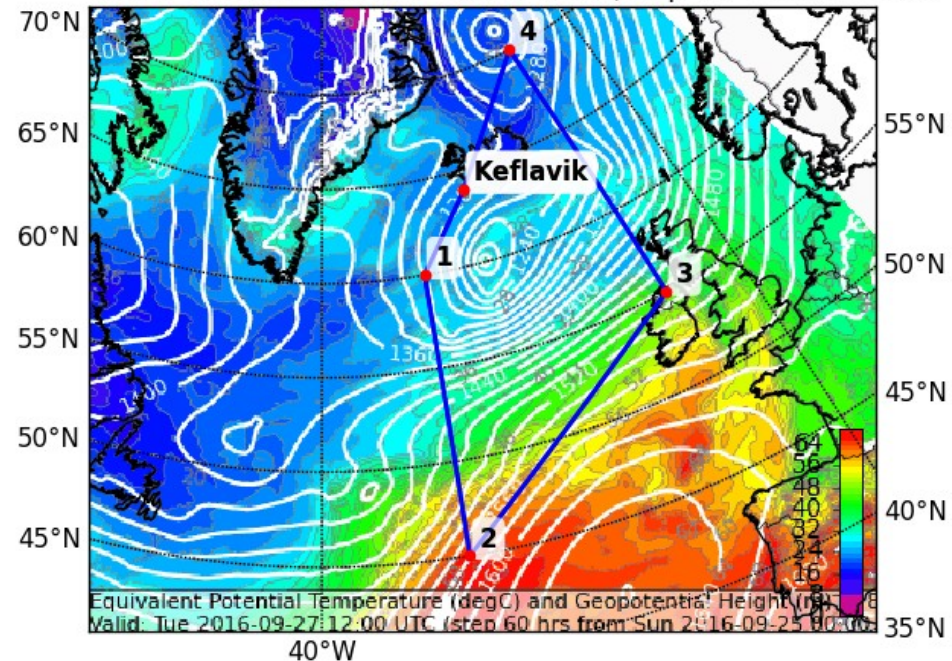
Tentative flight track for Tue, 27 Sep 2016 12 UTC

HALO

Dynamical Tropopause (Pressure (hPa)) at 2000 (10^{-3} P)
Valid: Tue 2016-09-27 12:00 UTC (step 60 hrs from Sun 2



Equivalent Potential Temperature (degC) and Geopotential
Valid: Tue 2016-09-27 12:00 UTC (step 60 hrs from Sun



Measure:

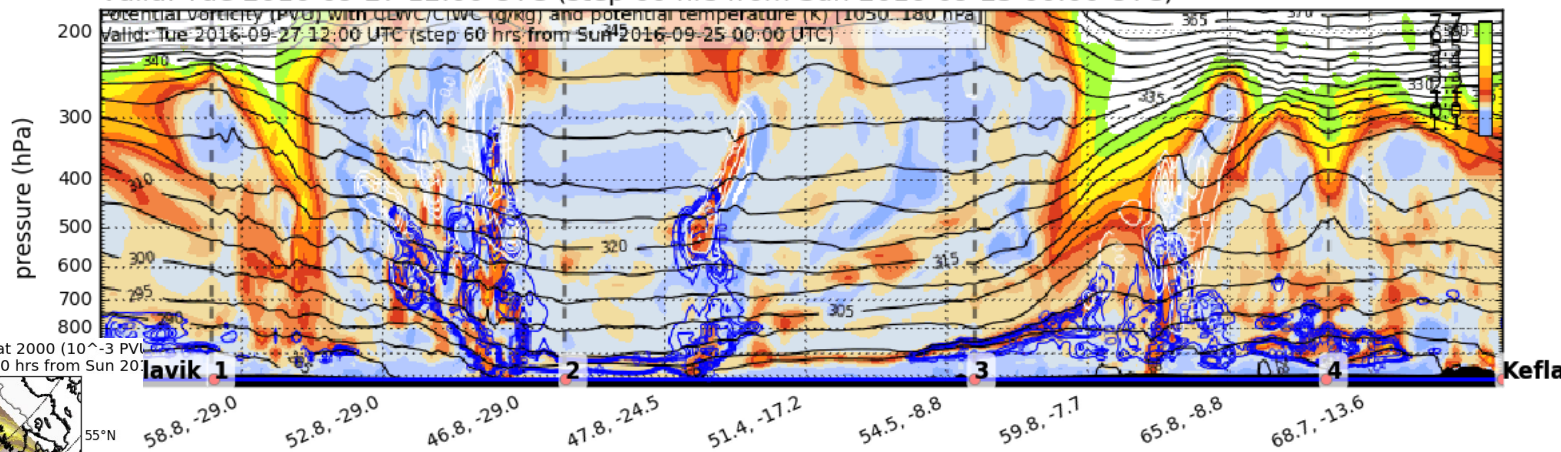
- Breaking up of PV streamer into a cutoff (P1)
- Strong moisture flux and WCB inflow/ascent between P1 and P2 (and between P2 and P3)
- Karl at mature stage and upper-level cutoff between P3 and P4

Tue 27, 12UTC

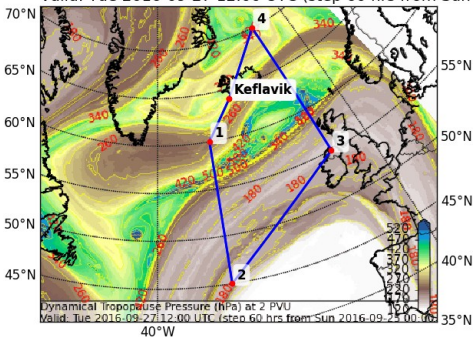
Flight cross section for Tue, 27 Sep 2016 12 UTC

Potential vorticity (PVO) vertical section (Northern Hemisphere)

Valid: Tue 2016-09-27 12:00 UTC (step 60 hrs from Sun 2016-09-25 00:00 UTC)

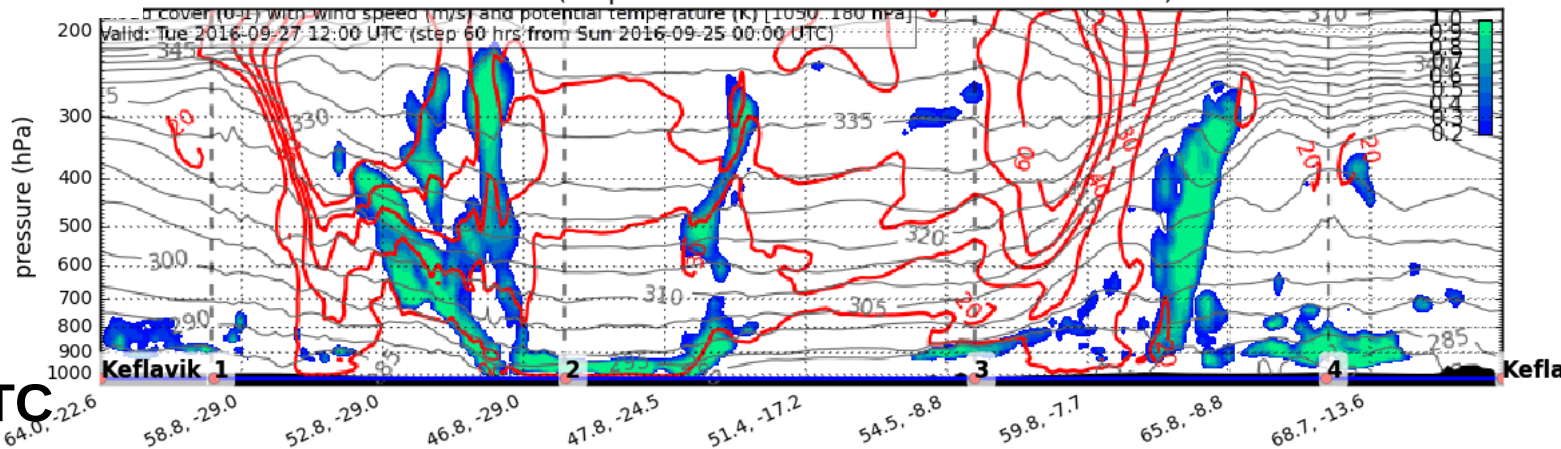


Dynamical Tropopause (Pressure (hPa)) at 2000 (10^{-3} PVU)
Valid: Tue 2016-09-27 12:00 UTC (step 60 hrs from Sun 2016-09-25 00:00 UTC)



Cloud cover (0-1) and wind speed (m/s) vertical section

Valid: Tue 2016-09-27 12:00 UTC (step 60 hrs from Sun 2016-09-25 00:00 UTC)

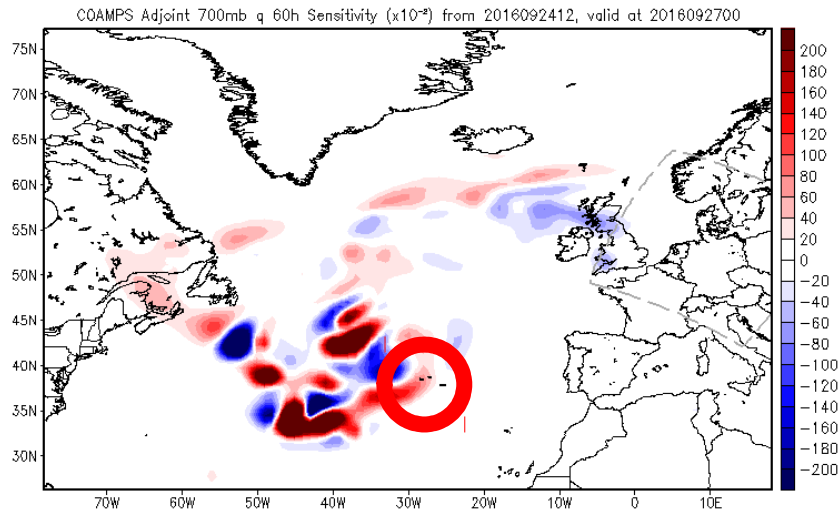


Tue 27, 12UTC

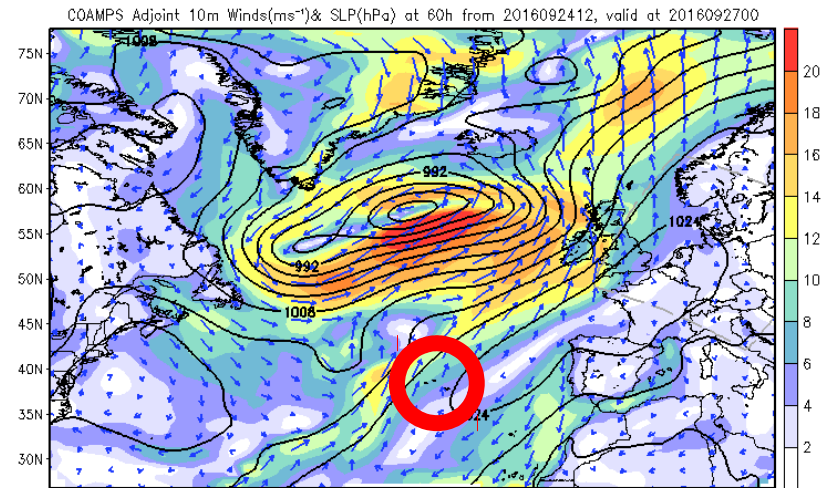
COAMPS Sensitivity Valid 00Z 27 SEP (Tue)

