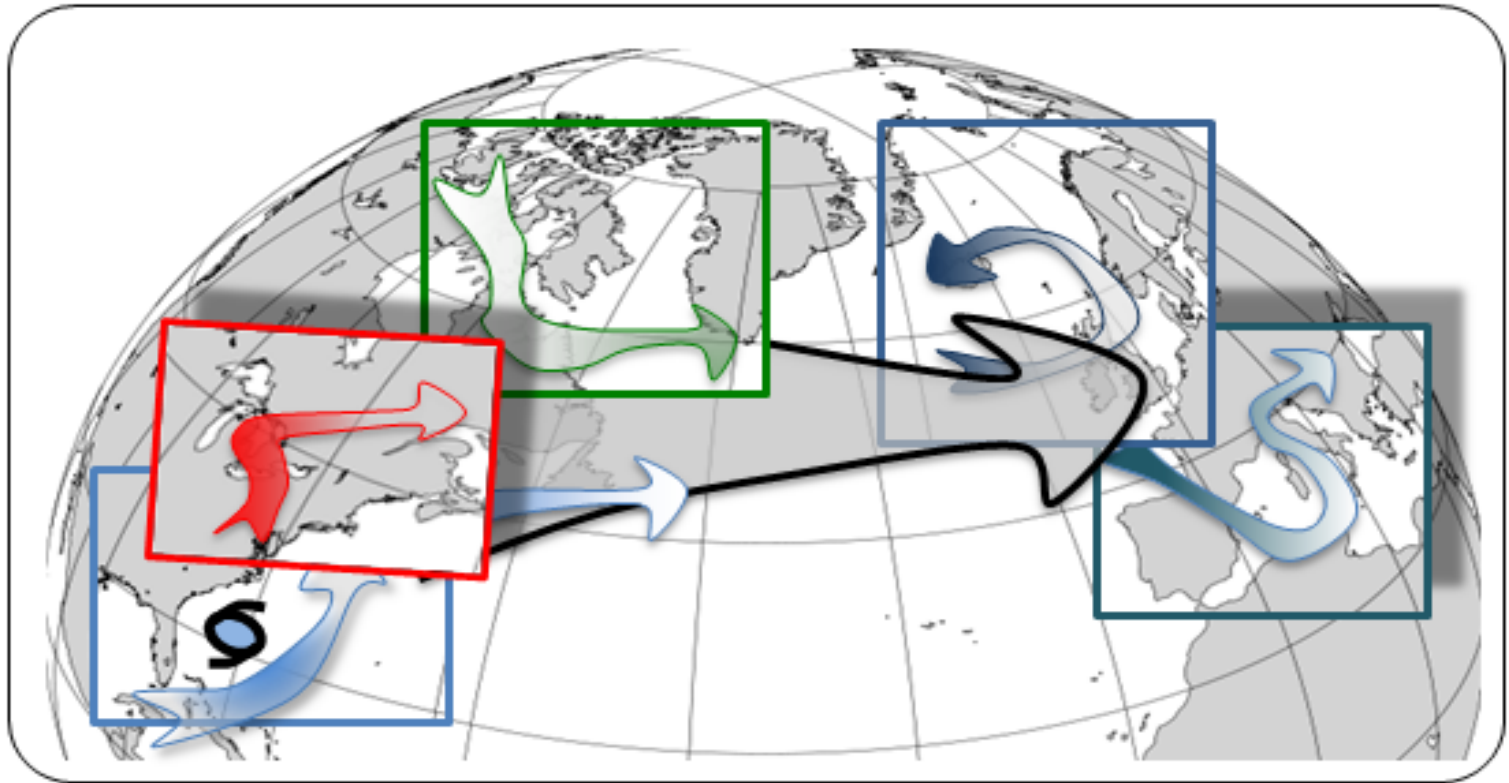


NAWDEX – Weather Discussion

21 September 2016, Keflavik 16 UTC



NAWDEX – Weather Discussion

21 September 2016, Keflavik 16 UTC

Decisions today

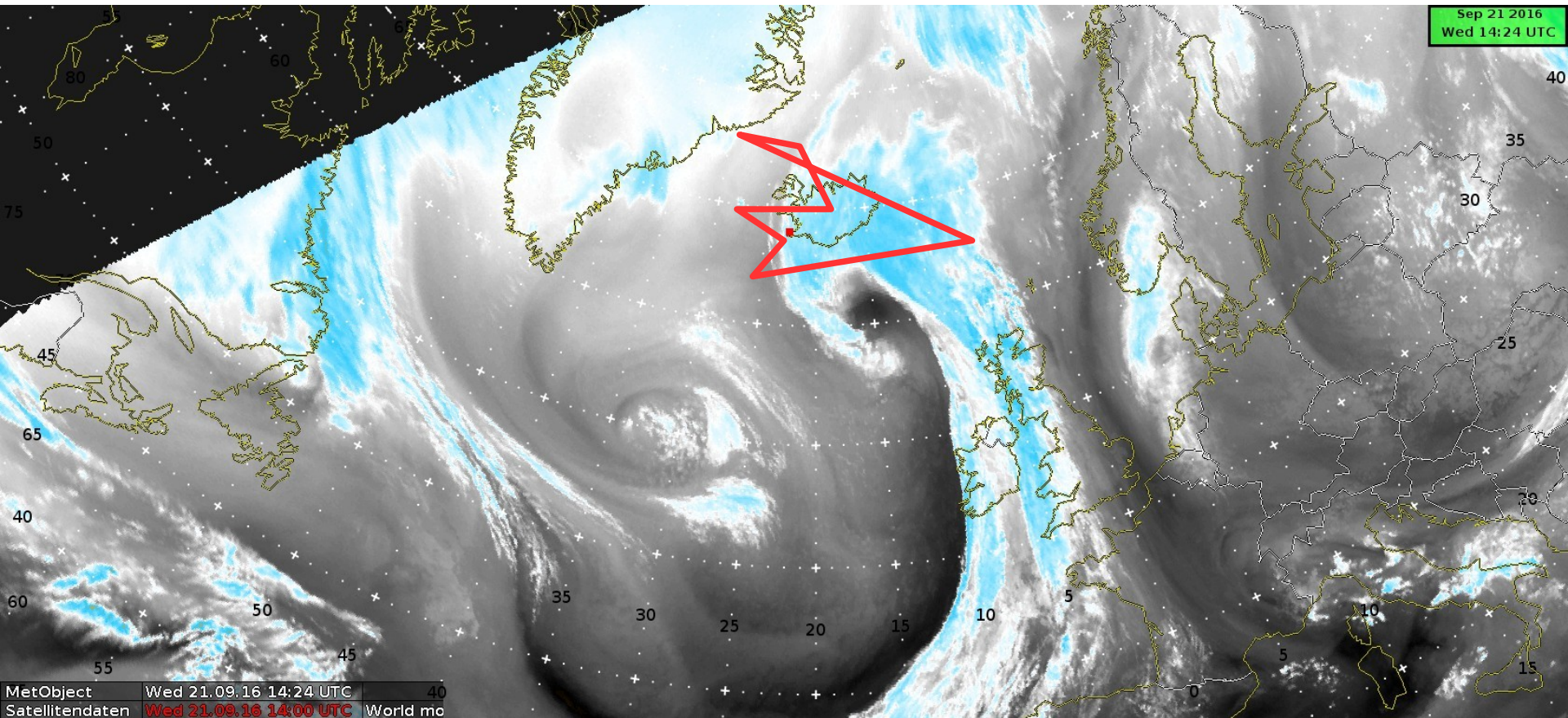
1. Friday mission (Lagrangian match)
 - Preliminary flight plan for HALO and FAAM
 - Possible Falcon flight
 - Saturday flight?
2. Day off Saturday/Sunday?

NAWDEX – Weather Discussion

21 September 2016, Keflavik 16 UTC

- Current situation & evolution until Monday 25 September
- **Mission Friday (Sat?) 23 (24) September**
 - WCB forecasts and timing
 - Preliminary flight plans
- Outlook possible Mission **Sun-Wed 25-28 September: ET**
Karl and downstream cyclone

Today's flight: HALO and Falcon are in the air

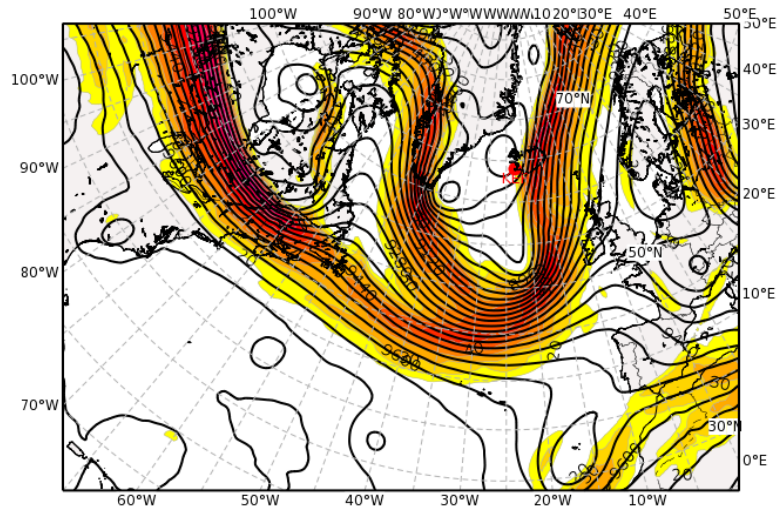


Synoptic overview

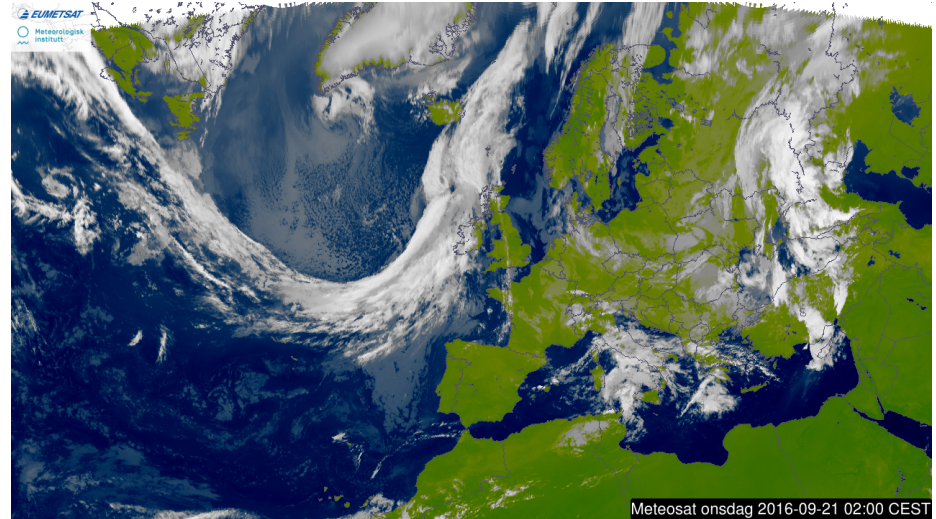
Analysis – 21 Sep 2016, 00 UTC

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

Valid: Wed, 21 Sep 2016, 00 UTC (step 000 h from Wed, 21 Sep 2016, 00 UTC)

