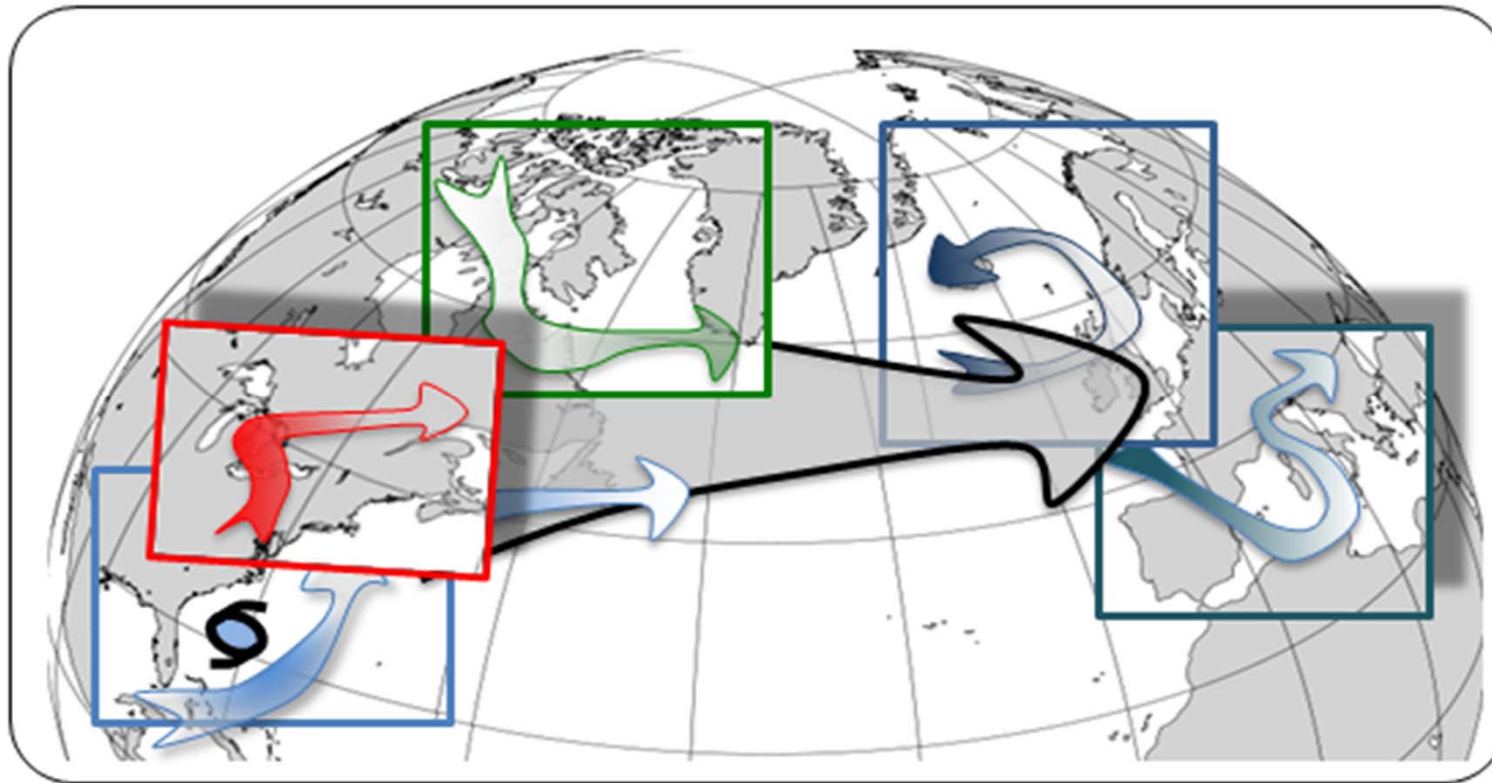


NAWDEX – Flight Planning Meeting

12 September 2016



Tasks & schedule

- **Transfer of HALO** (DLR Falcon) scheduled for **Thursday** (Saturday)
- **Today** the HALO **payload** is reintegrated & documents are updated
- Pilot needs test flight before campaign starts
- In case of a delay we will shift the HALO transfer to Saturday (no effect on NAWDEX schedule)
- Transfer provides some flexibility to pursue NAWDEX **aims**
 - **Overflight** of surface stations
 - **Instrument calibration** (radar) pattern
 - **Dropsonde** transmission check
 - (adapted pattern in case of interesting weather situation)
- Today's weather briefing:
 - Investigate synoptic situation until Saturday
 - Check cloud situation for overflights and calibration work

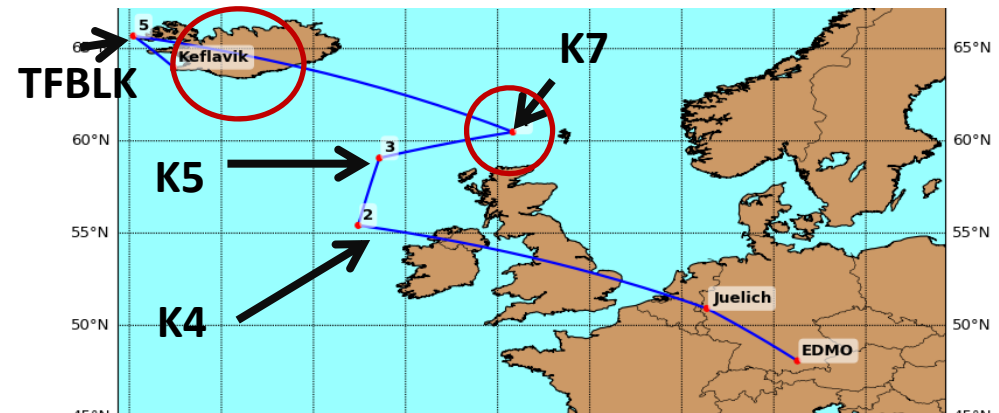
Radar calibration

- **Pattern needed**
 - (1) $2 \times \pm 20$ deg bank $1^\circ/\text{s}$ ($\sim 160\text{s}$) when descending to KEF (FL 400, FL 300, FL 200)
 - (2) 10 deg bank circle (10 minutes), FL 420
 - $|\mathbf{v}| < 15$ m/s and wave height $< 2\text{m}$
 - at entry and exit of the circle ± 20 deg bank maneuver
- Needs wind observations from buoy/satellite/dropsondes

- **Buoys**

- TFBLK (65.698 N 24.778 W)
- K4 Buoy (55.420 N 12.570 W)
- K5 Buoy (59.070 N 11.420 W)
- K7 Buoy (60.483 N 4.167 W)

- K4/K5 NAT Tracks
- TFBLK very close to KEF

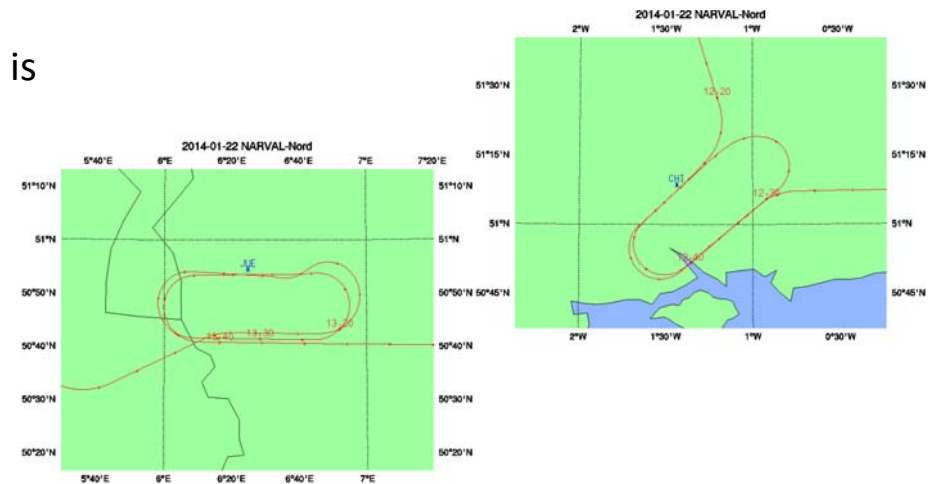
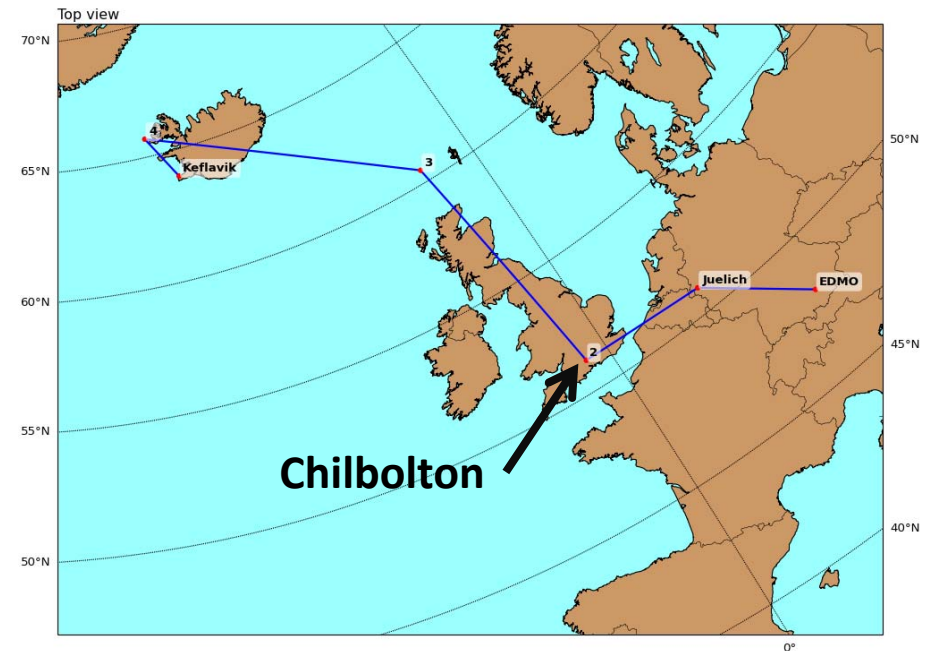


- **Satellites:**

- ASCAT: MetOp-A/B (11:30-12:00 UTC and 21:30-22:00 UTC) south of Iceland.
- AMSR-2: GCOM-W1 (A-Train) 13:30 UTC south of Iceland.
- WindSat: Coriolis 18:00 LT south of Iceland.

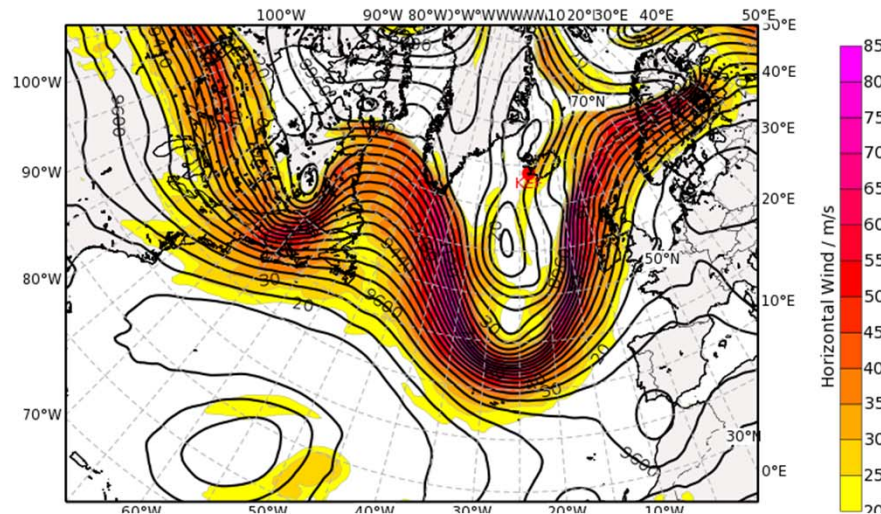
Overflights

- Stations
 - **Jülich**
(50° 54.513' N; 6° 24.812' E)
 - Radar + radiometer by Univ. Cologne
 - 1-2 radiosondes
 - **Chilbolton**
(51° 8.700' N; 1° 26.301' W)
 - Ka-band radars (our existing instrument + new Metek MIRA)
 - 94GHz radar - probably
 - 3GHz radar - if required.
 - Vaisala CL51 ceilometer
 - Radiometrics radiometer (22 GHz is only overlap)
 - Halo Photonics Doppler lidar.
- Pattern
 - Loops near Jülich and Chilbolton
 - Not directly above to avoid damage of radar
 - Straight legs of min. 2 minutes
 - FL 200 – FL 400

