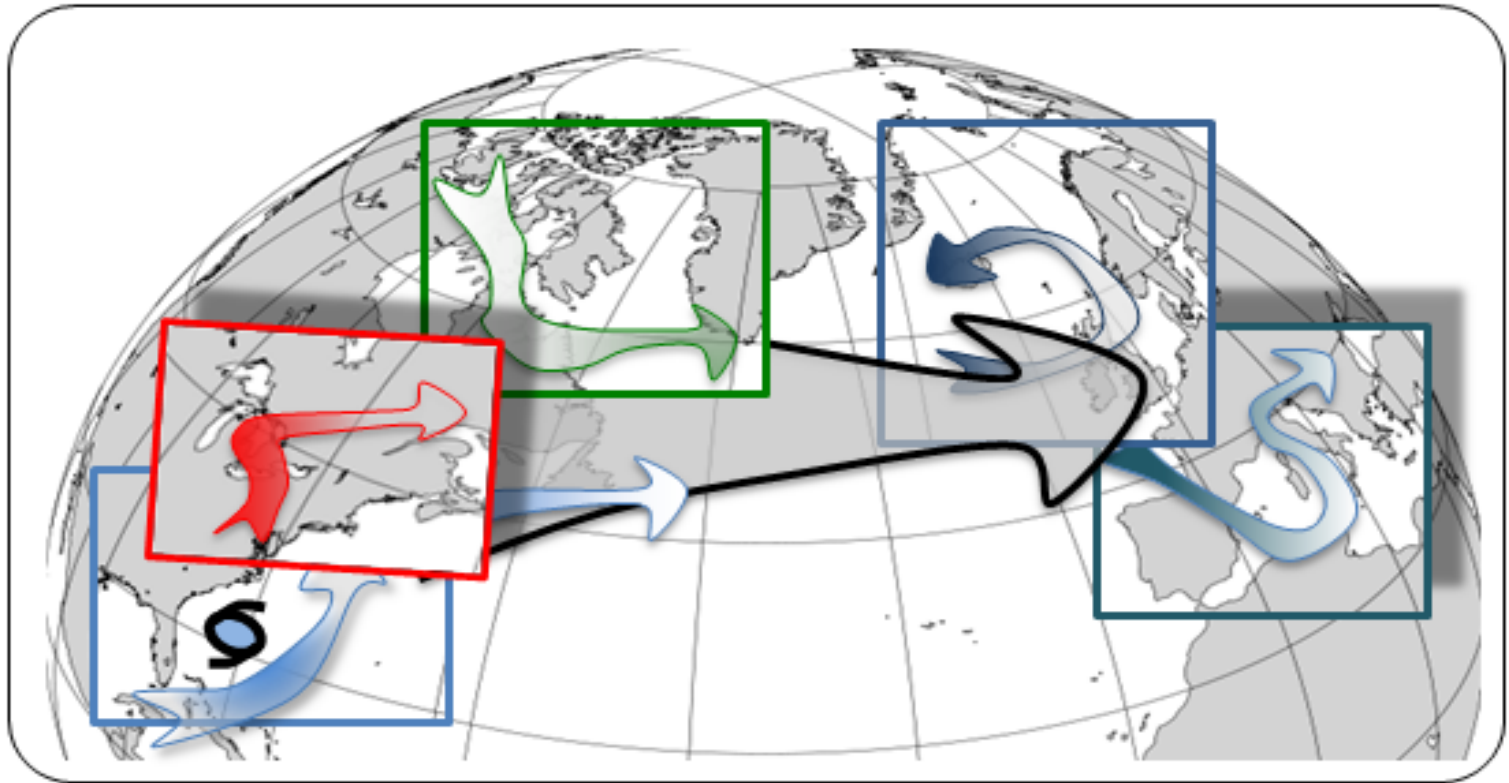


NAWDEX – General Planning Meeting

03 October 2016, Keflavik 11 UTC



NAWDEX – General Planning Meeting

21 September 2016, Keflavik 11 UTC

Topics

1. Weather overview until Thursday
2. Plans for flight in „frontal wave cyclone“ & associated strong WCB
3. Plans for potential missions next week Wed and Thu

NAWDEX – General Planning Meeting

21 September 2016, Keflavik 11 UTC

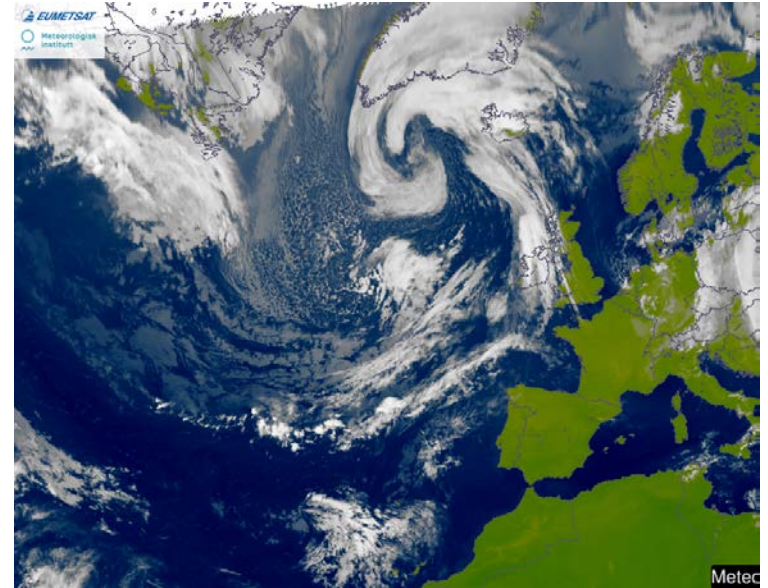
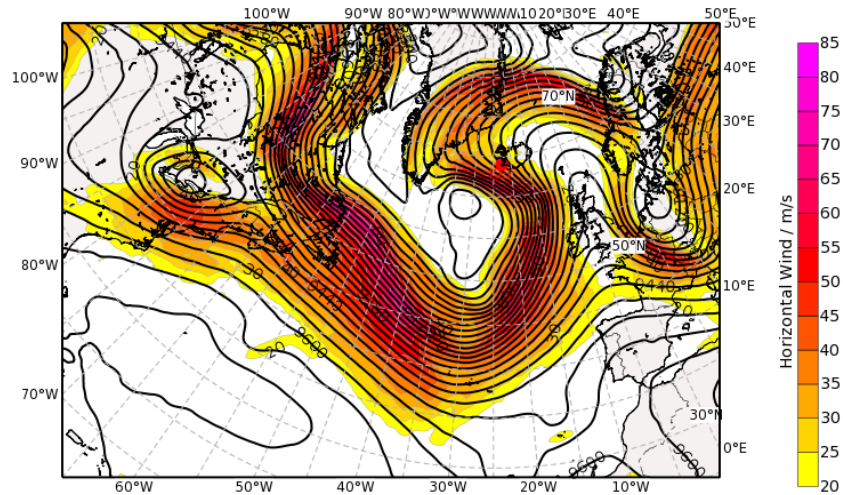
Topics

1. Key information from previous flight (2 minutes)
2. Aircraft status report by FX-Operations
3. Instrument status report by Instrument Manager
4. Short weather summary: information about flight options for the next days and update for planning for the next day with the latest forecast
5. Final discussion about flight pattern for next day (in case of 2 options)
6. Report of Ground-Based Observation coordinator
7. Announcement of tentative plans for Day+3
8. Coordination with other aircraft (Input from other groups)

Analysis – 03 Oct 2016, 00 UTC

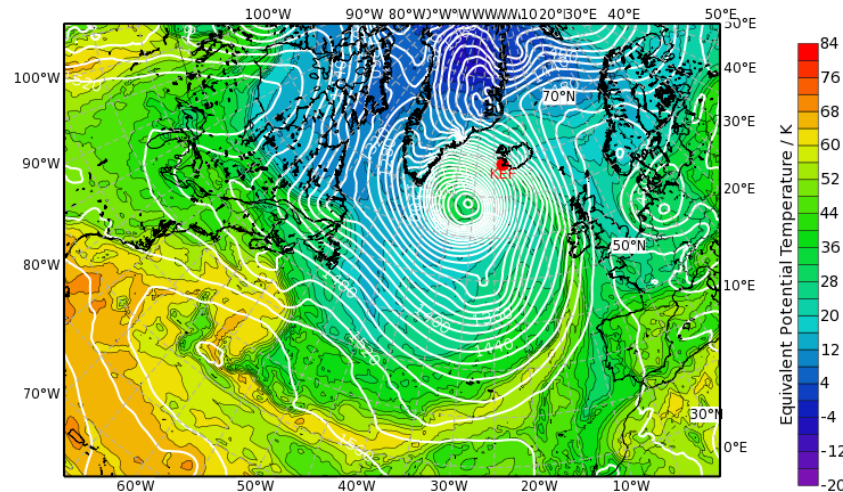
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa

Valid: Mon, 03 Oct 2016, 00 UTC (step 000 h from Mon, 03 Oct 2016, 00 UTC)



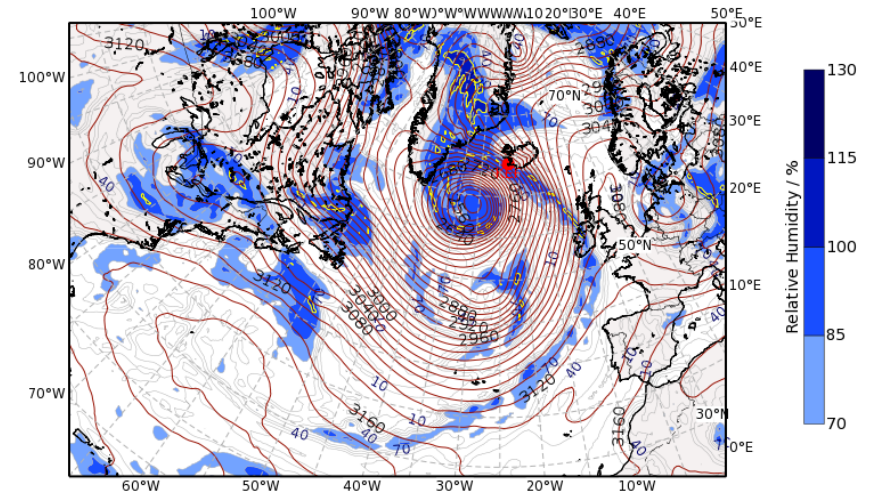
Equivalent Potential Temperature (degC) & Streamlines at 850 hPa

Valid: Mon, 03 Oct 2016, 00 UTC (step 000 h from Mon, 03 Oct 2016, 00 UTC)



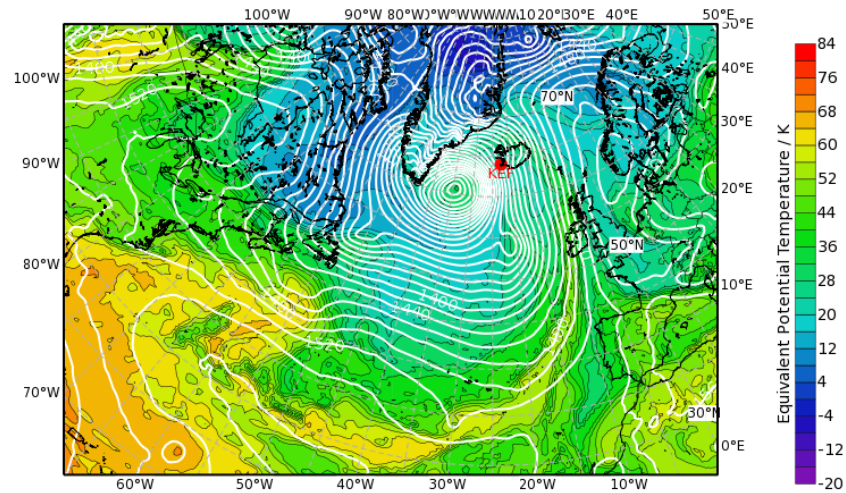
Relative Humidity (%) and Z (m) at 700 hPa

Valid: Mon, 03 Oct 2016, 00 UTC (step 000 h from Mon, 03 Oct 2016, 00 UTC)

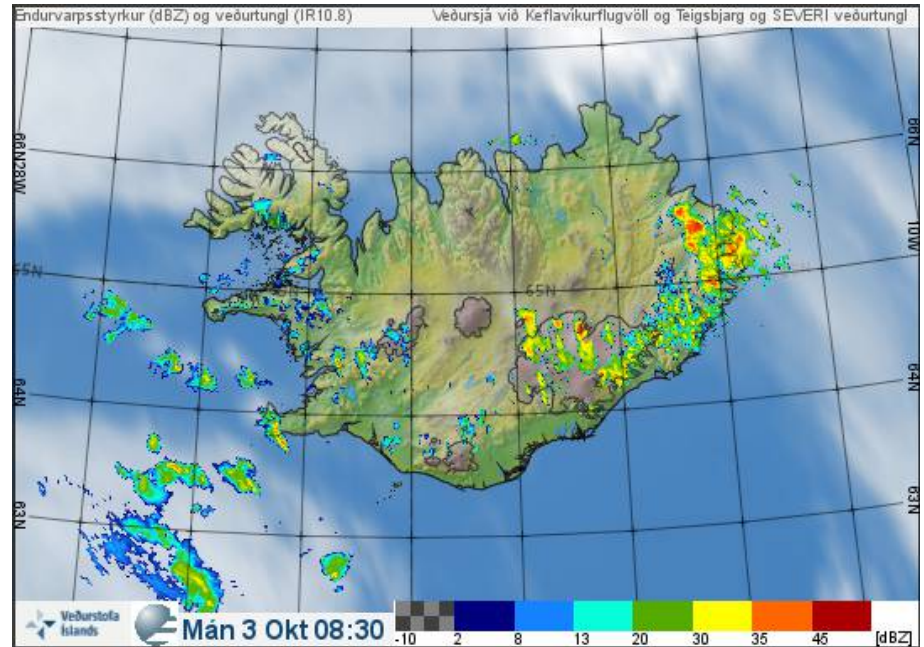
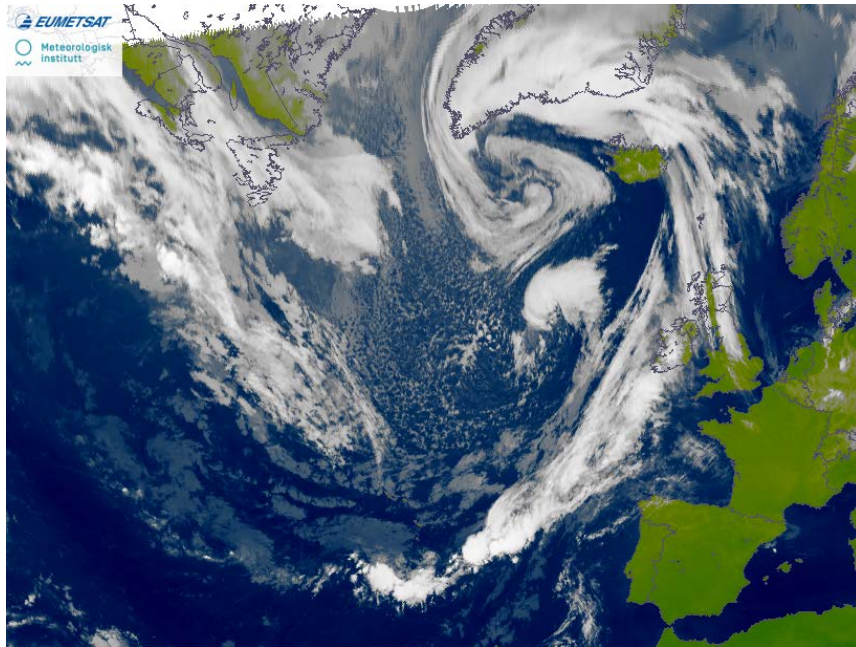
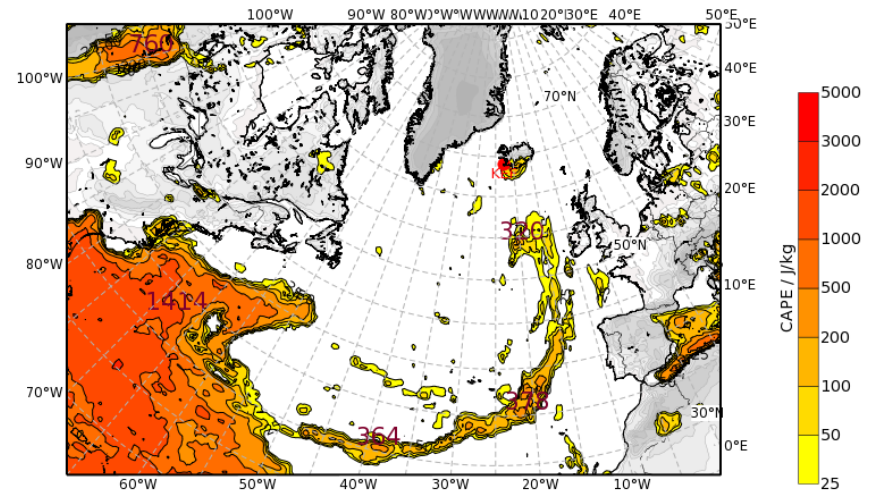


Analysis – 03 Oct 2016, 09 UTC

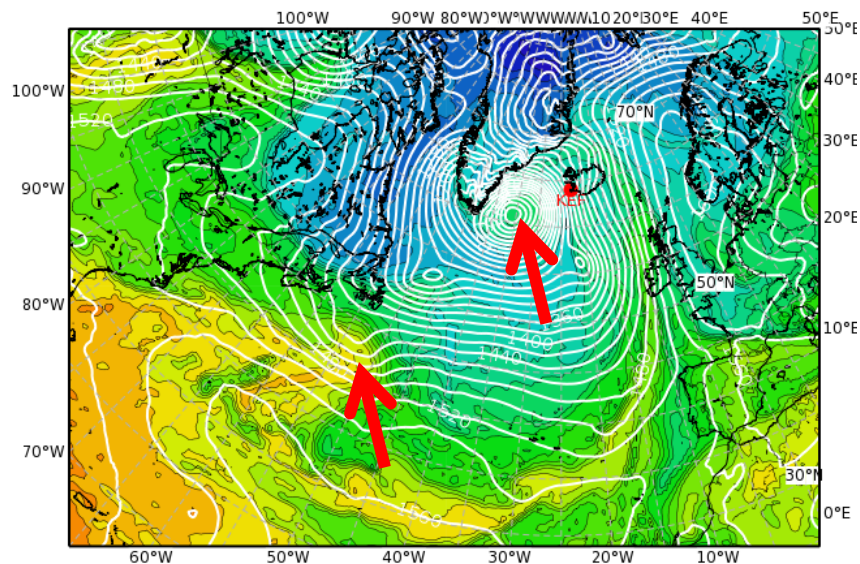
Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Mon, 03 Oct 2016, 09 UTC (step 009 h from Mon, 03 Oct 2016, 00 UTC)



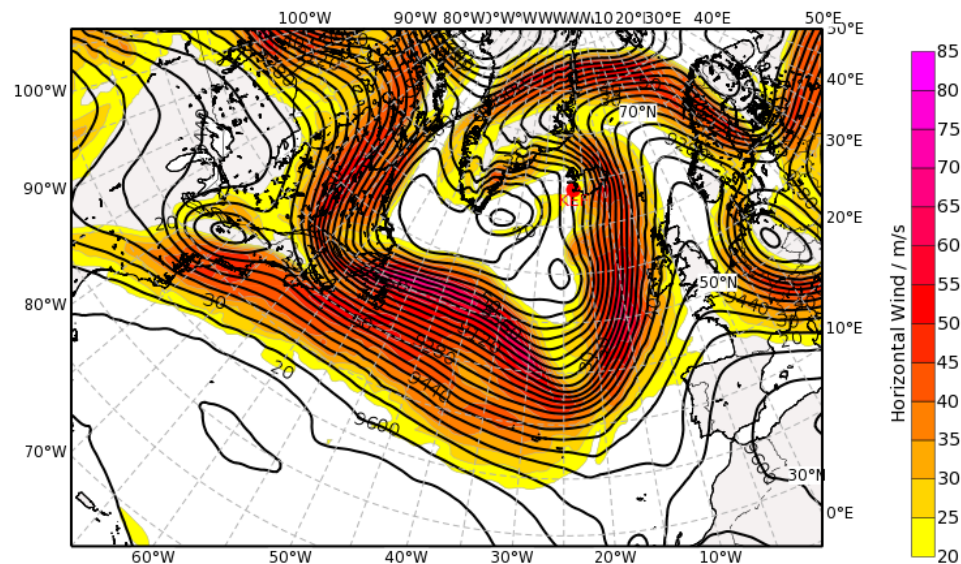
CAPE (J/kg)
Valid: Mon, 03 Oct 2016, 09 UTC (step 009 h from Mon, 03 Oct 2016, 00 UTC)



Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Mon, 03 Oct 2016, 12 UTC (step 012 h from Mon, 03 Oct 2016, 00 UTC)



Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Mon, 03 Oct 2016, 12 UTC (step 012 h from Mon, 03 Oct 2016, 00 UTC)

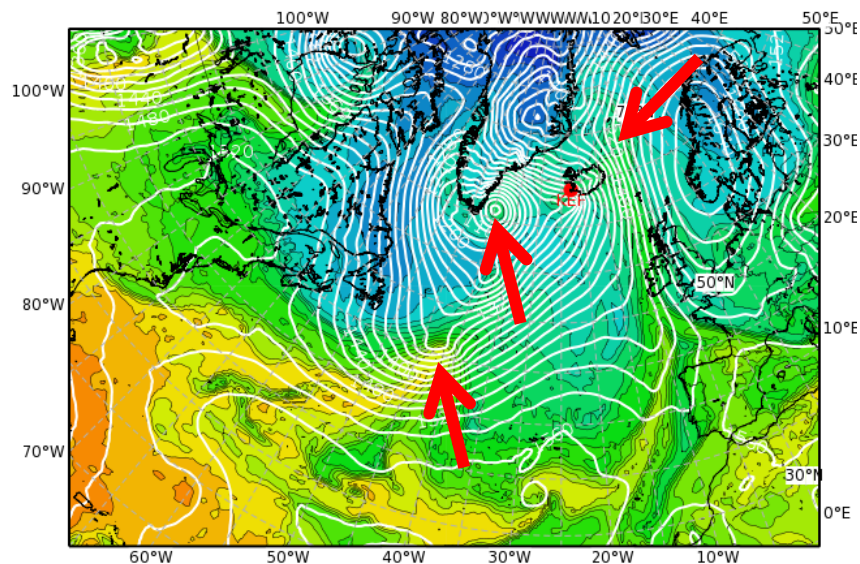


New frontal wave

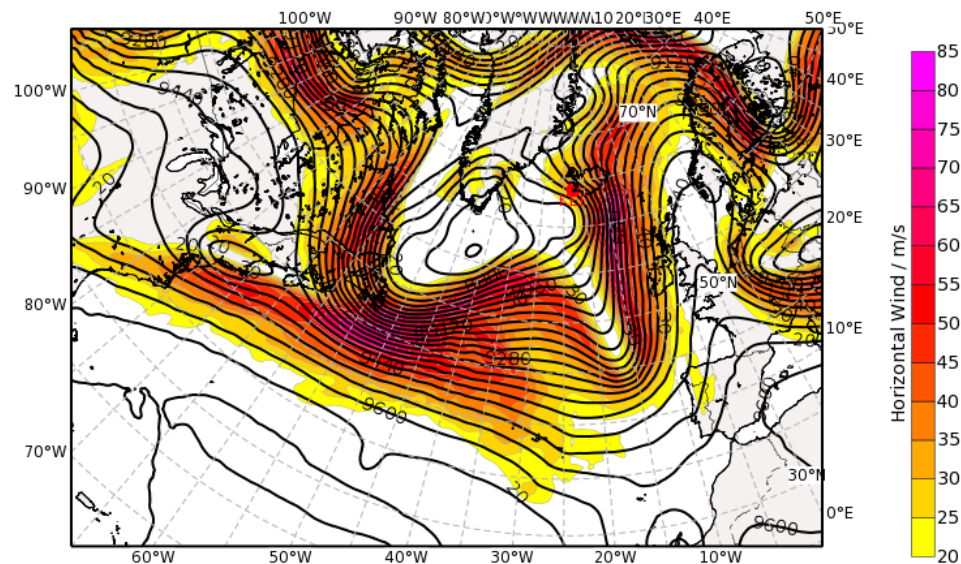
Saturday cyclone

Strong moisture transport

Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Tue, 04 Oct 2016, 00 UTC (step 024 h from Mon, 03 Oct 2016, 00 UTC)



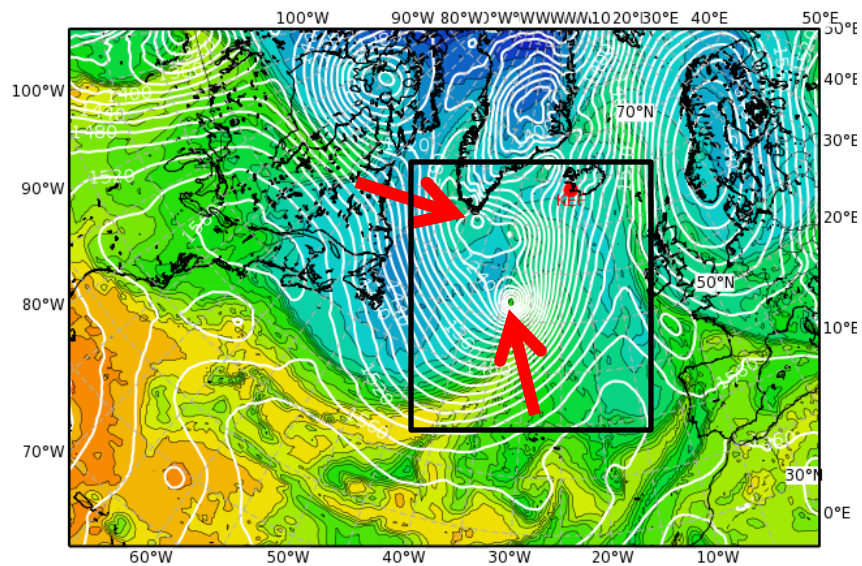
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Tue, 04 Oct 2016, 00 UTC (step 024 h from Mon, 03 Oct 2016, 00 UTC)



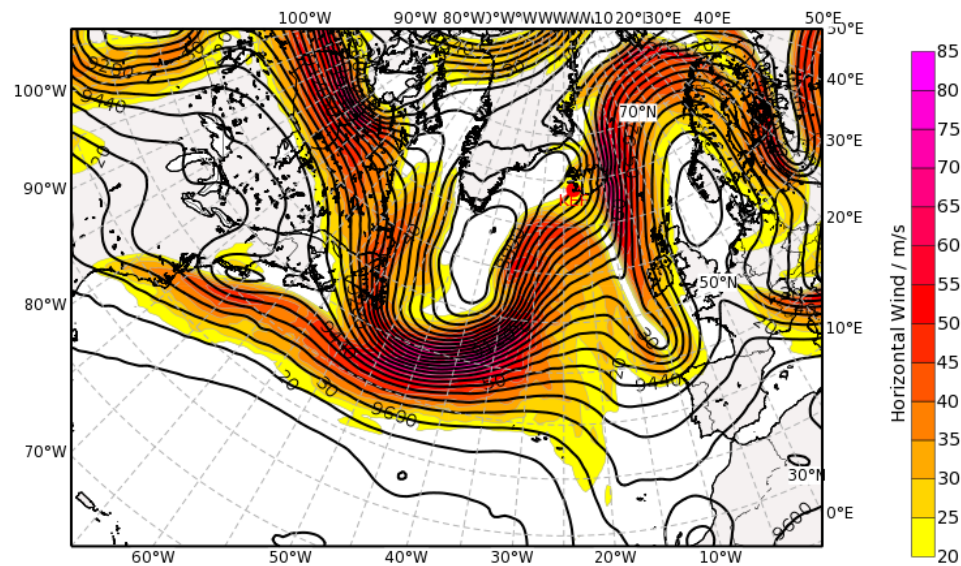
New frontal wave

Saturday cyclone

Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Tue, 04 Oct 2016, 12 UTC (step 036 h from Mon, 03 Oct 2016, 00 UTC)



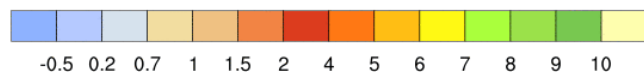
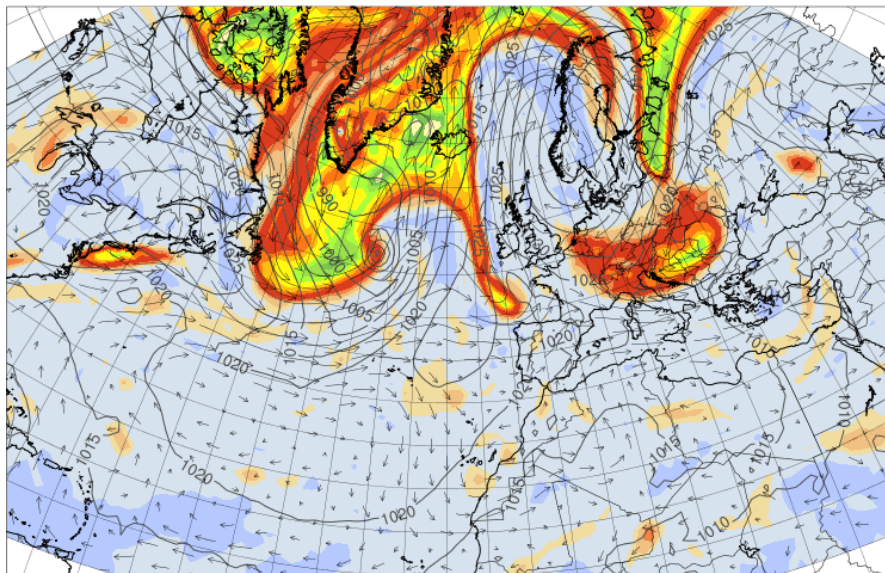
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Tue, 04 Oct 2016, 12 UTC (step 036 h from Mon, 03 Oct 2016, 00 UTC)



New frontal wave

Forecast for Tue 04 Oct 2016 12 UTC

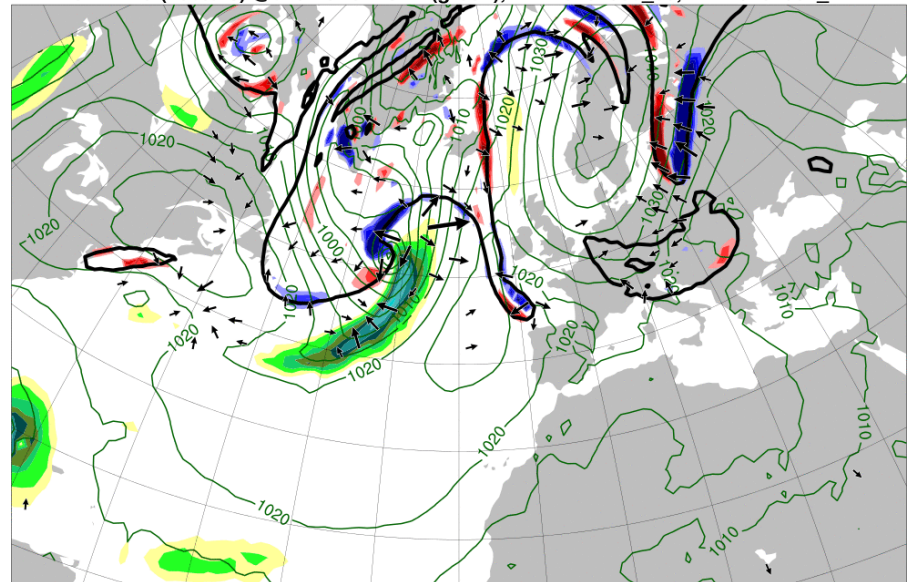
PV@320K at 20161004_12



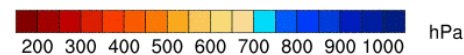
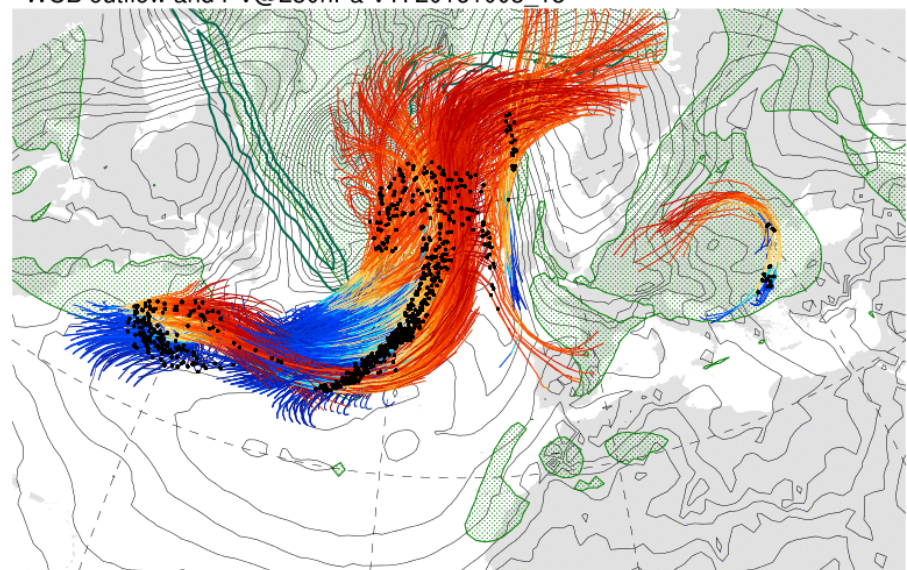
pvu

>> Flight plan presented by Maxi

2 PVU (black), PV adv by div wind (shading),
div wind (vectors) @320K and MSLP (green), BT: 20161003_00, VT: 20161004_12

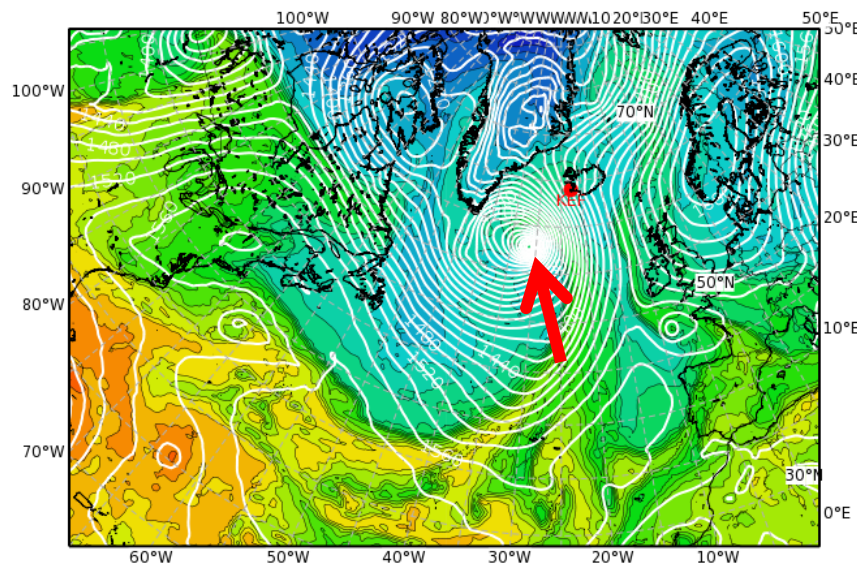


Trajectory start and SLP VT: 20161003_18
WCB outflow and PV@250hPa VT: 20161005_18

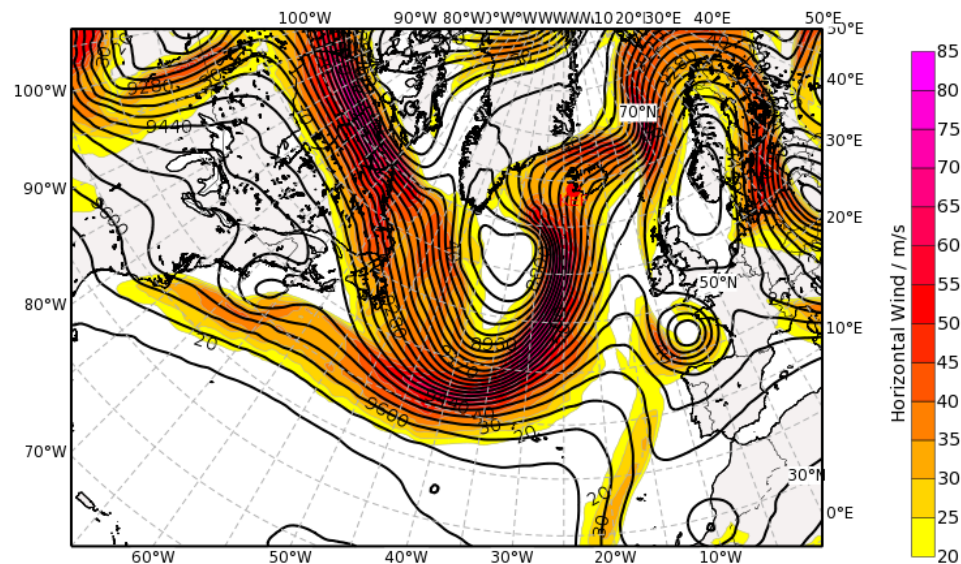


hPa

Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Wed, 05 Oct 2016, 00 UTC (step 048 h from Mon, 03 Oct 2016, 00 UTC)

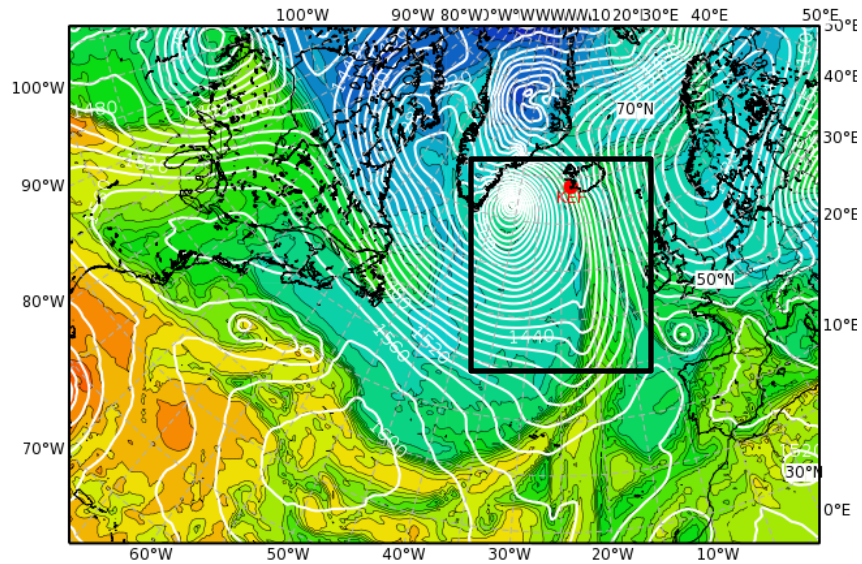


Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Wed, 05 Oct 2016, 00 UTC (step 048 h from Mon, 03 Oct 2016, 00 UTC)