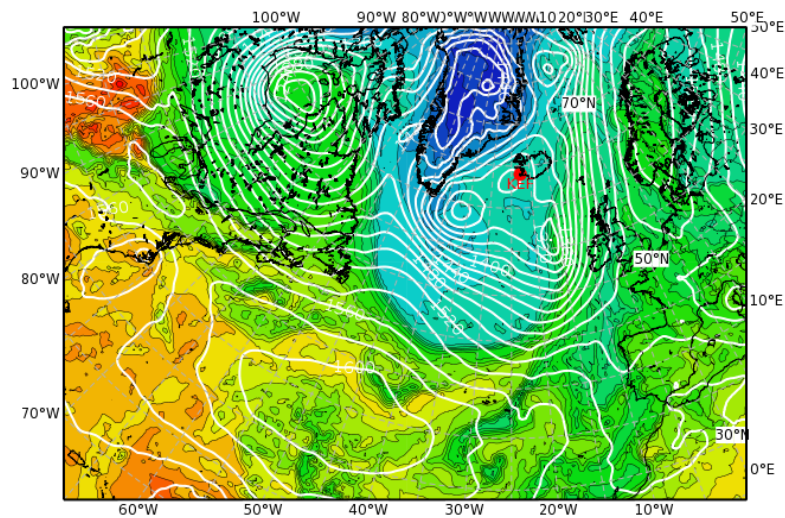


Z300, SAT THE850, RH700



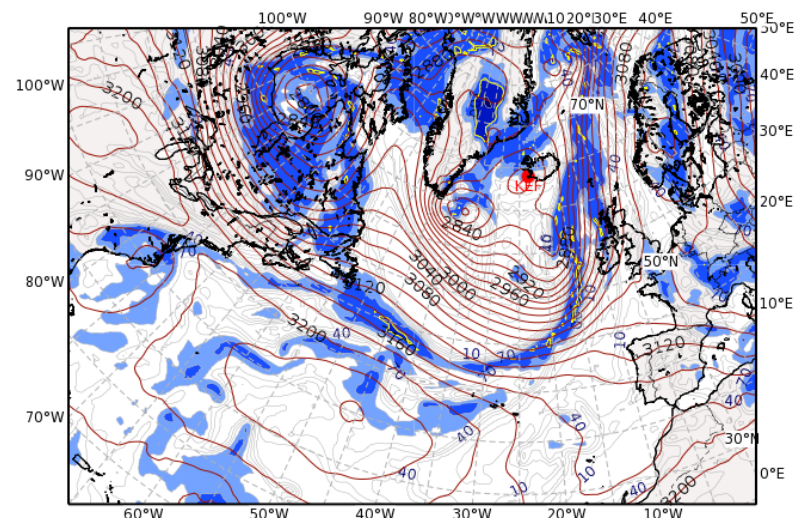
Equivalent Potential Temperature (degC) & Streamlines at 850 hPa

Valid: Wed, 21 Sep 2016, 00 UTC (step 000 h from Wed, 21 Sep 2016, 00 UTC)



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

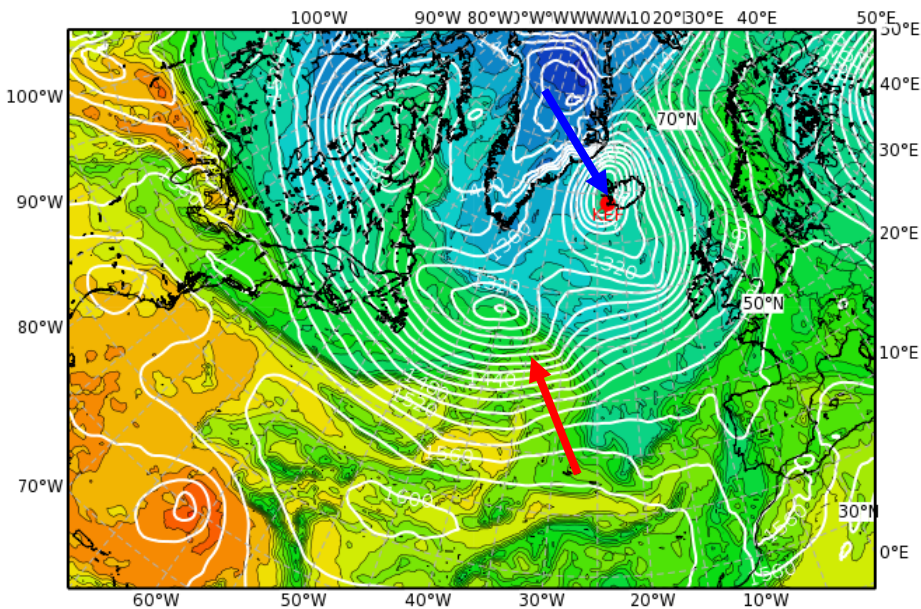
Valid: Wed, 21 Sep 2016, 00 UTC (step 000 h from Wed, 21 Sep 2016, 00 UTC)



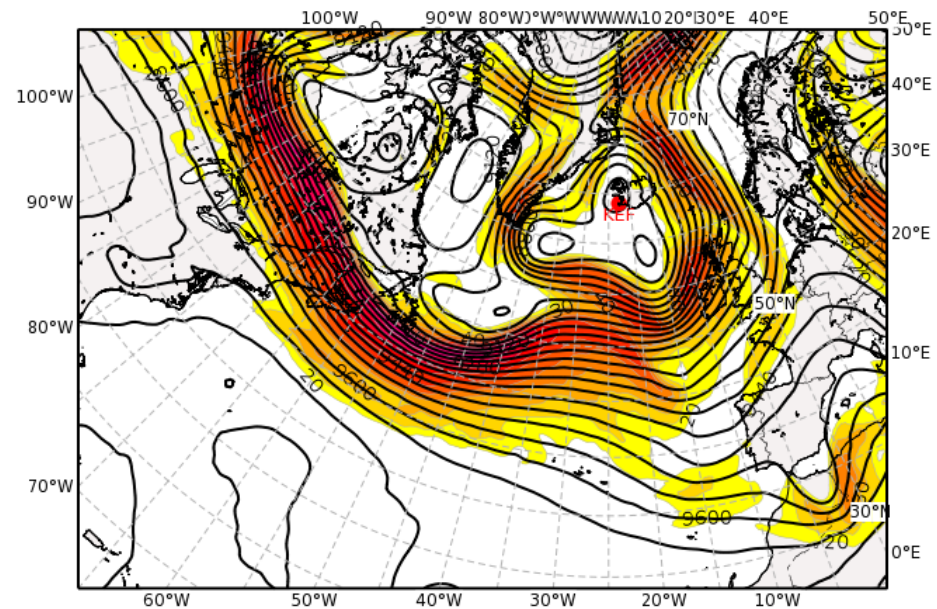
Forecast for Thu, 22 Sep 2016 12 UTC

THE850, Z300 BT21/00Z

Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Thu, 22 Sep 2016, 12 UTC (step 036 h from Wed, 21 Sep 2016, 00 UTC)



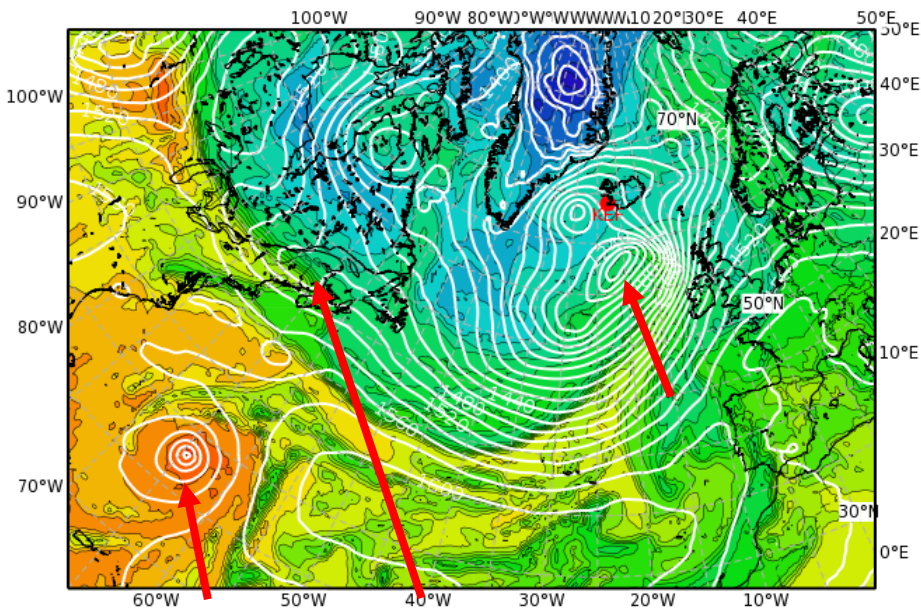
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Thu, 22 Sep 2016, 12 UTC (step 036 h from Wed, 21 Sep 2016, 00 UTC)