Azores Radiosondes

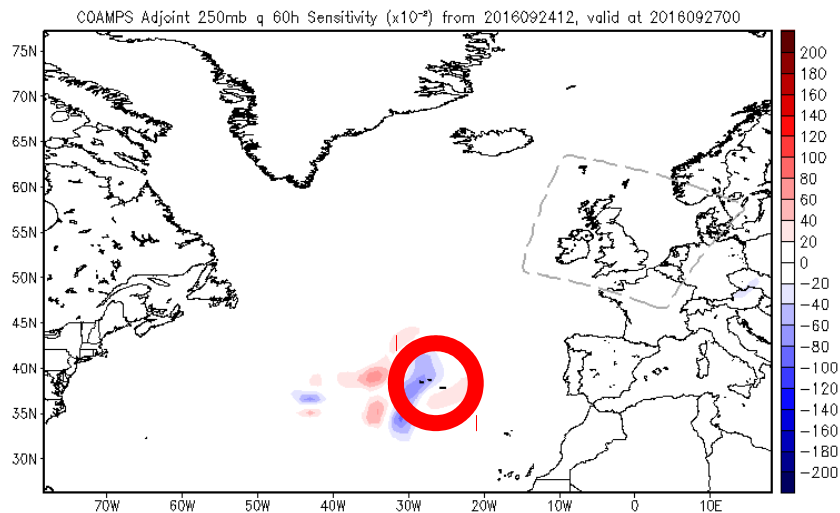
700-hPa 48-h O Sen 00Z 27 Sep



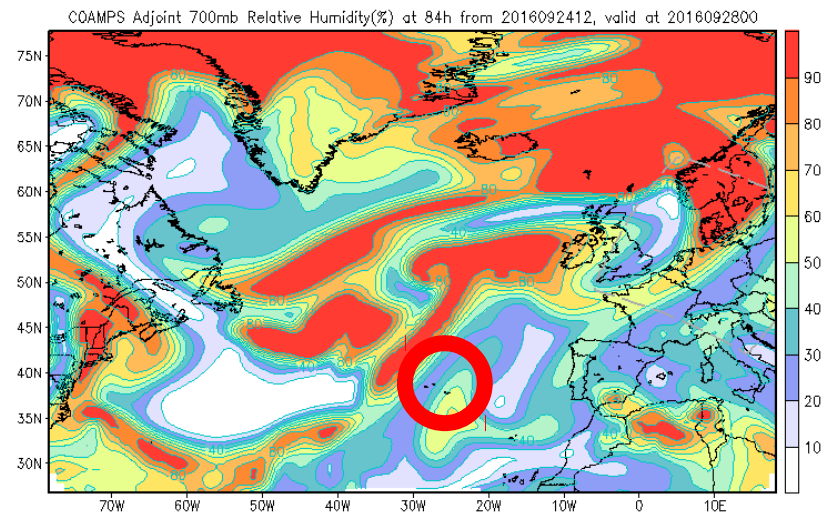
10-m Winds. SLP 00Z 27 SEP



250-hPa 24-h Q Sen 00Z 27 Sep



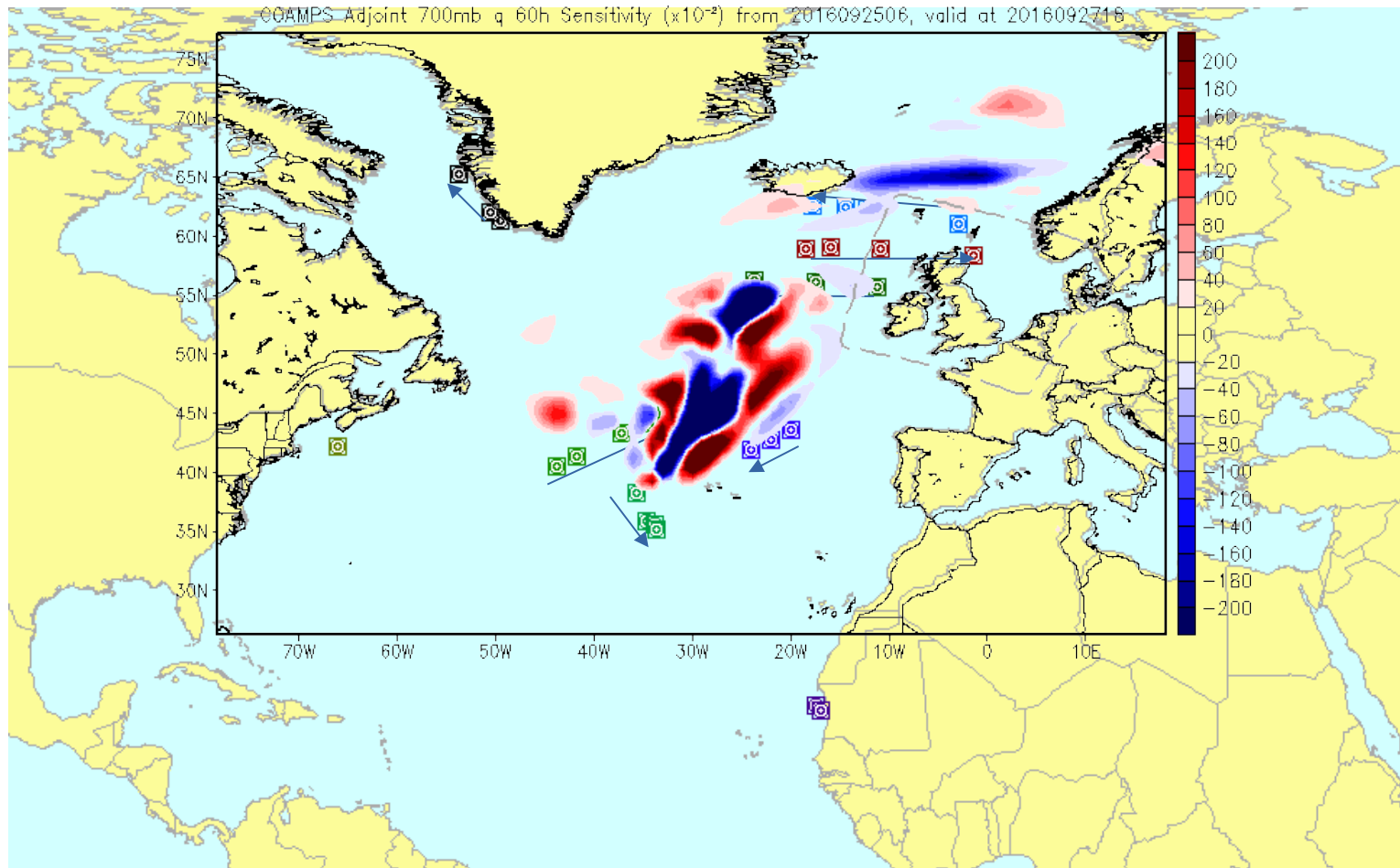
10-m Winds, SLP 00Z 28 SEP



- Request 00Z sondes from the Azores at 00Z 27 Sep and 00Z 28 Sep

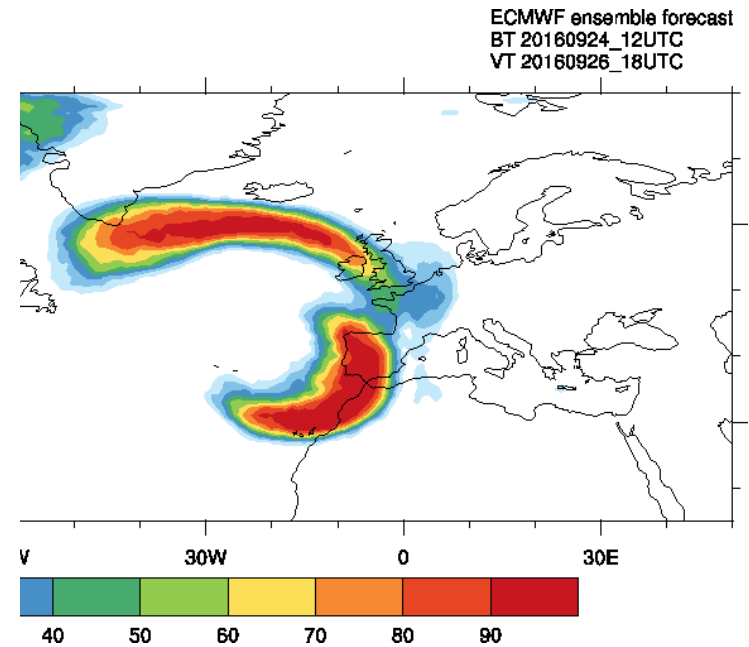
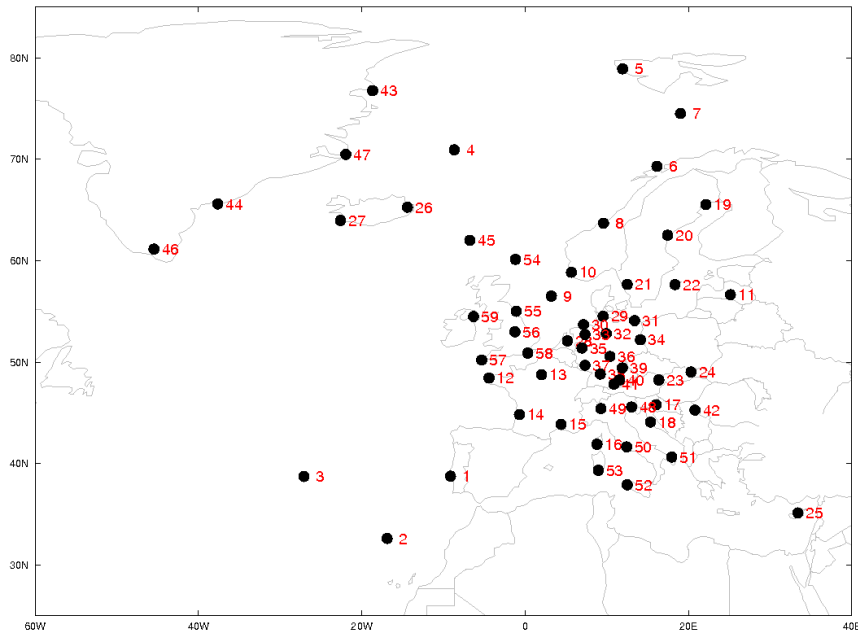
Ship Tracks

- Possibility of Additional Radiosondes on Tue/Wed near Ex-Lisa?

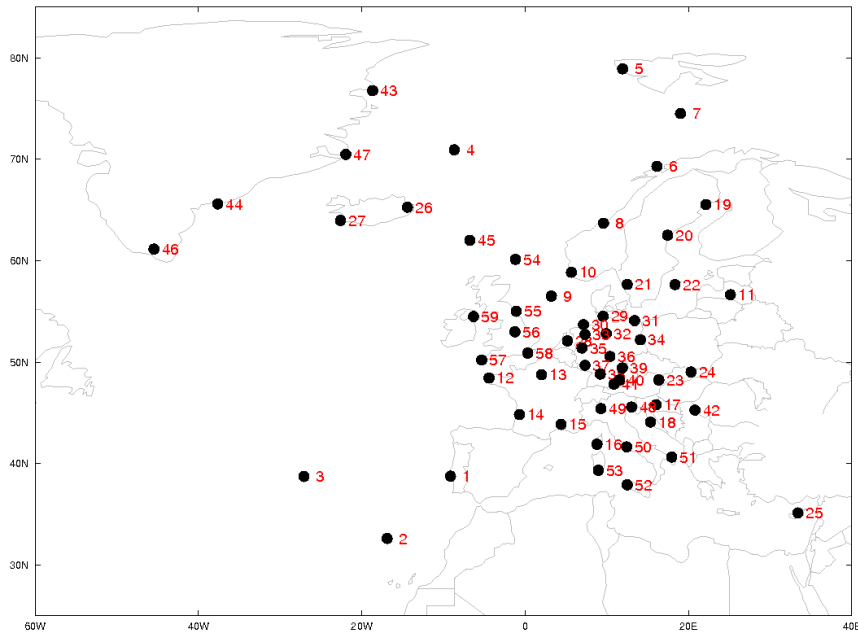


From Leo Saffin

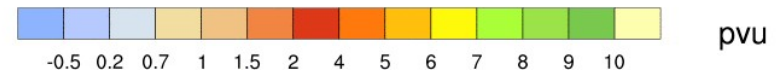
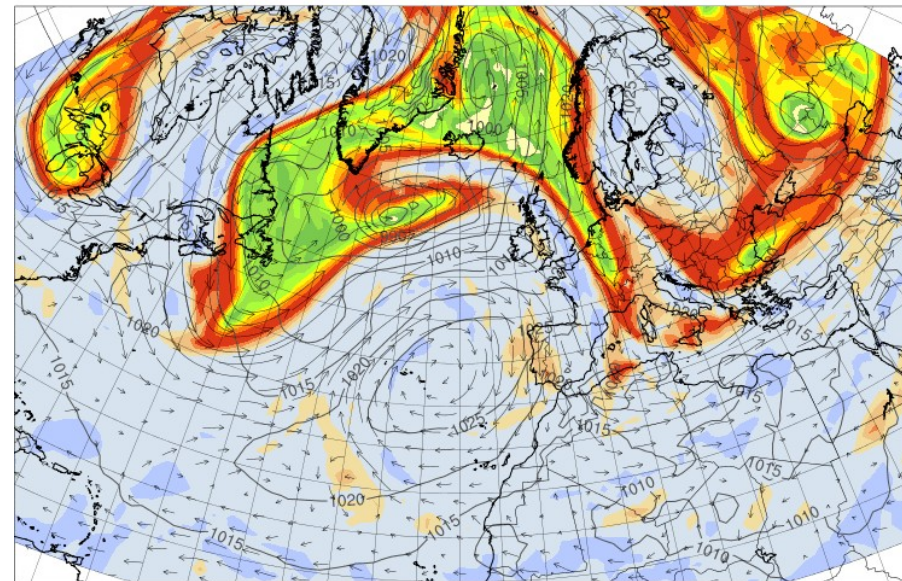
Monday 18 UTC