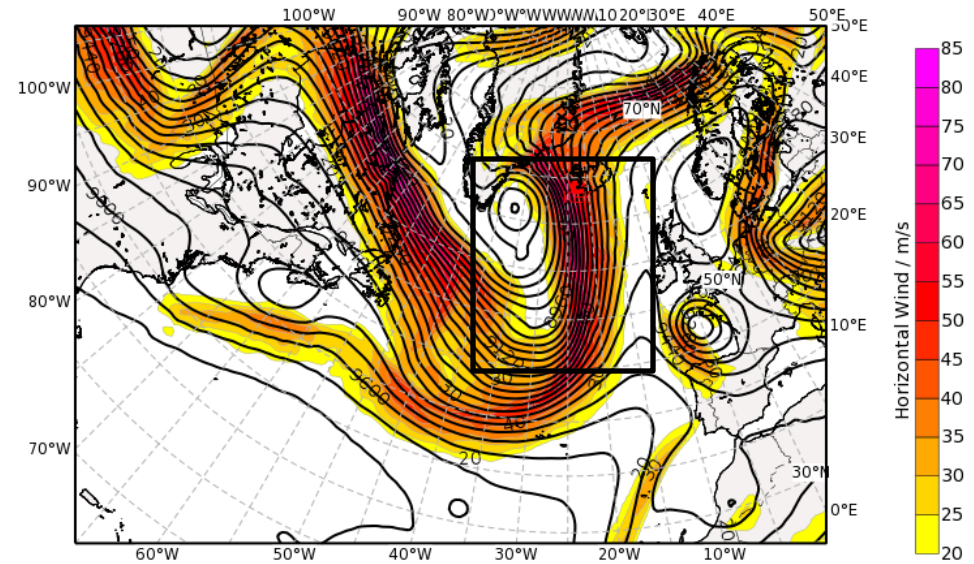


New frontal wave

Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Wed, 05 Oct 2016, 12 UTC (step 060 h from Mon, 03 Oct 2016, 00 UTC)

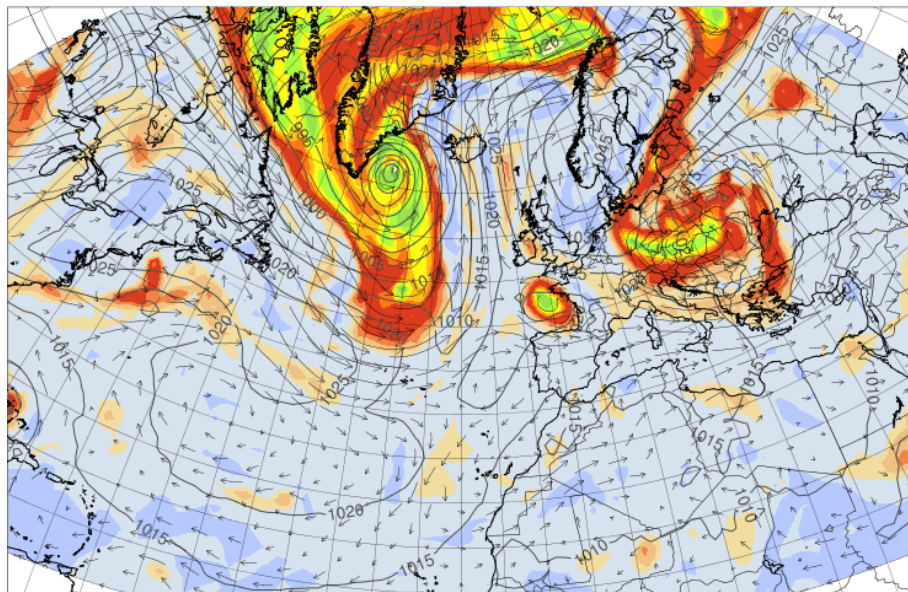


Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Wed, 05 Oct 2016, 12 UTC (step 060 h from Mon, 03 Oct 2016, 00 UTC)

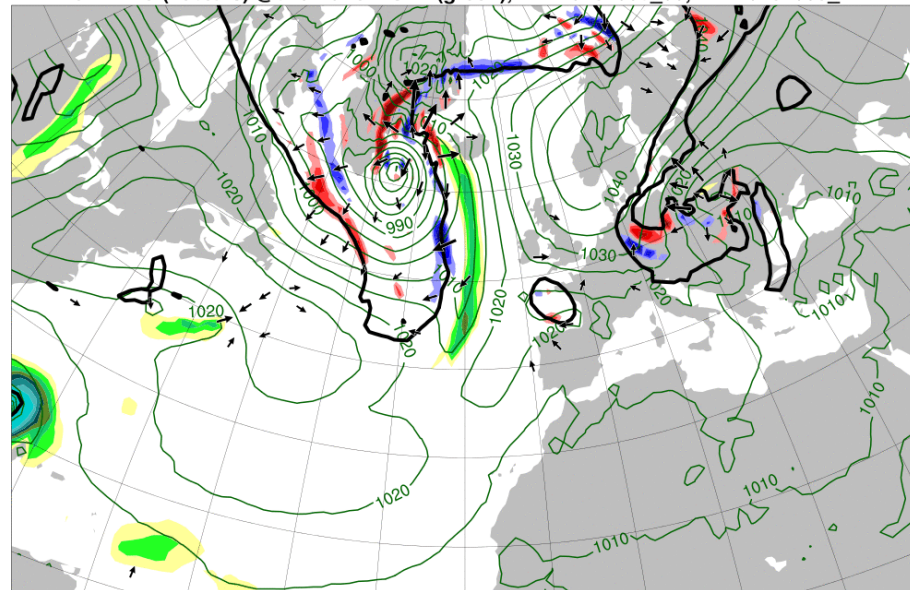


Forecast for Wed 05 Oct 2016 12 UTC

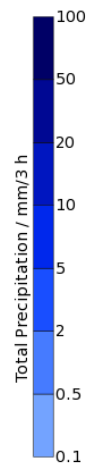
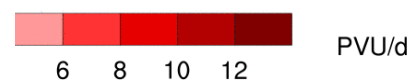
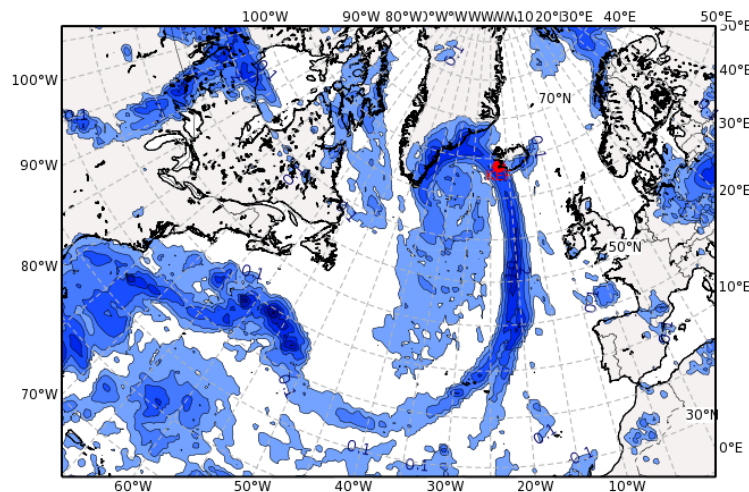
PV@320K at 20161005_12



2 PVU (black), PV adv by div wind (shading),
div wind (vectors) @320K and MSLP (green), BT: 20161003_00, VT: 20161005_12



Total Precipitation, accumulated over 3 hours prior to valid time (mm)
Valid: Wed, 05 Oct 2016, 12 UTC (step 060 h from Mon, 03 Oct 2016, 00 UTC)

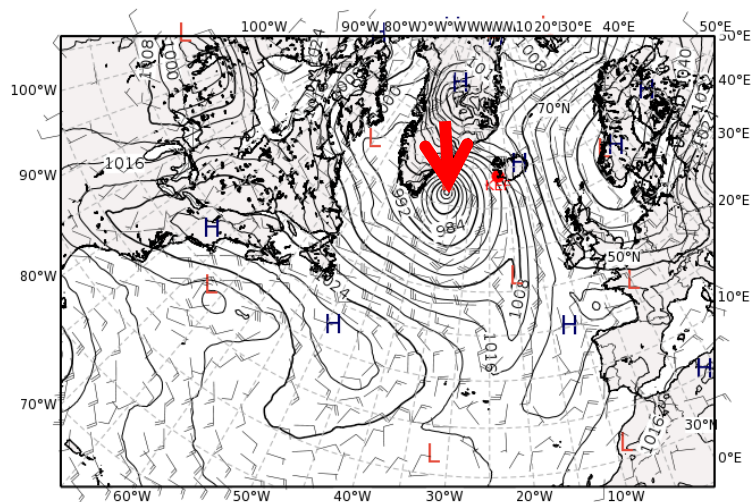


Surface Pressure field Wednesday

INI: 03/00TC

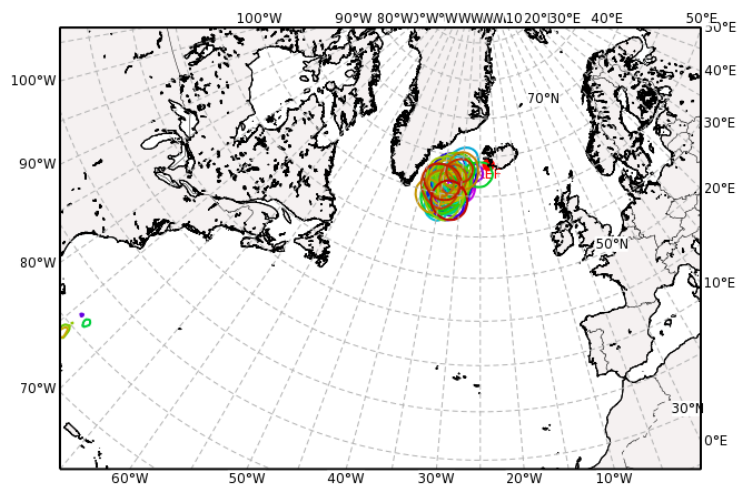
Mean Sea Level Pressure (hPa)

Valid: Wed, 05 Oct 2016, 12 UTC (step 060 h from Mon, 03 Oct 2016, 00 UTC)



ECMWF ENS MSLP (980hPa-isoline)

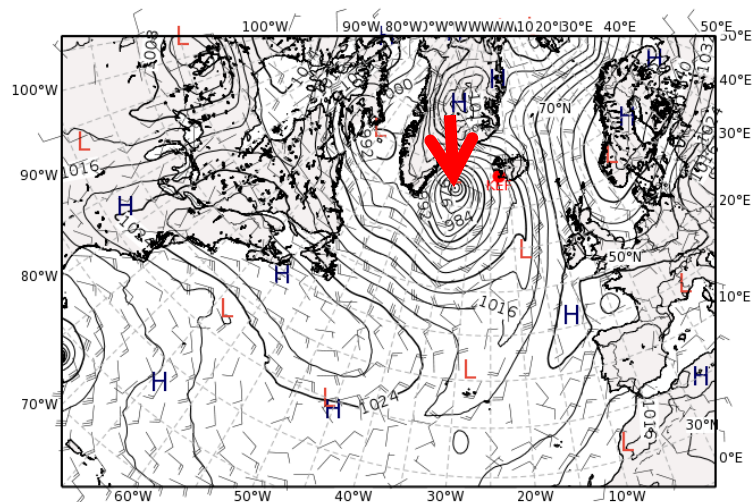
Valid: Wed, 05 Oct 2016, 12 UTC (step 084 h from Sun, 02 Oct 2016, 00 UTC)



INI: 02/00TC

Mean Sea Level Pressure (hPa)

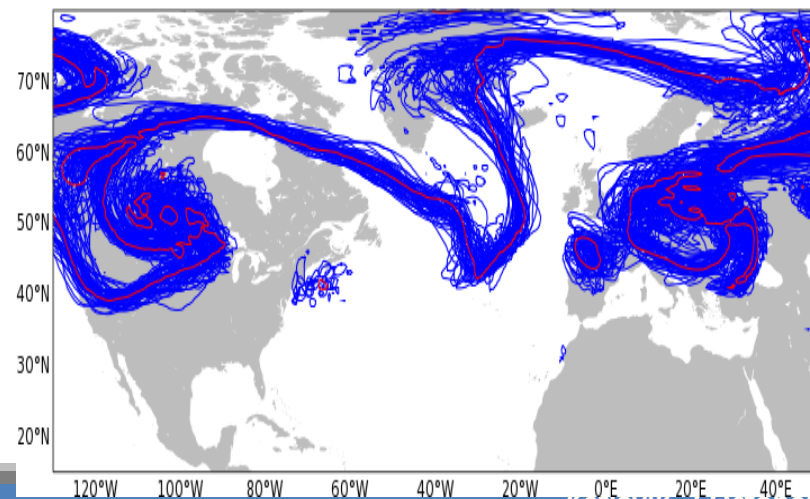
Valid: Wed, 05 Oct 2016, 12 UTC (step 084 h from Sun, 02 Oct 2016, 00 UTC)



ECMWF ENSEMBLE FC

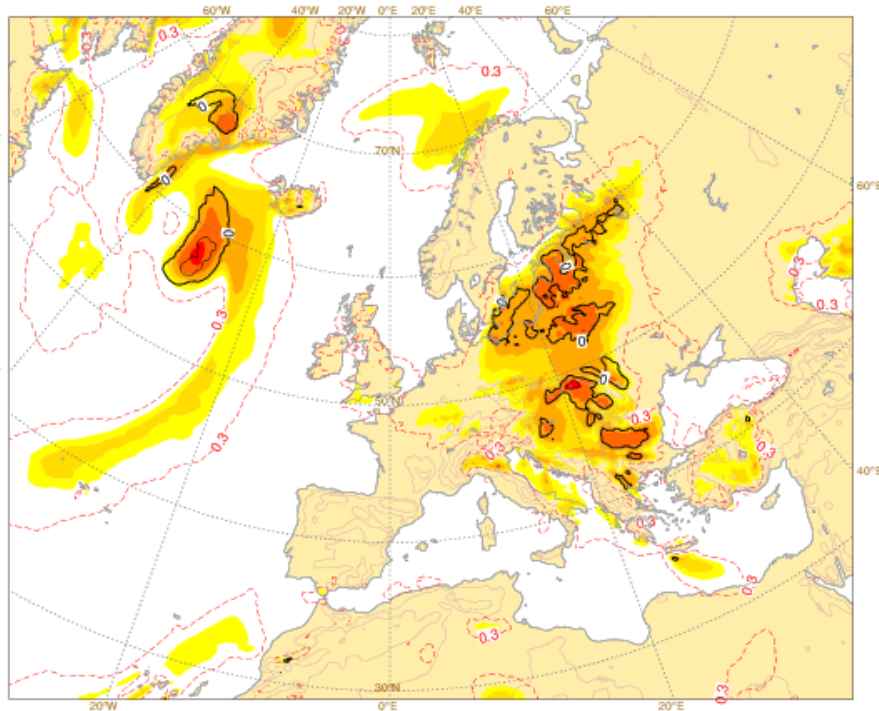
BT: 20161002 12UTC, VT: 20161005 18UTC

blue: perturbed, red: control

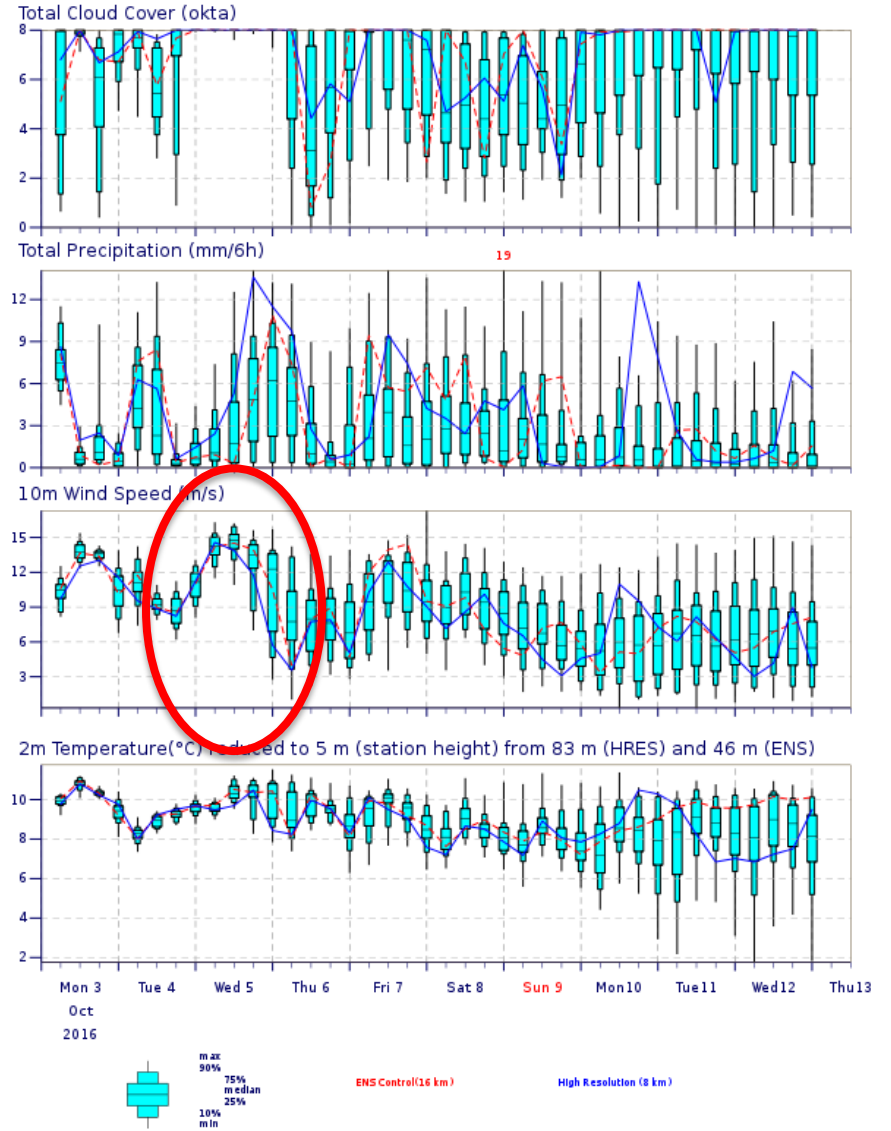


EFI gusts for Wednesday (BT 03/00Z)

Mon 03 Oct 2016 00UTC ©ECMWF t+48-72h VT: Wed 05 Oct 2016 00UTC - Thu 06 Oct 2016 00UTC
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for 10m wind gusts