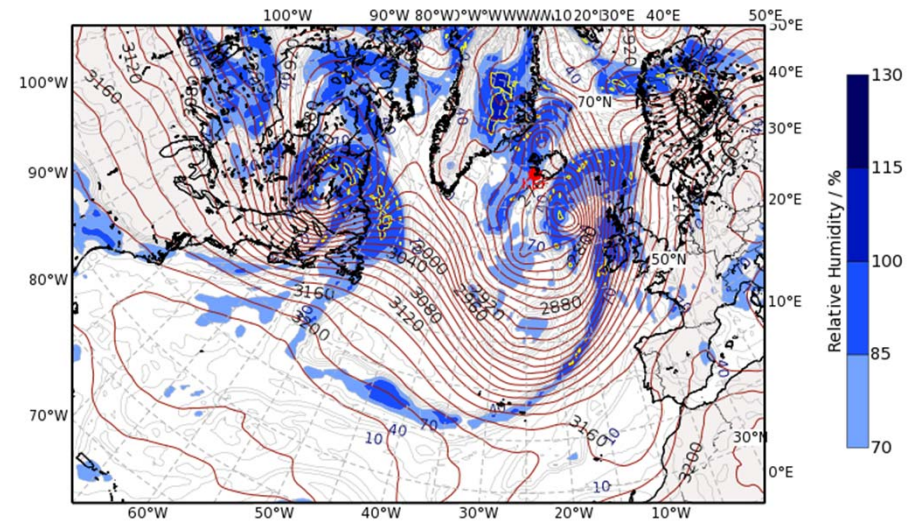


Analysis – 12 Sep 2016, 00 UTC

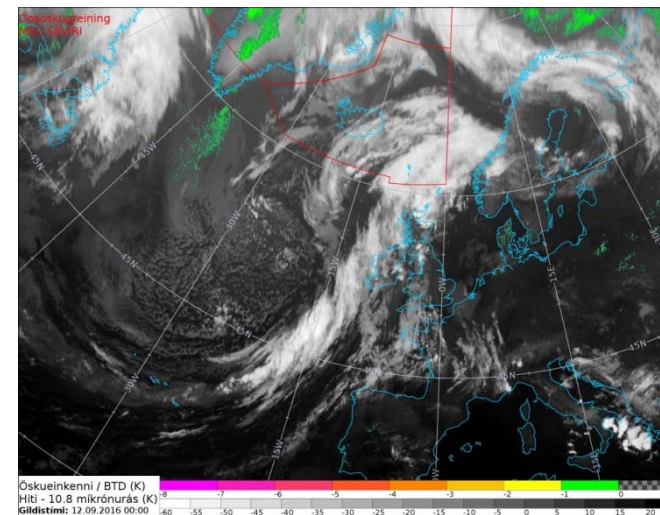
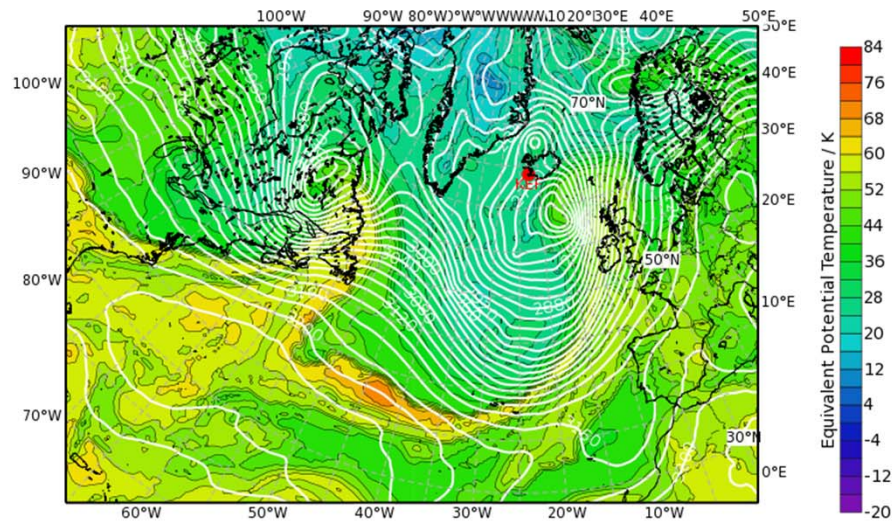
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Mon, 12 Sep 2016, 00 UTC (step 000 h from Mon, 12 Sep 2016, 00 UTC)



Relative Humidity (%) and Z (m) at 700 hPa
Valid: Mon, 12 Sep 2016, 00 UTC (step 000 h from Mon, 12 Sep 2016, 00 UTC)

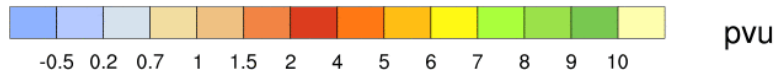
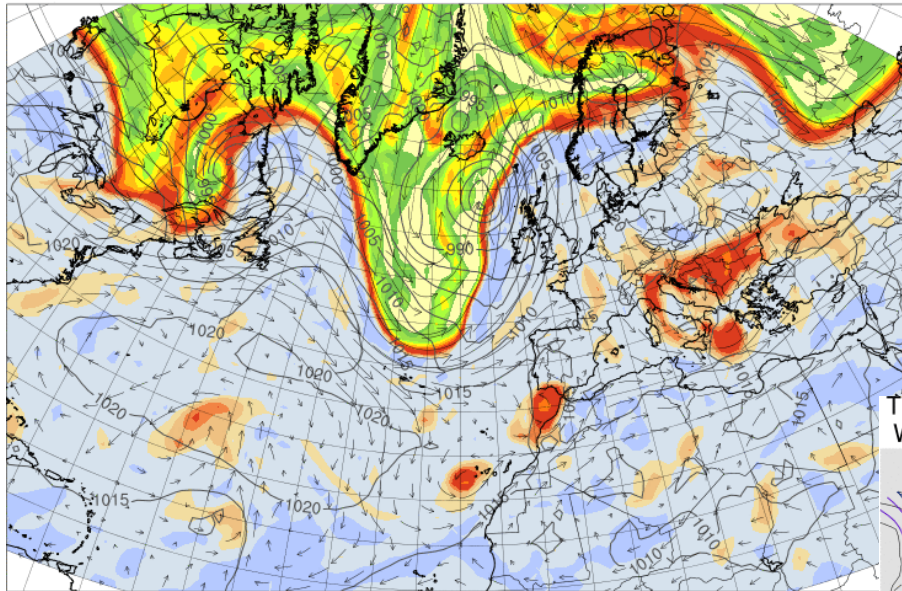


Equivalent Potential Temperature (degC) & Streamlines at 700 hPa
Valid: Mon, 12 Sep 2016, 00 UTC (step 000 h from Mon, 12 Sep 2016, 00 UTC)

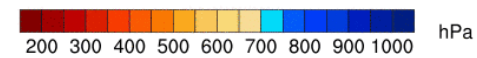
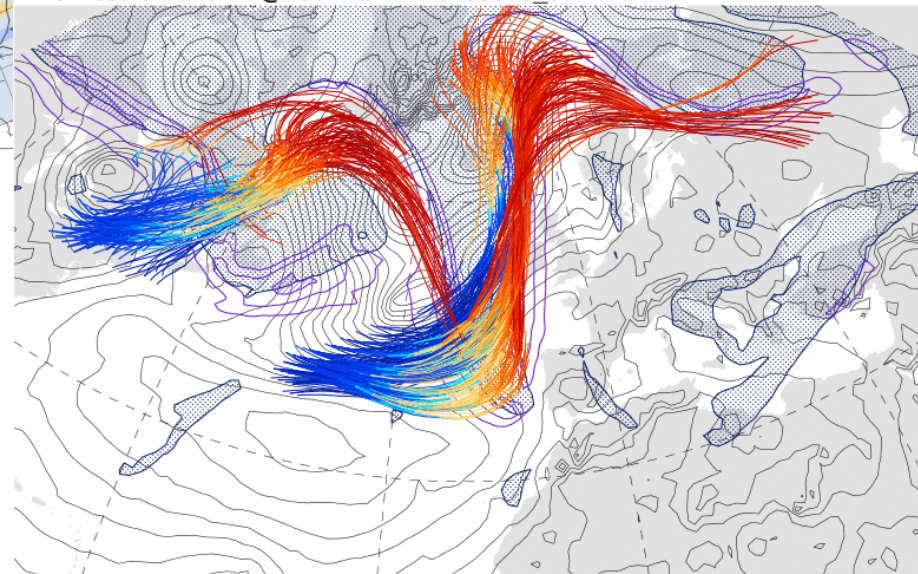


Analysis – 12 Sep 2016, 00 UTC

PV@330K at 20160912_00

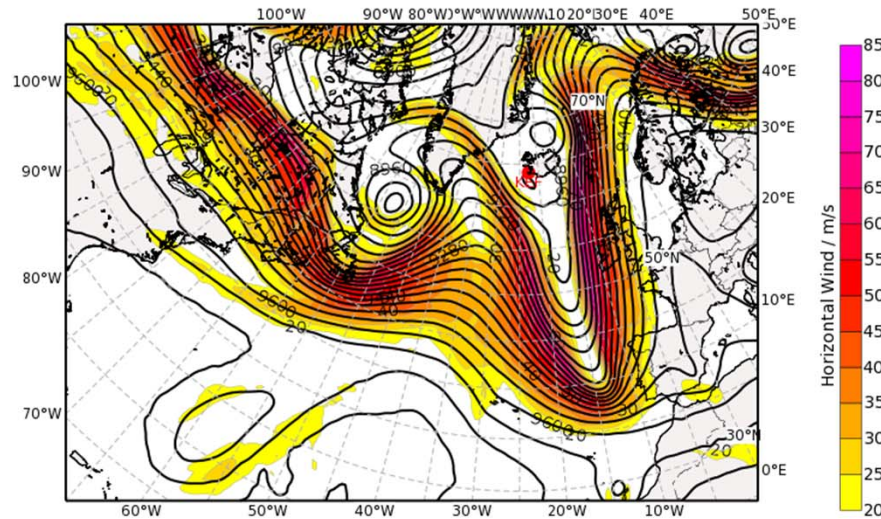


Trajectory start and SLP VT: 20160911_00
WCB outflow and PV@250hPa VT: 20160913_00

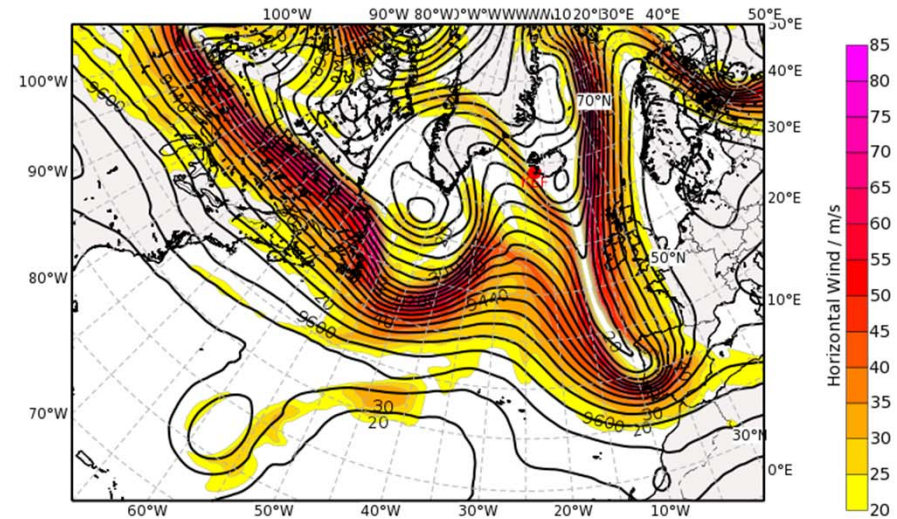


Forecast until Thursday, 15 Sep 2016

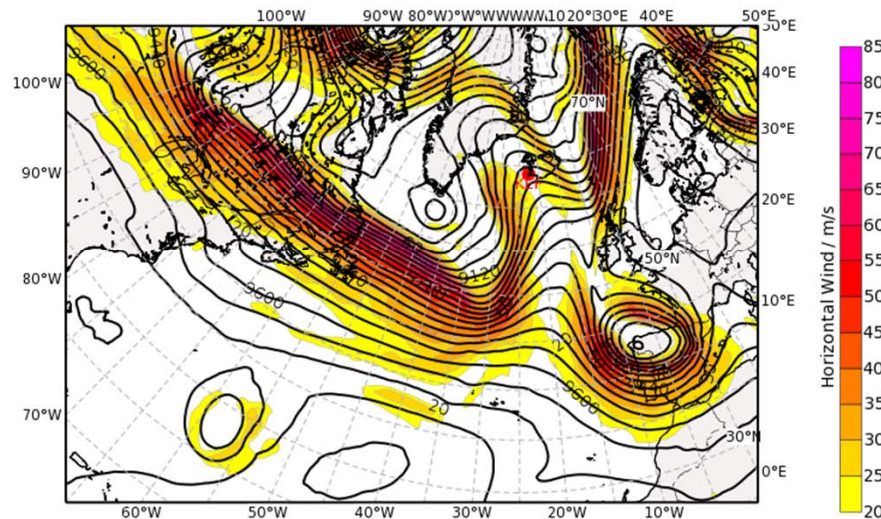
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Tue, 13 Sep 2016, 00 UTC (step 024 h from Mon, 12 Sep 2016, 00 UTC)