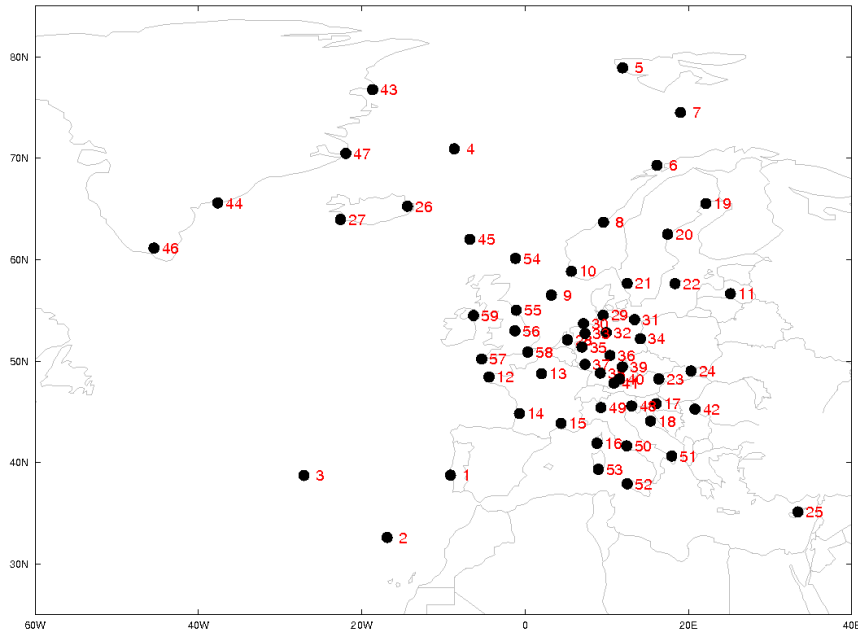
Tuesday 0 UTC



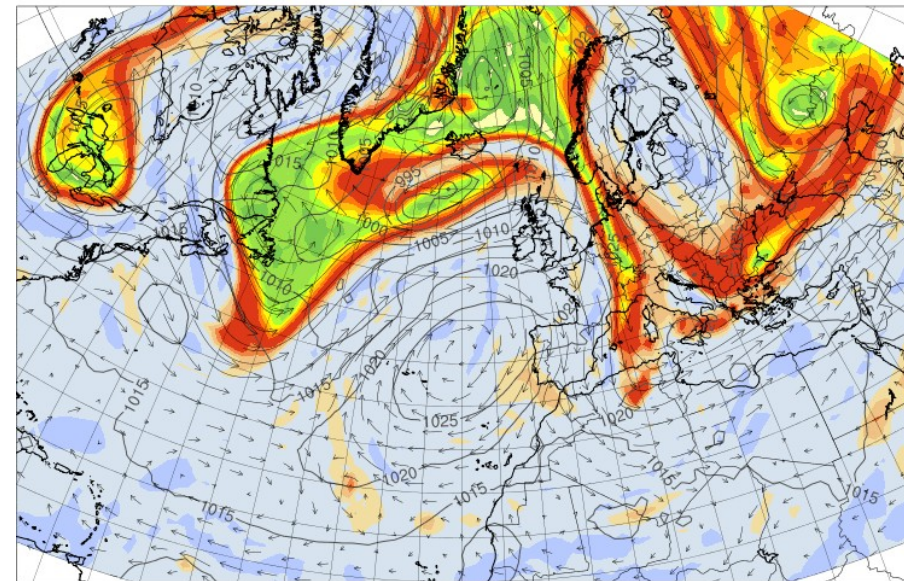
PV@325K at 20160927_00



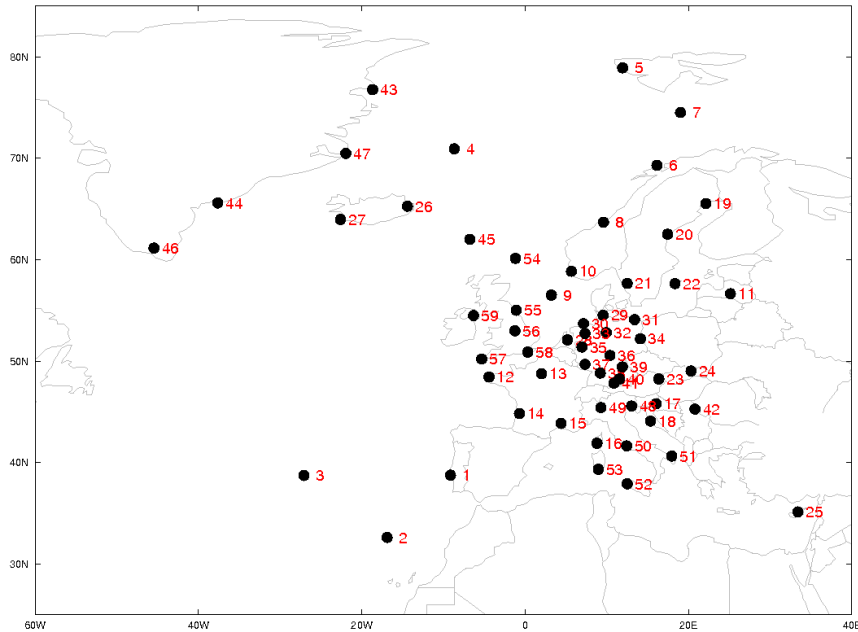
Tuesday 6 UTC



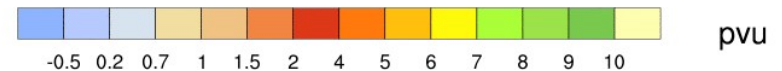
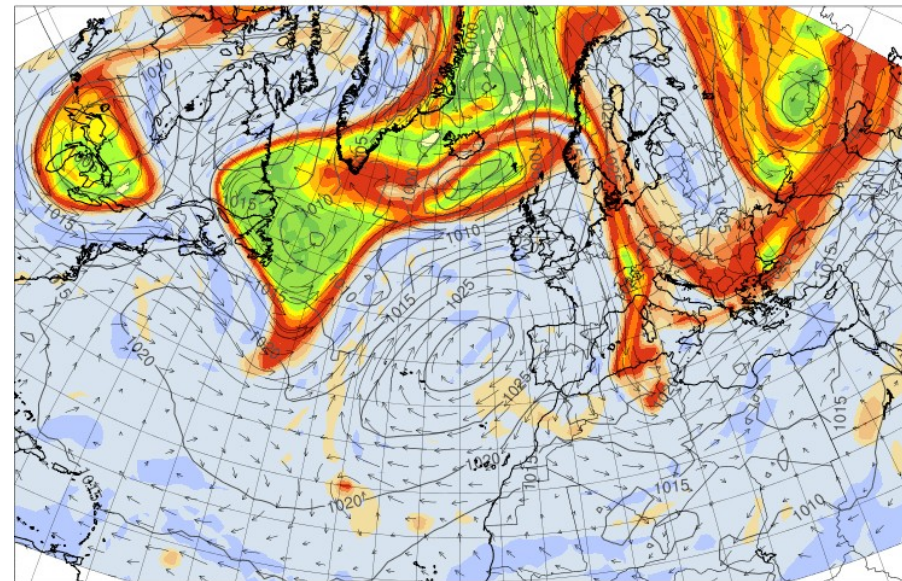
PV@325K at 20160927_06



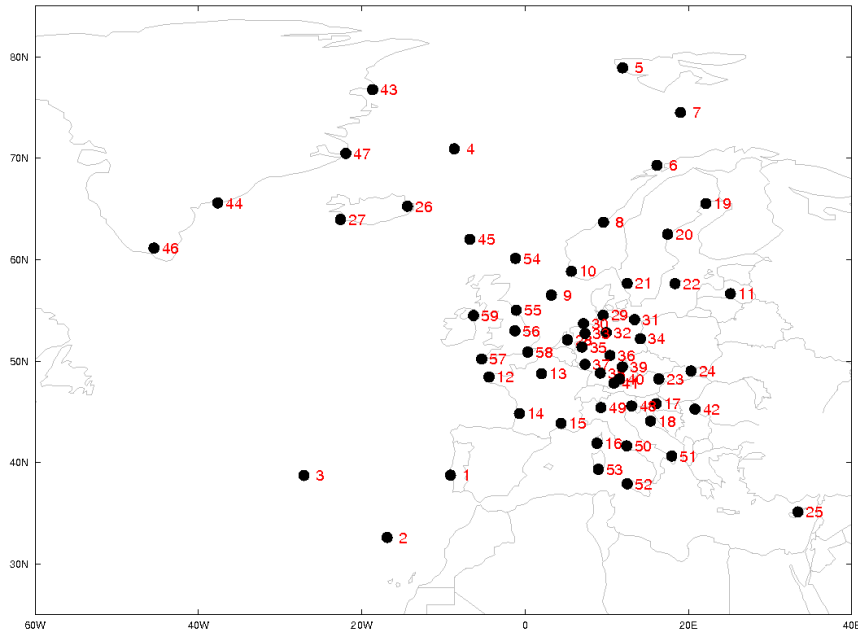
Tuesday 12 UTC



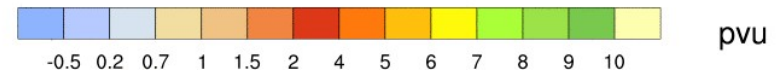
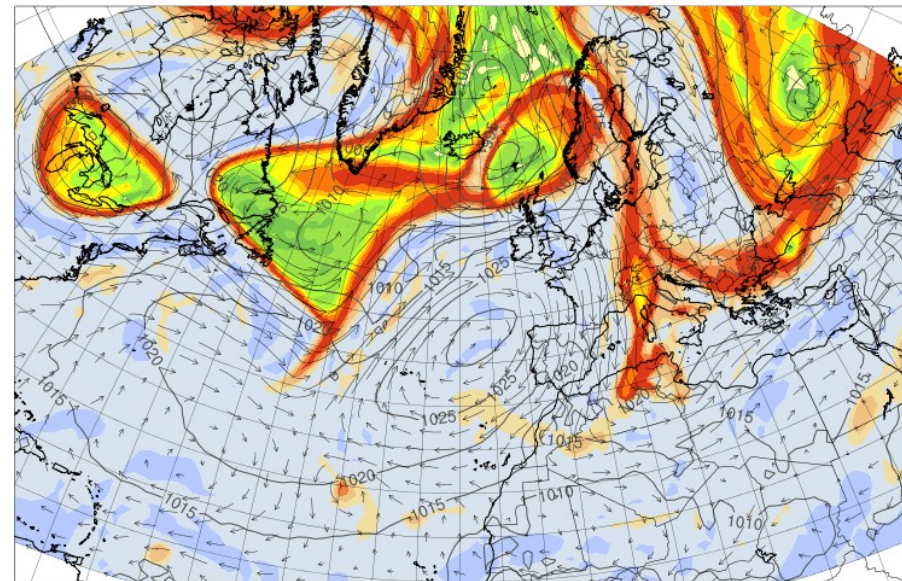
PV@325K at 20160927_12