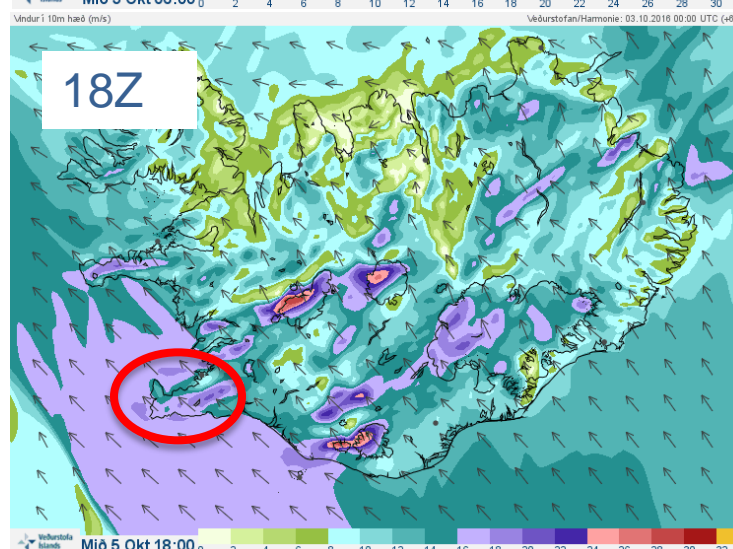
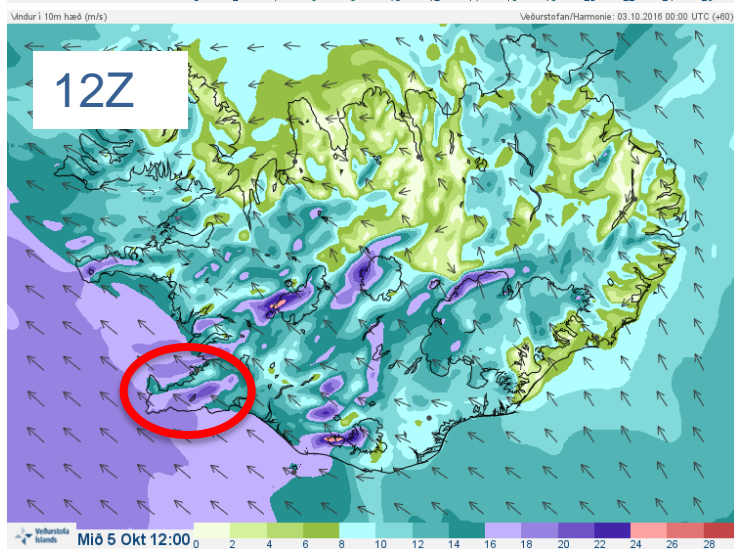
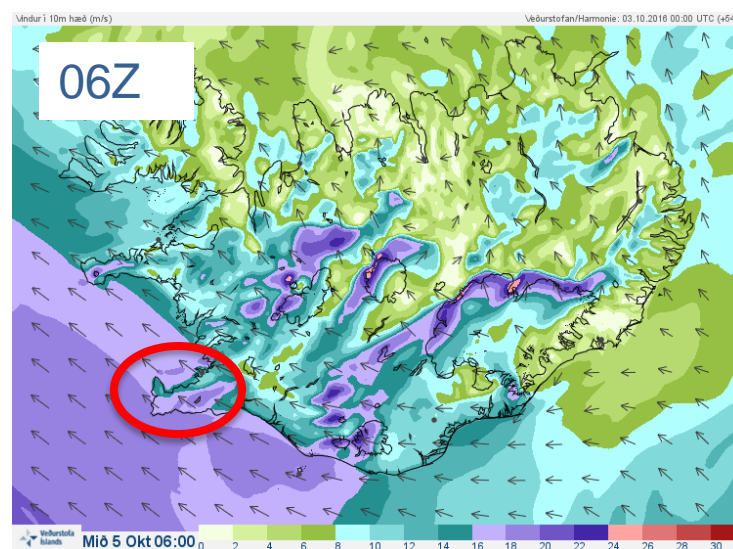
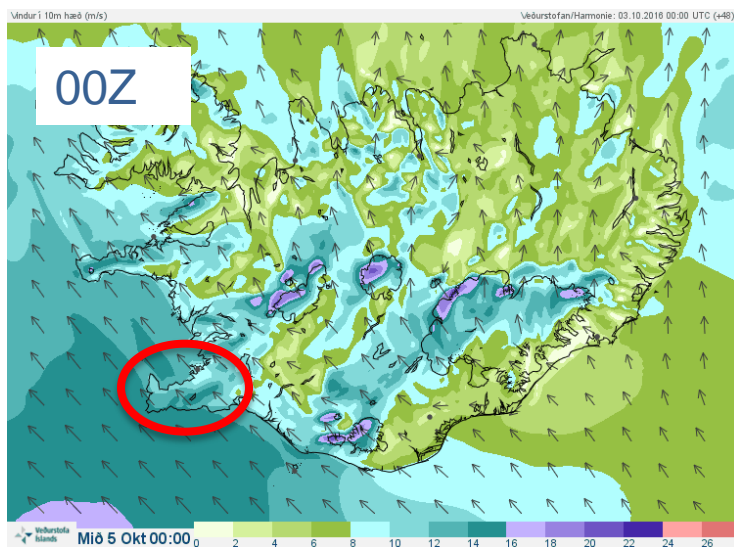


ENS Meteogram
Keflavík, Iceland 63.89°N 22.26°W (ENS land point) 5 m
High Resolution Forecast and ENS Distribution Monday 3 October 2016 00 UTC

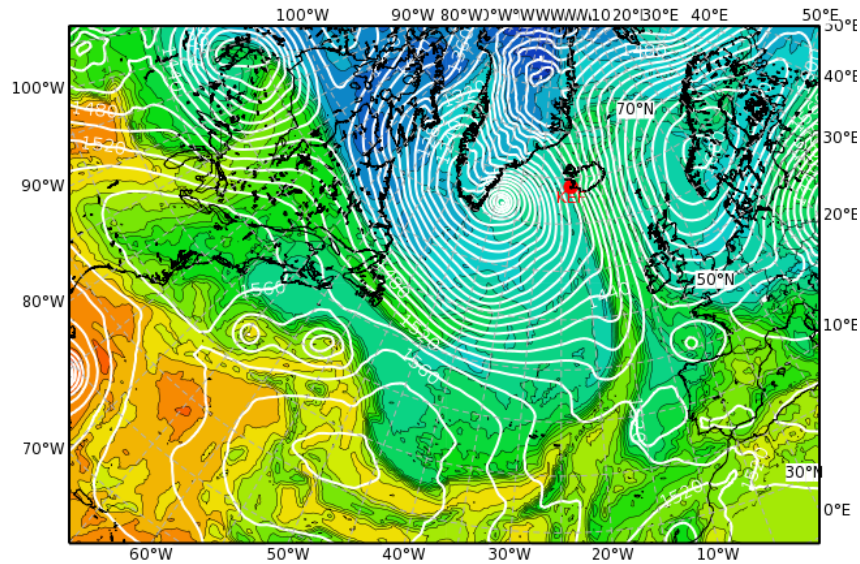


10m wind HARMONIE (2.5km) WED 05 10

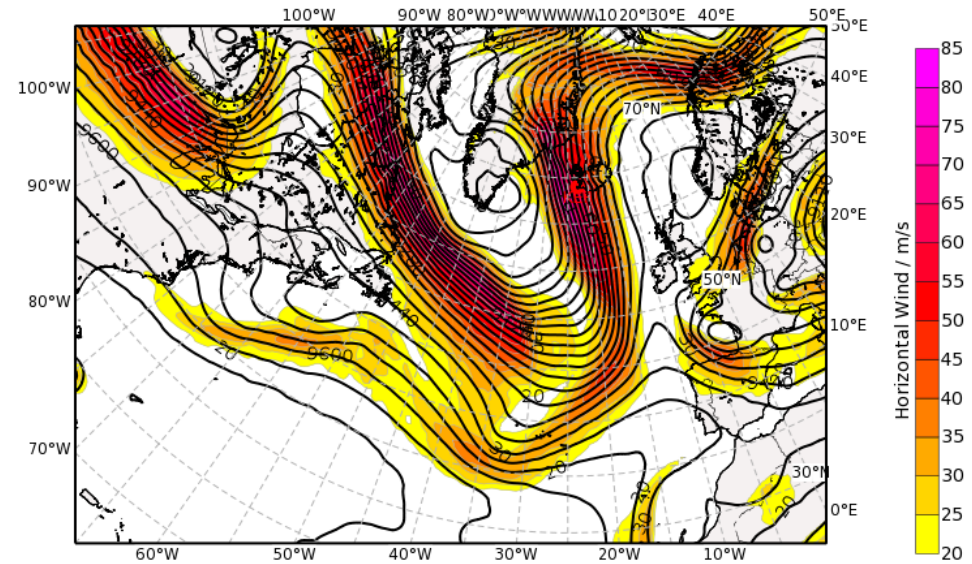
BT03/00Z



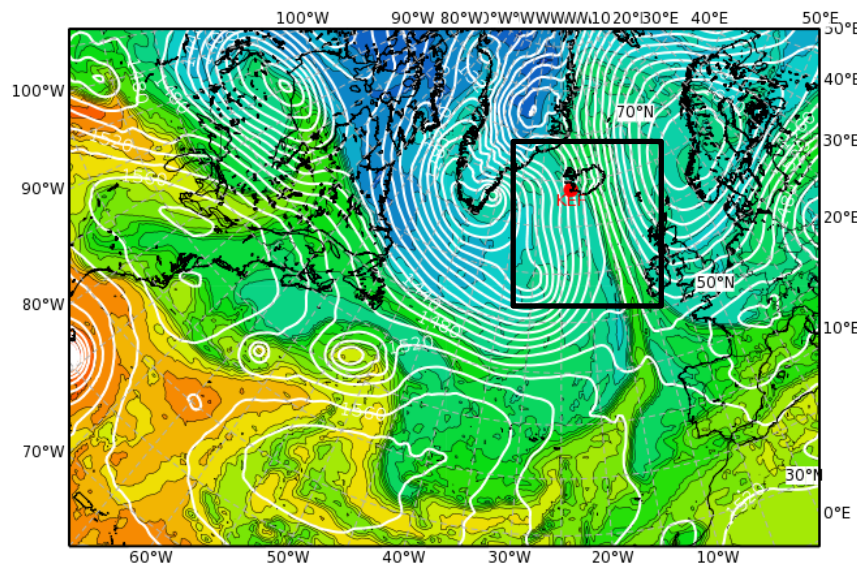
Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Thu, 06 Oct 2016, 00 UTC (step 072 h from Mon, 03 Oct 2016, 00 UTC)



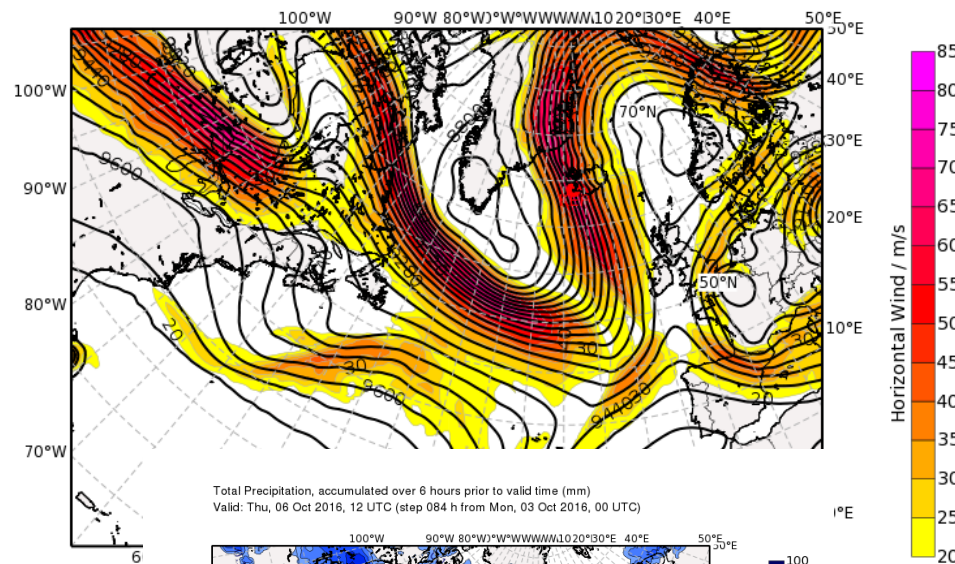
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Thu, 06 Oct 2016, 00 UTC (step 072 h from Mon, 03 Oct 2016, 00 UTC)



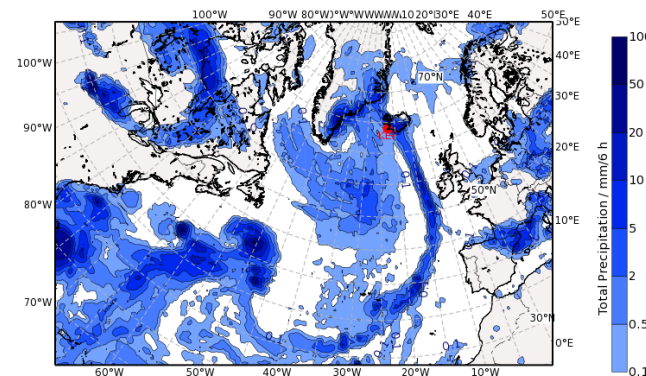
Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Thu, 06 Oct 2016, 12 UTC (step 084 h from Mon, 03 Oct 2016, 00 UTC)



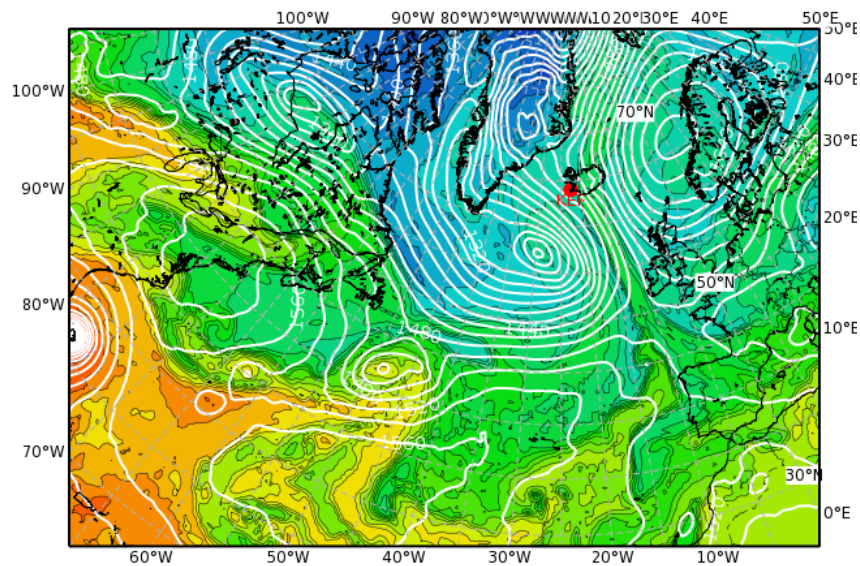
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Thu, 06 Oct 2016, 12 UTC (step 084 h from Mon, 03 Oct 2016, 00 UTC)



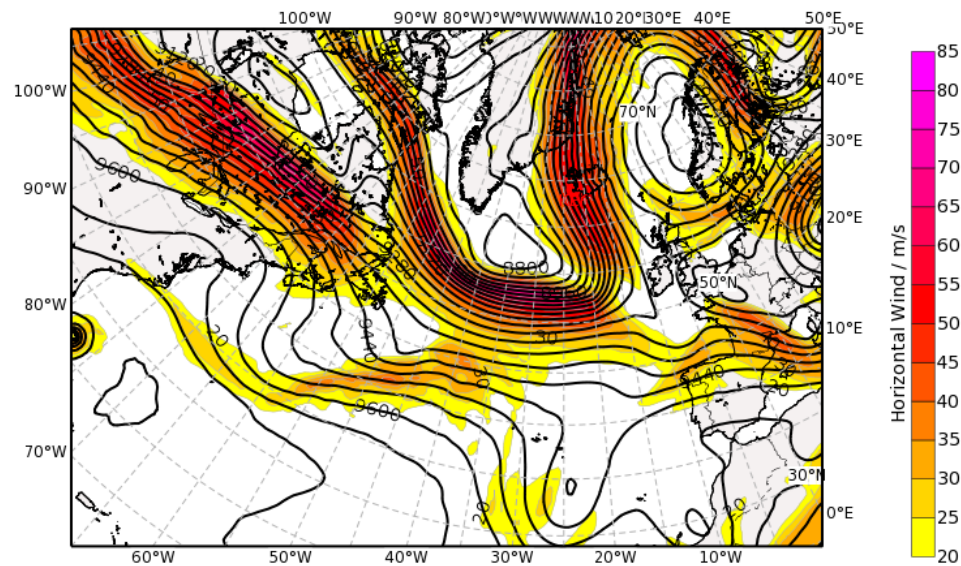
Total Precipitation, accumulated over 6 hours prior to valid time (mm)
Valid: Thu, 06 Oct 2016, 12 UTC (step 084 h from Mon, 03 Oct 2016, 00 UTC)



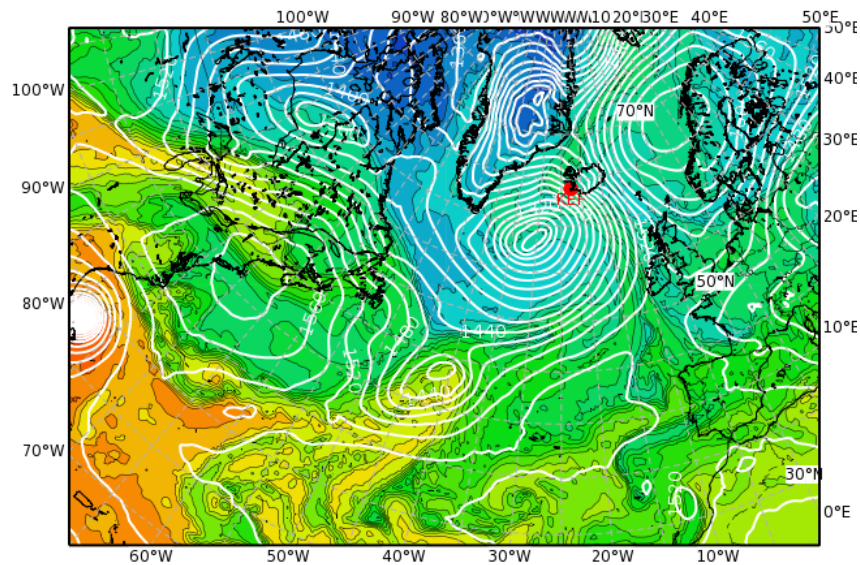
Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Fri, 07 Oct 2016, 00 UTC (step 096 h from Mon, 03 Oct 2016, 00 UTC)



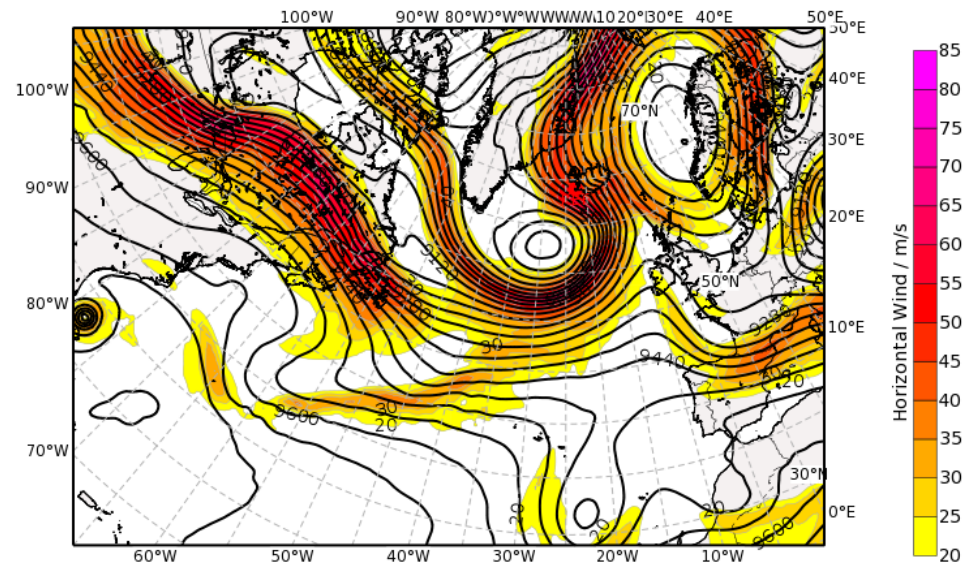
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Fri, 07 Oct 2016, 00 UTC (step 096 h from Mon, 03 Oct 2016, 00 UTC)



Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Fri, 07 Oct 2016, 12 UTC (step 108 h from Mon, 03 Oct 2016, 00 UTC)



Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Fri, 07 Oct 2016, 12 UTC (step 108 h from Mon, 03 Oct 2016, 00 UTC)



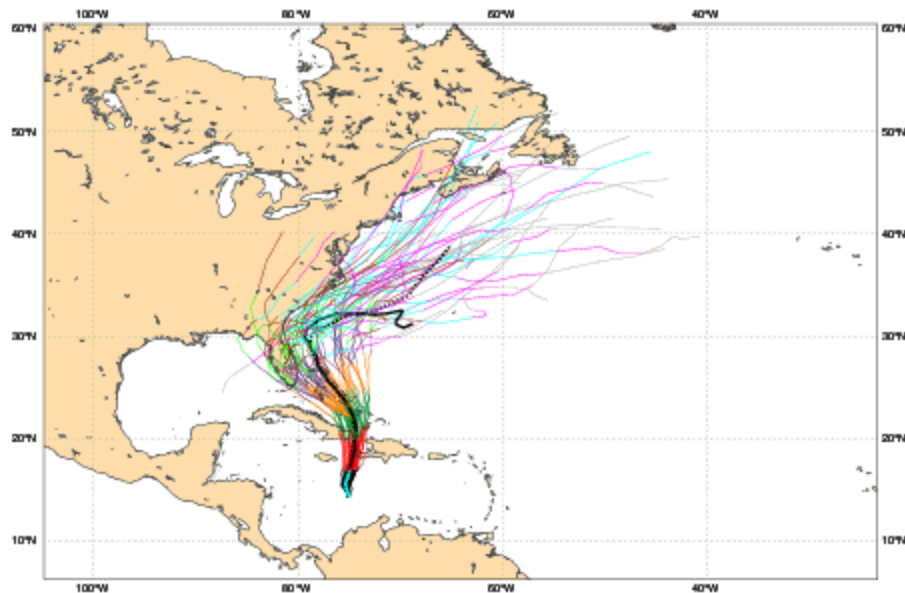
Potential extratropical transition of Hurricane Matthew