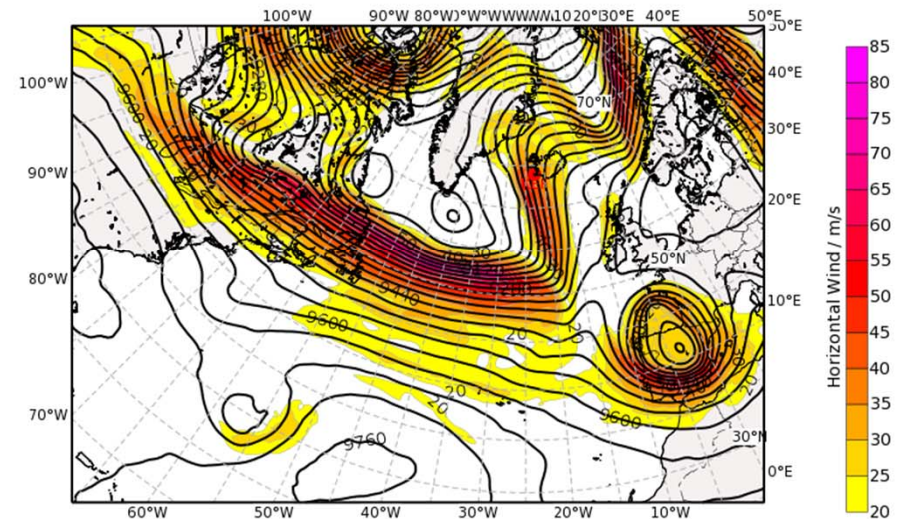
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Tue, 13 Sep 2016, 12 UTC (step 036 h from Mon, 12 Sep 2016, 00 UTC)



Valid: Wed, 14 Sep 2016, 00 UTC (step 048 h from Mon, 12 Sep 2016, 00 UTC)

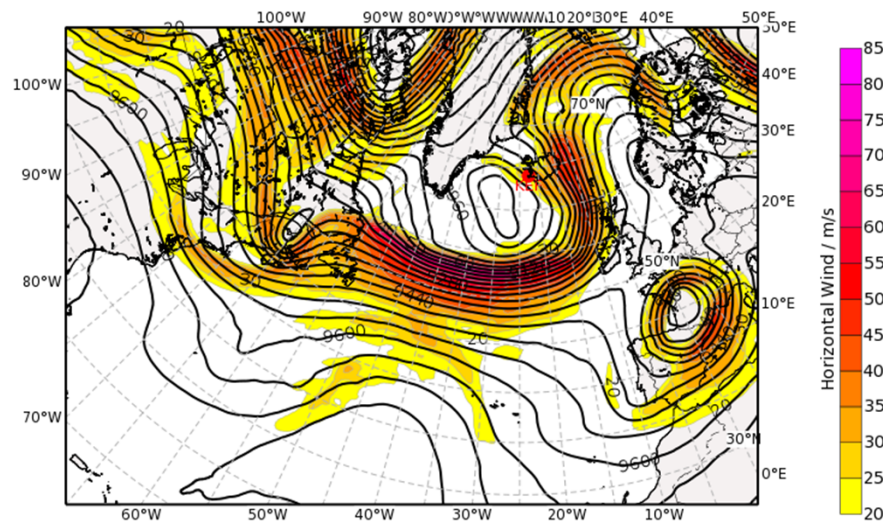


Valid: Wed, 14 Sep 2016, 12 UTC (step 060 h from Mon, 12 Sep 2016, 00 UTC)

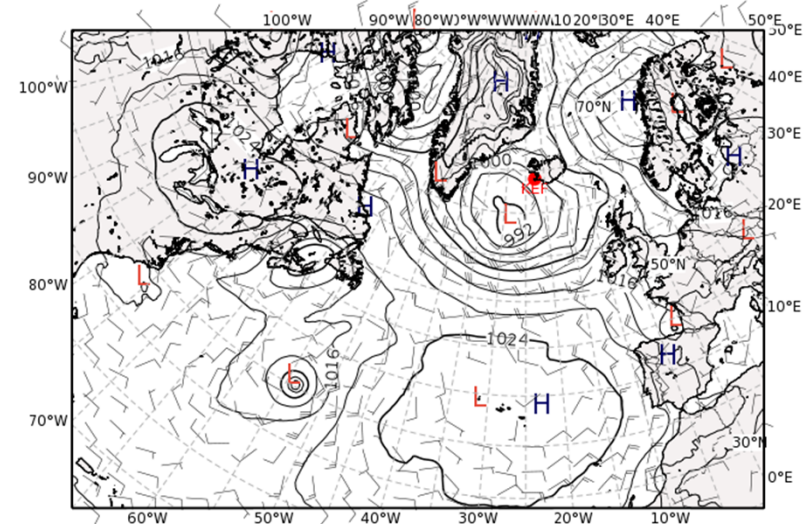


Forecast for Thursday, 15 Sep 2016

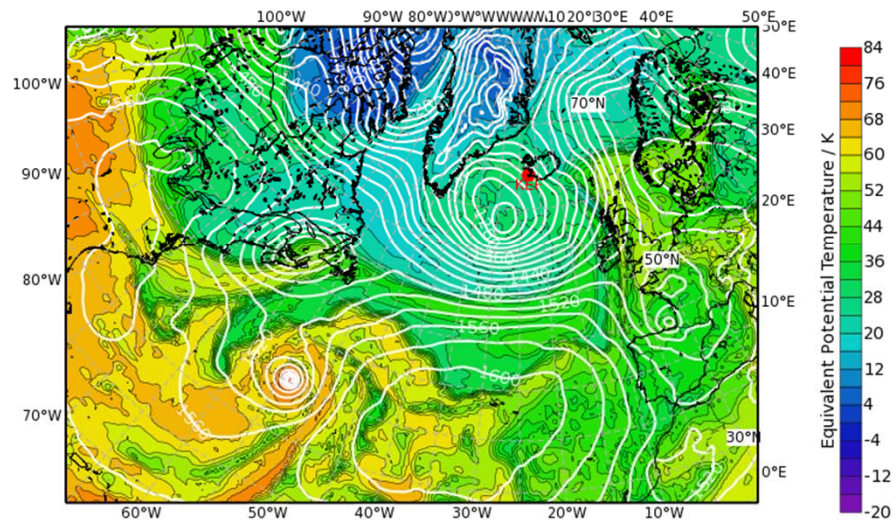
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Thu, 15 Sep 2016, 12 UTC (step 084 h from Mon, 12 Sep 2016, 00 UTC)



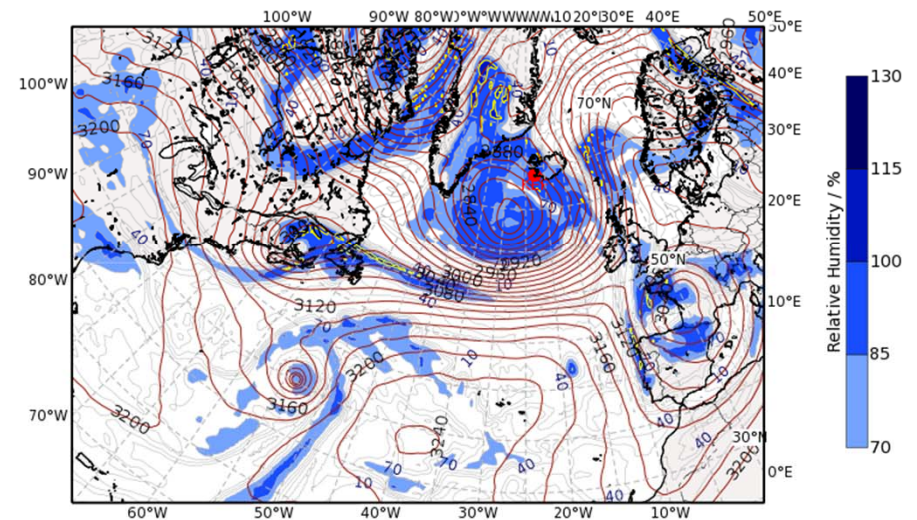
Mean Sea Level Pressure (hPa)
Valid: Thu, 15 Sep 2016, 12 UTC (step 084 h from Mon, 12 Sep 2016, 00 UTC)



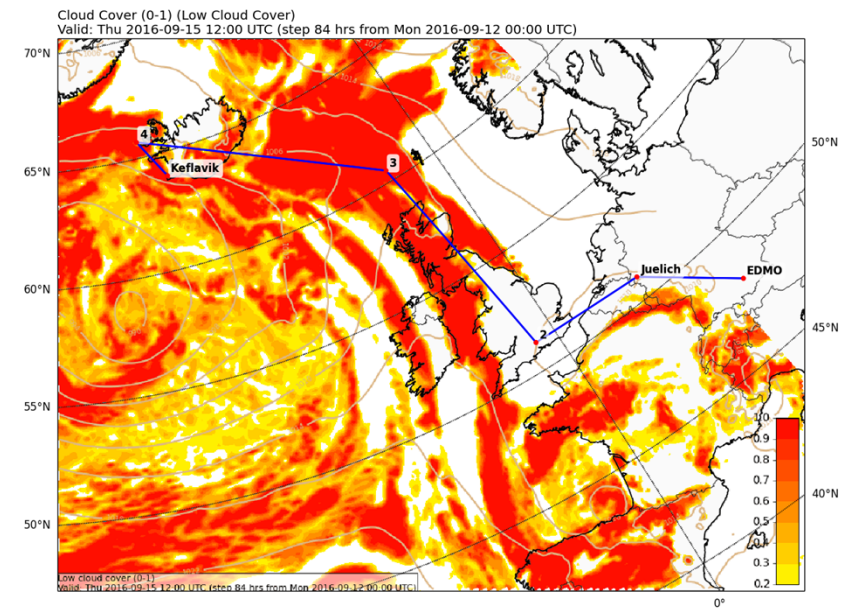
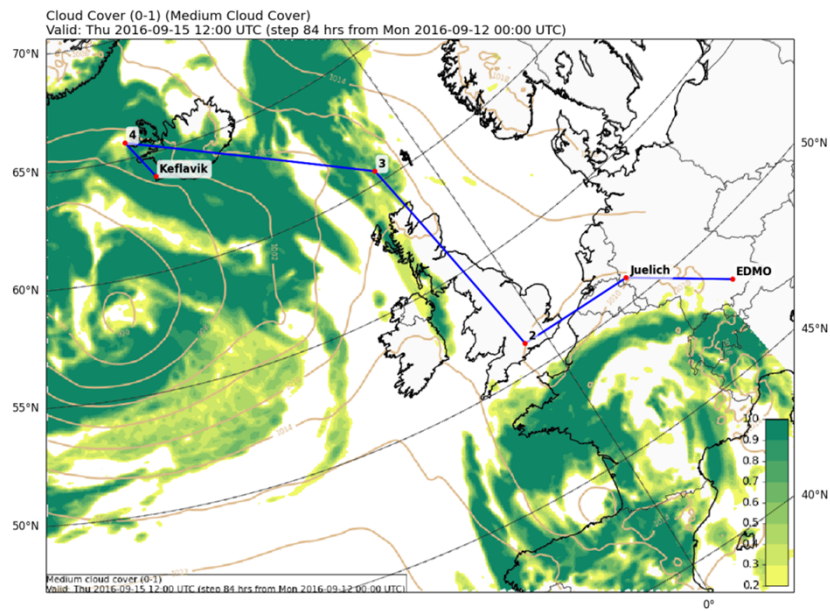
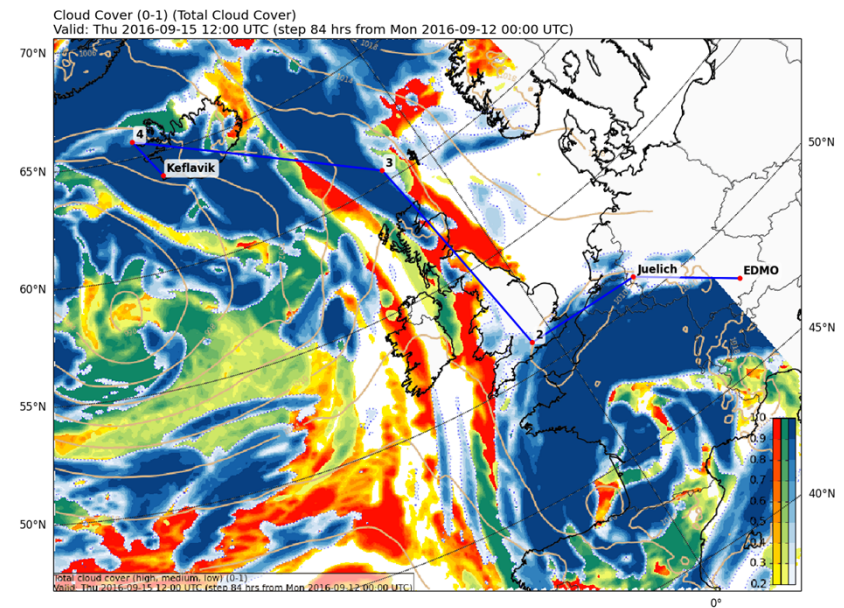
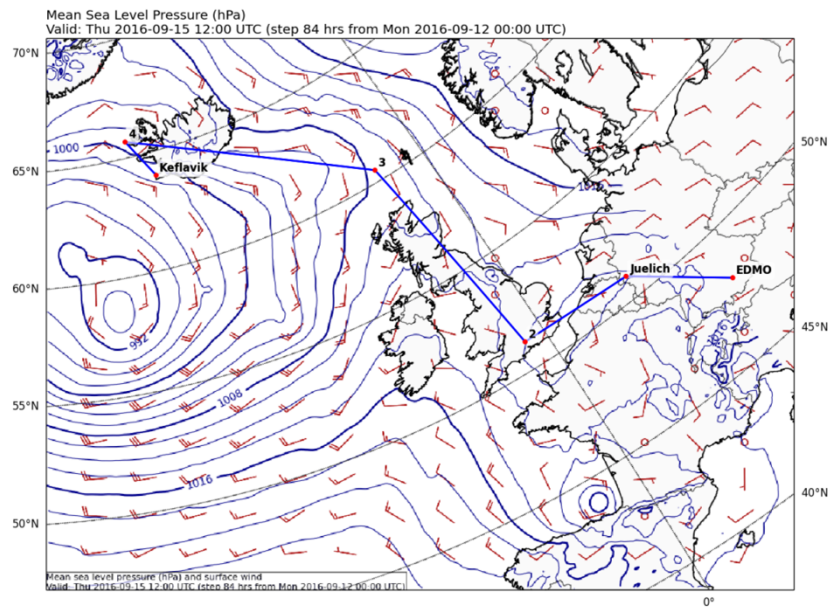
Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Thu, 15 Sep 2016, 12 UTC (step 084 h from Mon, 12 Sep 2016, 00 UTC)