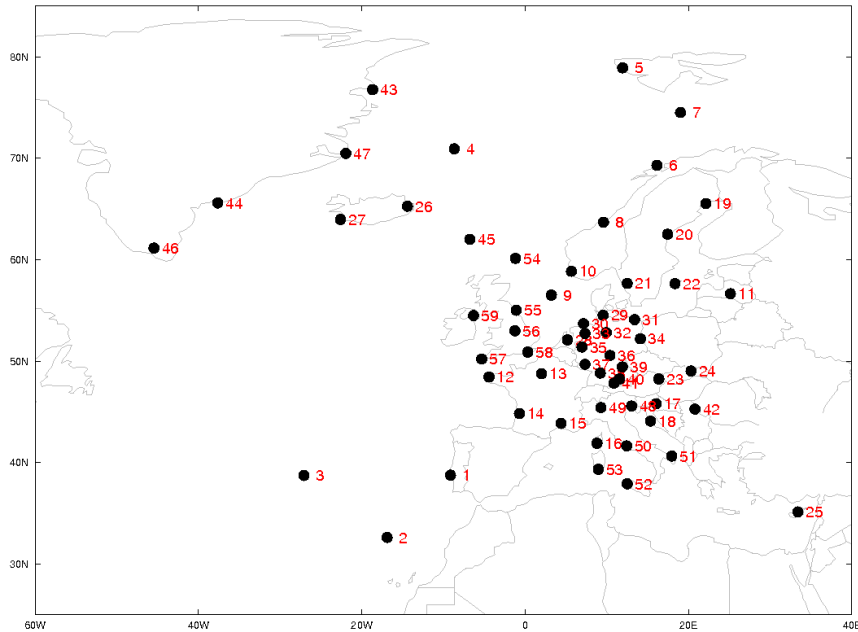
Tuesday 18 UTC



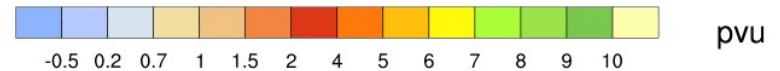
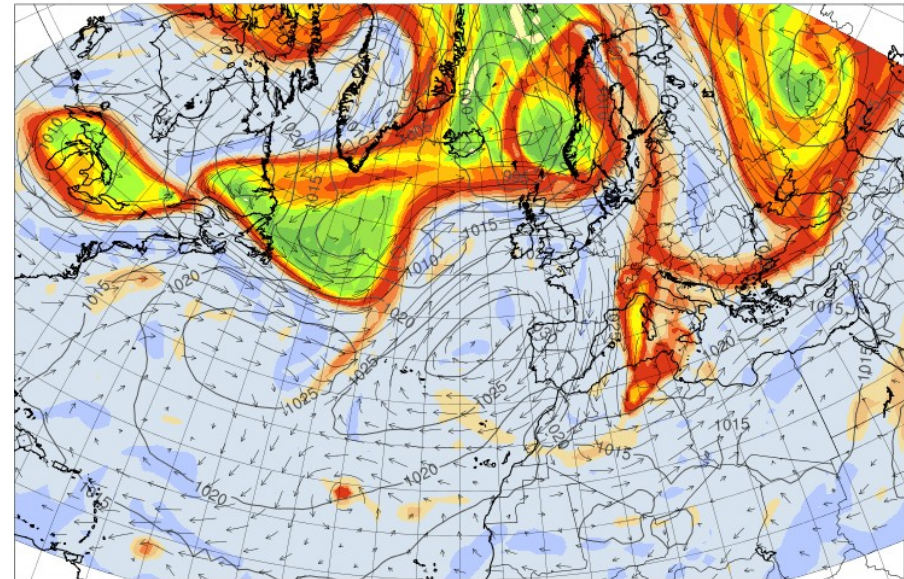
PV@325K at 20160927_18



Wednesday 0 UTC



PV@325K at 20160928_00



Gravity wave IOP on Wednesday

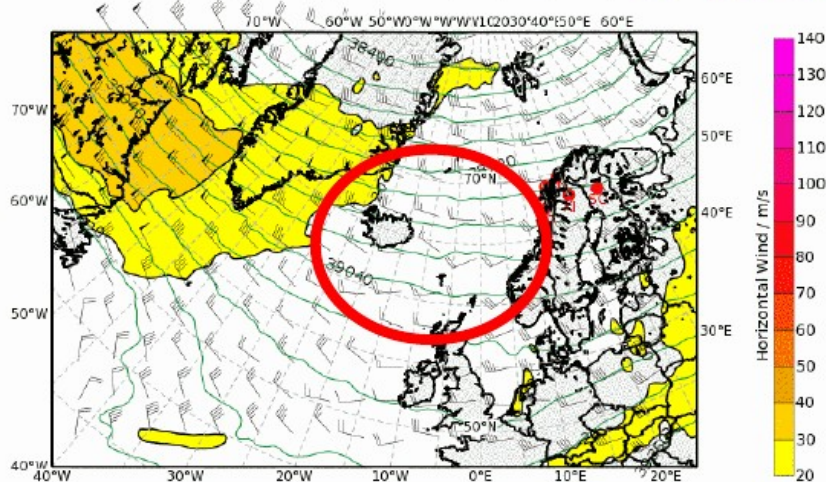
Intensive Radiosonde Observations with Deep Soundings

- stratospheric PNJ is building up and strengthens gradually with advancing seasonal change in circulation
- tropospheric jet migrates north and is strongly curved anti- cyclonically south of Iceland in the period from Tue to Wed , 27 – 28 September 2016
- **scientific goals:**
 - i. observe gravity waves possibly excited by tropopause jet and follow their vertical propagation higher up
 - ii. does the disturbed and partly divergent stratospheric flow at $p < 10$ hPa excites gravity waves?
- **propose:**
 - regular radiosoundings from Keflavik in the period 27 September 12 UTC until 28 September 12 UTC; sequence and period have to be refined based on newer fcs the next days
 - mix of small and large balloons (at least one 3000 g balloon, when tropopause jet is just over Iceland)
 - coordination with in- situ aircraft observations would be highly welcome!!

VT: Wednesday 28 September 2016 06 UTC (+ 78 h)

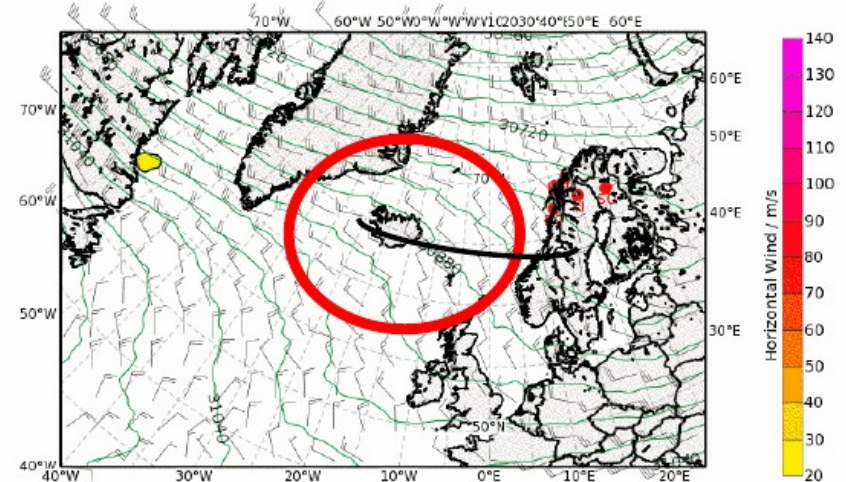
Geopotential Height (m) & Horizontal Wind (m/s) at 3 hPa
Valid: Wed, 28 Sep 2016, 06 UTC (step 078 h from Sun, 25 Sep 2016, 00 UTC)

3 hPa



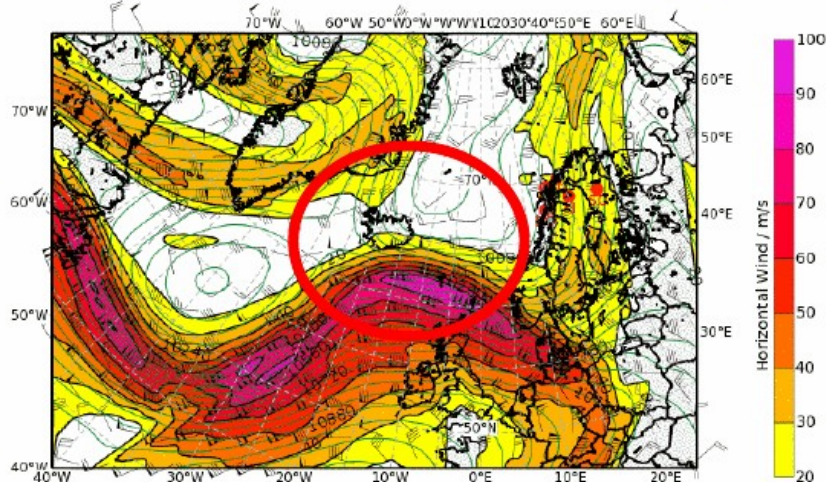
Geopotential Height (m) & Horizontal Wind (m/s) at 10 hPa
Valid: Wed, 28 Sep 2016, 06 UTC (step 078 h from Sun, 25 Sep 2016, 00 UTC)

10 hPa



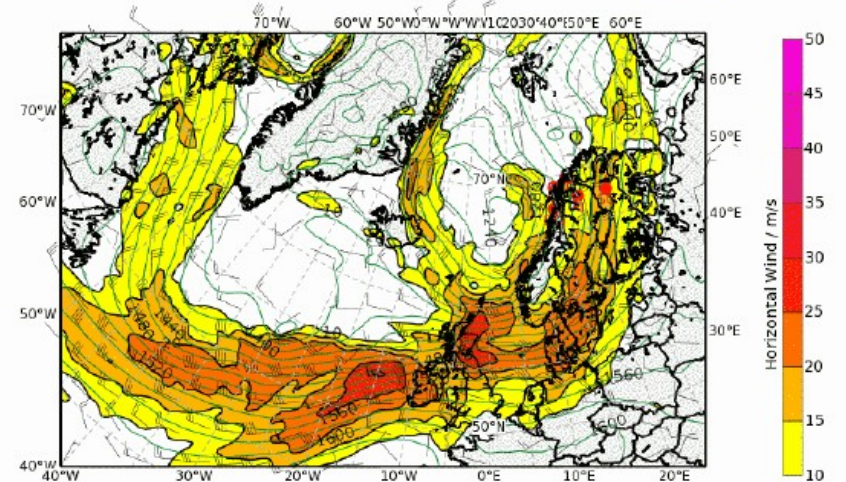
Geopotential Height (m) & Horizontal Wind (m/s) at 250 hPa
Valid: Wed, 28 Sep 2016, 06 UTC (step 078 h from Sun, 25 Sep 2016, 00 UTC)