Forecast for Fri, 23 Sep 2016 12 UTC

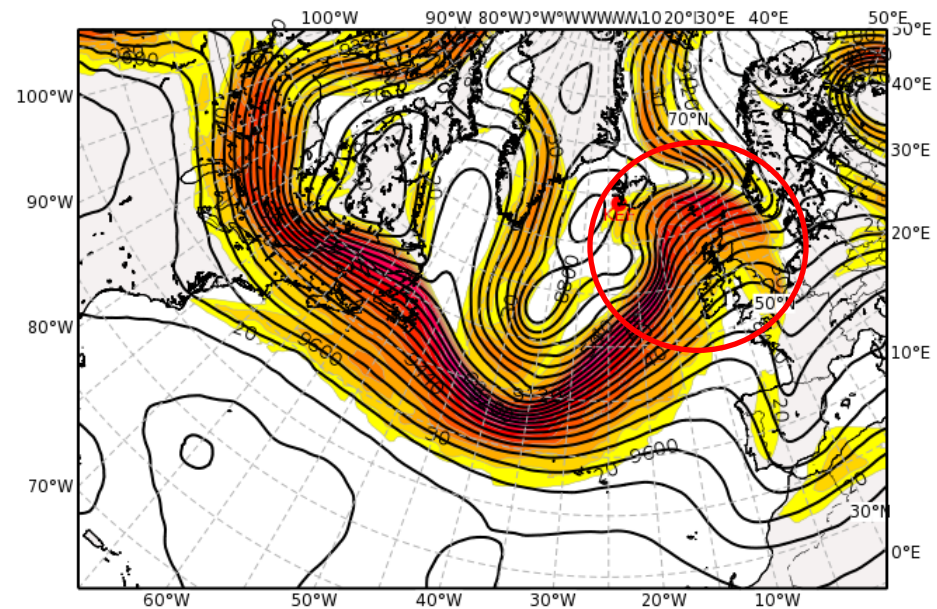
THE850, Z300 BT21/00Z

Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Fri, 23 Sep 2016, 12 UTC (step 060 h from Wed, 21 Sep 2016, 00 UTC)



TC Karl DS cyclone

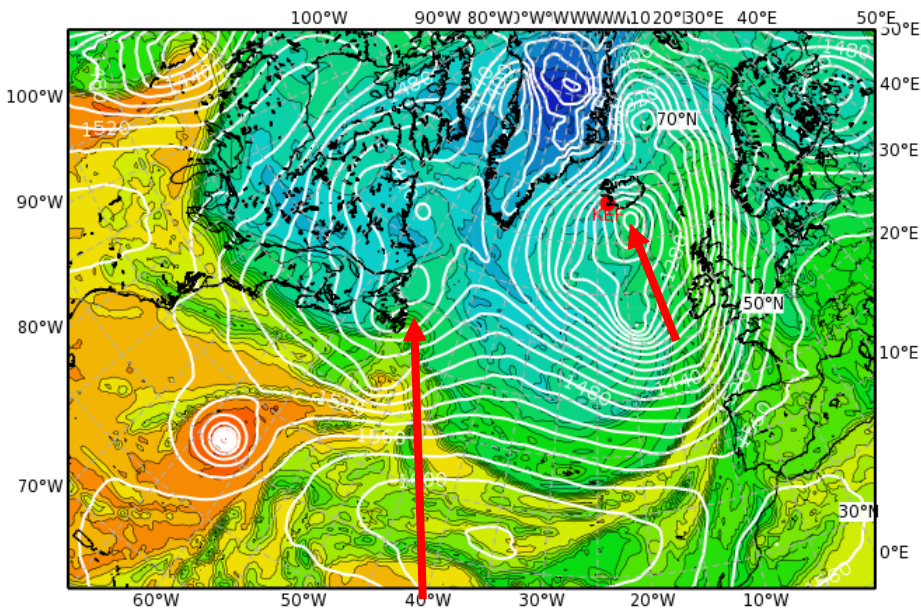
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Fri, 23 Sep 2016, 12 UTC (step 060 h from Wed, 21 Sep 2016, 00 UTC)



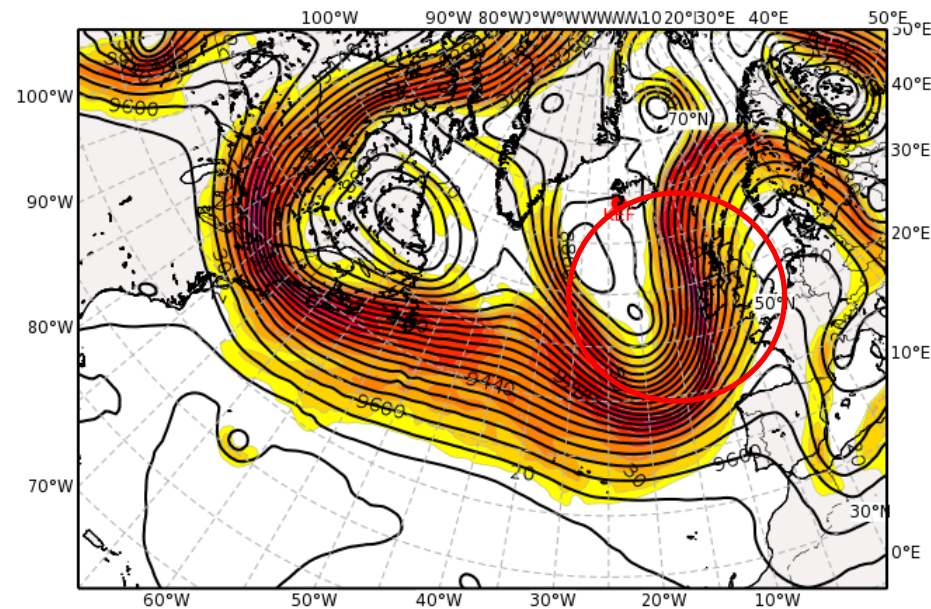
Forecast for Sat, 24 Sep 2016 12 UTC

THE850, Z300 BT21/00Z

Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Sat, 24 Sep 2016, 12 UTC (step 084 h from Wed, 21 Sep 2016, 00 UTC)



Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Sat, 24 Sep 2016, 12 UTC (step 084 h from Wed, 21 Sep 2016, 00 UTC)



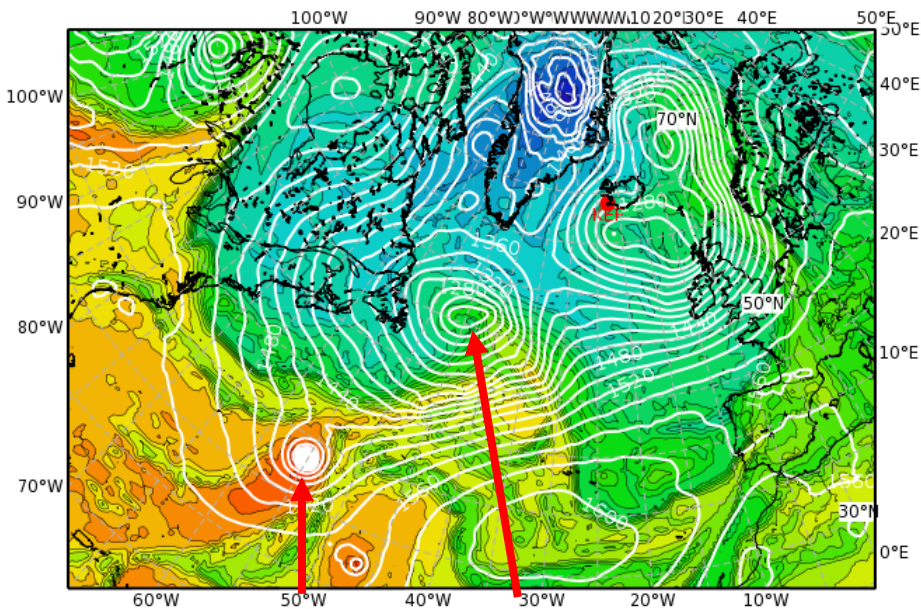
TC Karl DS cyclone

- Heavy precipitation & windy conditions in UK and Ireland

Forecast for Sun, 25 Sep 2016 12 UTC

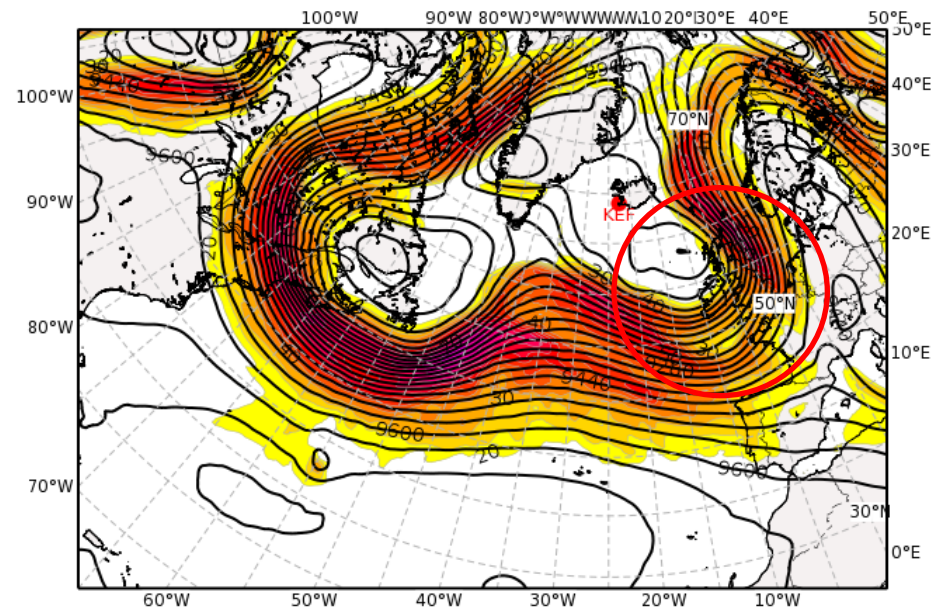
THE850, Z300 BT21/00Z

Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Sun, 25 Sep 2016, 12 UTC (step 108 h from Wed, 21 Sep 2016, 00 UTC)



TC Karl DS cyclone

Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Sun, 25 Sep 2016, 12 UTC (step 108 h from Wed, 21 Sep 2016, 00 UTC)