Date 20161003 00 UTC @ECMWF

Individual trajectories for **MATTHEW** during the next 240 hours

tracks: **thick solid**=HRES; **thick dot**=CTRL; **thin solid**=EPS members [coloured]

0-24h 24-48h 48-72h 72-96h 96-120h 120-144h 144-168h 168-192h 192-216h 216-240h

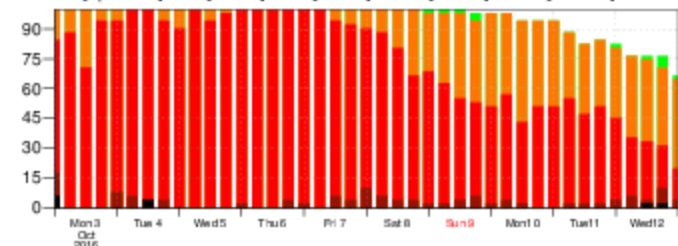


List of ensemble members numbers forecast Tropical Cyclone

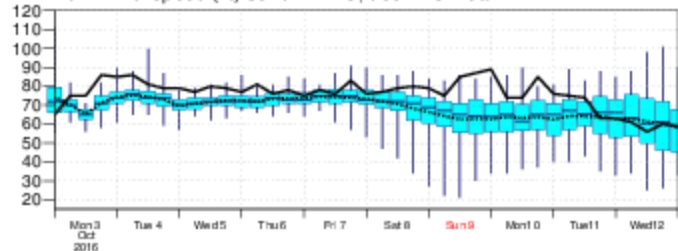
Intensity category in colours: **TD**[up to 33] **TS**[34-63] **HR1**[64-82] **HR2**[83-95] **HR3**[> 95 kt]

+024 h: hr:01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
 +048 h: hr:01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
 +072 h: hr:01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
 +096 h: hr:01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
 +120 h: hr:01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
 +144 h: hr:01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
 +168 h: hr:01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
 +192 h: hr:01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
 +216 h: hr:01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
 +240 h: hr:01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

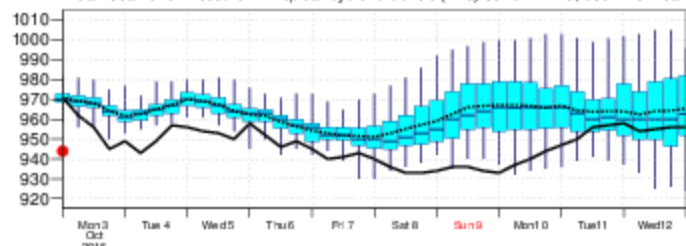
Probability (%) of Tropical Cyclone Intensity falling in each category
TD[up to 33] **TS**[34-63] **HR1**[64-82] **HR2**[83-95] **HR3**[> 95 kt]



10m Wind Speed (kt) **solid**=HRES; **dot**=Ens Mean



Mean Sea Level Pressure in Tropical Cyclone Centre (hPa) **solid**=HRES; **dot**=Ens Mean

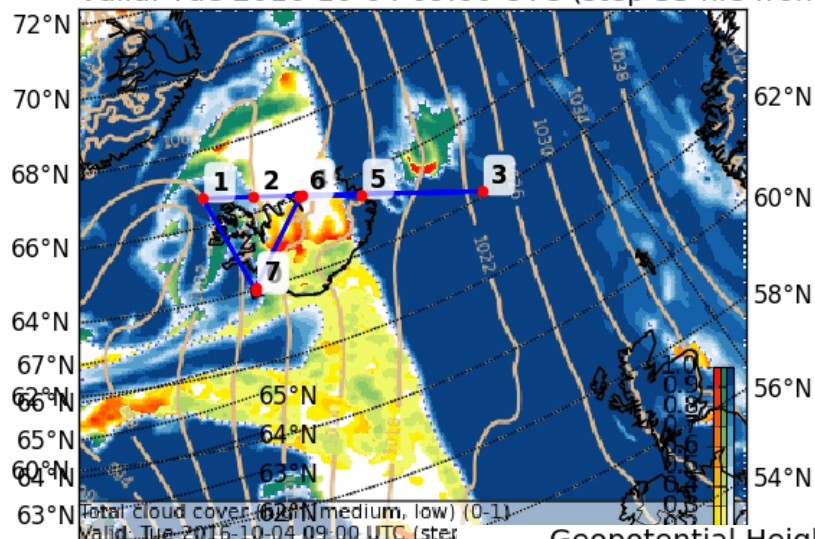


Tuesday Flight Falcon

Overview of flight planning DLR-Falcon Tuesday 4 October 2016 - 9 UTC

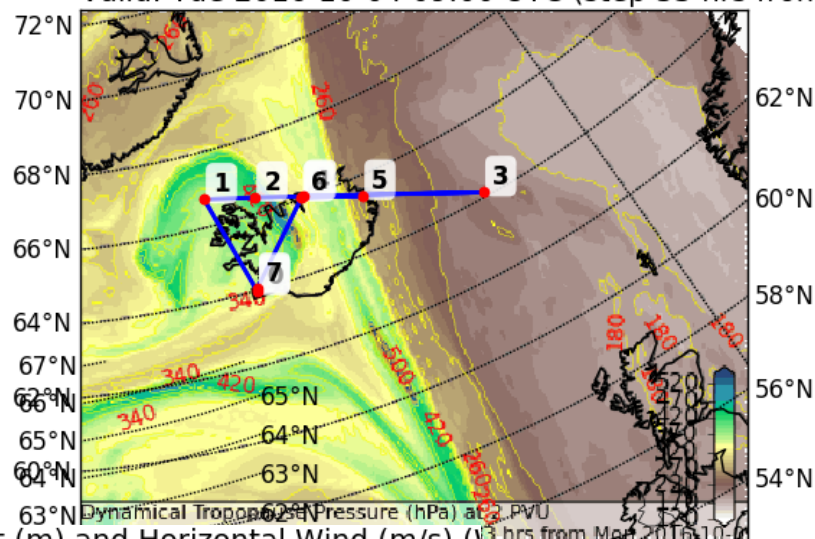
Cloud Cover (0-1) (Total Cloud Cover)

Valid: Tue 2016-10-04 09:00 UTC (step 33 hrs from Mon 2016-10-03 00:00 UTC)



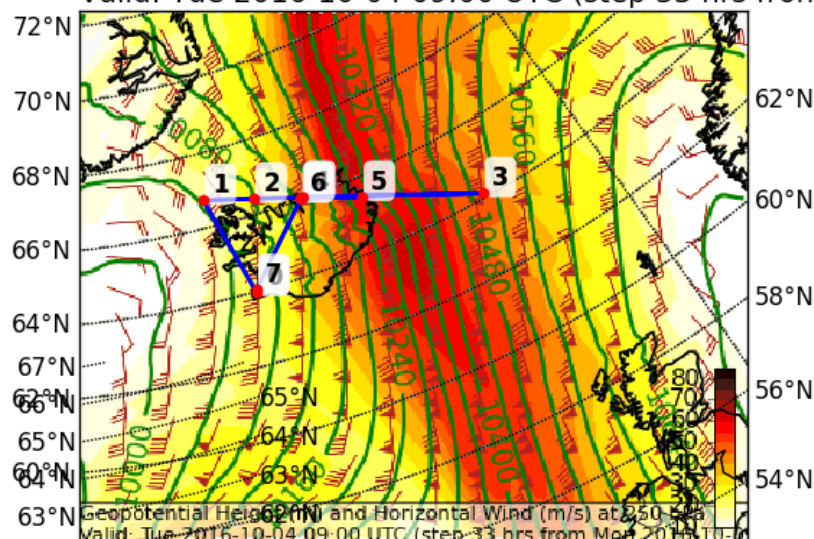
Dynamical Tropopause (Pressure (hPa)) at 2000 (10' PVU)

Valid: Tue 2016-10-04 09:00 UTC (step 33 hrs from Mon 2016-10-03 00:00 UTC)



Geopotential Height (m) and Horizontal Wind (m/s) at 250 hPa

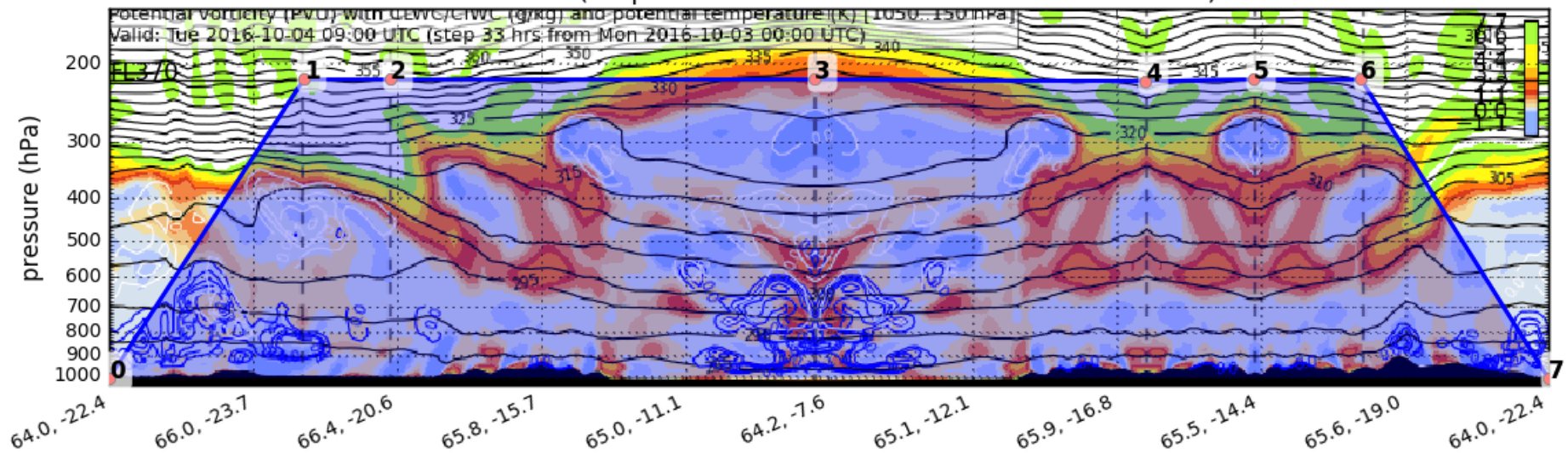
Valid: Tue 2016-10-04 09:00 UTC (step 33 hrs from Mon 2016-10-03 00:00 UTC)



Overview of flight planning DLR-Falcon Tuesday 4 October 2016 - 15 UTC

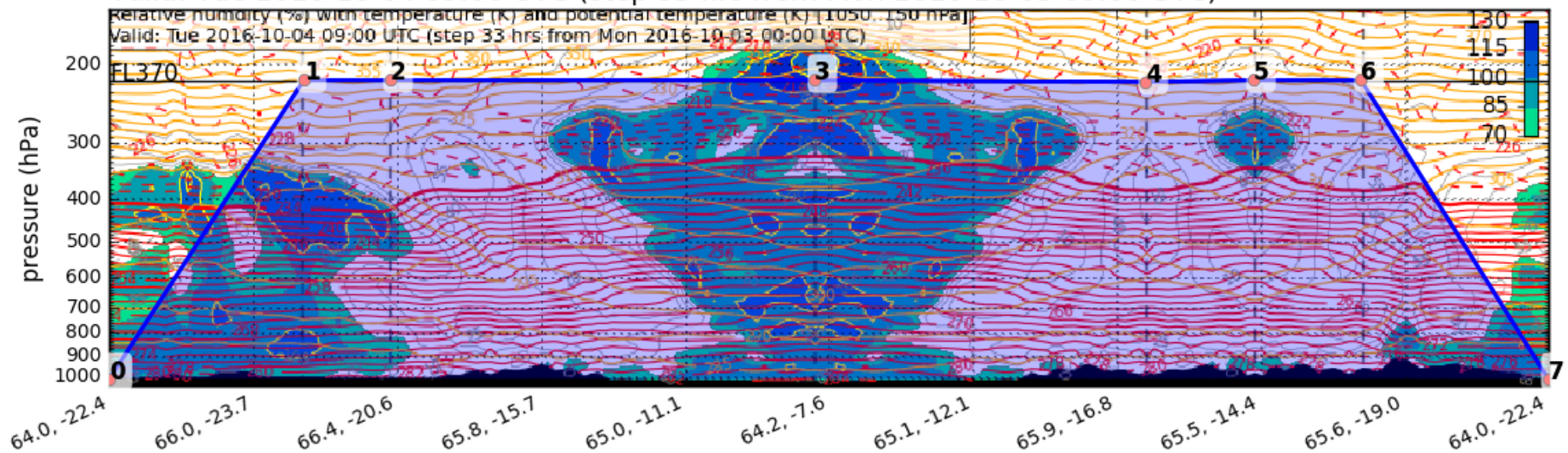
Potential vorticity (PVO) vertical section (Northern Hemisphere)

Valid: Tue 2016-10-04 09:00 UTC (step 33 hrs from Mon 2016-10-03 00:00 UTC)



Relative humidity (%) vertical section

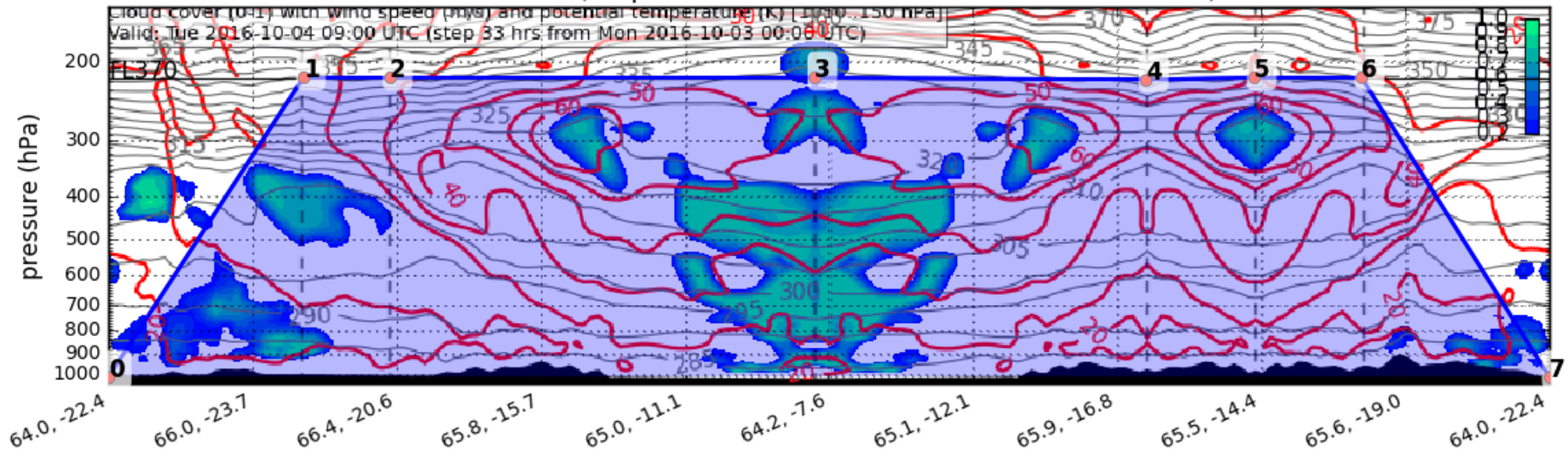
Valid: Tue 2016-10-04 09:00 UTC (step 33 hrs from Mon 2016-10-03 00:00 UTC)



Overview of flight planning DLR-Falcon Tuesday 4 October 2016 - 15 UTC

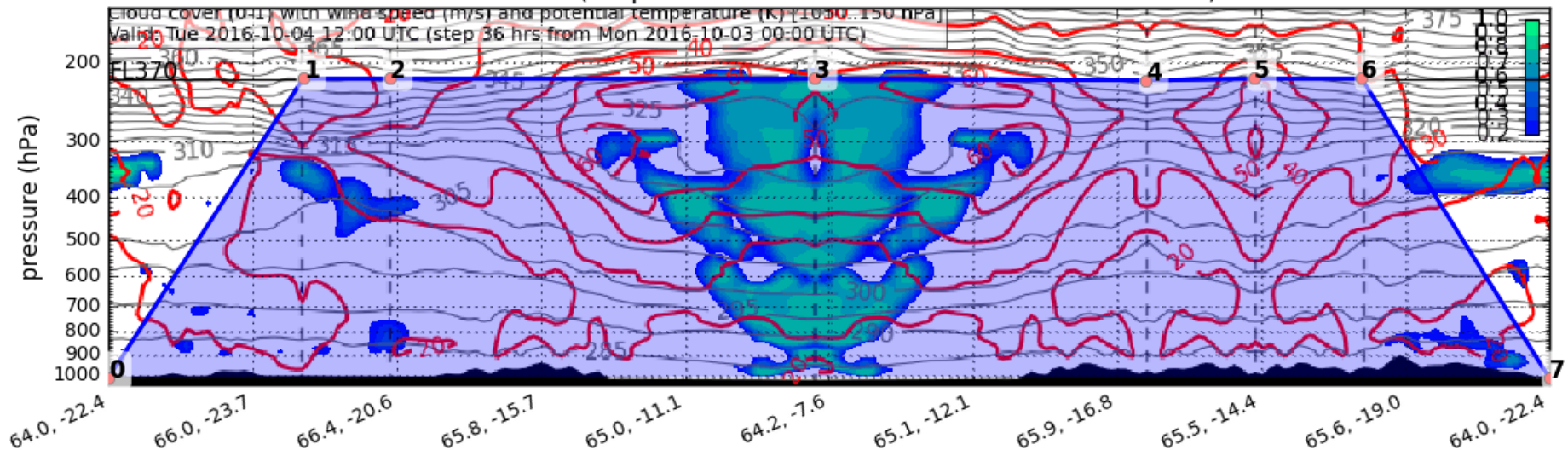
Cloud cover (0-1) and wind speed (m/s) vertical section

Valid: Tue 2016-10-04 09:00 UTC (step 33 hrs from Mon 2016-10-03 00:00 UTC)



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

Valid: Tue 2016-10-04 12:00 UTC (step 36 hrs from Mon 2016-10-03 00:00 UTC)



HALO flight Tue 04 Oct

System under investigation:

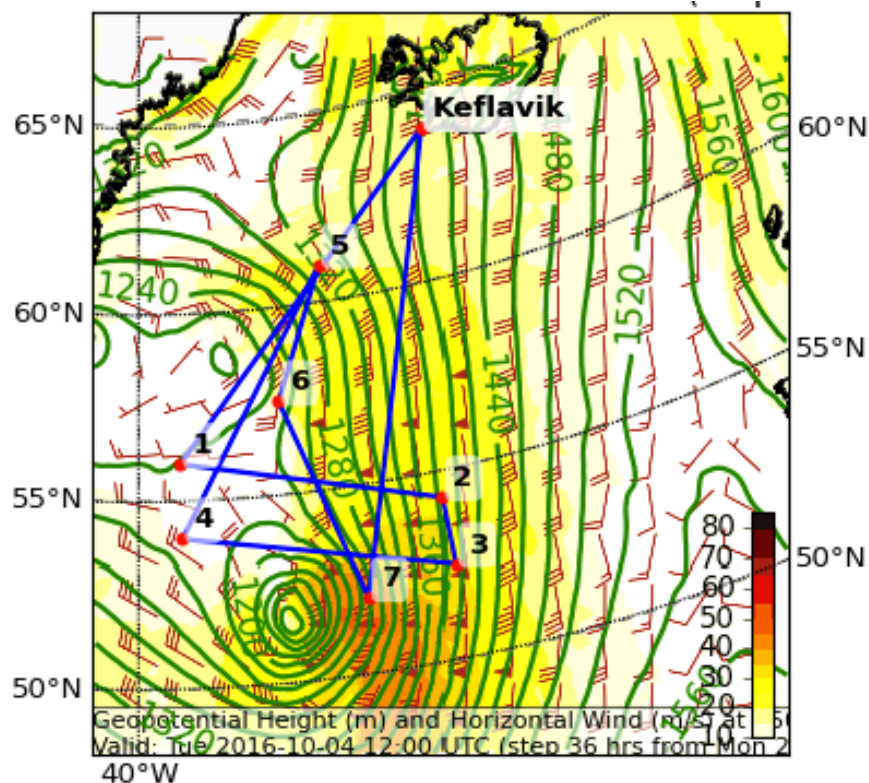
Rapidly intensifying diabatic Rossby wave