250 hPa



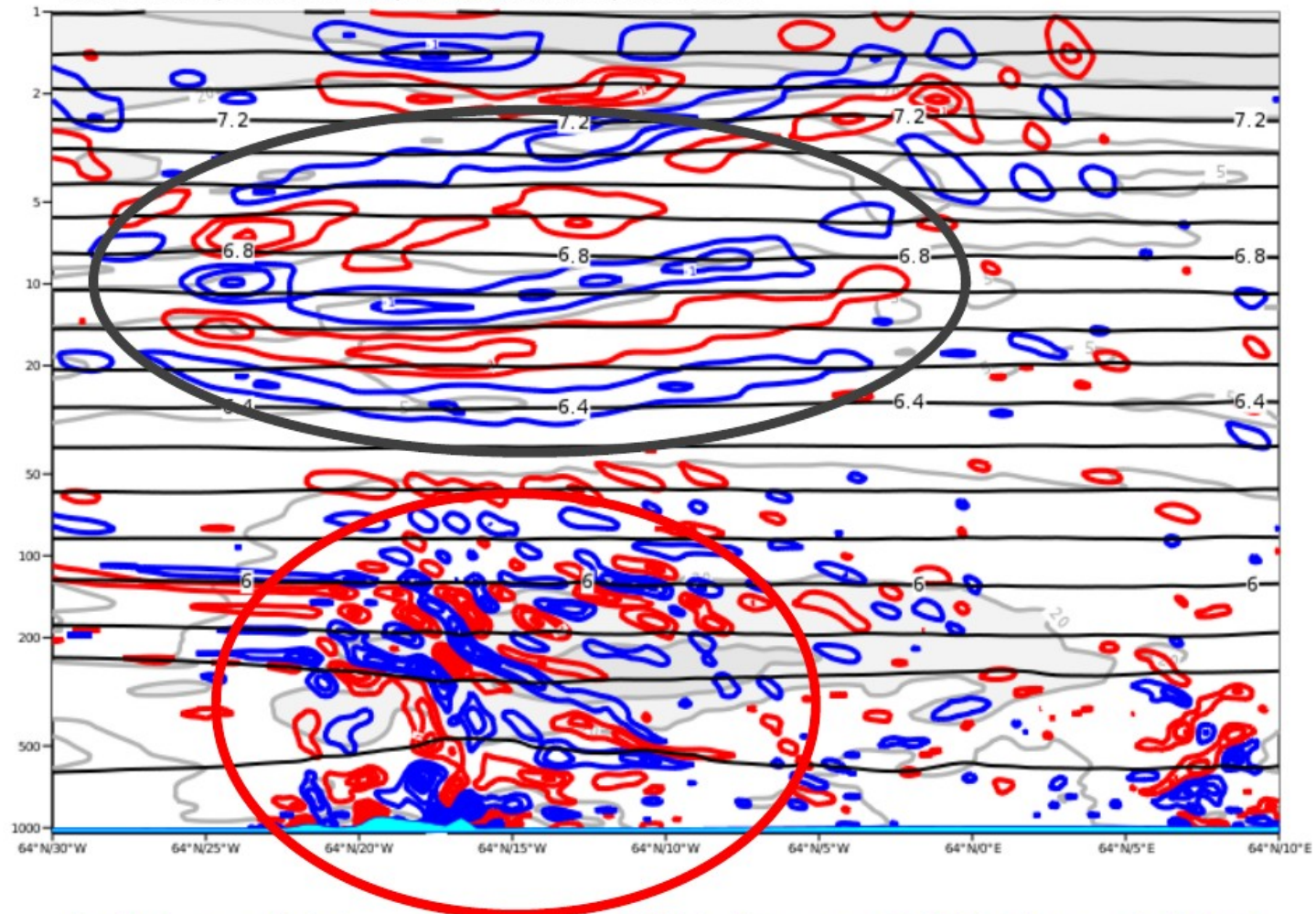
Geopotential Height (m) & Horizontal Wind (m/s) at 850 hPa
Valid: Wed, 28 Sep 2016, 06 UTC (step 078 h from Sun, 25 Sep 2016, 00 UTC)

850 hPa



VT: Wednesday 28 September 2016 06 UTC (+ 78 h)

Divergence (10^{-4} s^{-1}), Horizontal Wind (m/s), Log Potential Temperature (K)
Valid: Wed, 28 Sep 2016, 06 UTC (step 078 h from Sun, 25 Sep 2016, 00 UTC)



DIV and V_H along 64°N from 30°W to 10°E

Plan for Radiosonde launches

- **Start: Tuesday 18 UTC**
- **Finish: Wednesday 12 UTC**
- **Request 2 additional Radiosondes from IMO (for Tuesday 18 UTC and Wednesday 6 UTC)**
- **DLR launches parallel to IMO balloons with less Helium**
 - > get vertical gradients
- **Possible launch of large 3kg balloon on Wednesday 9 UTC**
- **Tomorrow test launch**

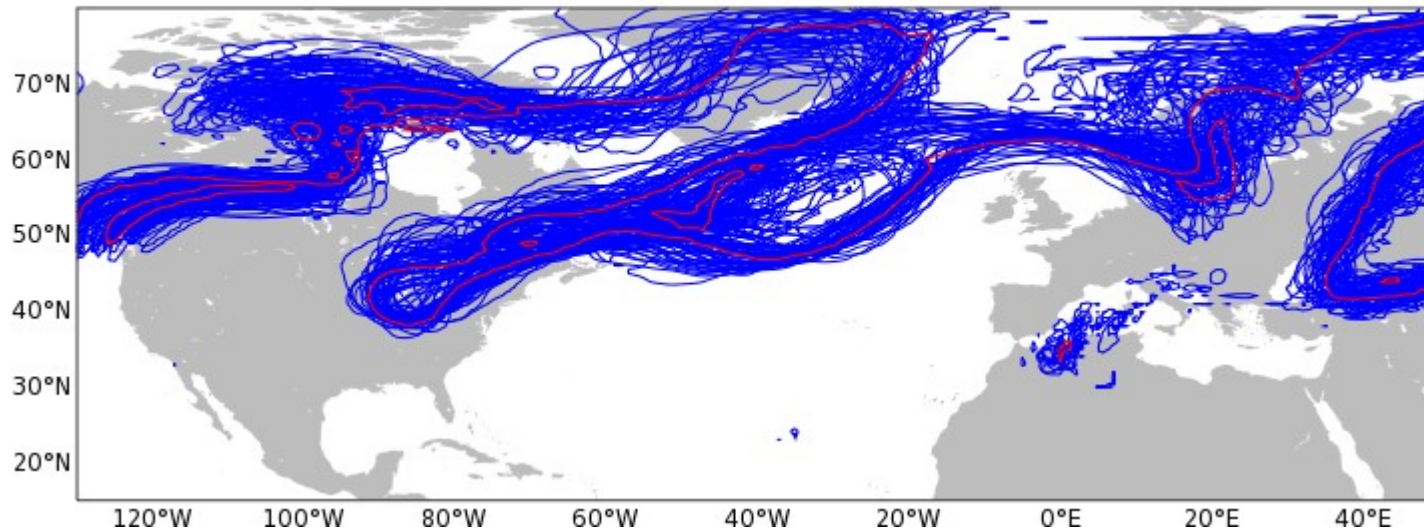


Request for 3 more people in order to be able to work in shift

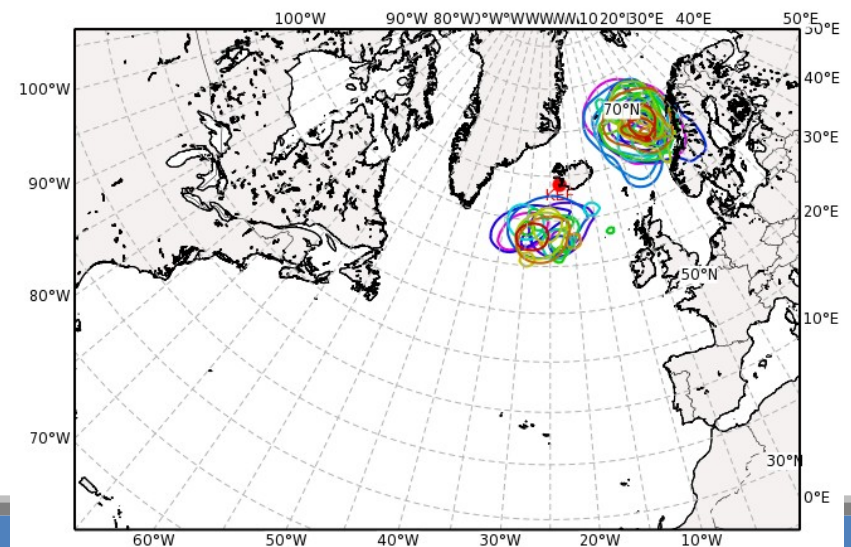
Outlook

Forecast for Wed, 28 Sep 2016 12 UTC: 2PVU at 320K

ECMWF ENSEMBLE FC
BT: 20160925 00UTC, VT: 20160928 12UTC
blue: perturbed, red: control

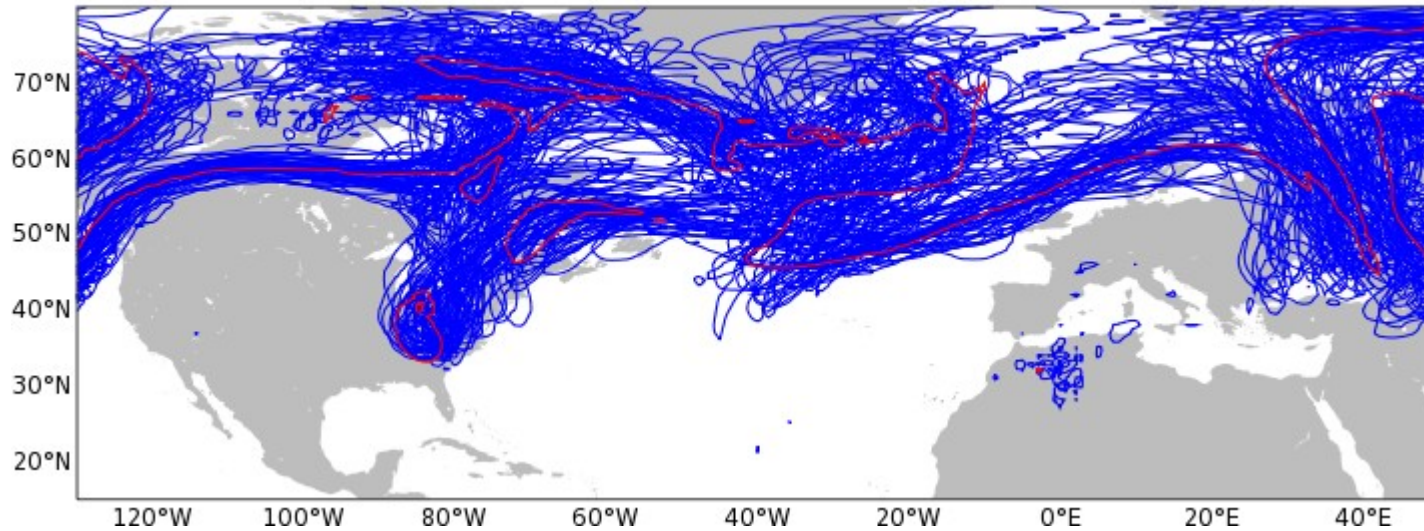


ECMWF ENS MSLP (990hPa-isoline)
Valid: Wed, 28 Sep 2016, 12 UTC (step 084 h from Sun, 25 Sep 2016, 00 UTC)

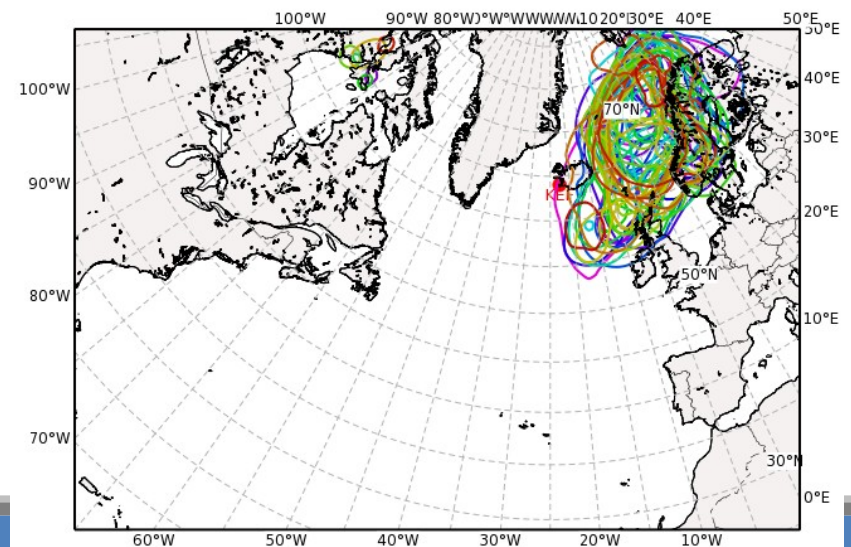


Forecast for Thursday, 29 Sep 2016 12 UTC: 2PVU at 320K

ECMWF ENSEMBLE FC
BT: 20160925 00UTC, VT: 20160929 12UTC
blue: perturbed, red: control