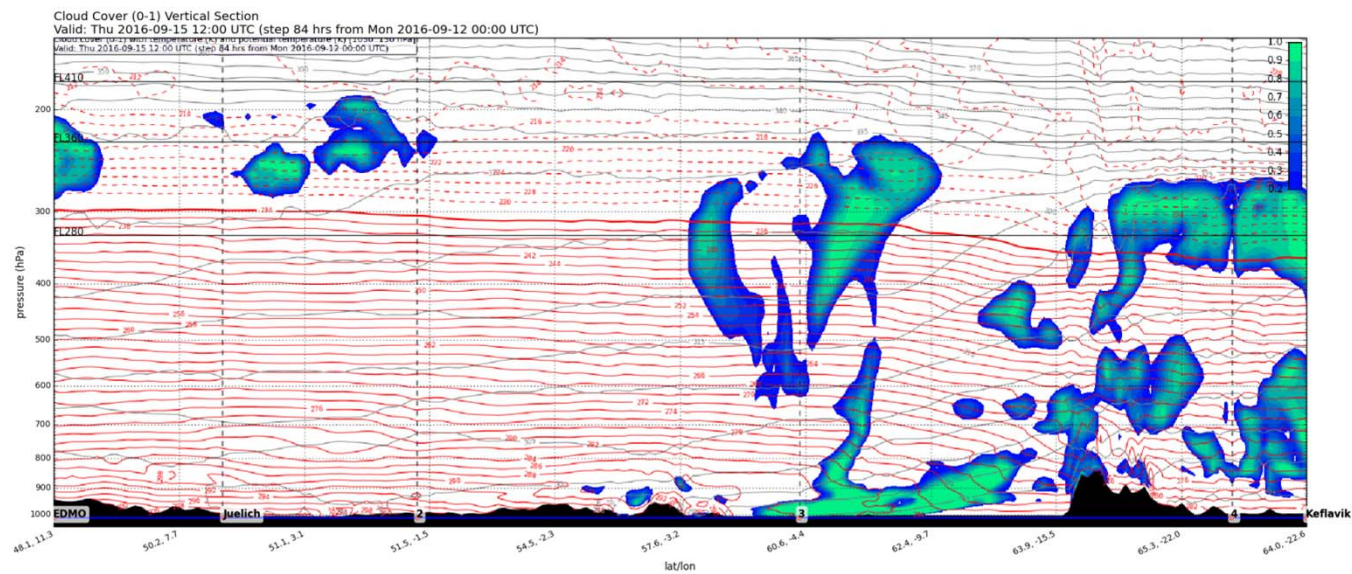
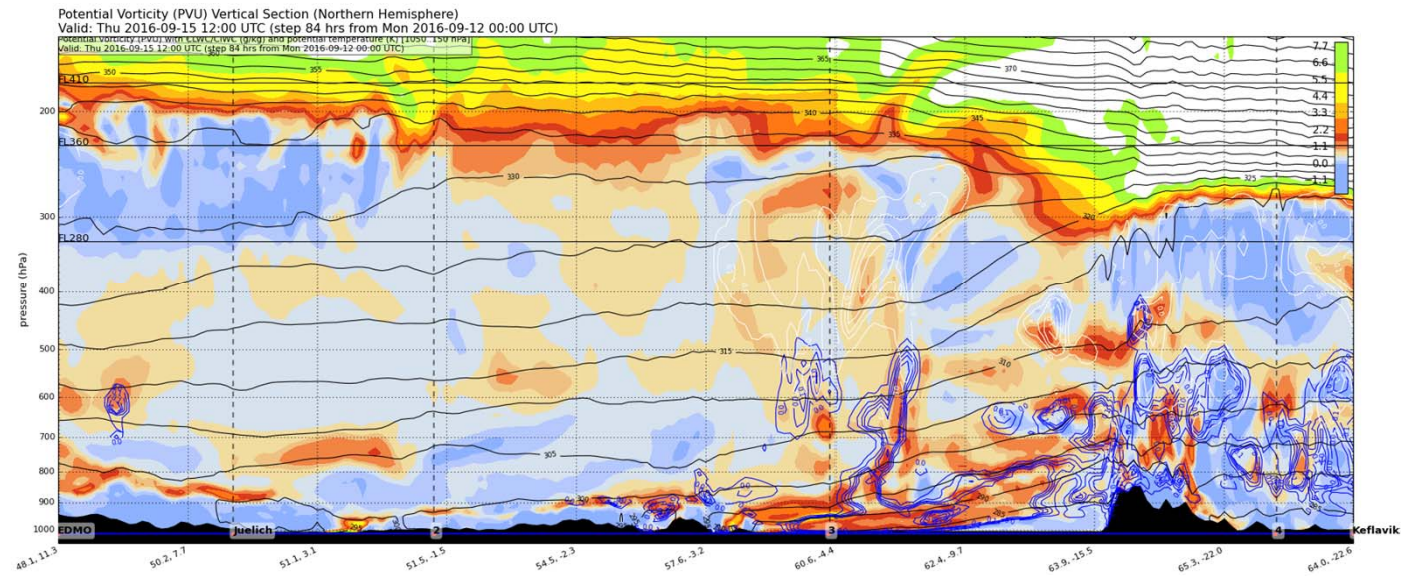
Relative Humidity (%) and Z (m) at 700 hPa
Valid: Thu, 15 Sep 2016, 12 UTC (step 084 h from Mon, 12 Sep 2016, 00 UTC)



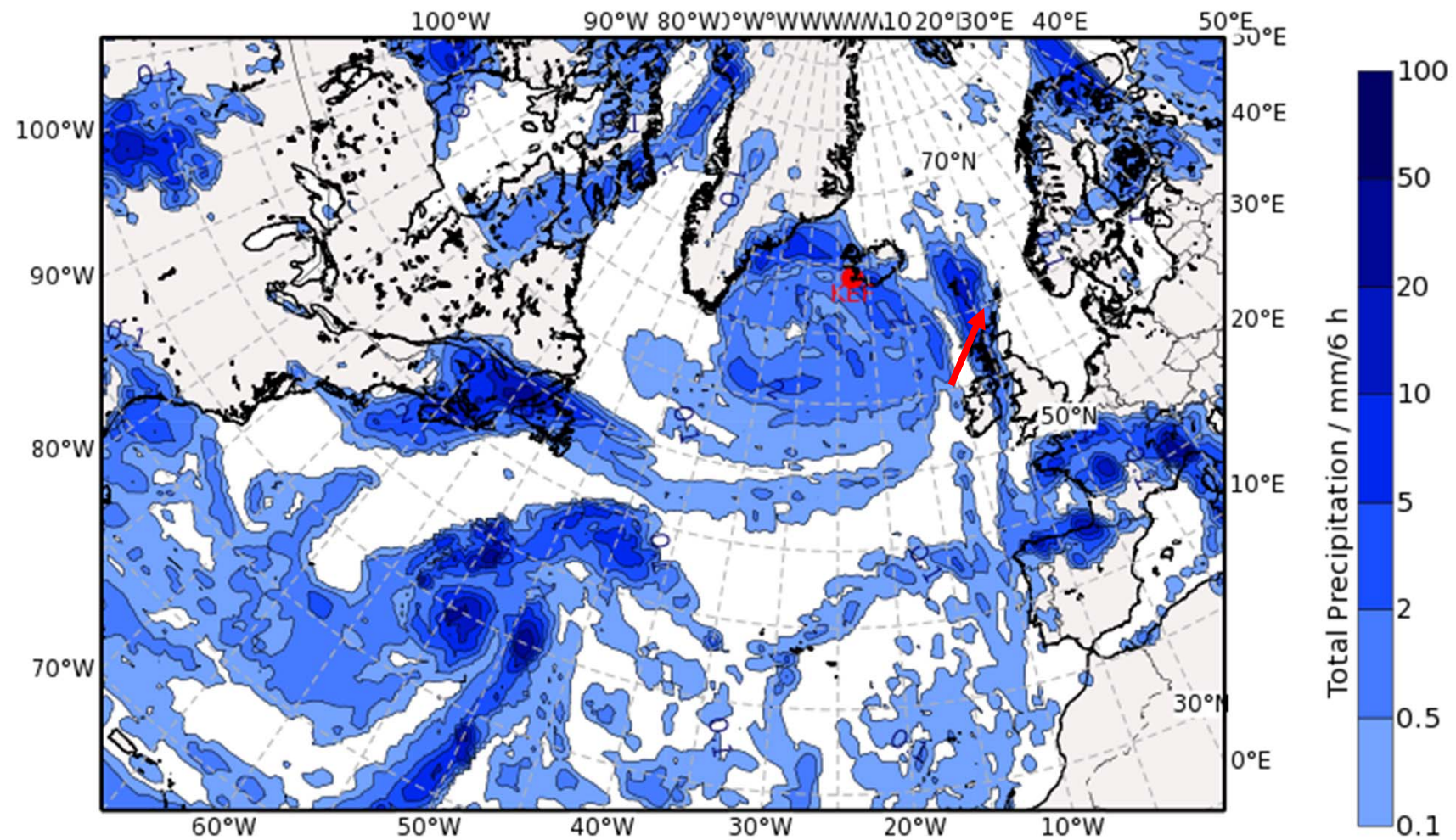
Forecast for Thursday, 15 Sep 2016



Forecast for Thursday, 15 Sep 2016



Total Precipitation, accumulated over 6 hours prior to valid time (mm)
Valid: Thu, 15 Sep 2016, 12 UTC (step 084 h from Mon, 12 Sep 2016, 00 UTC)



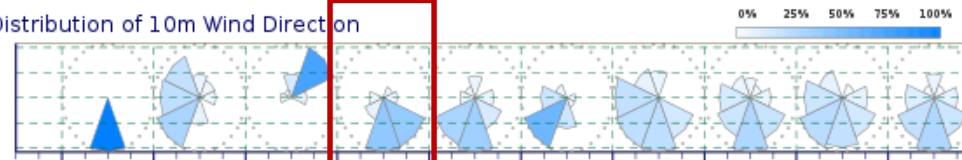
Overview of flight planning until +72h

Wave ENSgram

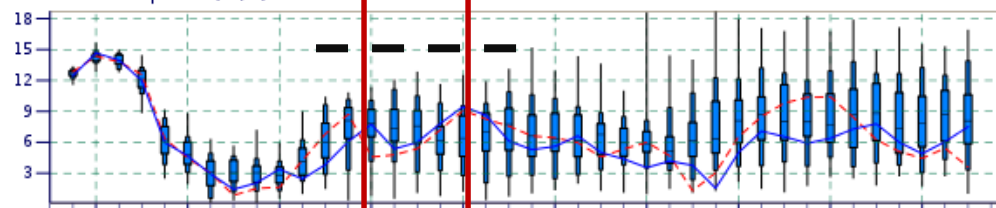
60.52°N 4.21°W (ENS sea point)

High resolution forecast and ENS distribution Sunday 11 September 2016 12 UTC

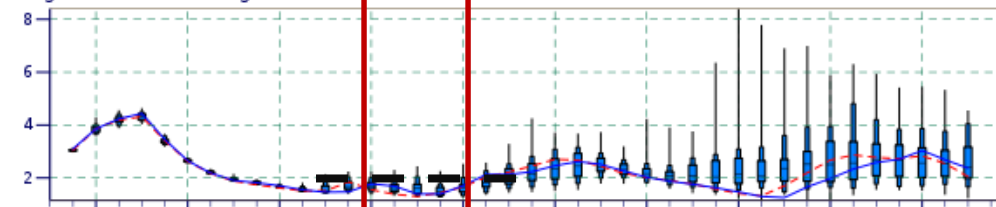
Distribution of 10m Wind Direction



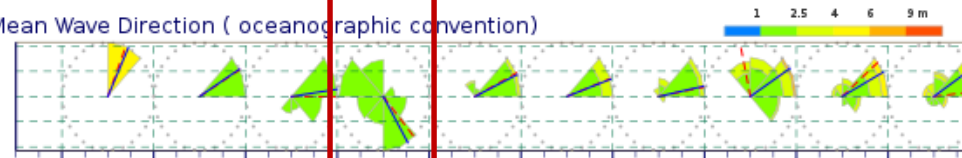
10m Wind Speed (m/s)