Main objectives:

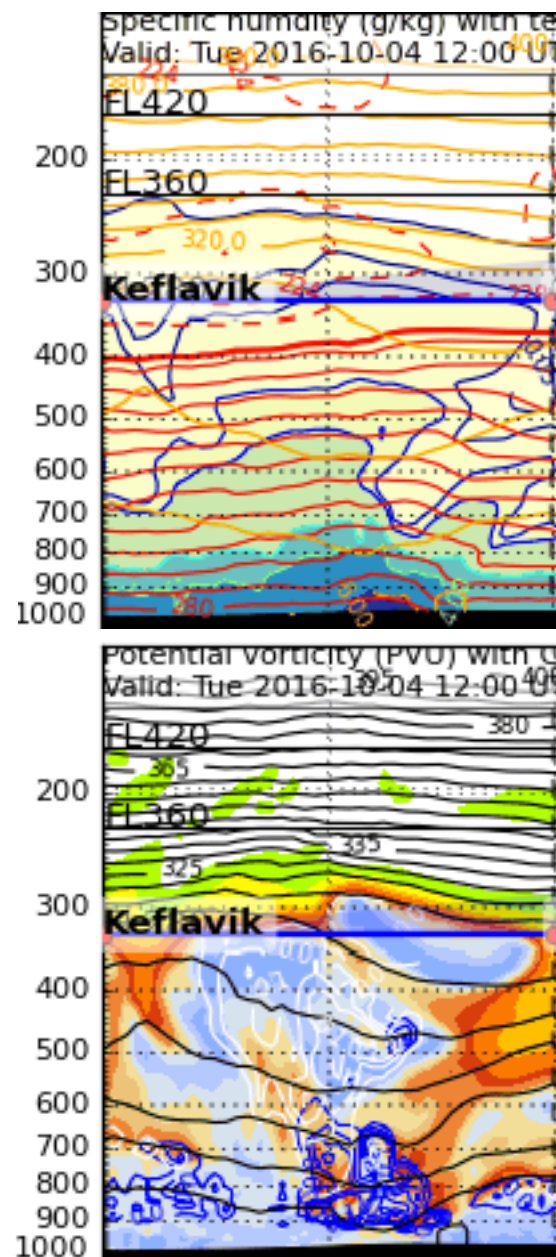
- pre-DRW environment (baroclinicity, moisture) → dropsondes
- Moisture transport and embedded clouds → radar, dropsondes
- Structure of intensifying DRW (stability, clouds) → dropsondes and remote sensing
- Structure of topopause, PV tower and clouds above cyclone → WALES

HALO flight Tue 04 Oct

12 UTC



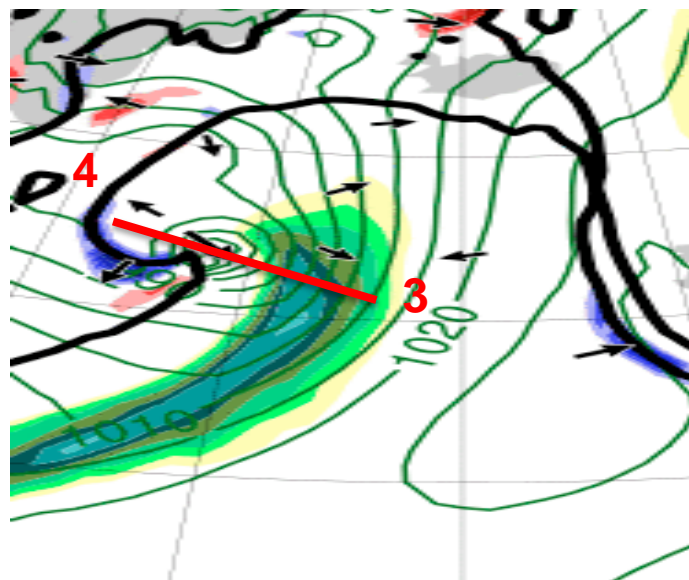
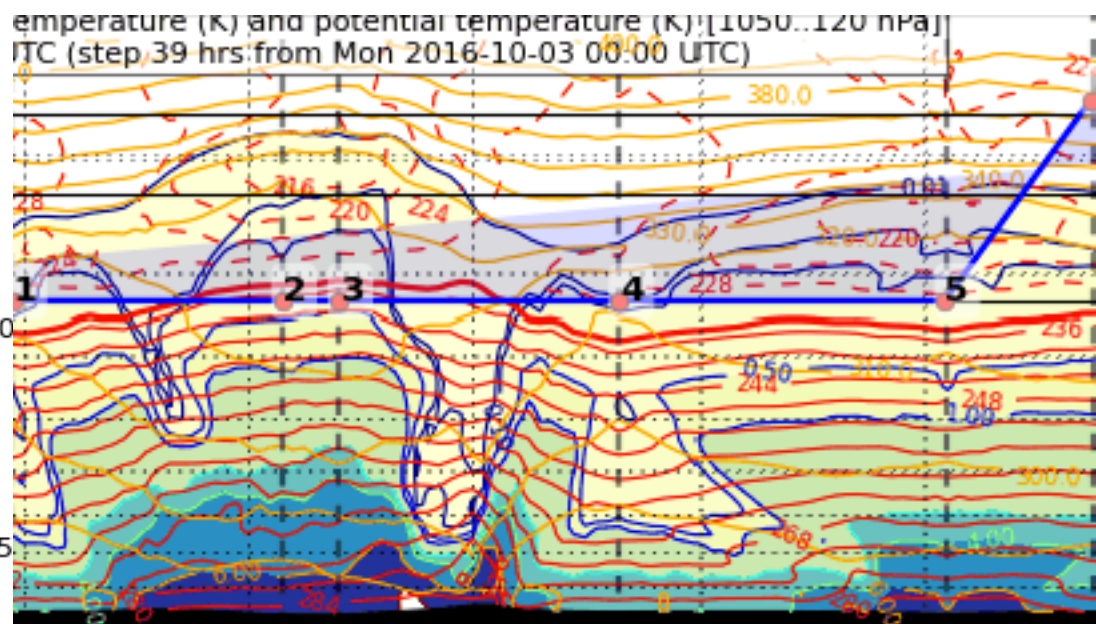
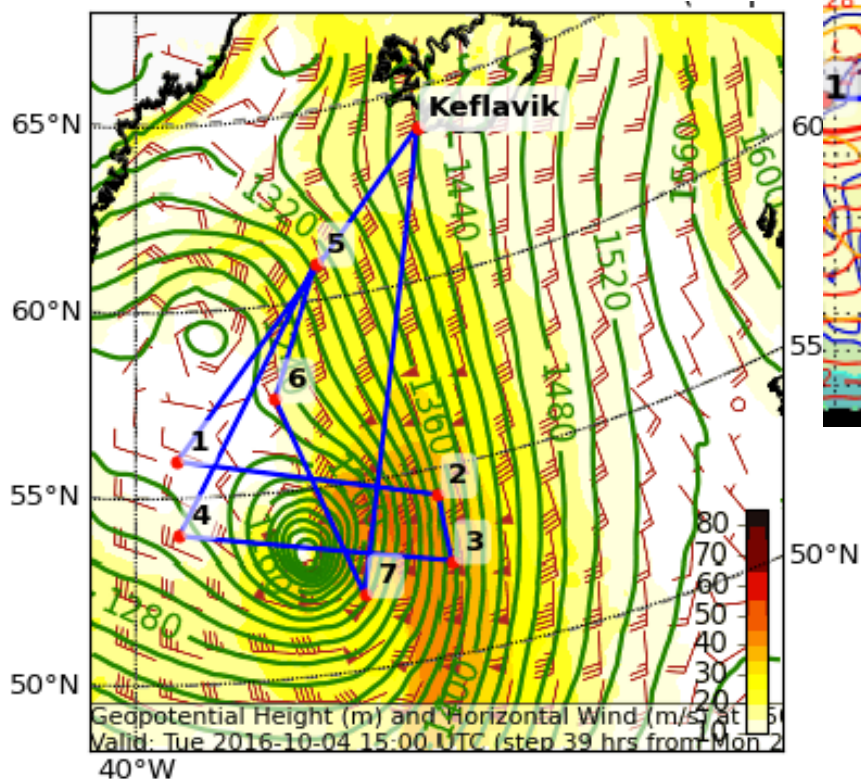
Z850



Q, TH

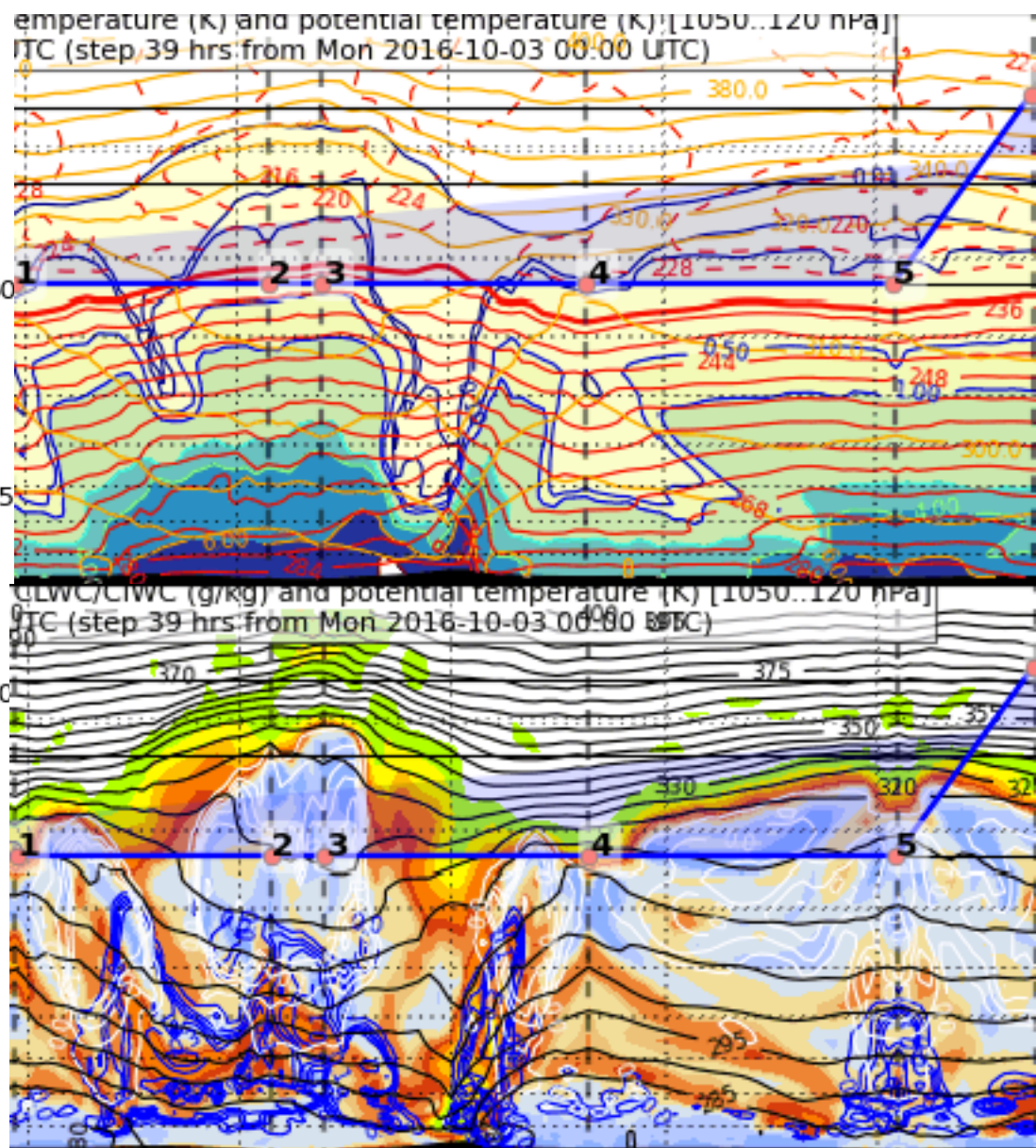
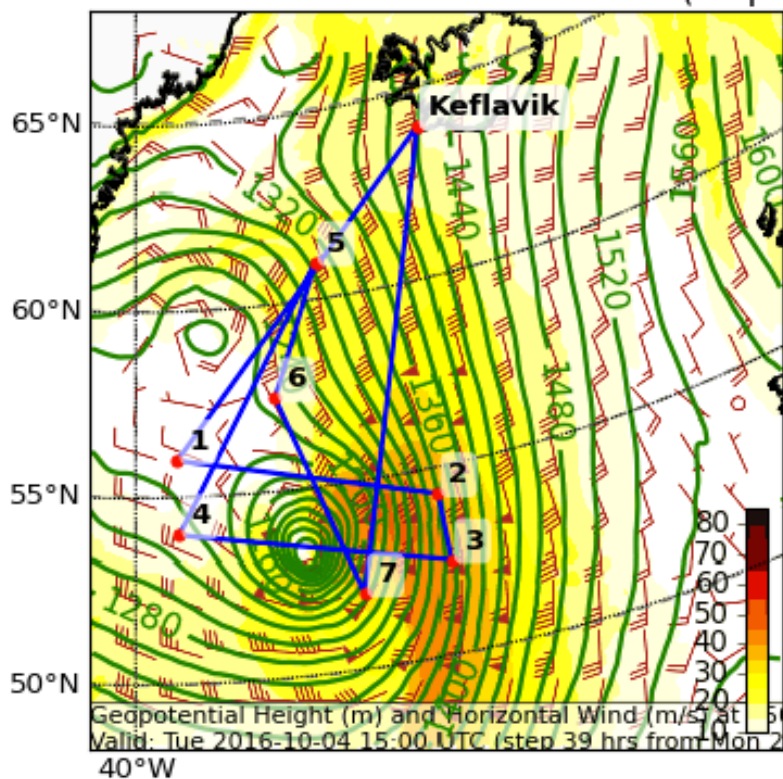
HALO flight Tue 04 Oct

15 UTC



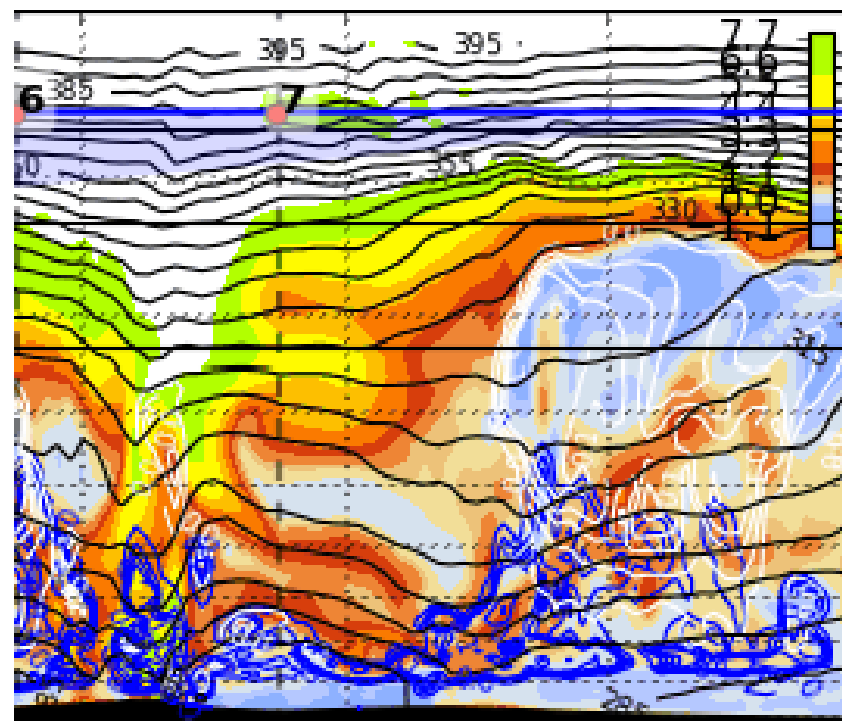
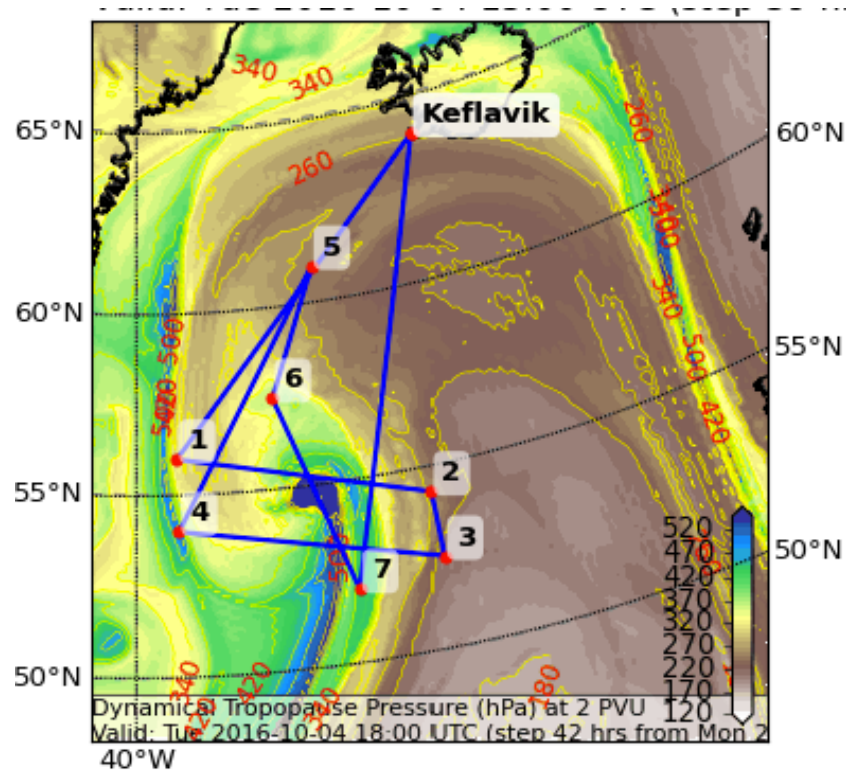
HALO flight Tue 04 Oct