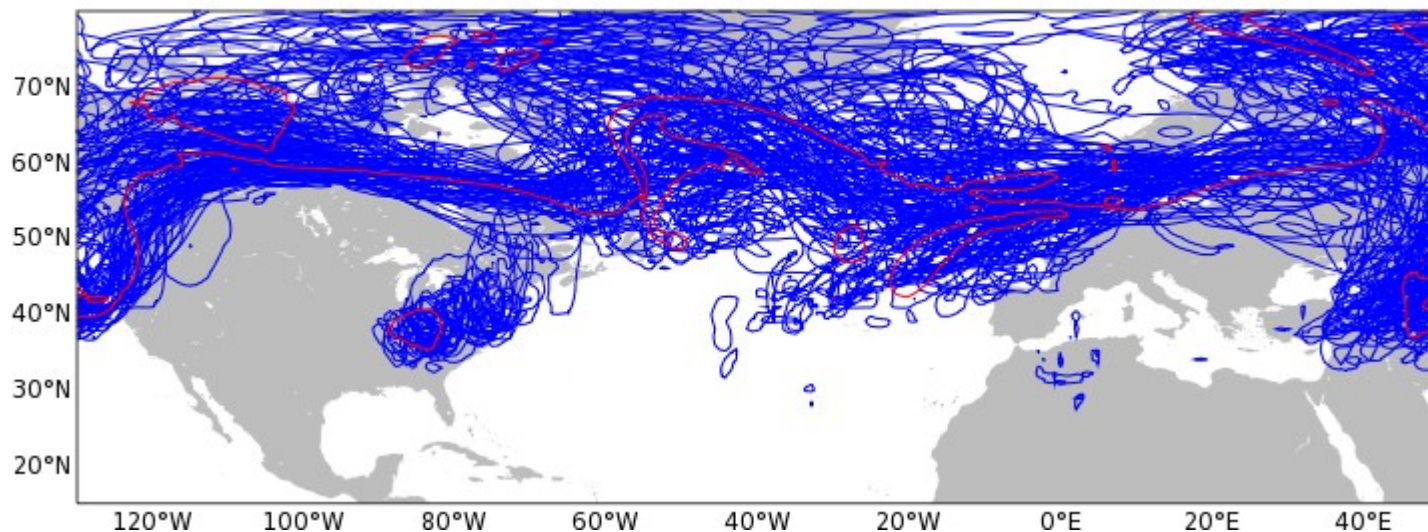


ECMWF ENS MSLP (990hPa-isoline)
Valid: Thu, 29 Sep 2016, 12 UTC (step 108 h from Sun, 25 Sep 2016, 00 UTC)

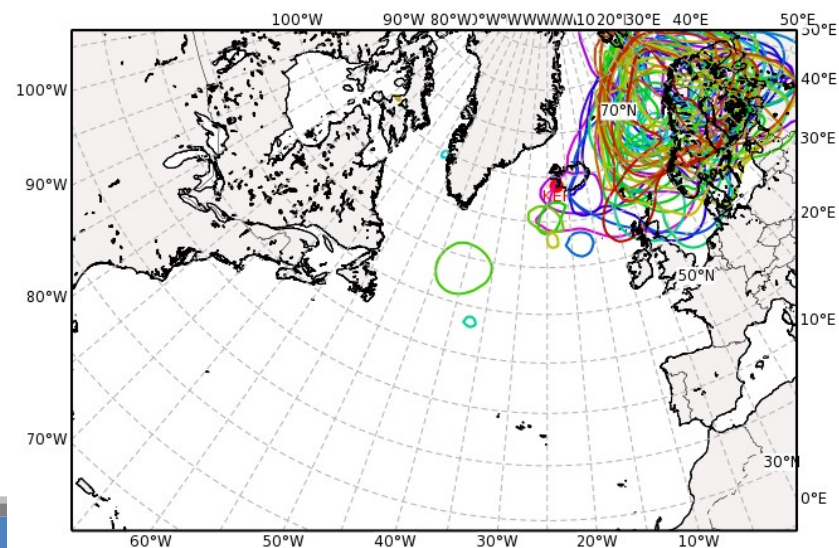


Forecast for Friday, 30 Sep 2016 12 UTC: 2PVU at 320K

ECMWF ENSEMBLE FC
BT: 20160925 00UTC, VT: 20160930 12UTC
blue: perturbed, red: control

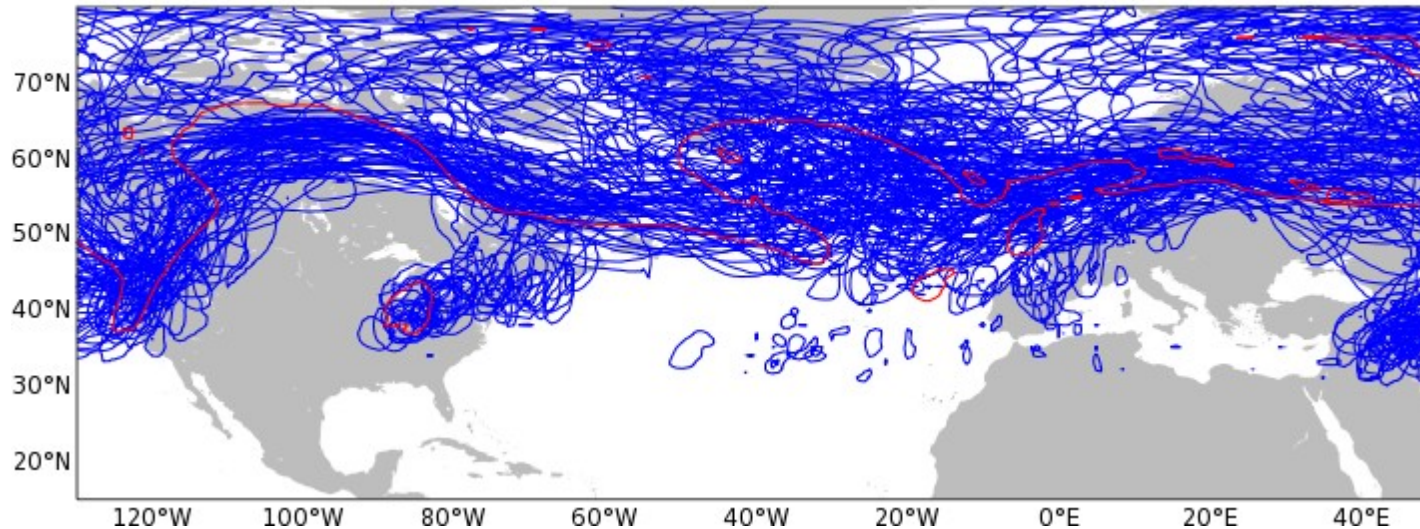


ECMWF ENS MSLP (990hPa-isoline)
Valid: Fri, 30 Sep 2016, 12 UTC (step 132 h from Sun, 25 Sep 2016, 00 UTC)



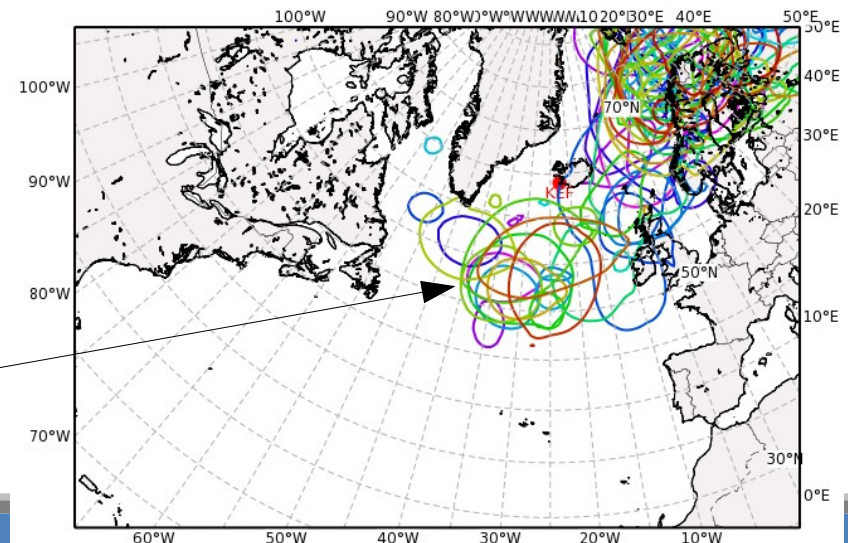
Forecast for Saturday, 01 Oct 2016 12 UTC: 2PVU at 320K

ECMWF ENSEMBLE FC
BT: 20160925 00UTC, VT: 20161001 12UTC
blue: perturbed, red: control



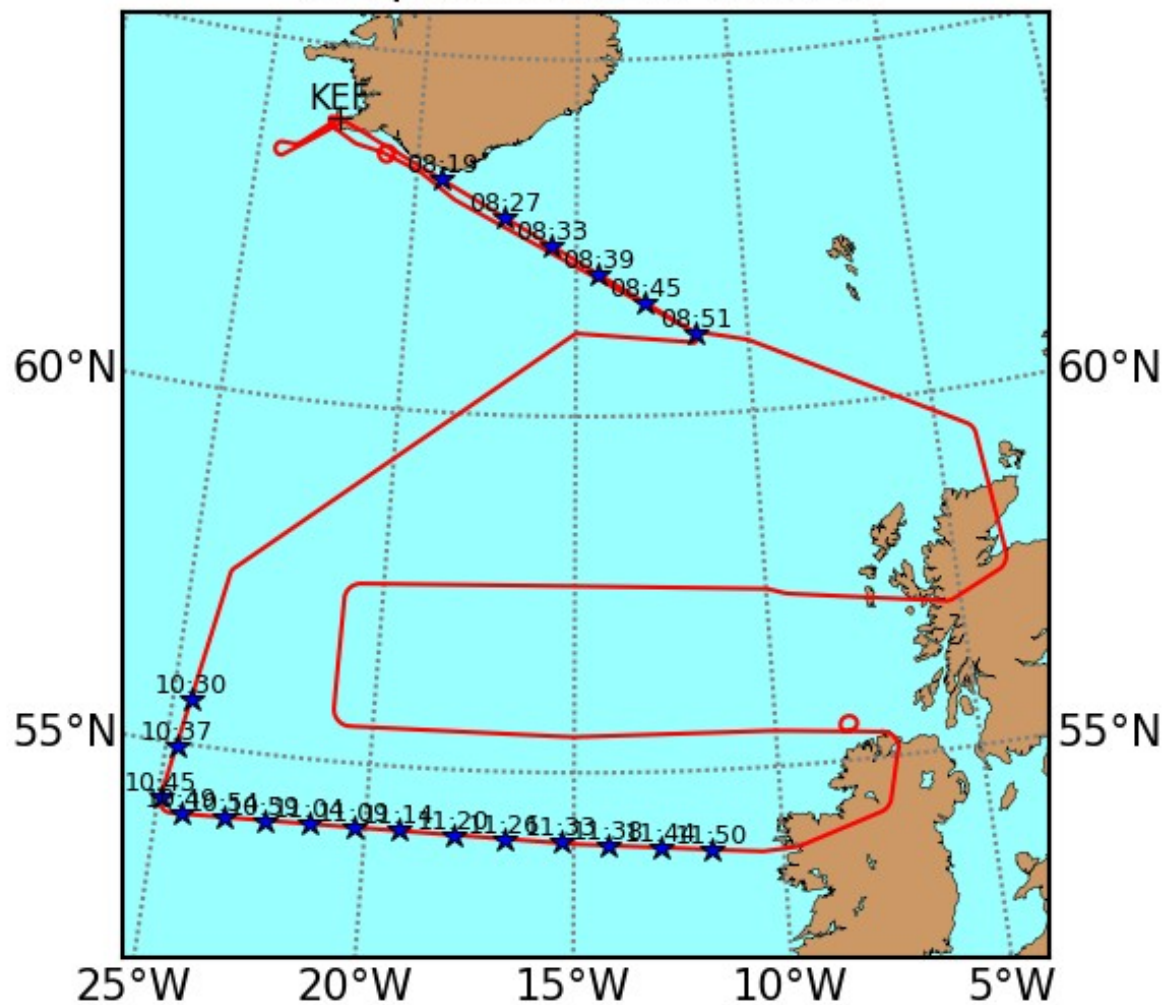
ECMWF ENS MSLP (990hPa-isoline)
Valid: Sat, 01 Oct 2016, 12 UTC (step 156 h from Sun, 25 Sep 2016, 00 UTC)