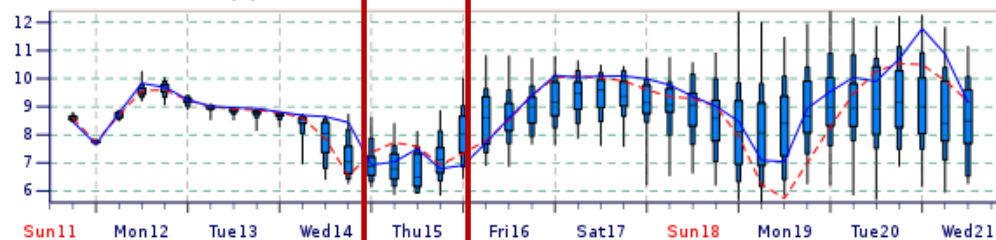
Significant wave height (m)



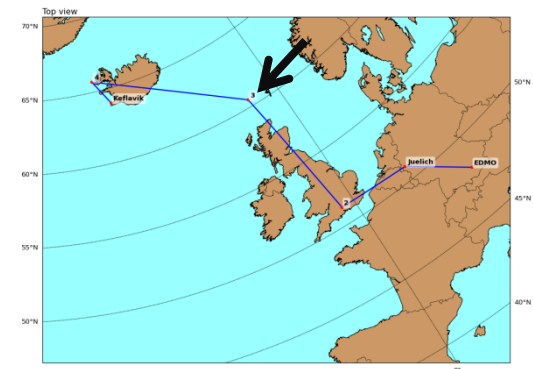
Mean Wave Direction (oceanographic convention)



Mean Wave Period (s)

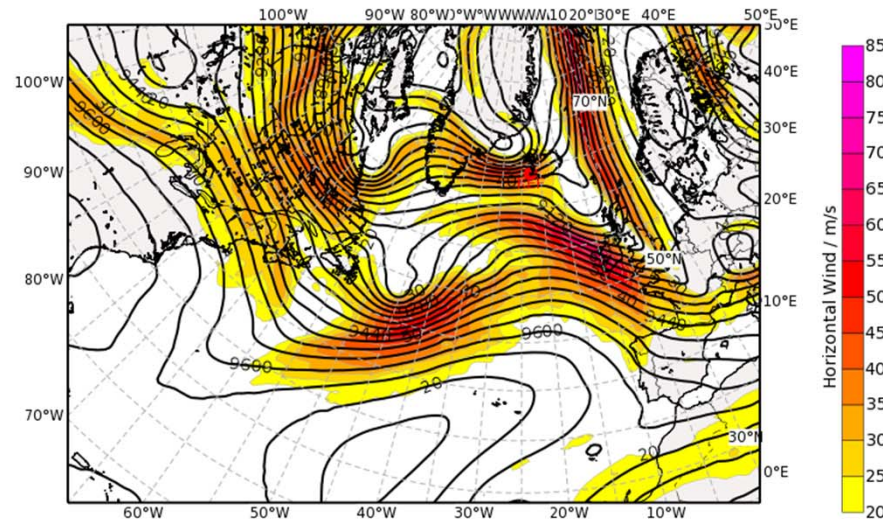


ECMWF ENS Meteogram For K7 Buoy

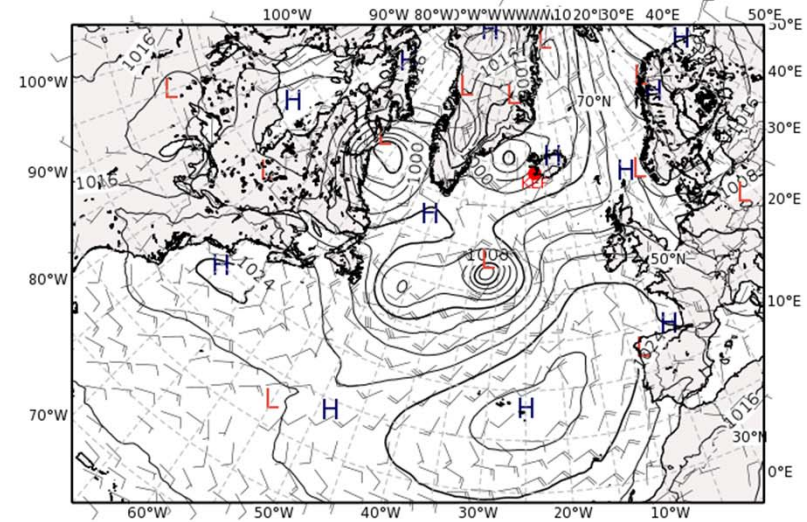


Forecast for Saturday, 15 Sep 2016

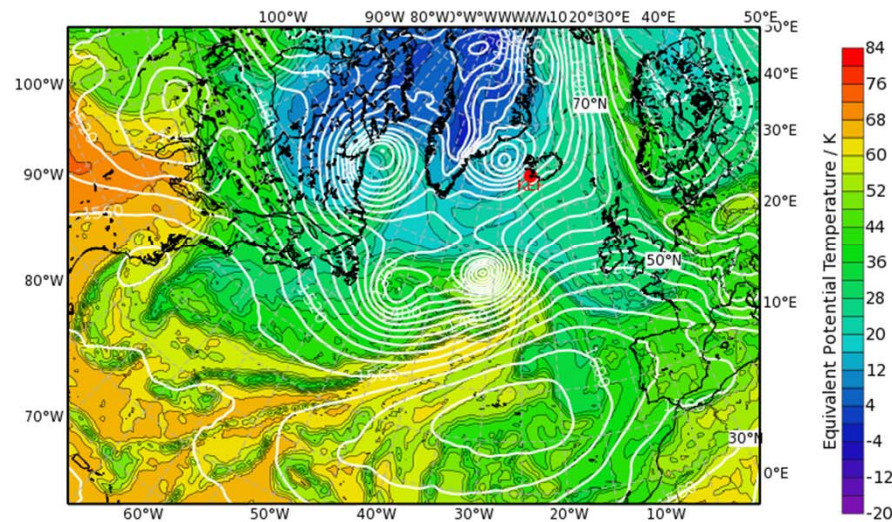
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Sat, 17 Sep 2016, 12 UTC (step 132 h from Mon, 12 Sep 2016, 00 UTC)



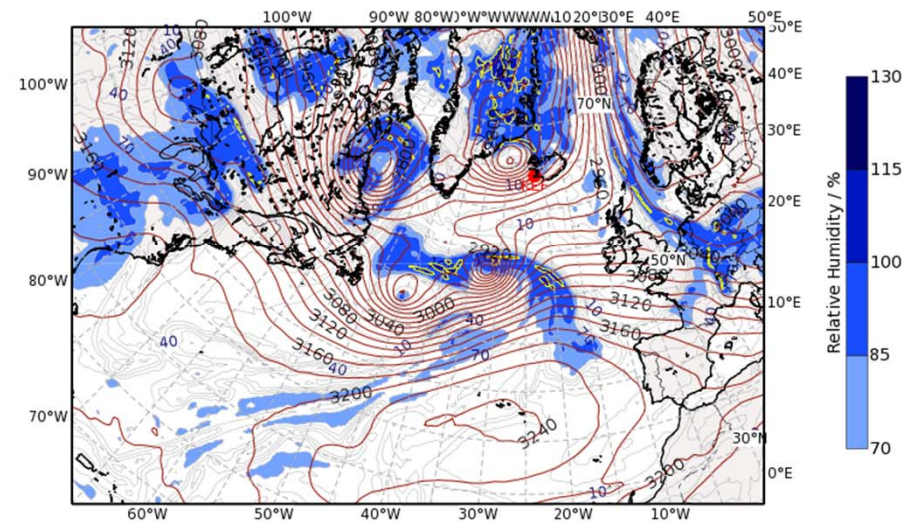
Mean Sea Level Pressure (hPa)
Valid: Sat, 17 Sep 2016, 12 UTC (step 132 h from Mon, 12 Sep 2016, 00 UTC)



Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Sat, 17 Sep 2016, 12 UTC (step 132 h from Mon, 12 Sep 2016, 00 UTC)

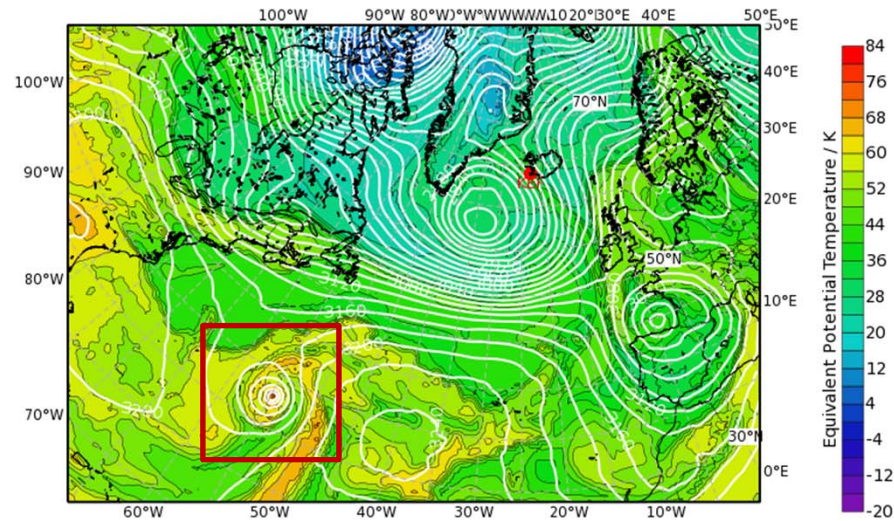


Relative Humidity (%) and Z (m) at 700 hPa
Valid: Sat, 17 Sep 2016, 12 UTC (step 132 h from Mon, 12 Sep 2016, 00 UTC)

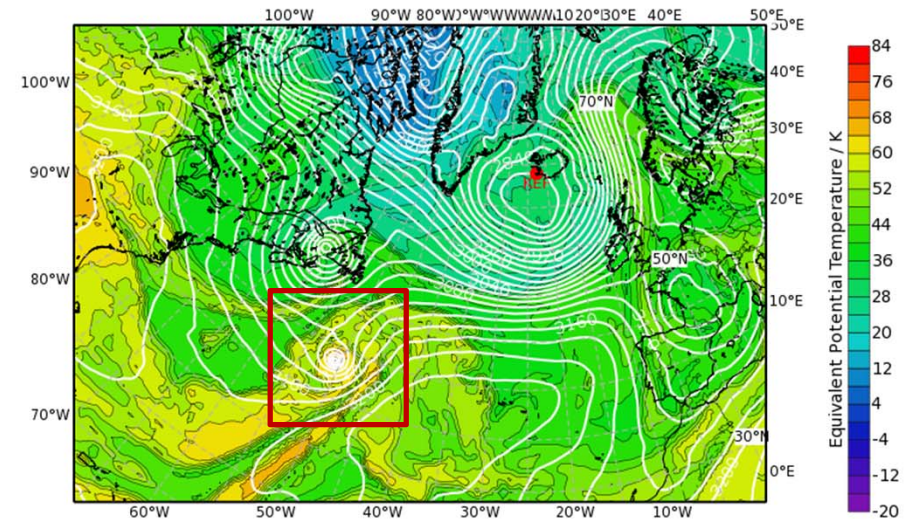


Outlook

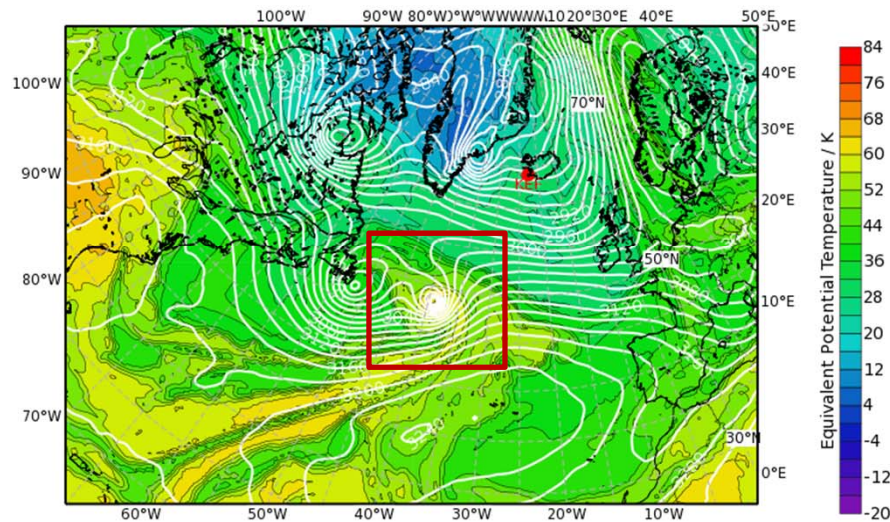
Equivalent Potential Temperature (degC) & Streamlines at 700 hPa
Valid: Thu, 15 Sep 2016, 00 UTC (step 072 h from Mon, 12 Sep 2016, 00 UTC)