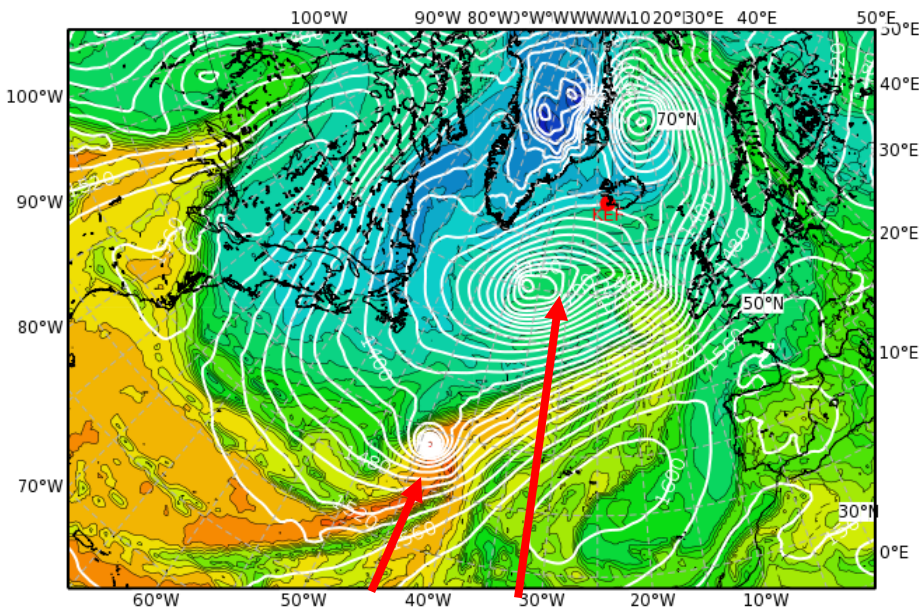


- Heavy precipitation & windy conditions in Norway coastal regions

Forecast for Mon, 26 Sep 2016 12 UTC

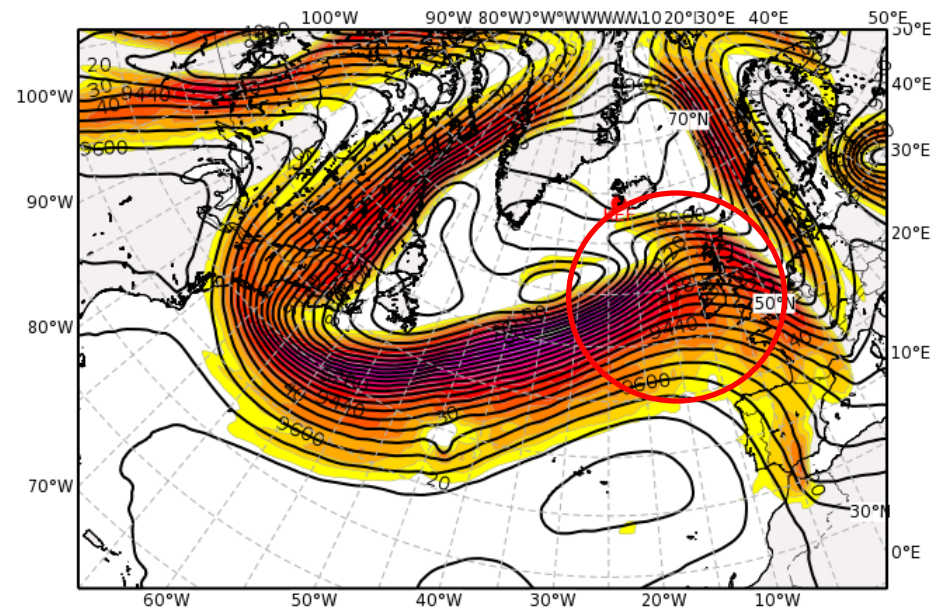
THE850, Z300 BT21/00Z

Equivalent Potential Temperature (degC) & Streamlines at 850 hPa
Valid: Mon, 26 Sep 2016, 12 UTC (step 132 h from Wed, 21 Sep 2016, 00 UTC)



TC Karl DS cyclone

Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Mon, 26 Sep 2016, 12 UTC (step 132 h from Wed, 21 Sep 2016, 00 UTC)



- Heavy precipitation & windy conditions in Northern UK, Ireland, Scotland
- Affecting North Sea region on Tu

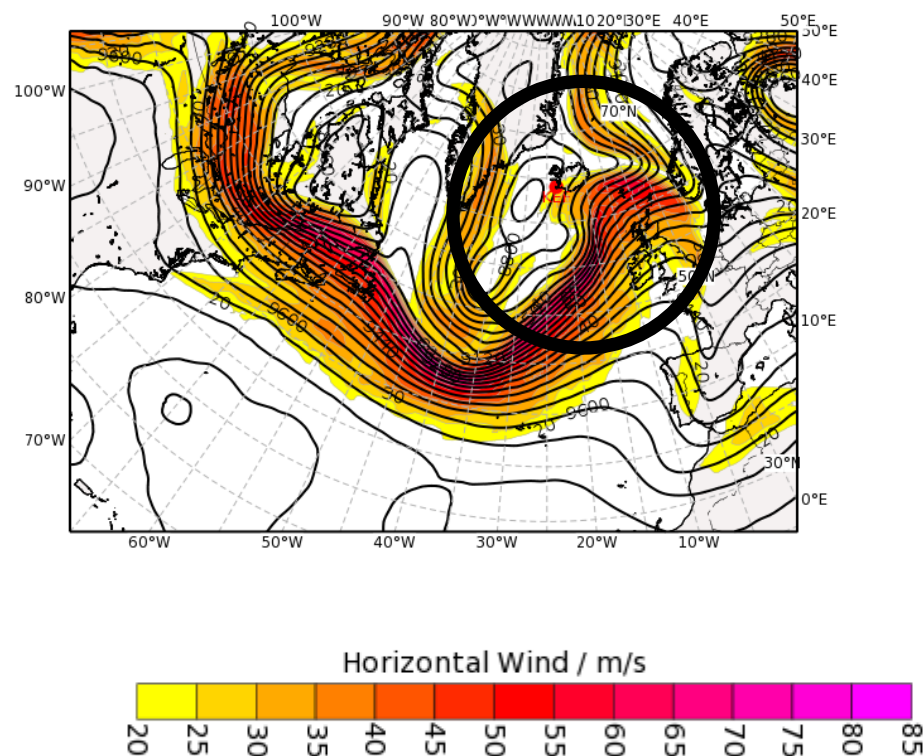
Friday mission: Meteorology

Mission on Friday, 23 Sep 2016 12 UTC

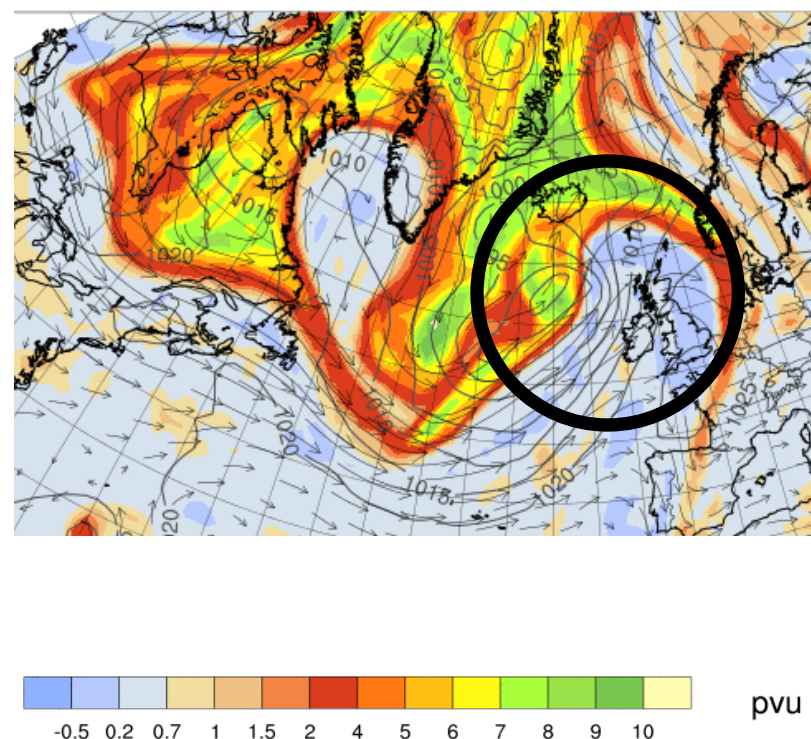
BT21/00Z

Geopotential height 300hPa and wind speed

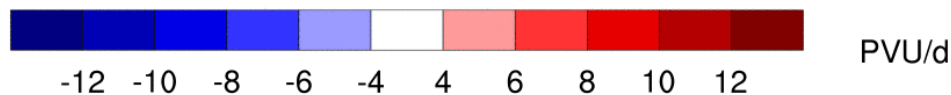
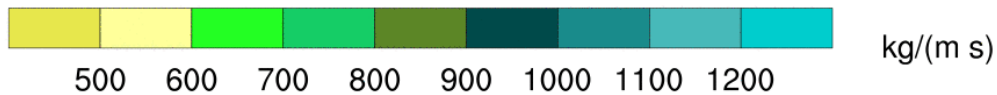
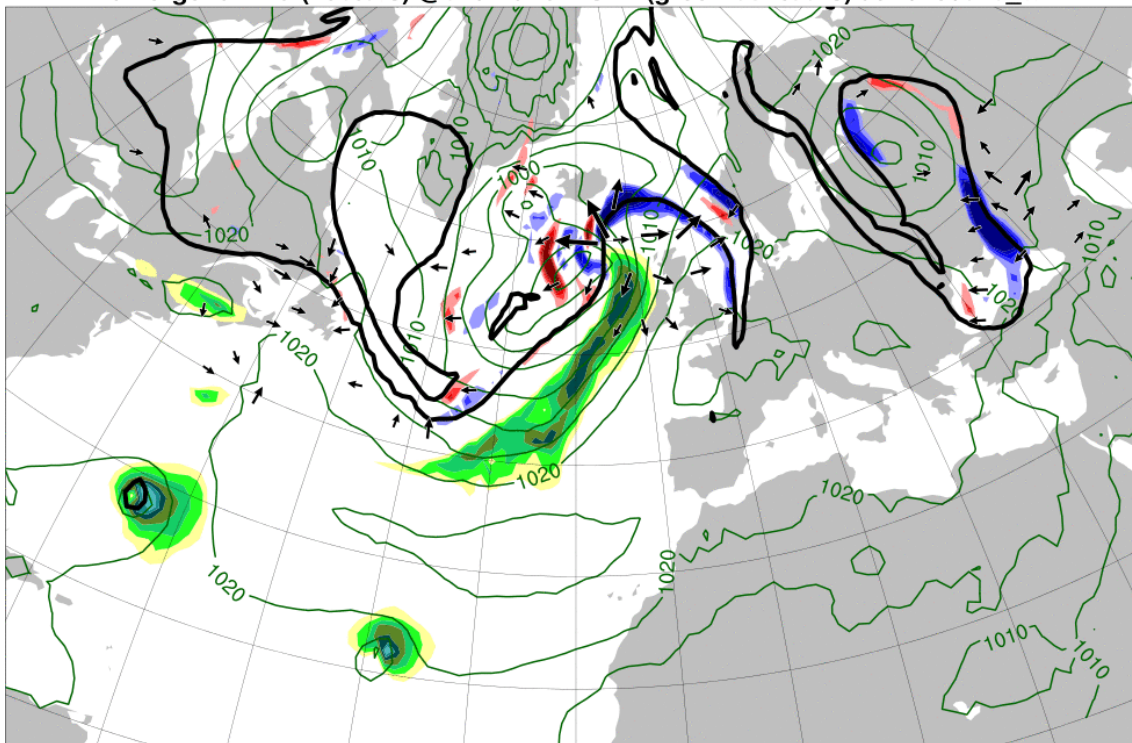
Geopotential Height (m) & Horizontal Wind (m/s) at 300 hPa
Valid: Fri, 23 Sep 2016, 12 UTC (step 060 h from Wed, 21 Sep 2016, 00 UTC)