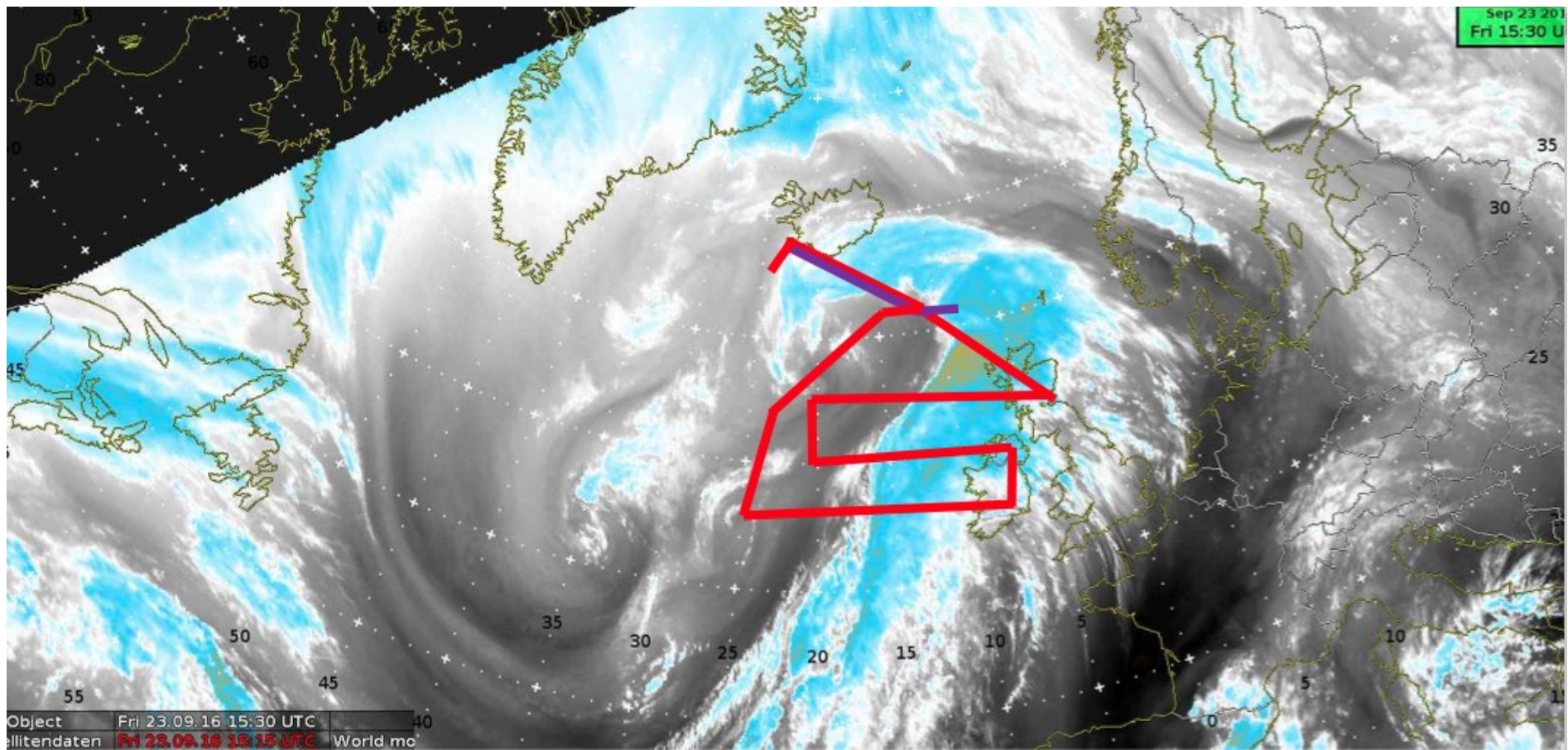
Cyclogenesis in ECMWF
deterministic forecast