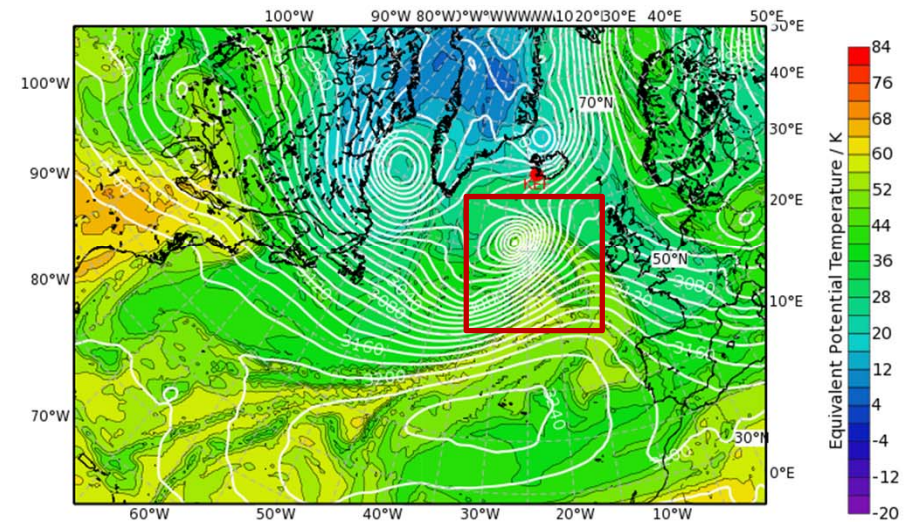
Equivalent Potential Temperature (degC) & Streamlines at 700 hPa
Valid: Fri, 16 Sep 2016, 00 UTC (step 096 h from Mon, 12 Sep 2016, 00 UTC)



Equivalent Potential Temperature (degC) & Streamlines at 700 hPa
Valid: Sat, 17 Sep 2016, 00 UTC (step 120 h from Mon, 12 Sep 2016, 00 UTC)

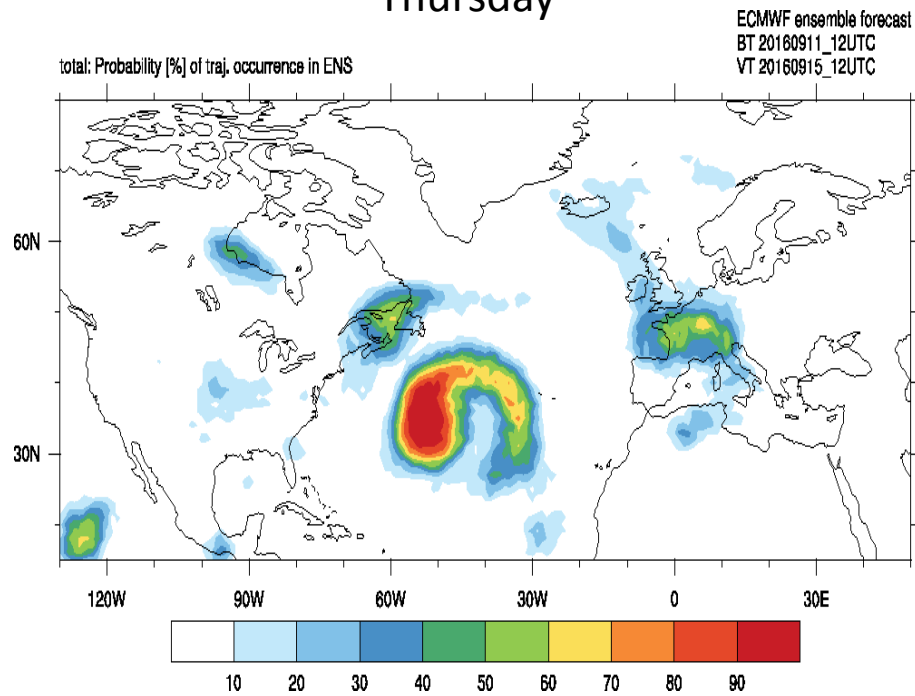


Equivalent Potential Temperature (degC) & Streamlines at 700 hPa
Valid: Sun, 18 Sep 2016, 00 UTC (step 144 h from Mon, 12 Sep 2016, 00 UTC)

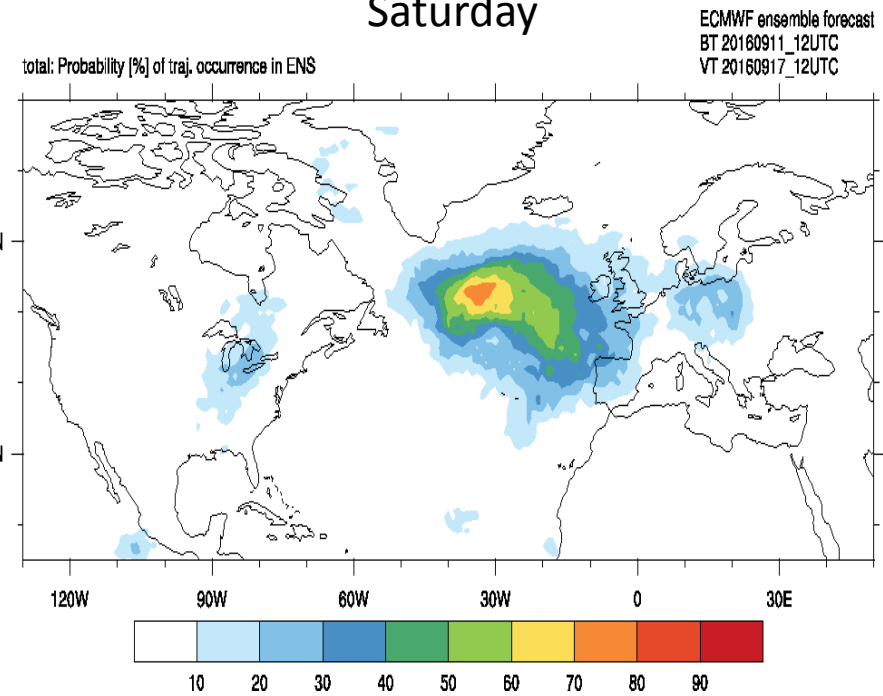


Outlook

Thursday



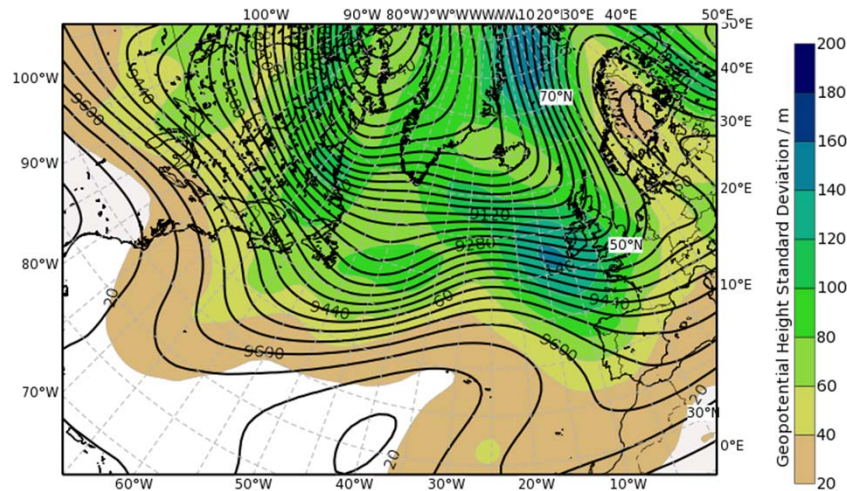
Saturday



Outlook

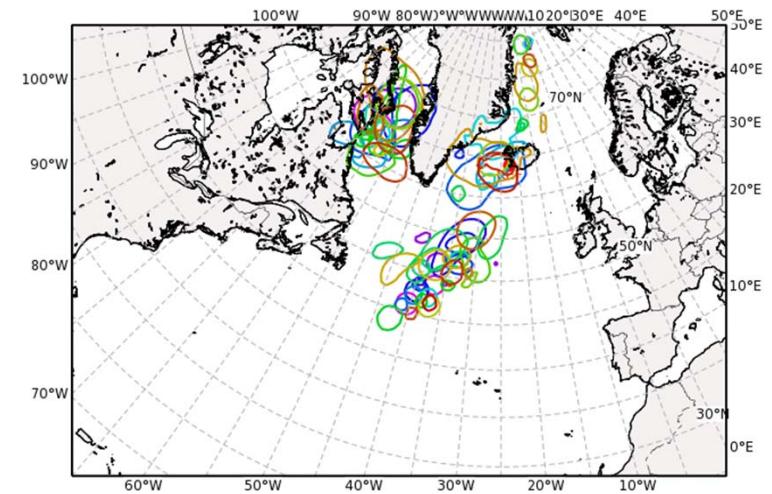
ECMWF ENS MEAN & STDEV @ Z300

Valid: Sat, 17 Sep 2016, 12 UTC (step 144 h from Sun, 11 Sep 2016, 12 UTC)



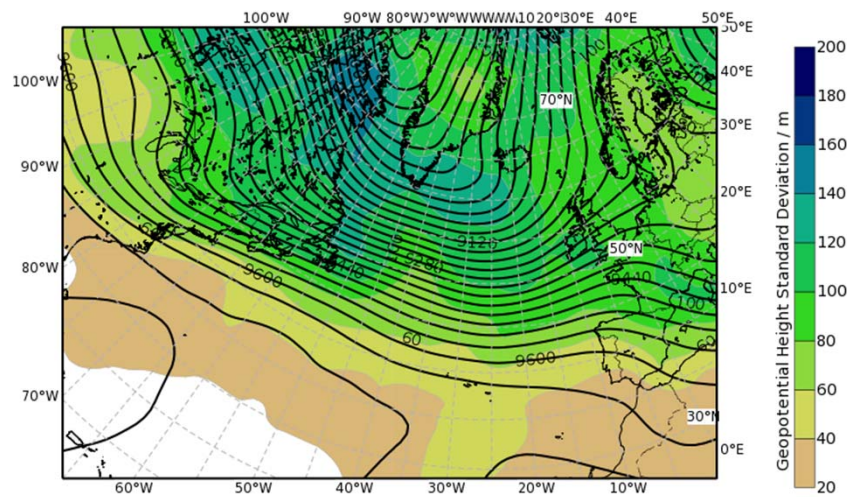
ECMWF ENS MSLP (990hPa-isoline)

Valid: Sat, 17 Sep 2016, 12 UTC (step 144 h from Sun, 11 Sep 2016, 12 UTC)



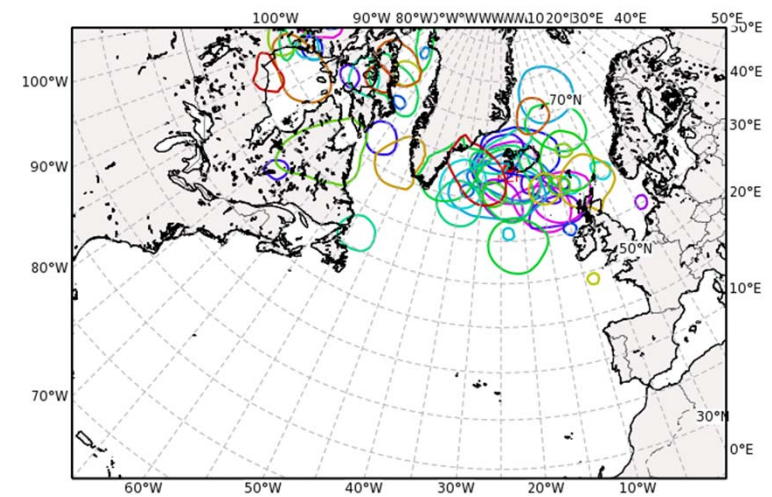
ECMWF ENS MEAN & STDEV @ Z300

Valid: Mon, 19 Sep 2016, 12 UTC (step 192 h from Sun, 11 Sep 2016, 12 UTC)



ECMWF ENS MSLP (990hPa-isoline)

Valid: Mon, 19 Sep 2016, 12 UTC (step 192 h from Sun, 11 Sep 2016, 12 UTC)