PV@320K at 20160923_12

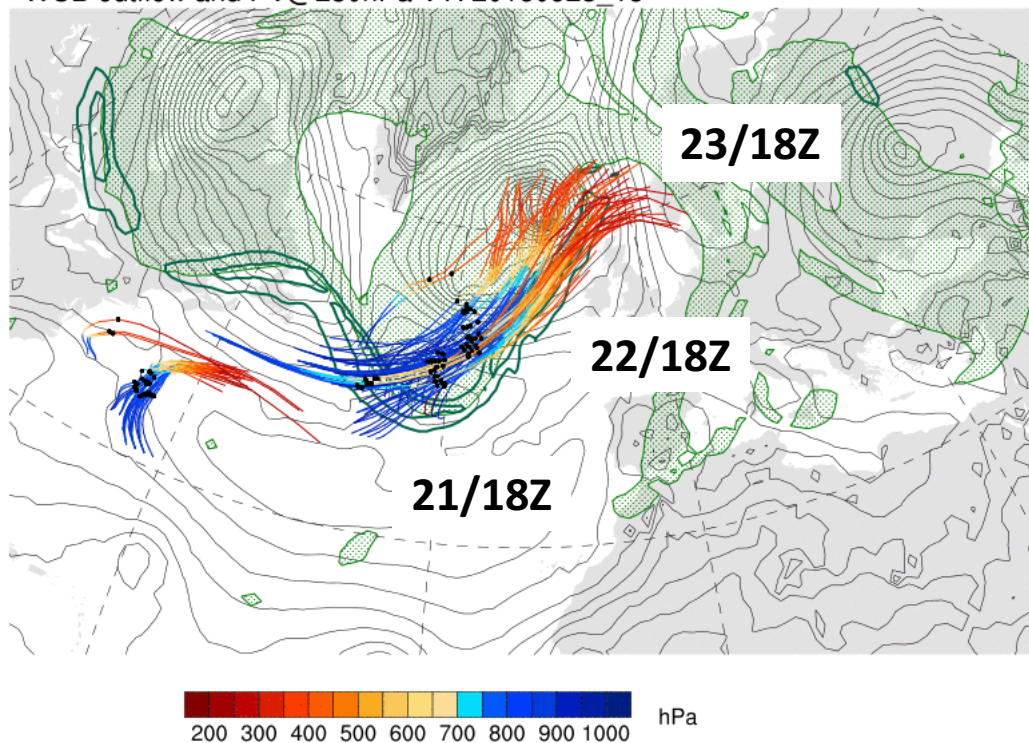


2 PVU (black contour), PV advection through divergent wind (shading),
divergent wind (vectors) @320K and MSLP (green contours) at 20160923_12

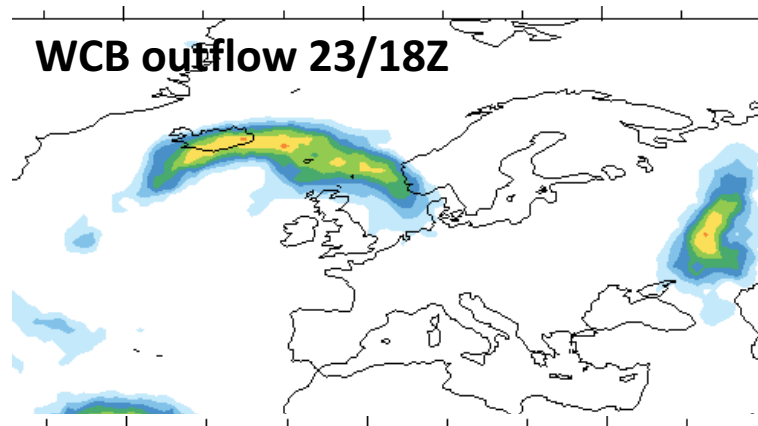


BT21/00Z

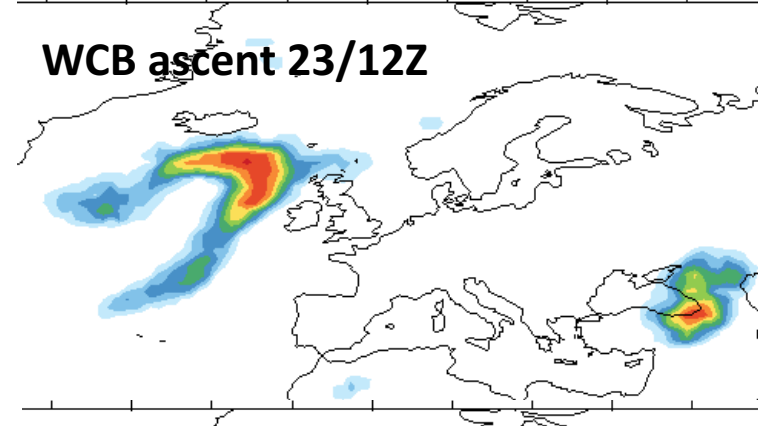
Trajectory start and SLP VT: 20160921_18
WCB outflow and PV@250hPa VT: 20160923_18



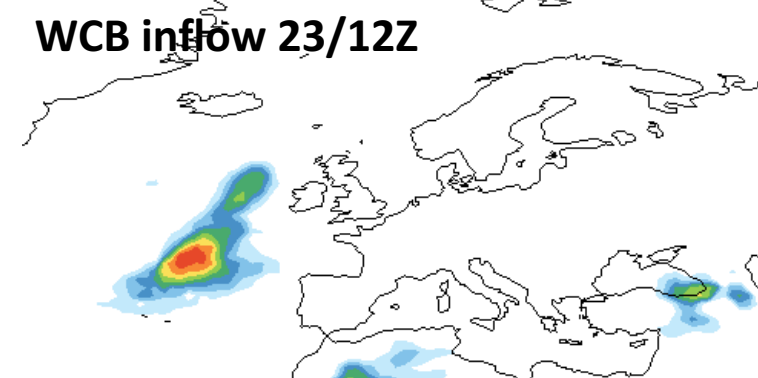
WCB outflow 23/18Z



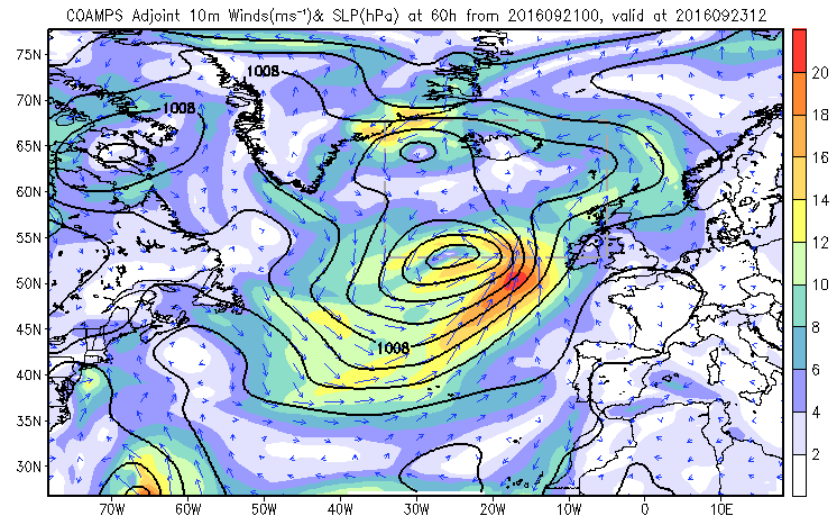
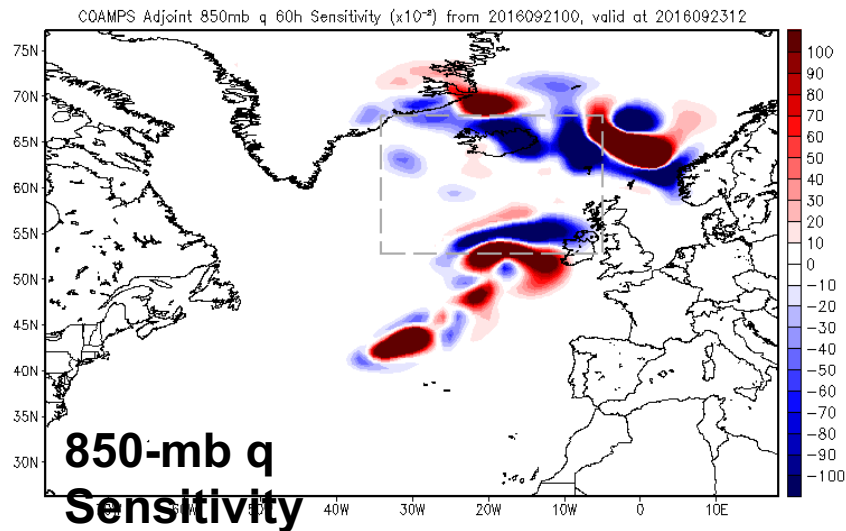
WCB ascent 23/12Z