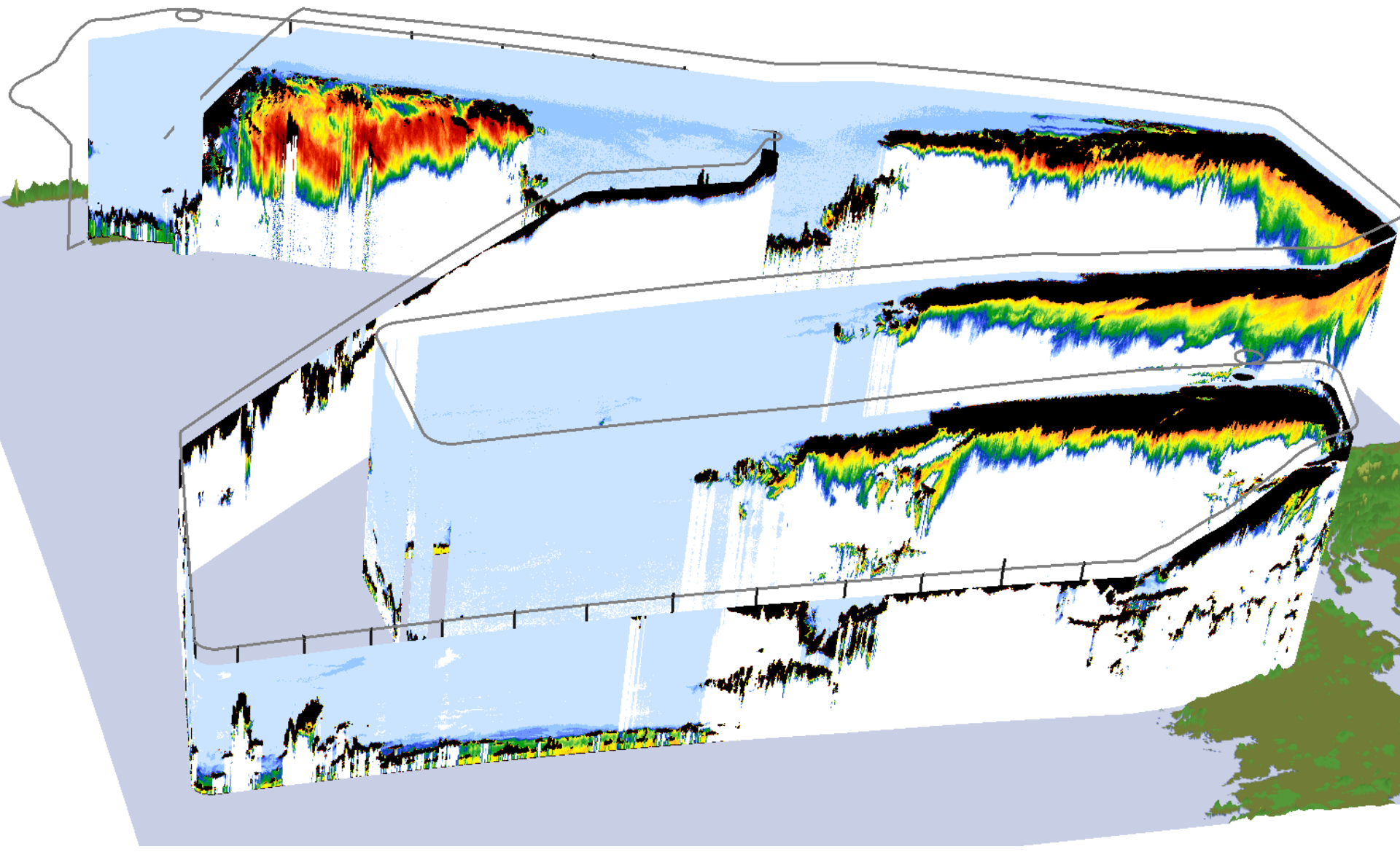


Quicklooks IOP 3

Dropsondes 20160923





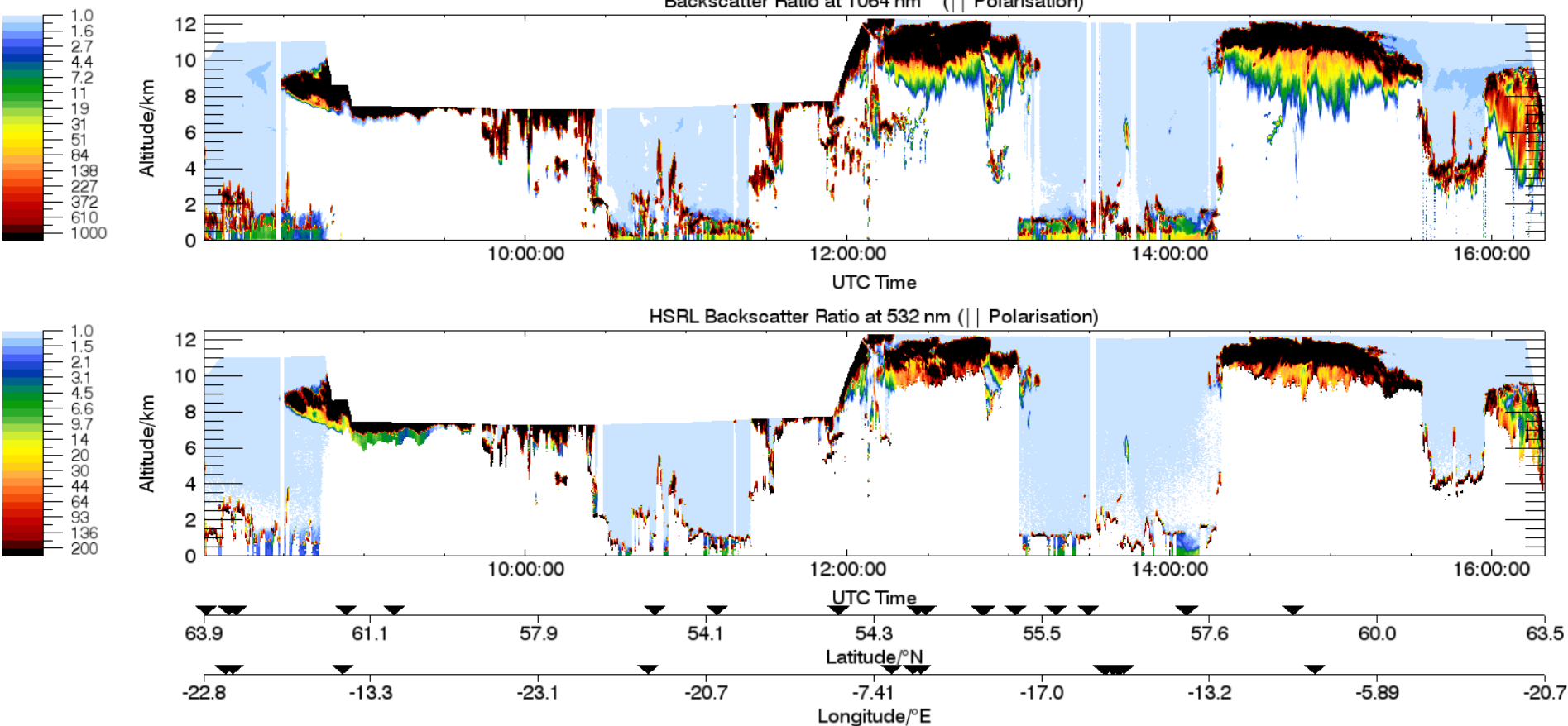




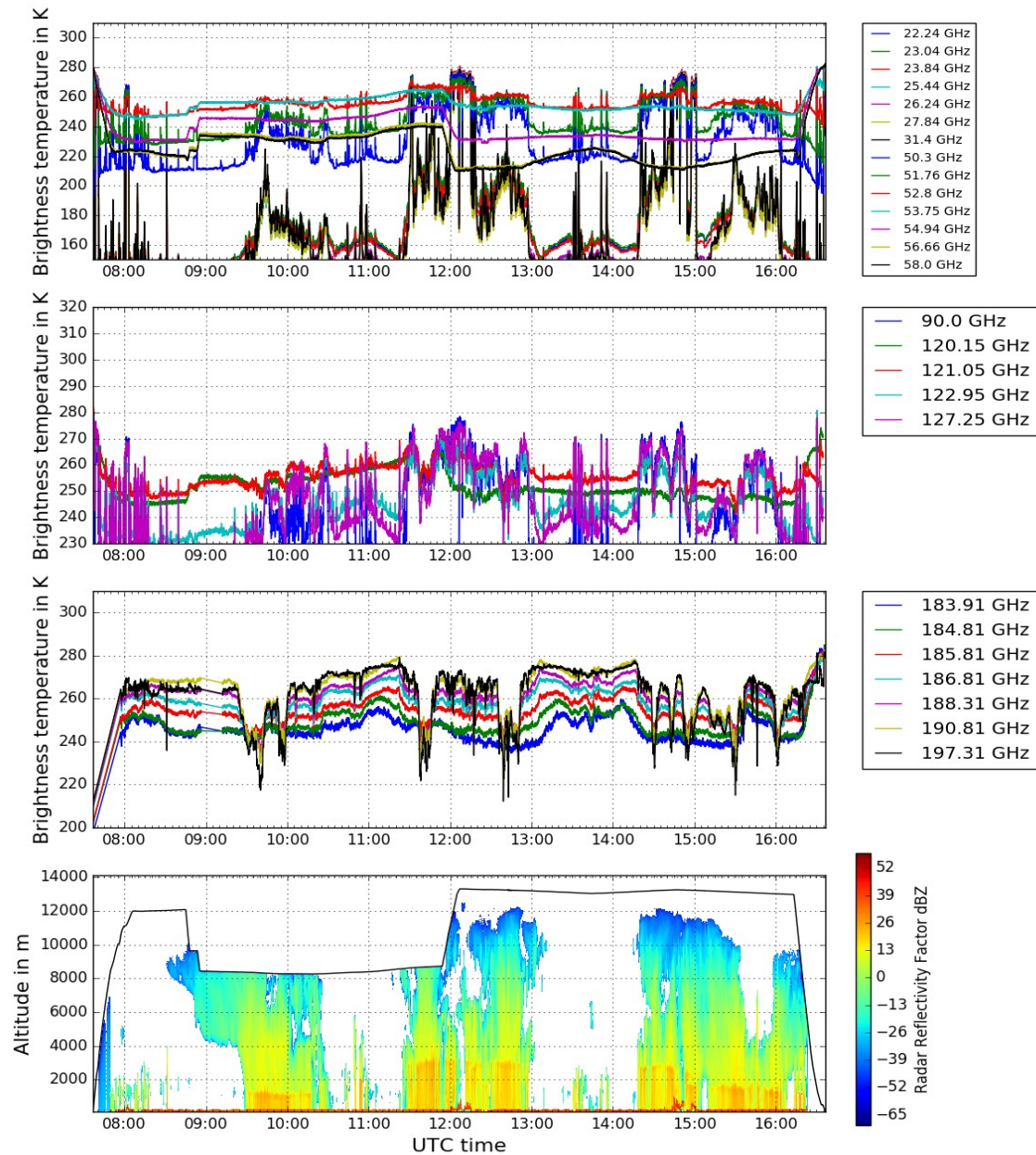
WALES

NAWDEX 23-09-2016

RF03 Cyclone Vladiana

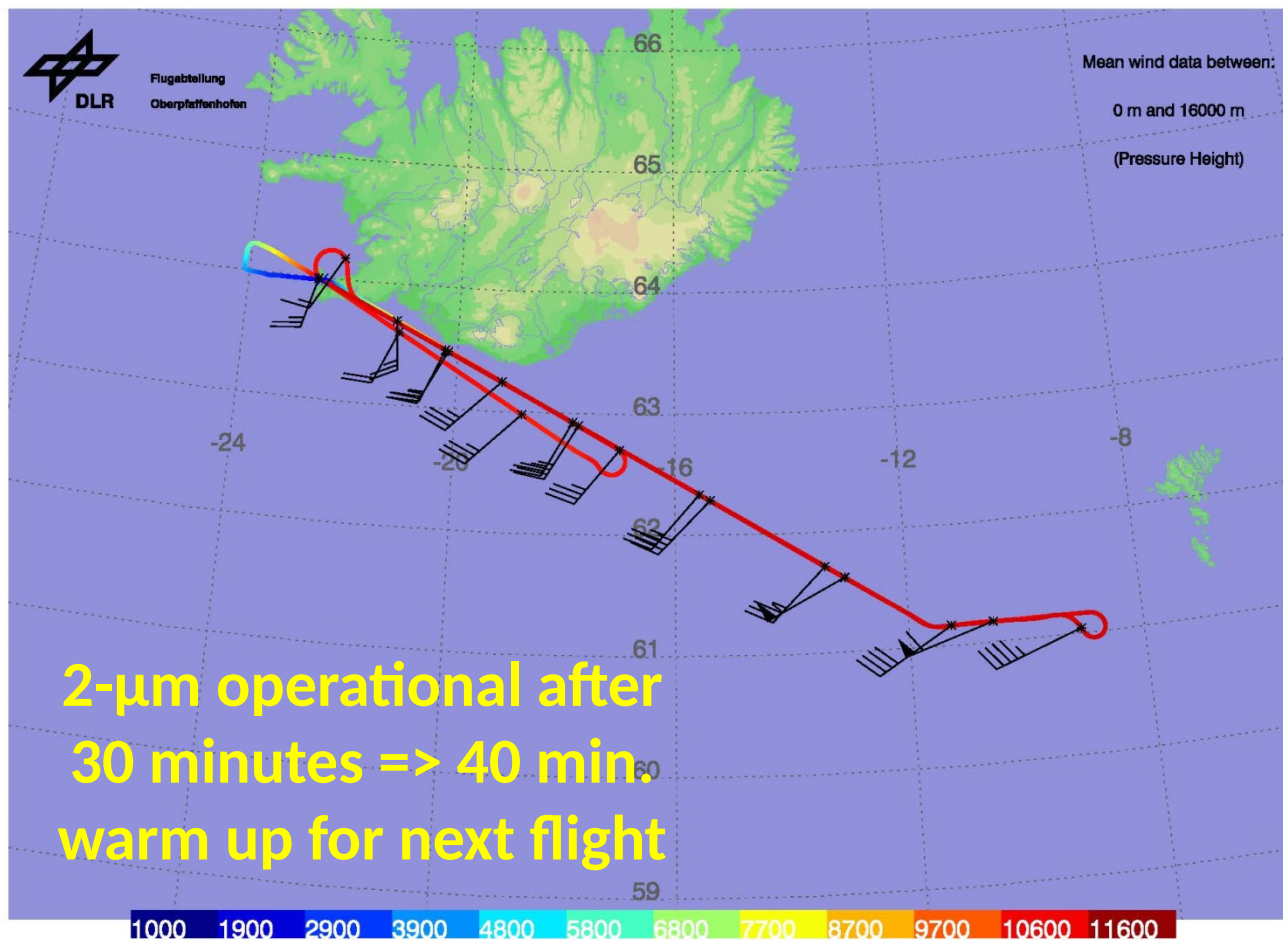


NAWDEX, Radiometer + Radar, 23.09.2016



IOP 3 - 23/09/2016 – Falcon Flight Track

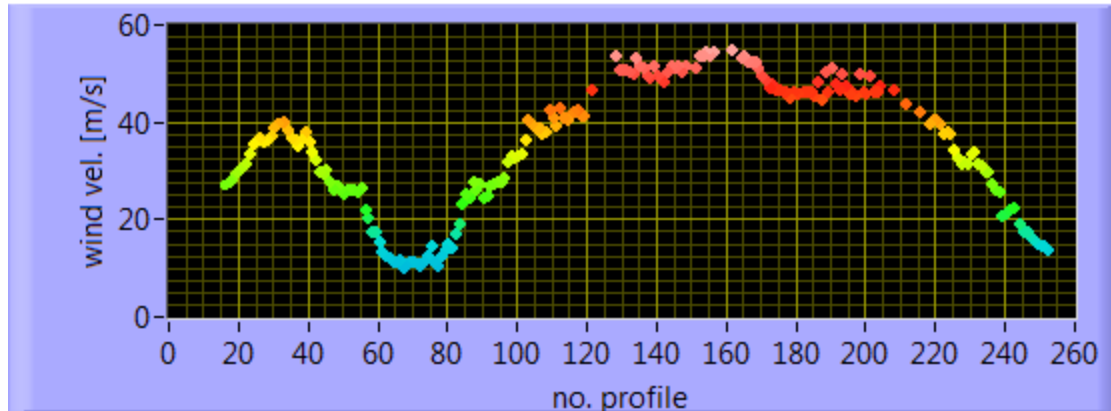
NAWDEX 23/09/2016



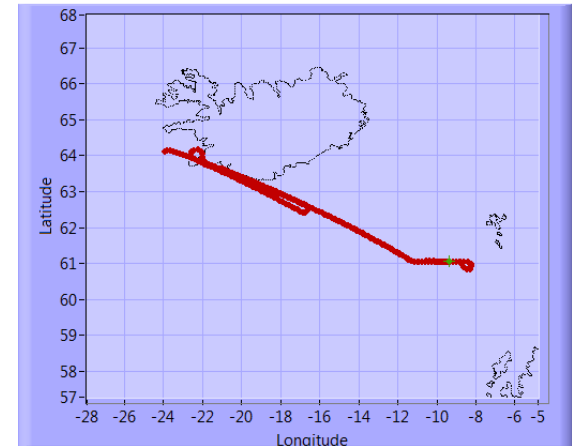
Flight Time: 07:01:39 to 10:21:29 System Time from DAQ SCALE=1:5.00000e+006

IOP 3 - 23/09/2016 – Jet Stream Southeast Iceland

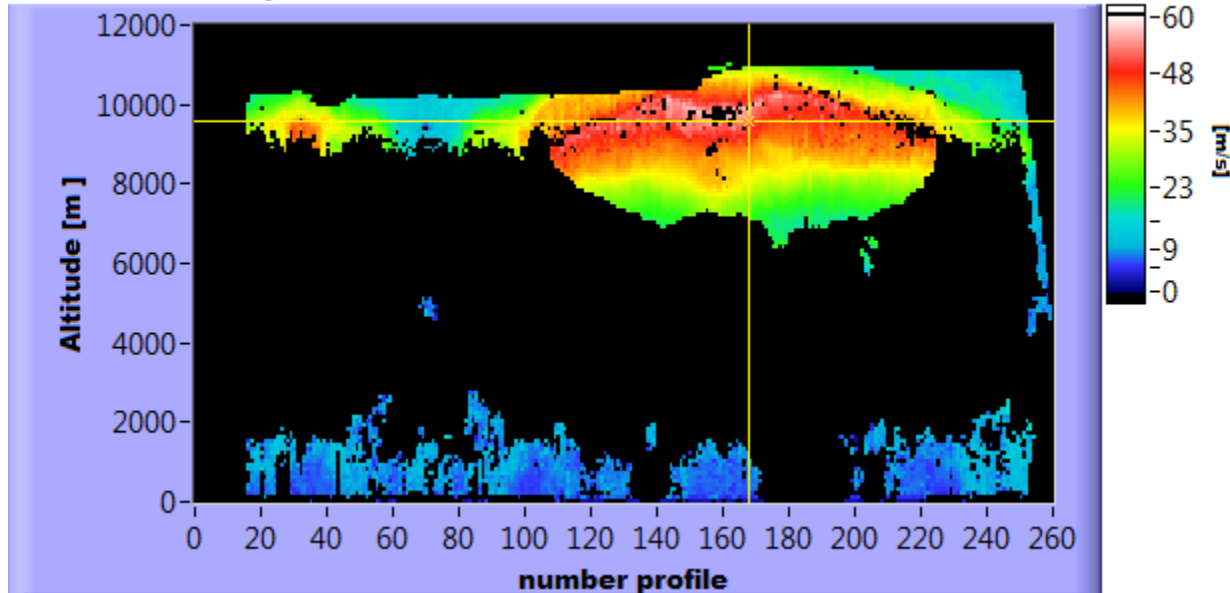
Along Track Hor. Wind Speed



Track



Horizontal Wind Speed



Profile Hor. Wind Speed