15 UTC



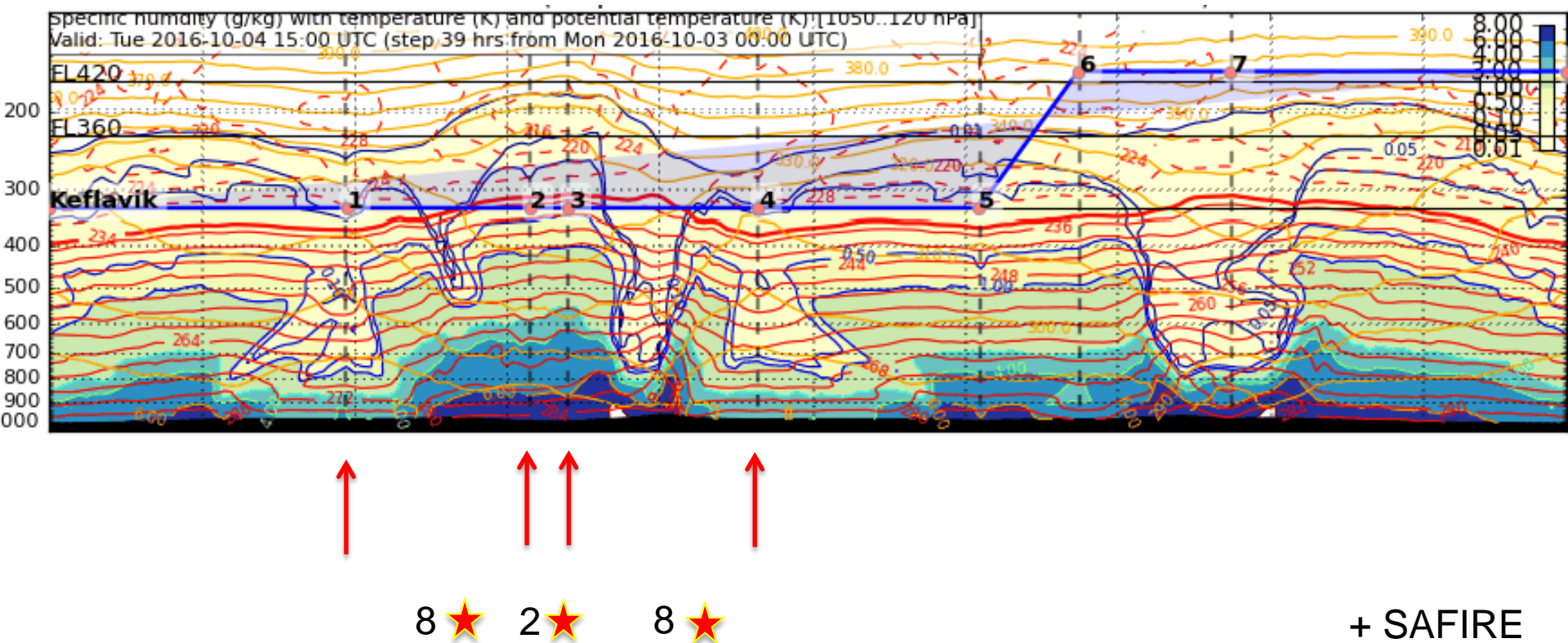
HALO flight Tue 04 Oct

18 UTC



HALO flight Tue 04 Oct

15 UTC

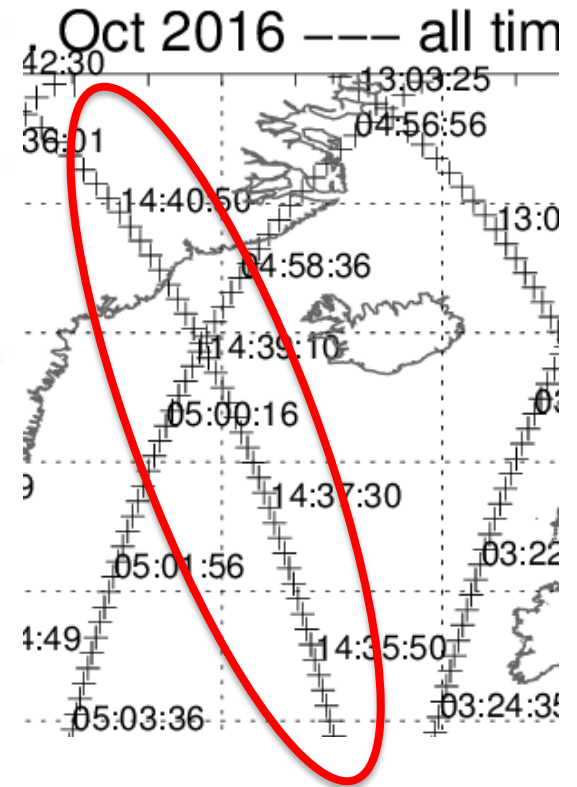
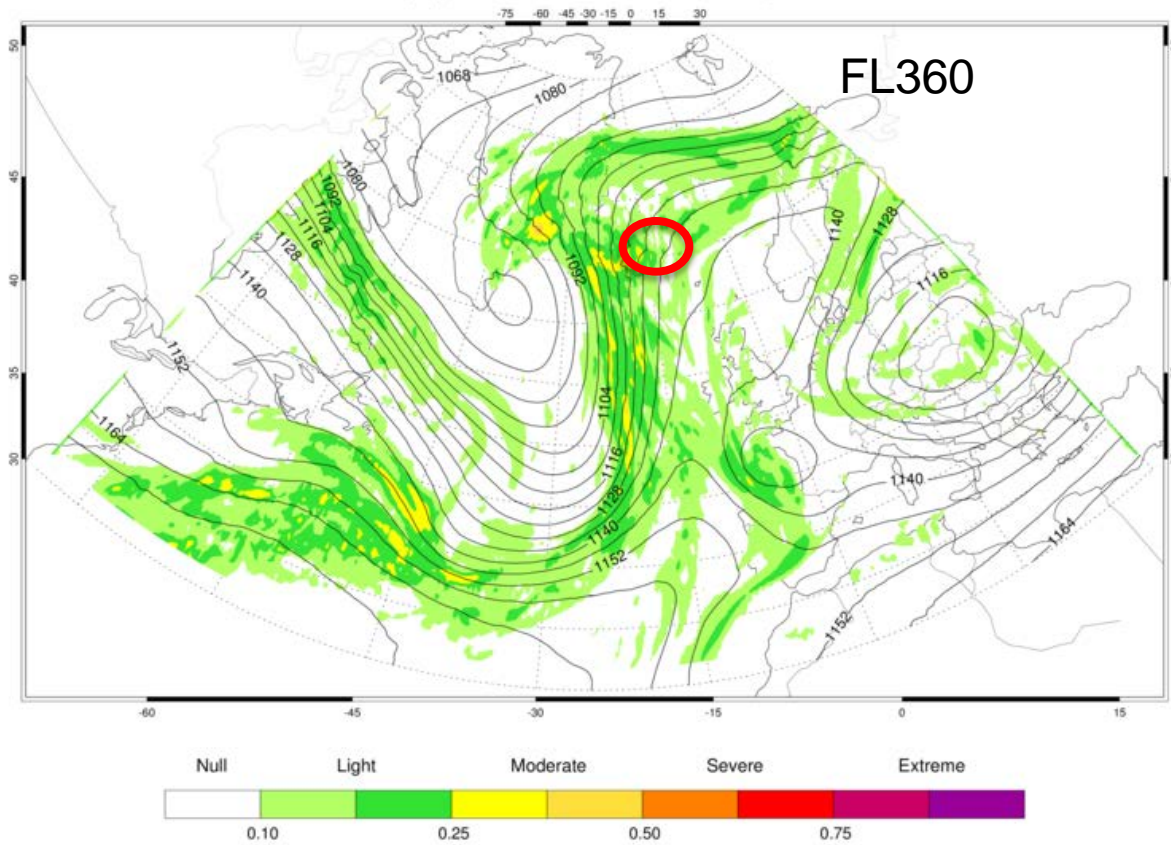


Objectives Wednesday HALO

- Moisture transport close to Iceland
- Tropopause fold close to Iceland
- WCB ascent
- Jet streak west of Iceland -> potential for turbulence measurements
- Satellite overpass at 14.40Z between Iceland and Greenland

PV advection by irrotational wind, moisture transport

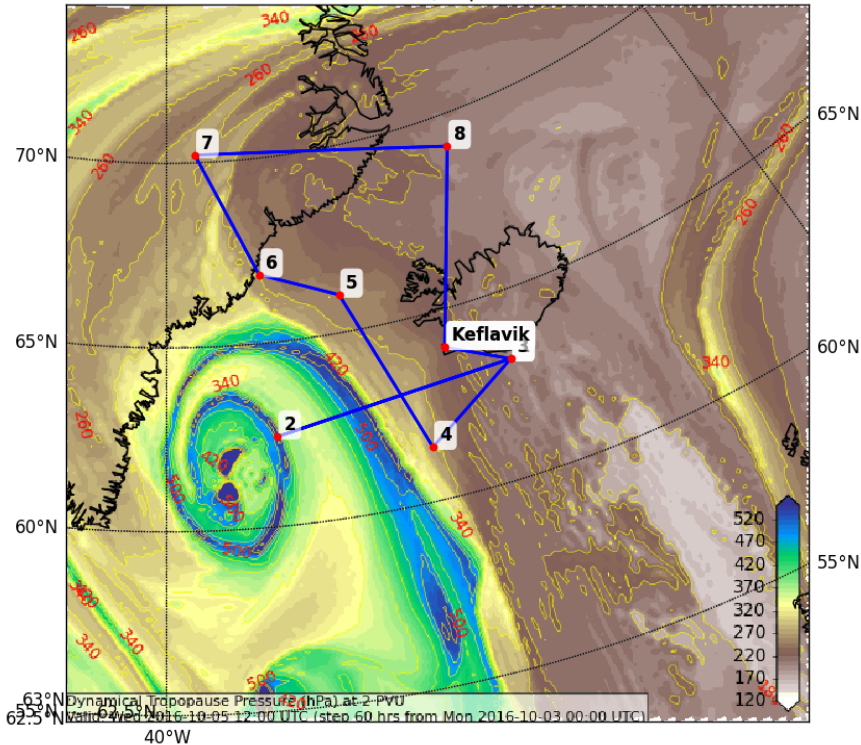
VT 15Z/05/10 BT 00Z/03/10



Wednesday HALO flight

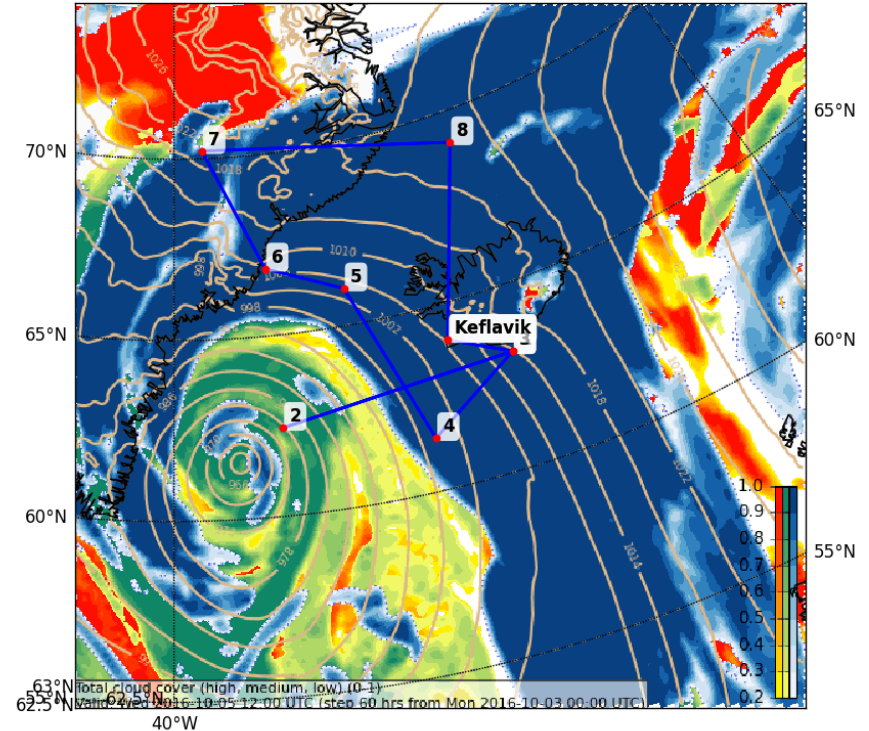
Dynamical Tropopause (Pressure (hPa)) at 2000 (10^{-3} PVU)

Valid: Wed 2016-10-05 12:00 UTC (step 60 hrs from Mon 2016-10-03 00:00 UTC)



Cloud Cover (0-1) (Total Cloud Cover)

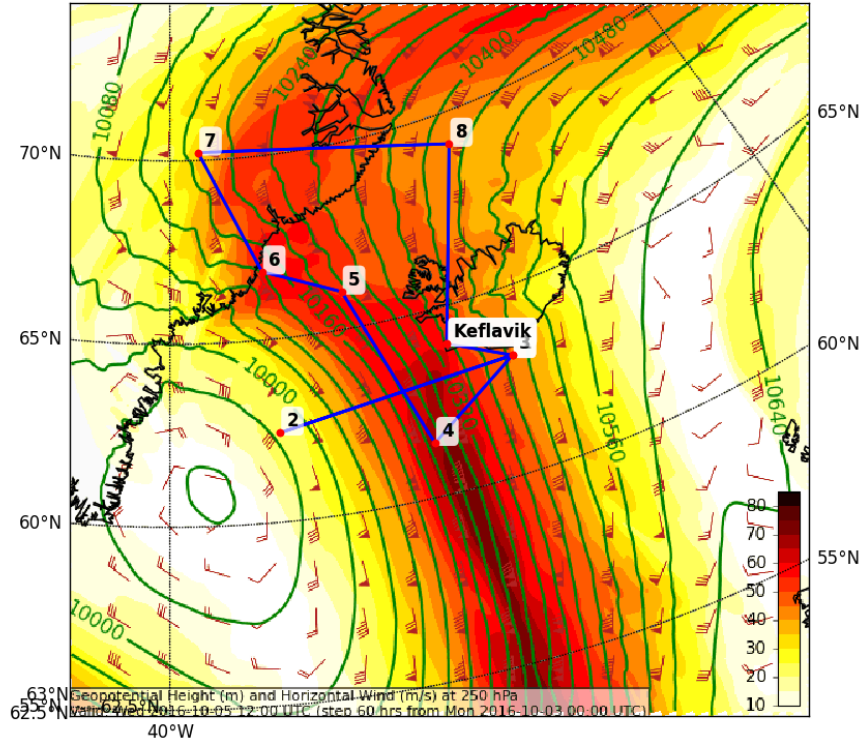
Valid: Wed 2016-10-05 12:00 UTC (step 60 hrs from Mon 2016-10-03 00:00 UTC)



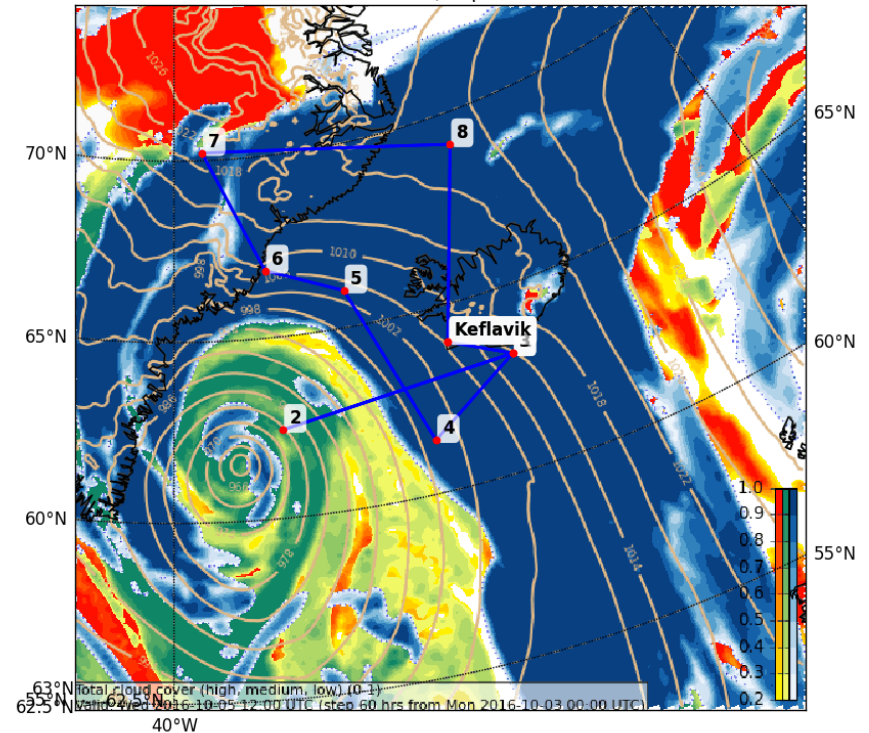
- Coordinated flight leg 2-3 with FALCON & SAFIRE?
- Dropsondes leg 1-2
- Along jet leg 4-5
- Sat overpass leg 6-7
- Divergent outflow leg 7-8

Wednesday HALO flight

Geopotential Height (m) and Horizontal Wind (m/s) (Wind Speed 10-85 m/s) at 250 hPa
Valid: Wed 2016-10-05 12:00 UTC (step 60 hrs from Mon 2016-10-03 00:00 UTC)

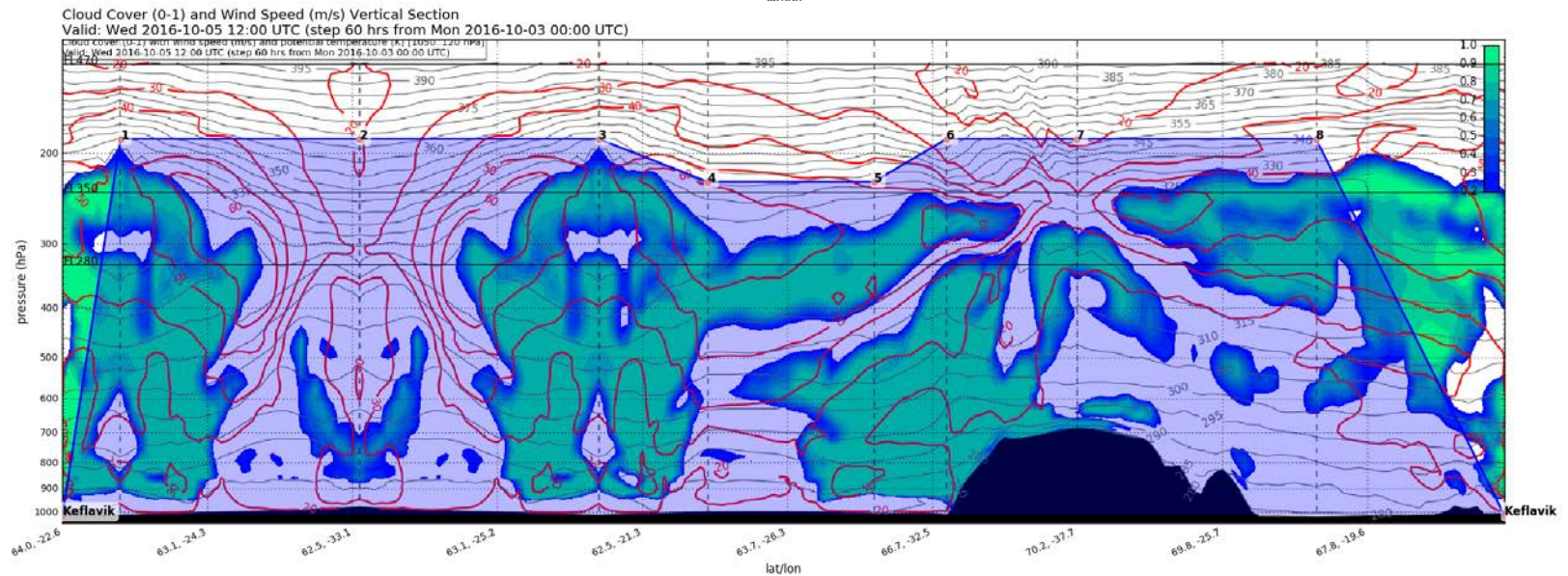
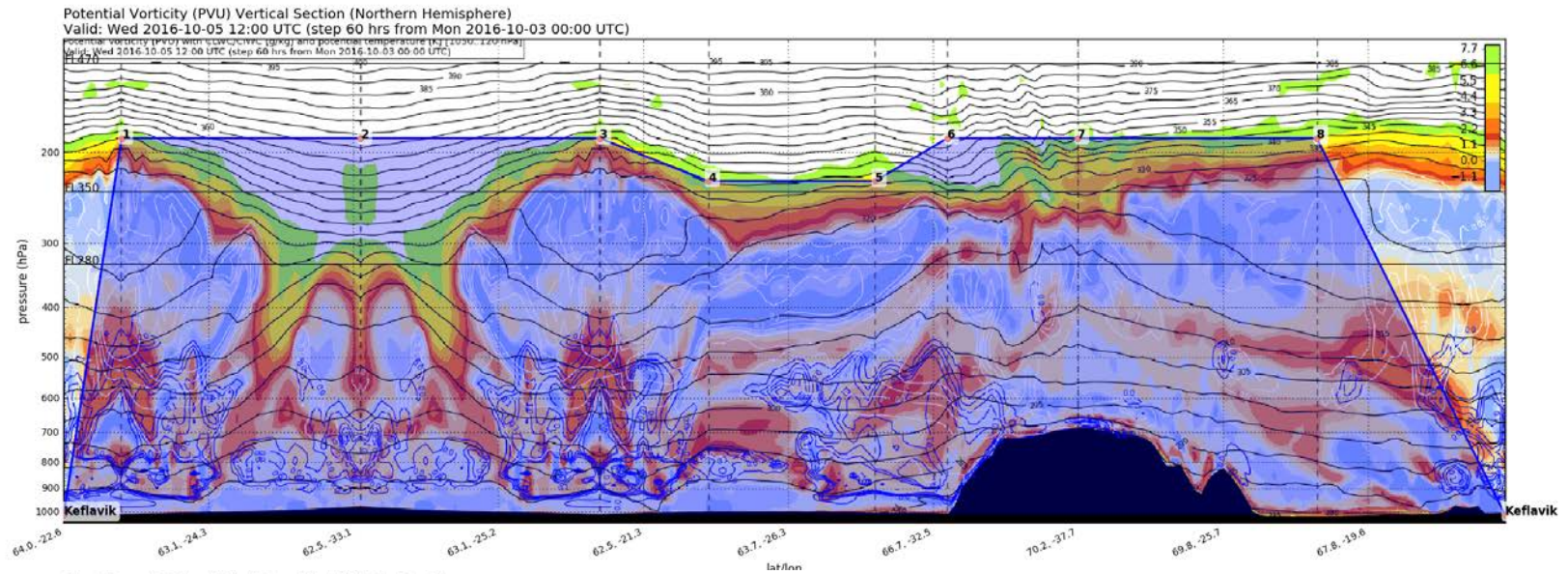