WCB inflow 23/12Z

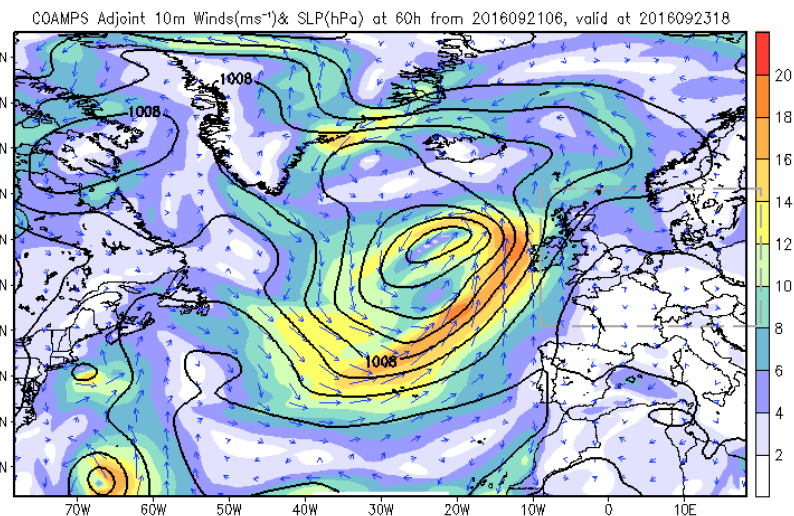
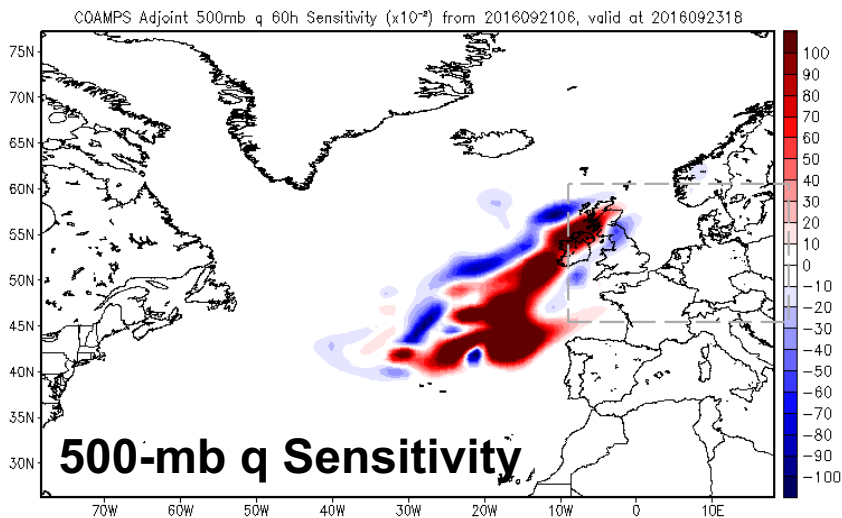


COAMPS Sensitivity (24h) Valid 12Z 23 Sep (Box over Iceland)



Two moisture sensitivity maxima: i) E flow NE of Iceland, ii) WCB

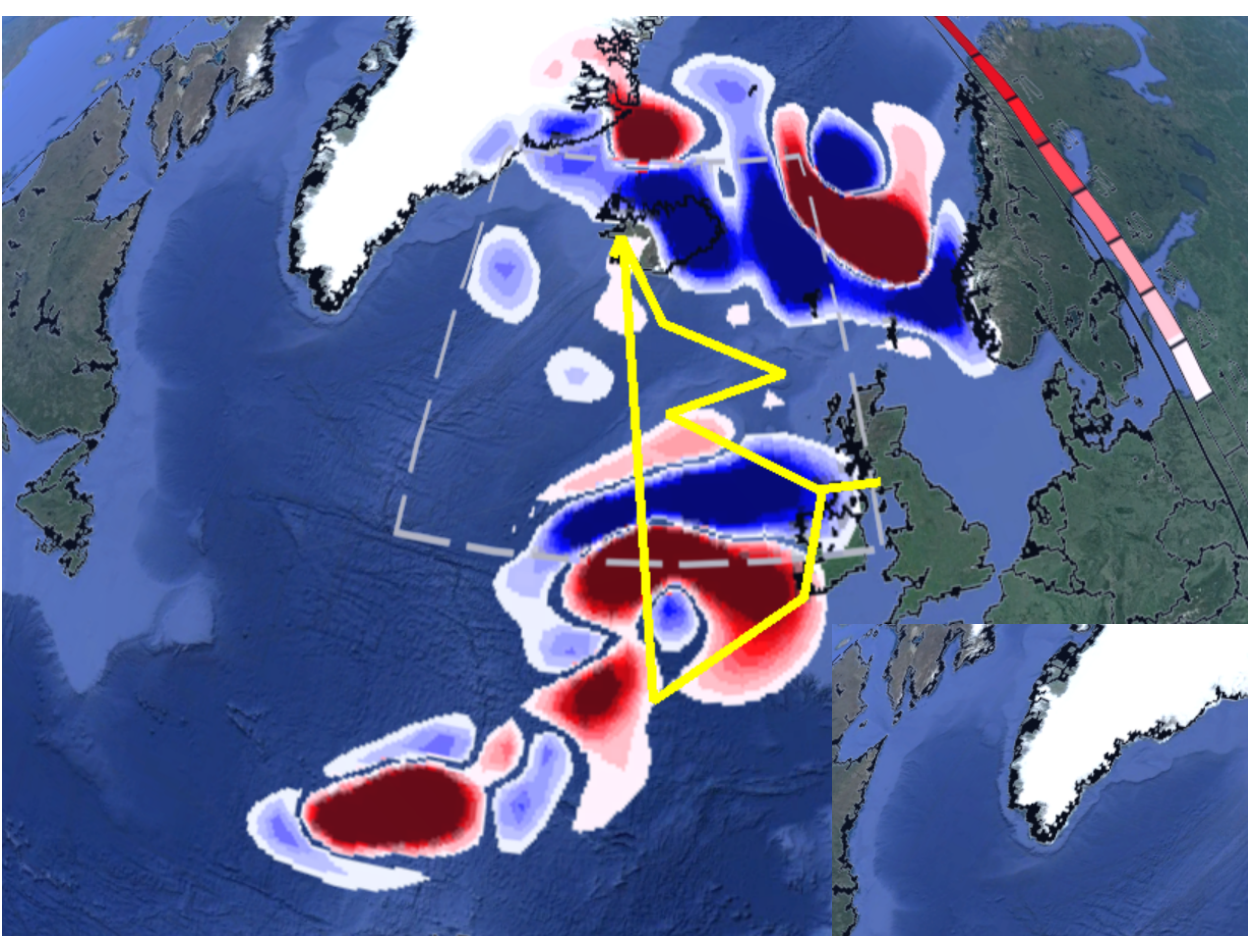
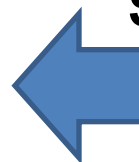
COAMPS Sensitivity (24h) Valid 18Z 23 Sep (Box over UK & Europe)



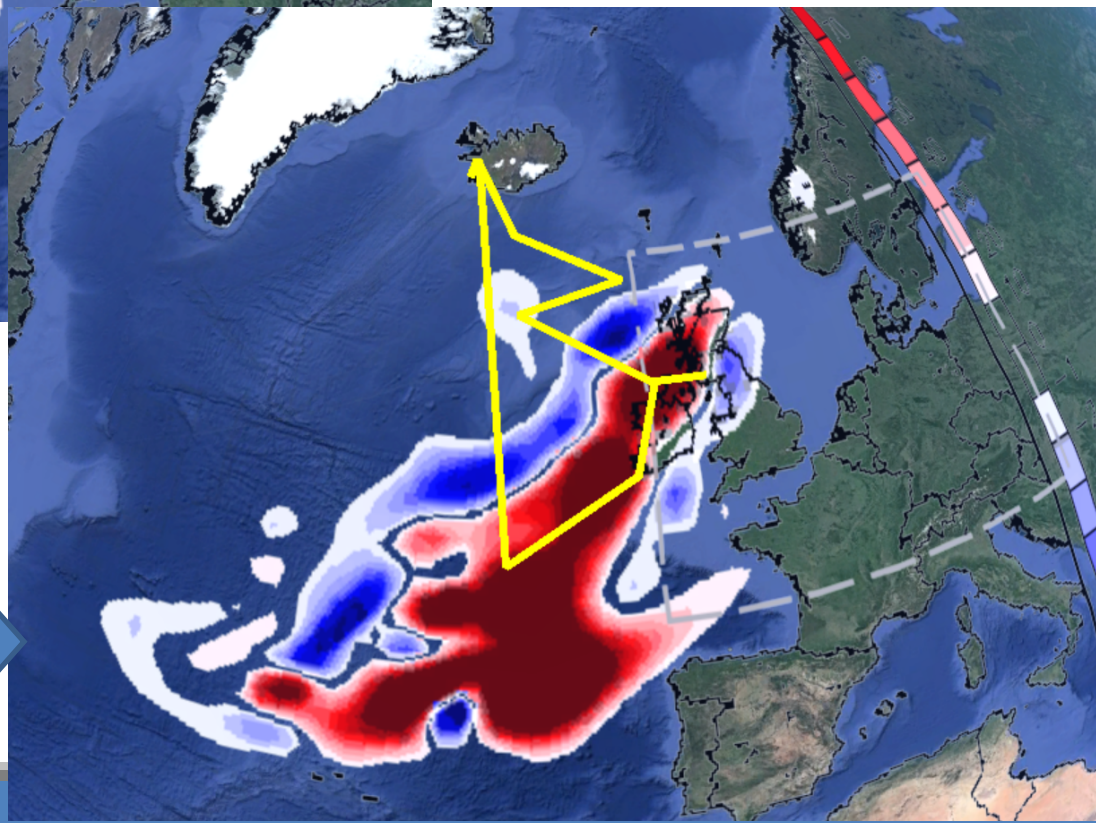
Moisture sensitivity maximum in mid-levels along ascent in WCB