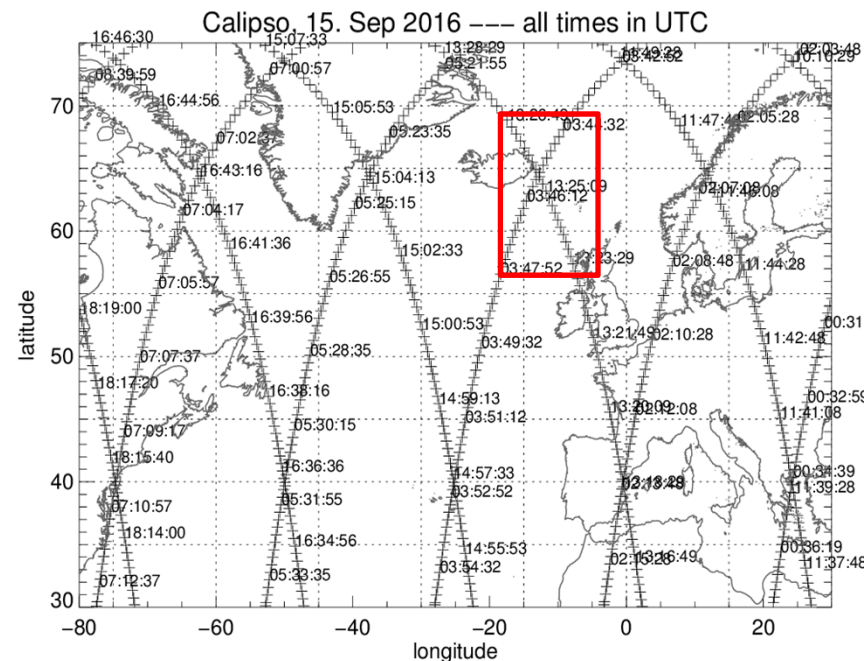


Conclusion (to be discussed)

- Weather systems on Thu do not look promising for NAWDEX aims
→ **plan for transfer with overflights and without extending the flight**
- Low total cloud coverage predicted for Jülich and Chilbolton for Thursday, 12 UTC
- Clouds at all altitude predicted near Iceland and Buoy K7
- Wind speeds and wave heights are predicted to be low near Buoy 7
→ **plan for calibration circle near buoy K7**
- **Release dropsonde near Iceland and perform radar calibration pattern**
- Saturday is a transition day until the next system arrives Sun/Mon (former tropical cyclone)

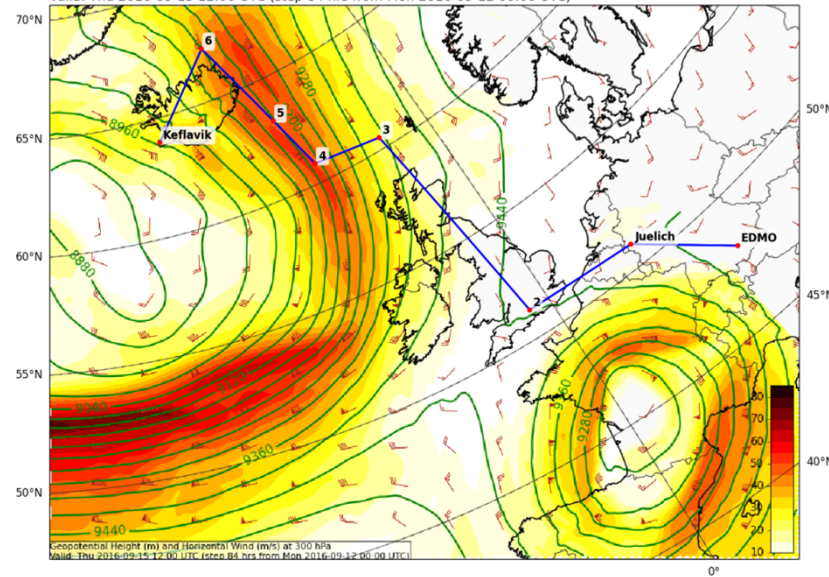
Discussion

- We discussed about the (WCB) ascent in the cut-off low that is predicted to be located over the Biscaya on Thursday
 - On Wed WCB inflow air was located in the Biscaya, unfortunately the ascent ceases on Thu
 - On Thu outflow air would be observable near the cutoff low with an earlier ascent on the leading edge of the cut-off
- We discussed about option of integrating a Calipso(A-Train) undeflight

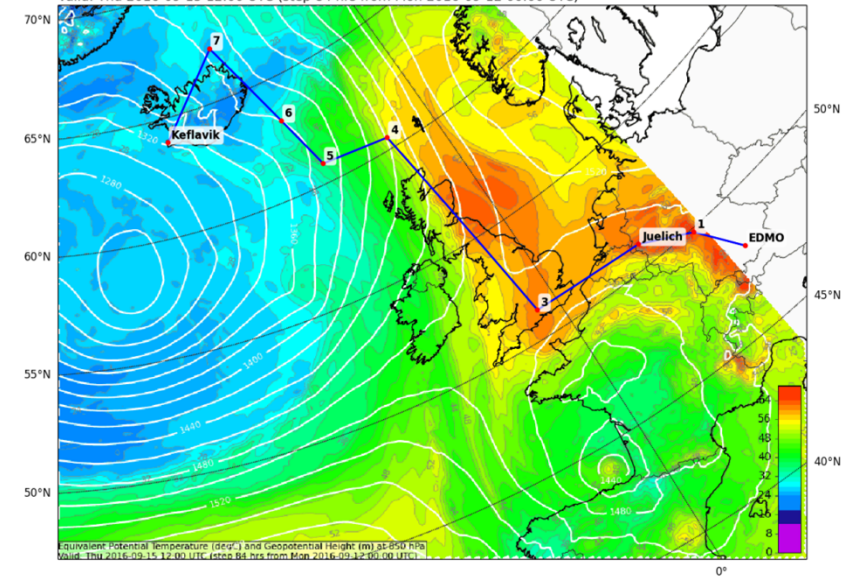


Updated Planning

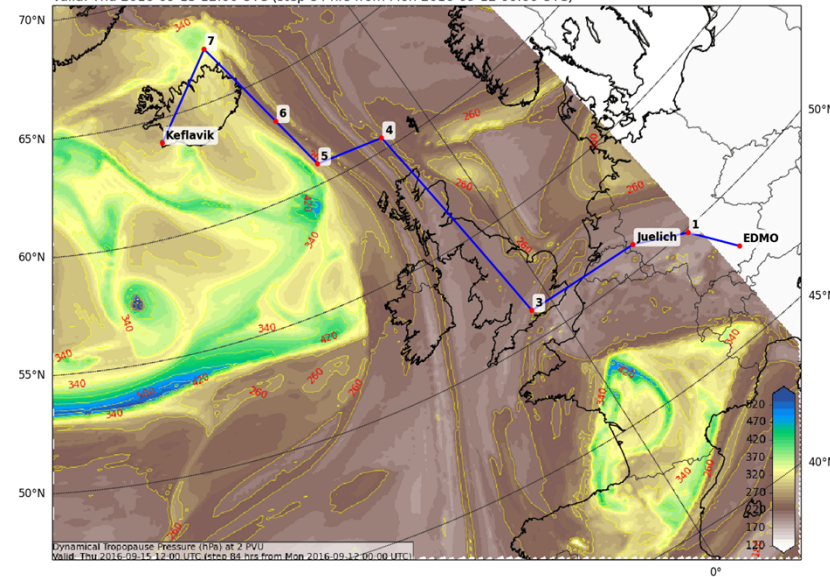
Geopotential Height (m) and Horizontal Wind (m/s) (Wind Speed 10-85 m/s) at 300 (hPa)
Valid: Thu 2016-09-15 12:00 UTC (step 84 hrs from Mon 2016-09-12 00:00 UTC)



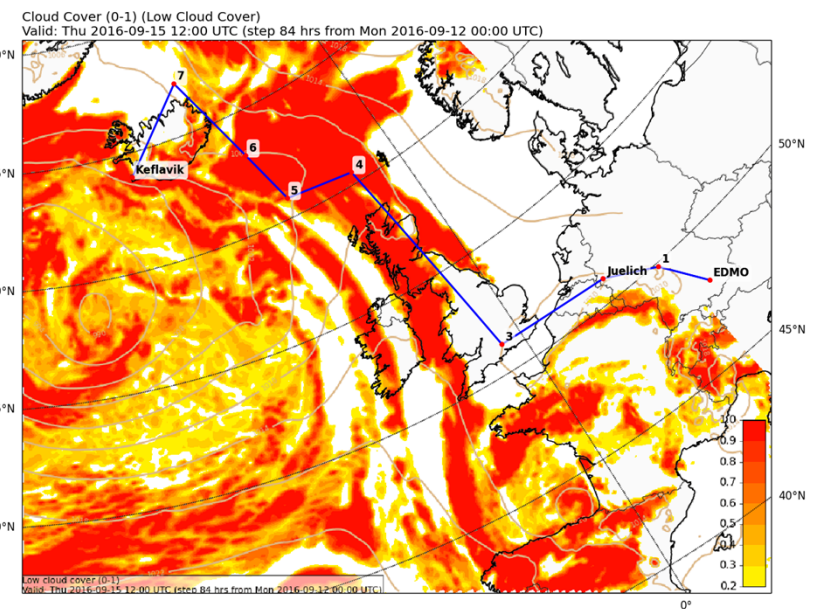
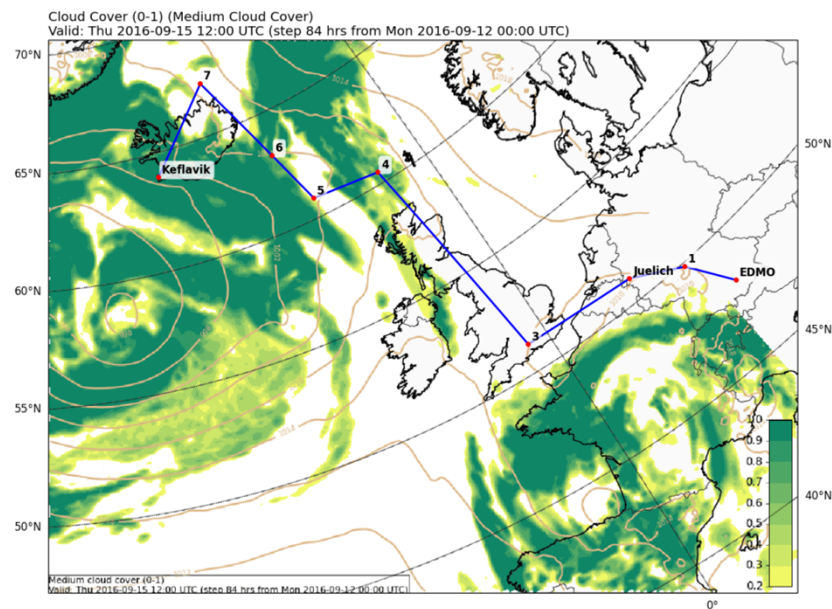
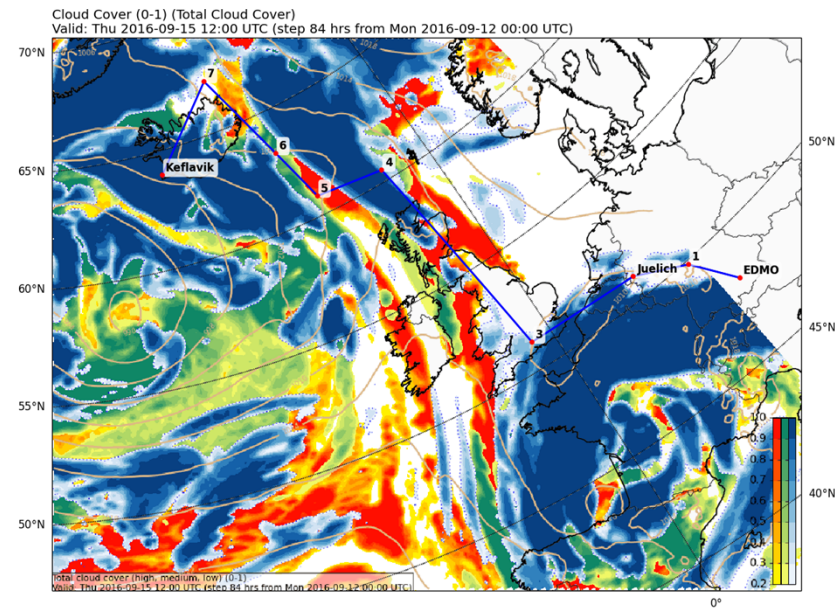
Equivalent Potential Temperature (degC) and Geopotential Height (m) at 850 (hPa)
Valid: Thu 2016-09-15 12:00 UTC (step 84 hrs from Mon 2016-09-12 00:00 UTC)