Cloud Cover (0-1) (Total Cloud Cover)
Valid: Wed 2016-10-05 12:00 UTC (step 60 hrs from Mon 2016-10-03 00:00 UTC)



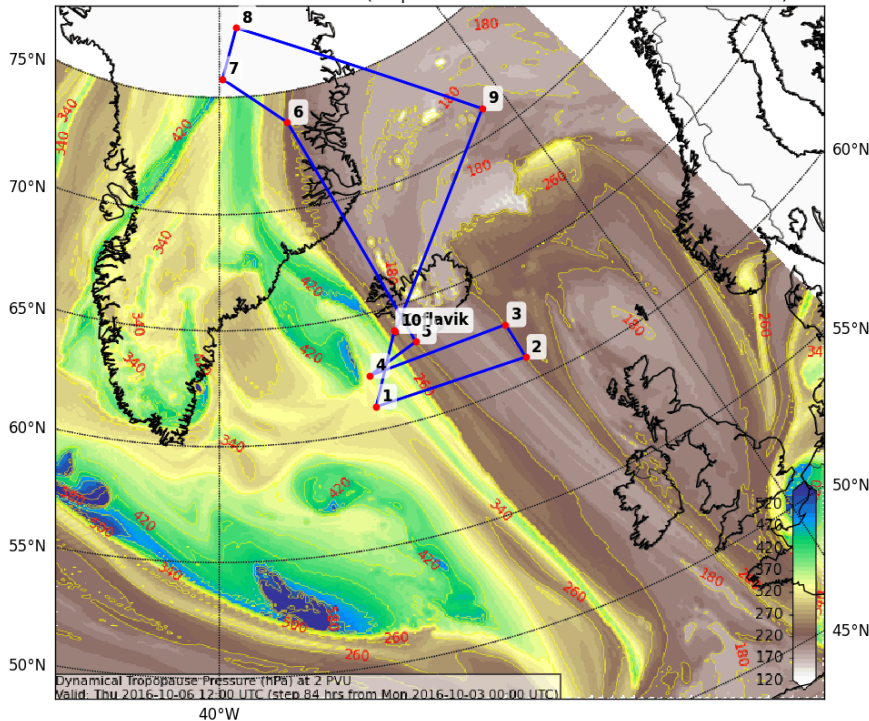
- Coordinated flight leg 2-3 with FALCON & SAFIRE?
- Dropsondes leg 1-2
- Along jet leg 4-5
- Sat overpass leg 6-7
- Divergent outflow leg 7-8

Wednesday HALO flight

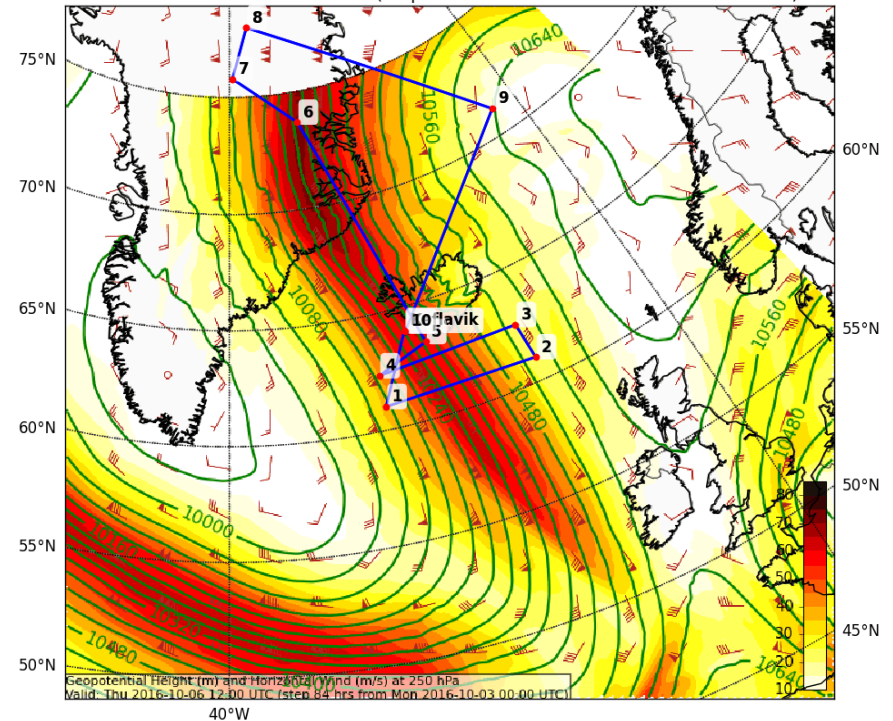


Tentative flight plans for Halo/DLR-Falcon 06 Oct 2016, 12 UTC

Dynamical Tropopause (Pressure (hPa)) at 2000 (10^{-3} PVU)
Valid: Thu 2016-10-06 12:00 UTC (step 84 hrs from Mon 2016-10-03 00:00 UTC)



Geopotential Height (m) and Horizontal Wind (m/s) (Wind Speed 10-85 m/s) at 250 (hPa)
Valid: Thu 2016-10-06 12:00 UTC (step 84 hrs from Mon 2016-10-03 00:00 UTC)



- Coordinated Falcon/HALO flight in moisture flux region south of Iceland
- Coordinated Falcon/HALO flight across tropopause fold
- WCB outflow at late stage
- Tropopause structure in divergent outflow region
- Secondary Objective: Turbulence measurements along jet stream/gravity waves in the Lee of Iceland

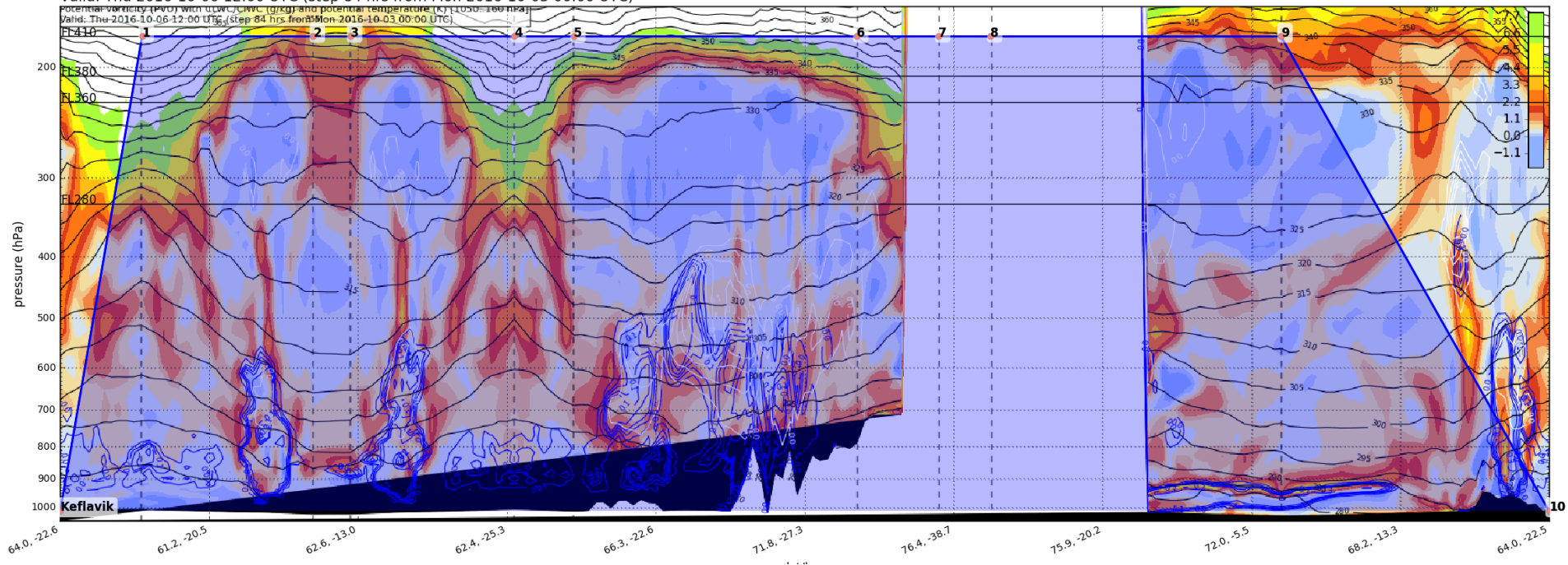
Objectives Thursday HALO

Tentative flight plans for Halo/DLR-Falcon 06 Oct 2016, 12 UTC

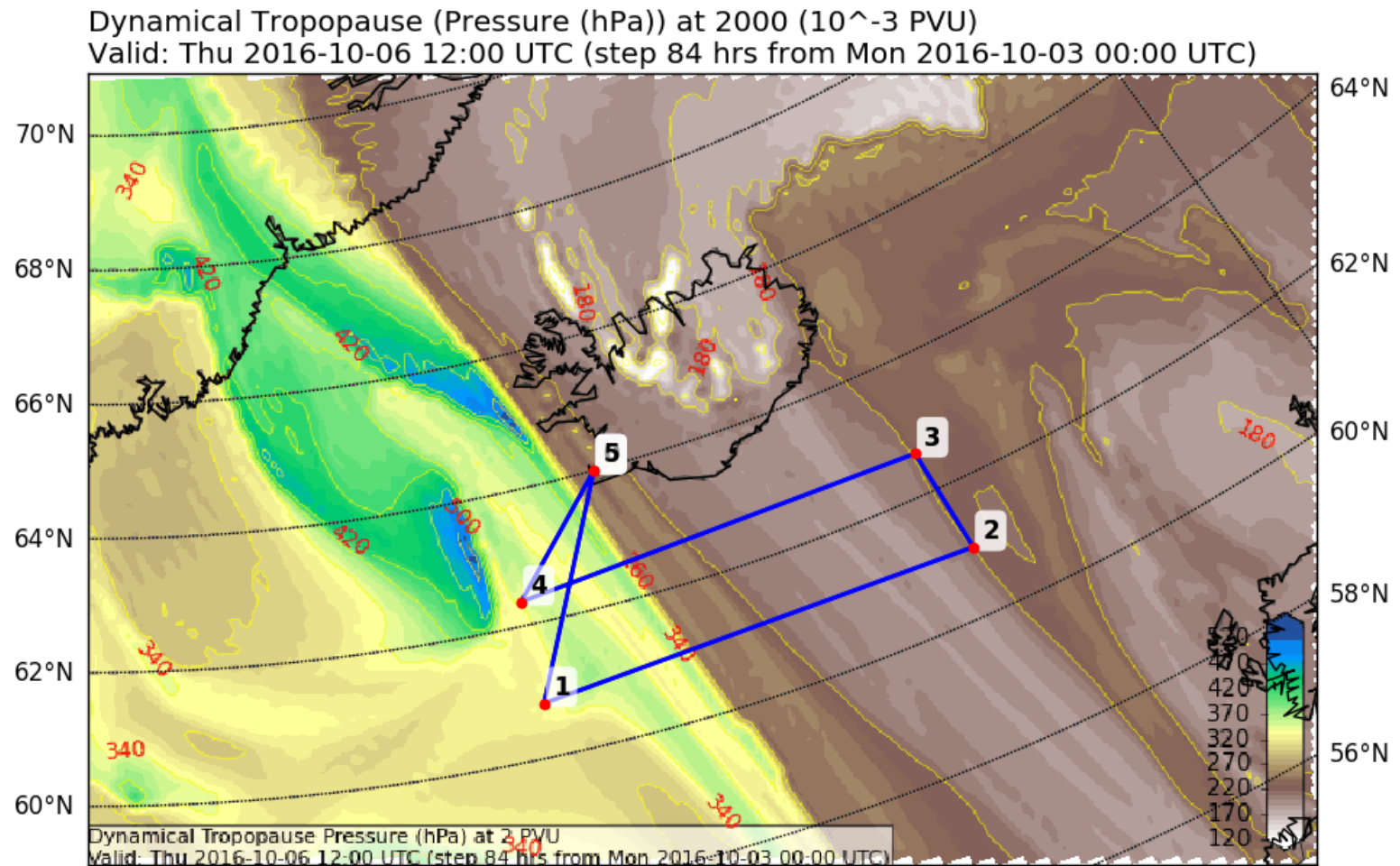
Potential Vorticity (PVU) Vertical Section (Northern Hemisphere)

Valid: Thu 2016-10-06 12:00 UTC (step 84 hrs from Mon 2016-10-03 00:00 UTC)

Valid: Thu 2016-10-06 12:00 UTC (step 84 hrs from Mon 2016-10-03 00:00 UTC)



Tentative flight plans for Halo/DLR-Falcon 06 Oct 2016, 12 UTC



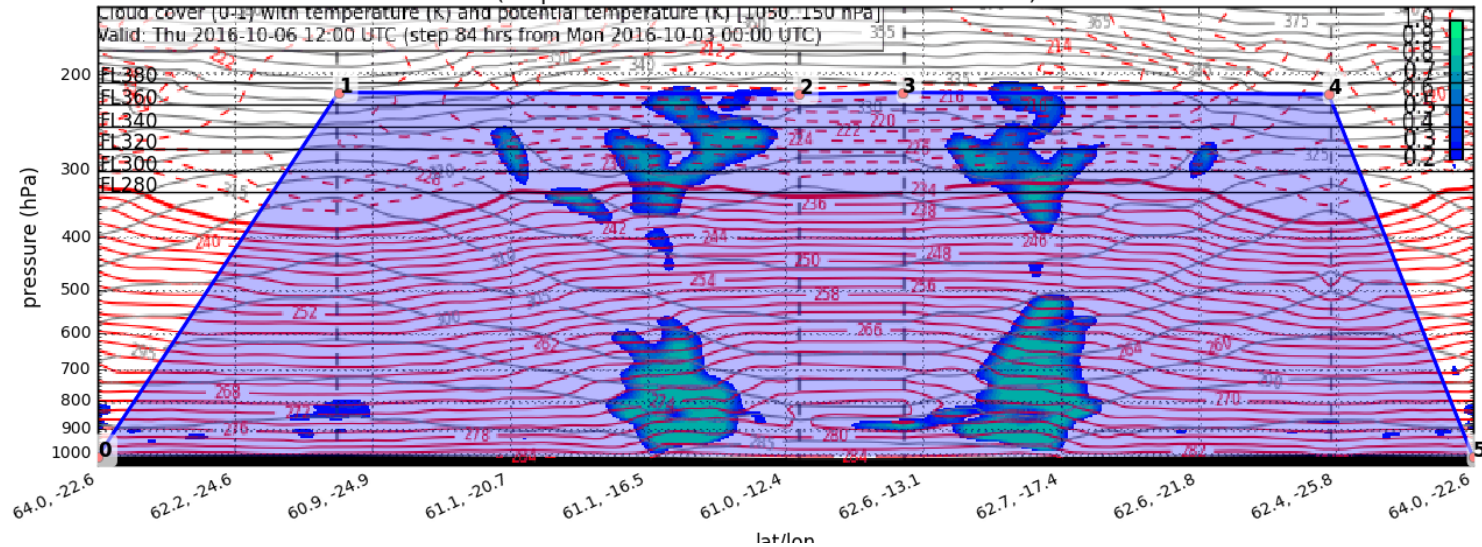
Tentative flight plans for Halo/DLR-Falcon 06 Oct 2016. 12 UTC

Cloud Cover (0-1) Vertical Section

Valid: Thu 2016-10-06 12:00 UTC (step 84 hrs from Mon 2016-10-03 00:00 UTC)

Cloud cover (0-1) with temperature (K) and potential temperature (K) [1050..150 hPa]

Valid: Thu 2016-10-06 12:00 UTC (step 84 hrs from Mon 2016-10-03 00:00 UTC)

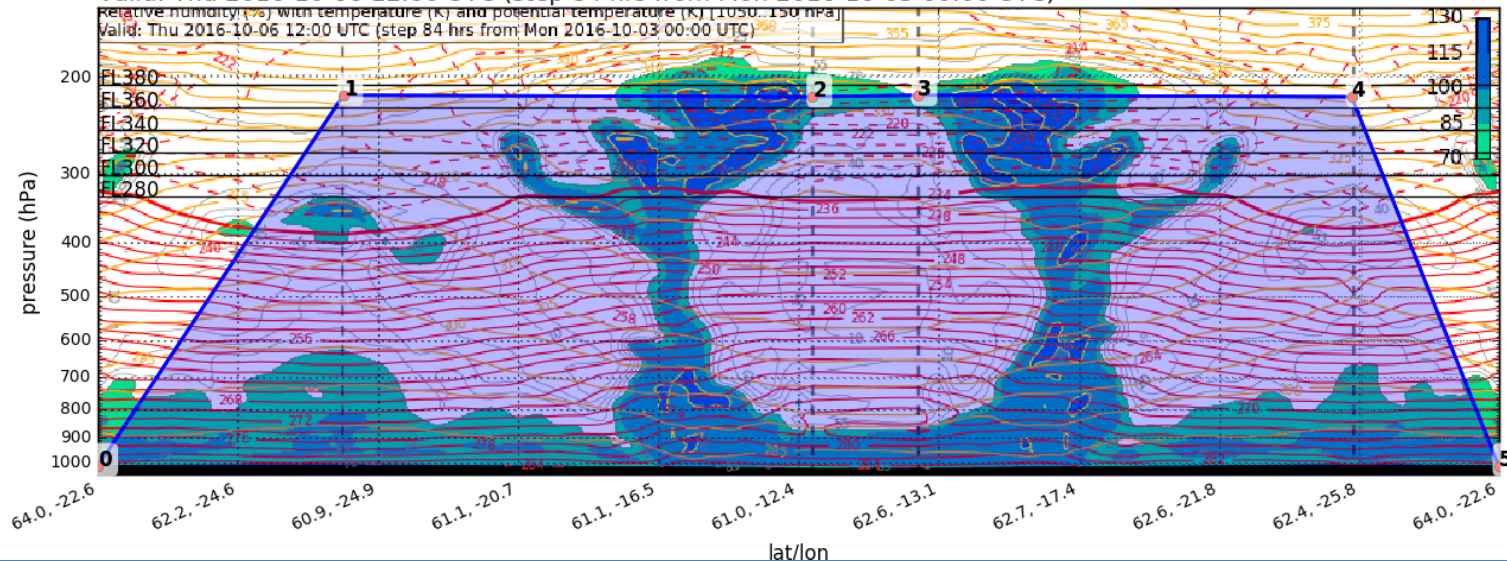


Relative Humidity (%) Vertical Section

Valid: Thu 2016-10-06 12:00 UTC (step 84 hrs from Mon 2016-10-03 00:00 UTC)

Relative humidity (%) with temperature (K) and potential temperature (K) [1050..150 hPa]

Valid: Thu 2016-10-06 12:00 UTC (step 84 hrs from Mon 2016-10-03 00:00 UTC)



Summary plans

- **Tuesday 4 Oct**
 - **FALCON** jet transect / calibration
 - **HALO** frontal wave cyclone / DRW
- **Wednesday**
 - **HALO:** WCB ascent, jet crossing for CAT observations, aircraft coordination with French & German Falcon needs to be discussed
 - **Falcon:**
- **(Thursday:**
 - **HALO:**