20

**850-mb Moisture
Sensitivity Valid at
12Z 23 Sep**

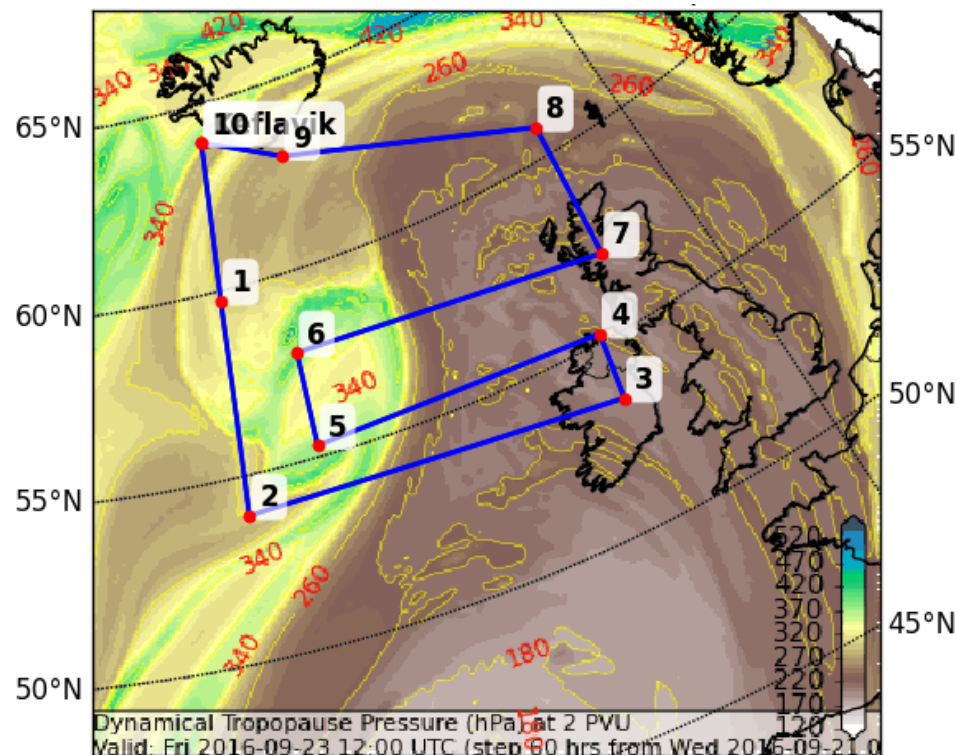
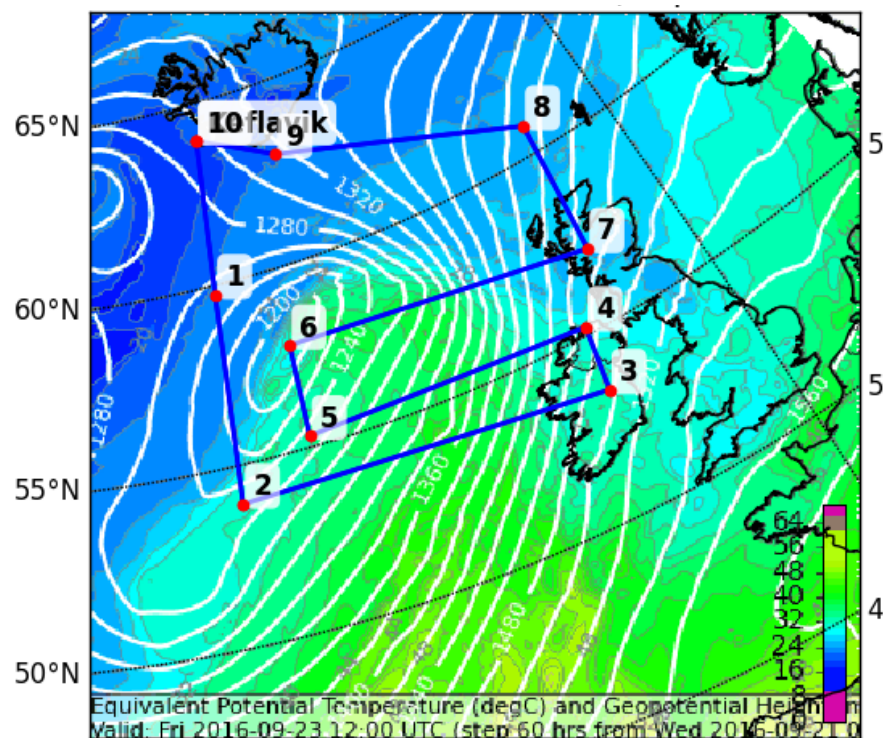