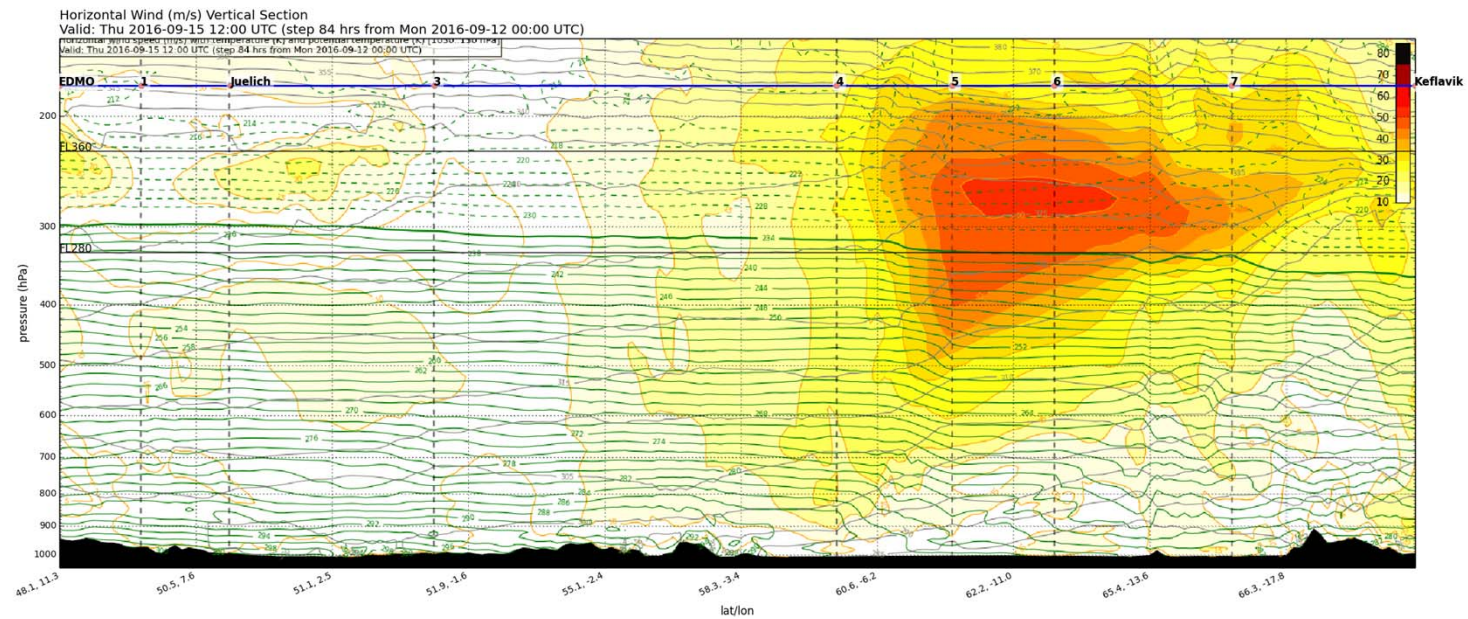
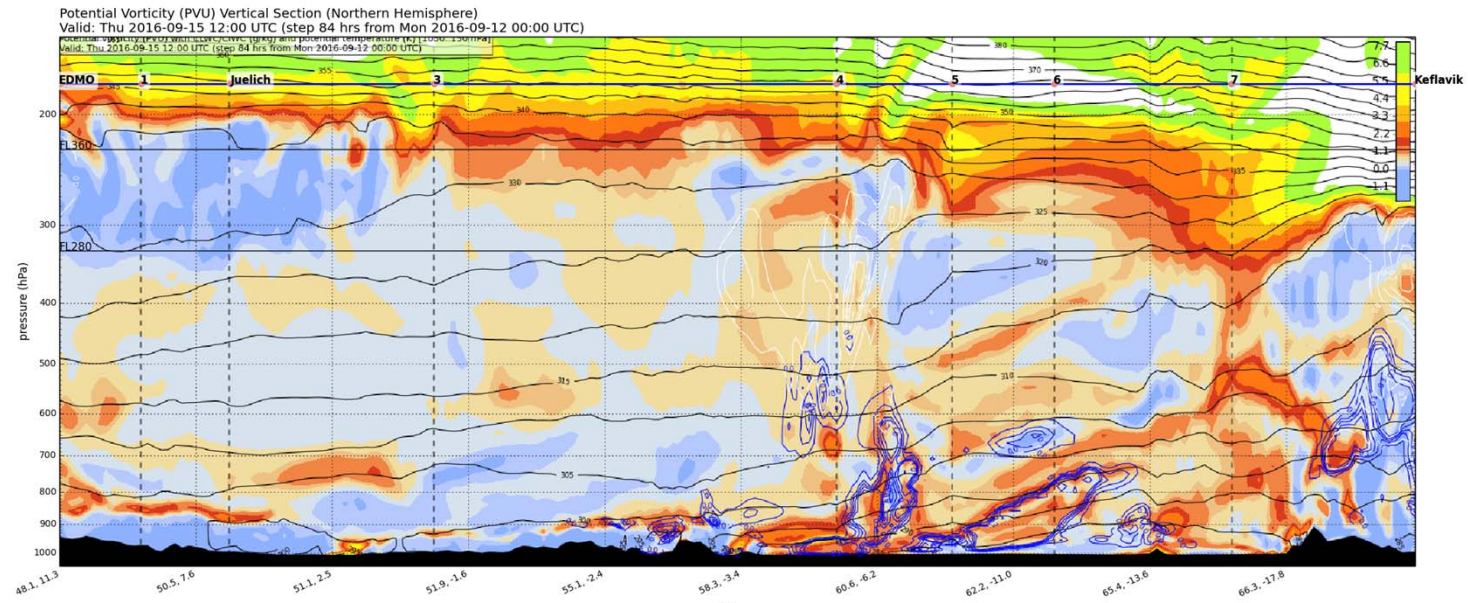
Dynamical Tropopause (Pressure (hPa)) at 2000 (10⁻³ PVU)
Valid: Thu 2016-09-15 12:00 UTC (step 84 hrs from Mon 2016-09-12 00:00 UTC)



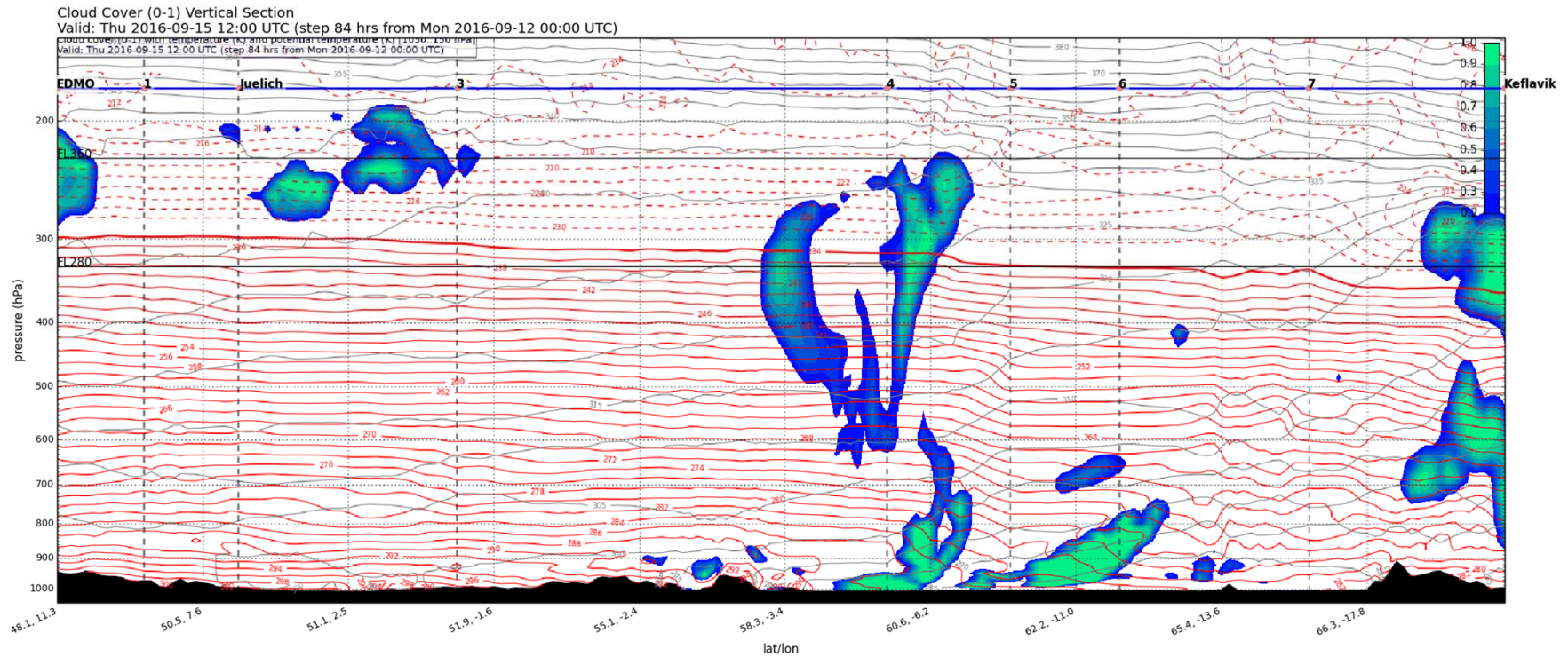
Updated Planning

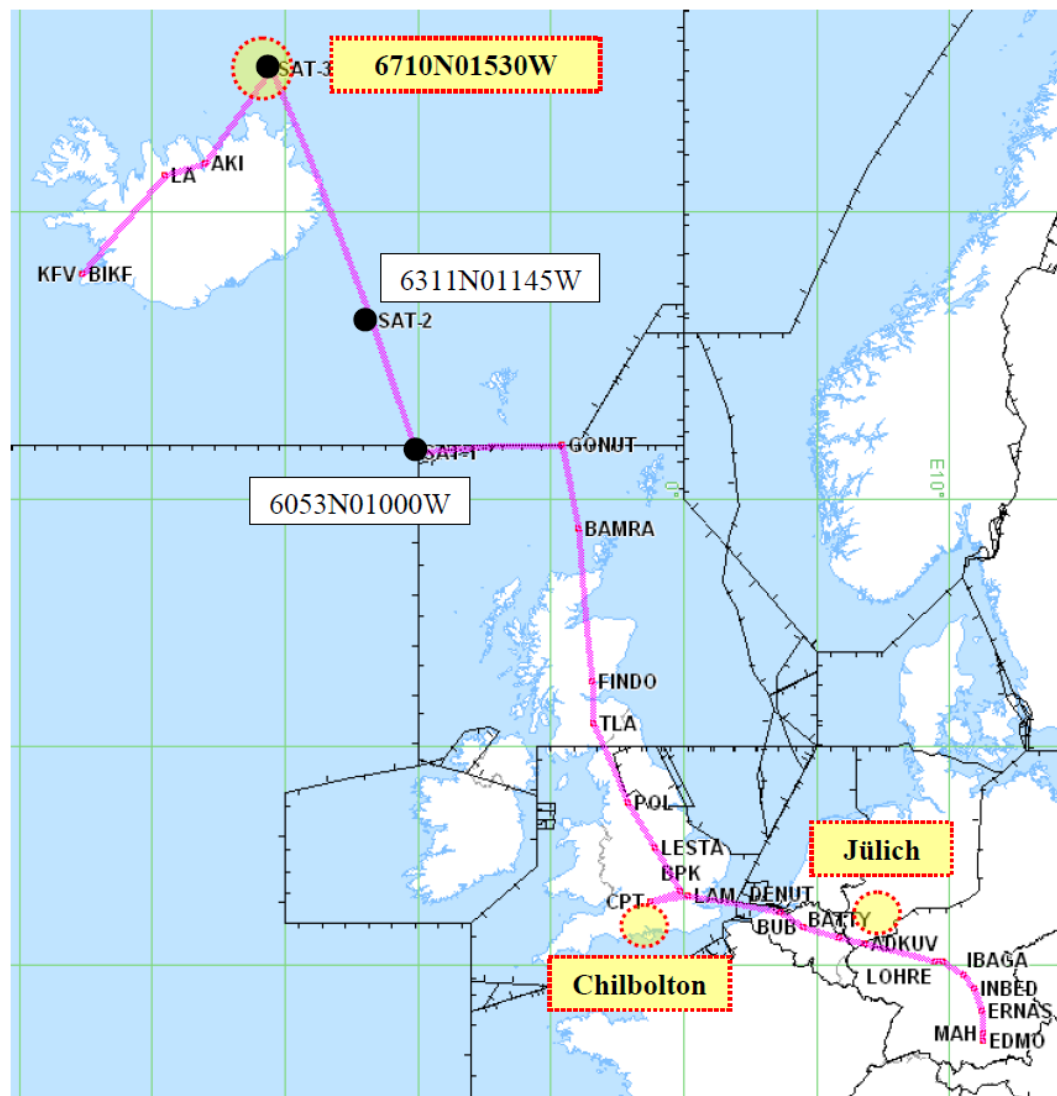


Updated Planning



Updated Planning





In der Helmholtz-Gemeinschaft

Date of flight: **15-Sep-2016**

Callsign: **D-ADLR**

Type of Aircraft: G550

Departure Aerodrome: EDMO

Destination Aerodrome: BIKF

Takeoff Time: 0900 UTC

Cruising-Level:

FL410

Planned Routing:

MAH UM726 ERNAS Y101 OSBIT
 UL984 LOHRE UL610 BATTY UL608
 DENUT UL610 LAM UL179 CPT UQ295
 BPK UN601 TLA UL613 DCT GONUT
 DCT 6053N01000W DCT 6311N01145W
 DCT 6710N01530W DCT AKI G1 KFK

Remarks:

req. 2 "Holding Patterns" ovhd "Jülich"
 at FL410 - dimensions: ~ 25 x 12 NM
 (see figure on next page)

req. 2 "Holding Patterns" ovhd "Chilbolton"
 at FL410 - dimensions: ~ 25 x 12 NM
 (see figure on next page)

req. to operate @ position 6710N 01530W
 at **FL410** for 20 min and
drop of 1 Meteorological Probe
 at **FL300** for 10 min /at **FL200** for 10 min