**500-mb Moisture
Sensitivity Valid at
182Z 23 Sep**



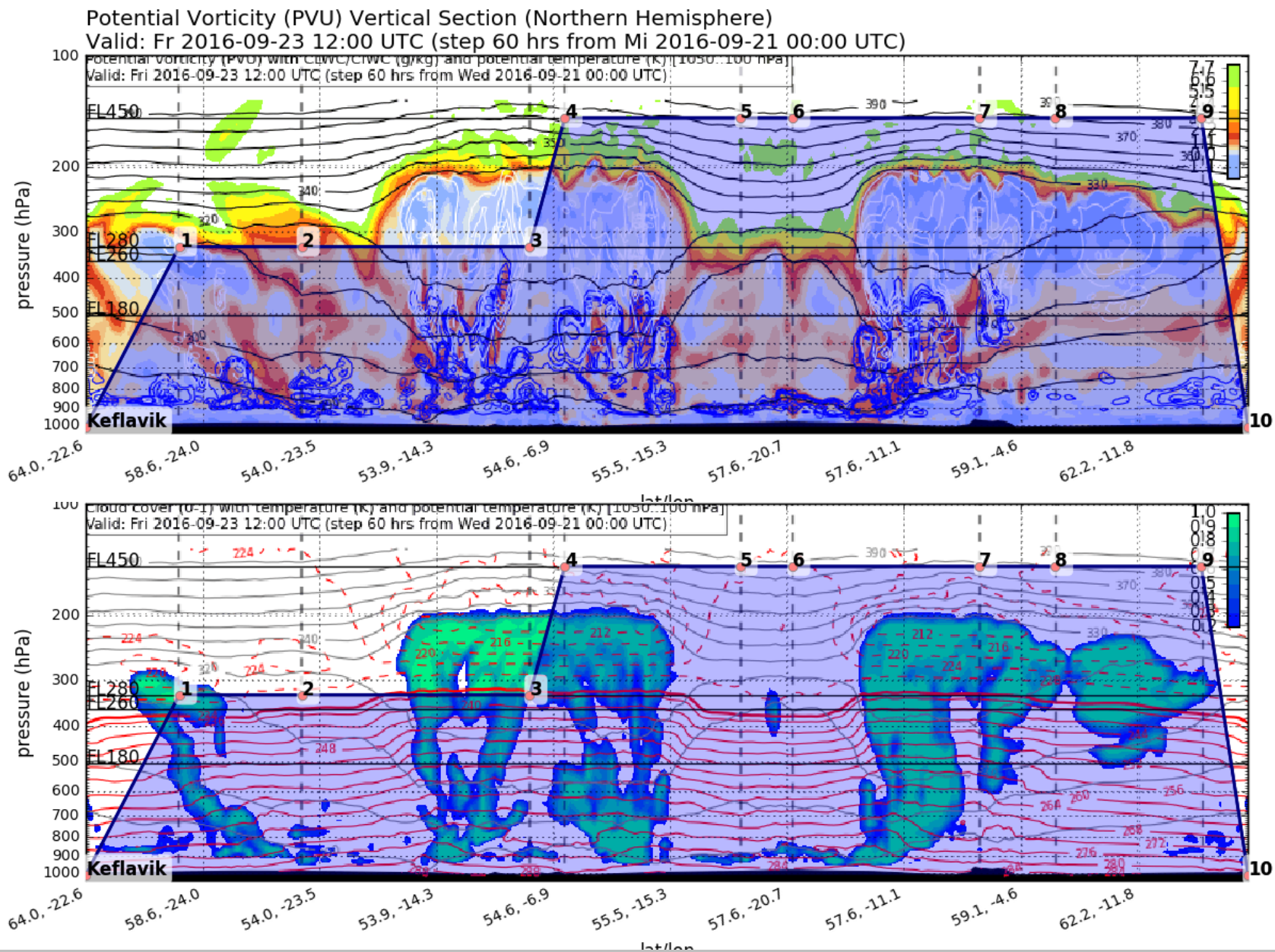
Friday mission: Flight planning

Flight planning for Friday 23 September 2016: HALO

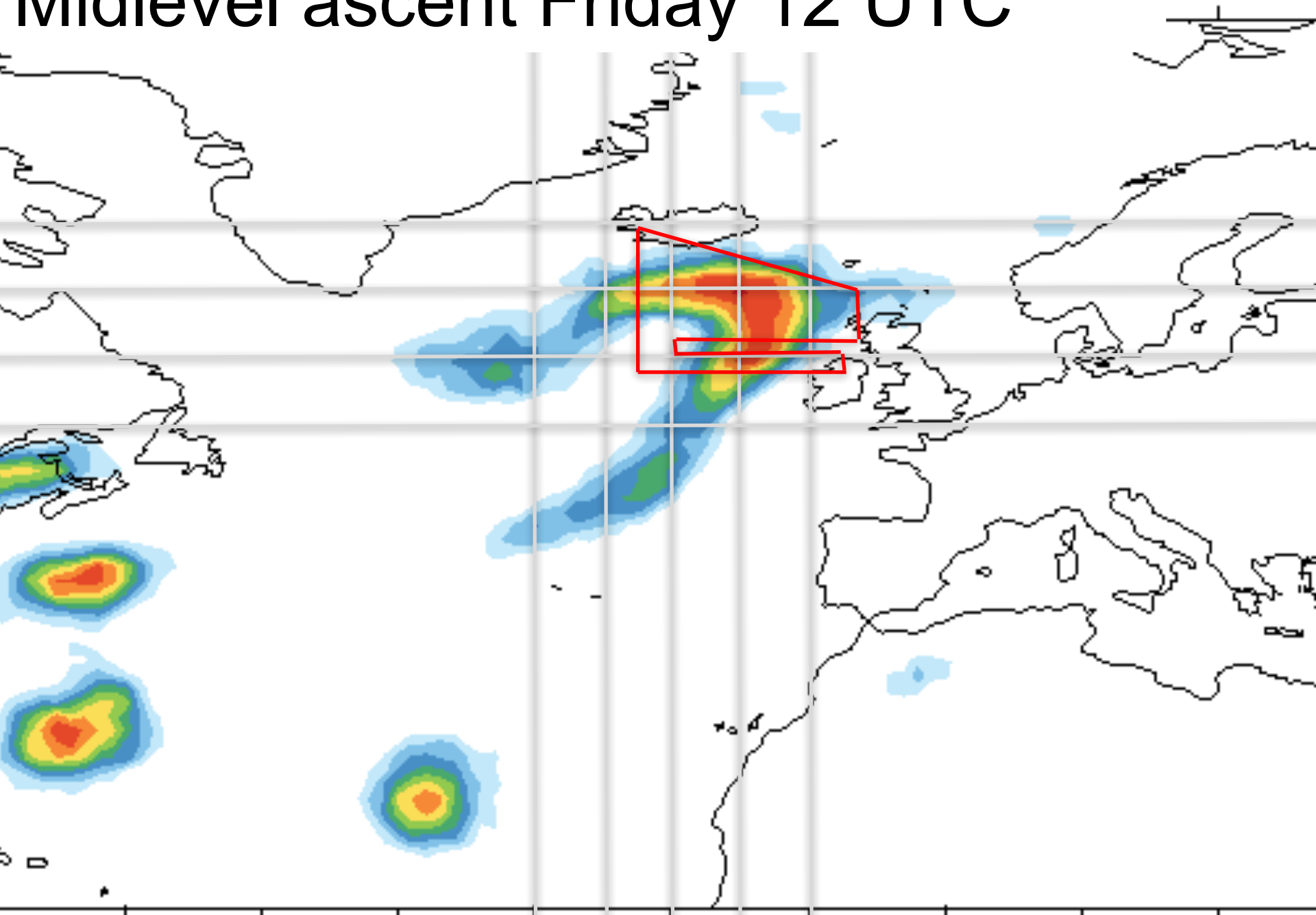


- 16 dropsondes (3 leg 1-2, 8 leg 2-3, 5 leg 8-9, every 100km?)
- Flight centered around 12 UTC
- Coordinated flight with FAAM leg 4-5 → timing to be decided tomorrow

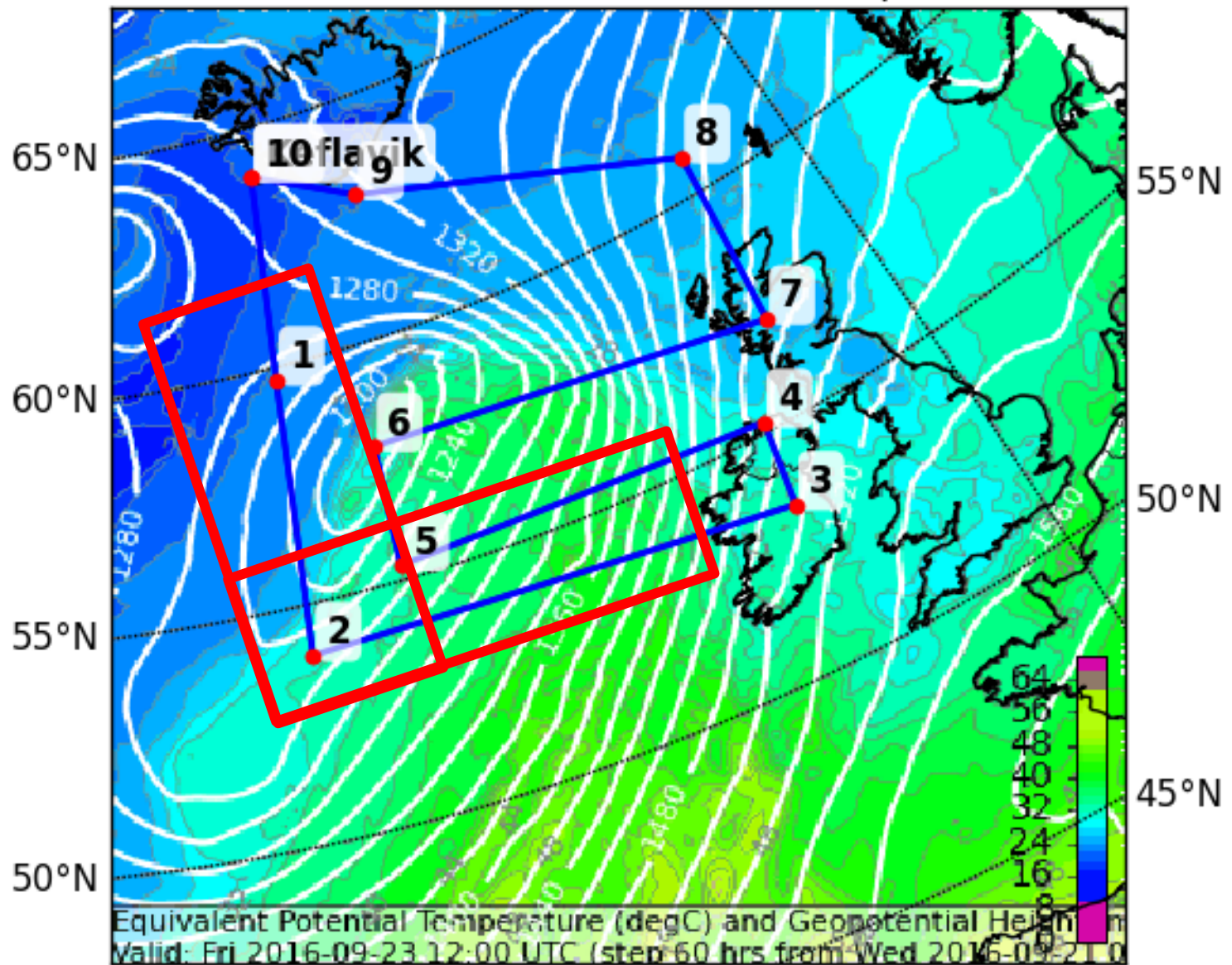
Flight planning for Friday 23 September 2016



Midlevel ascent Friday 12 UTC

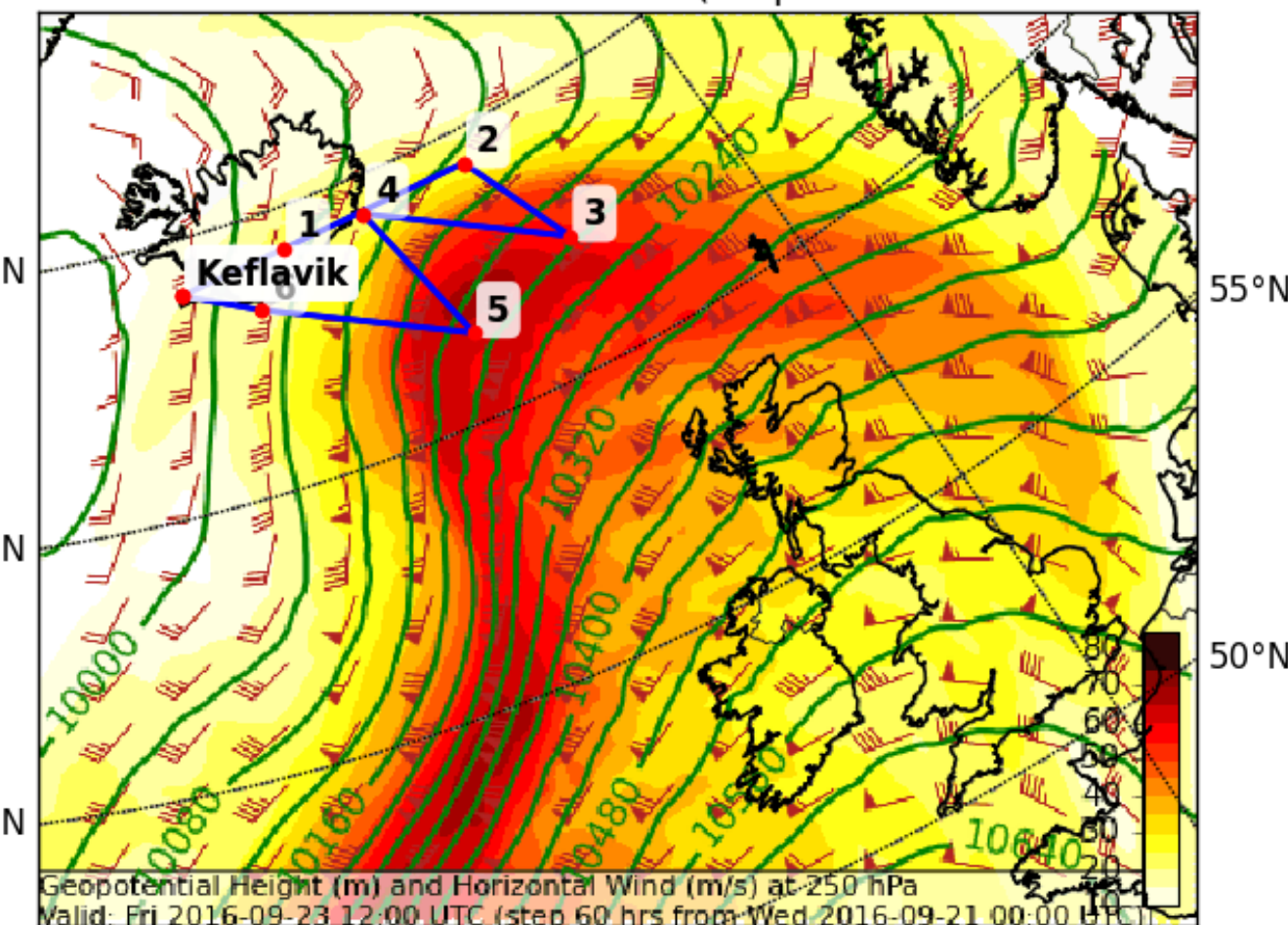


NOTAM Box



Flight planning for Friday 23 September 2016: FALCON

Geopotential Height (m) and Horizontal Wind (m/s) (Wind Speed 10-85 m/s) at 250 (hPa)
Valid: Fr 2016-09-23 12:00 UTC (step 60 hrs from Mi 2016-09-21 00:00 UTC)

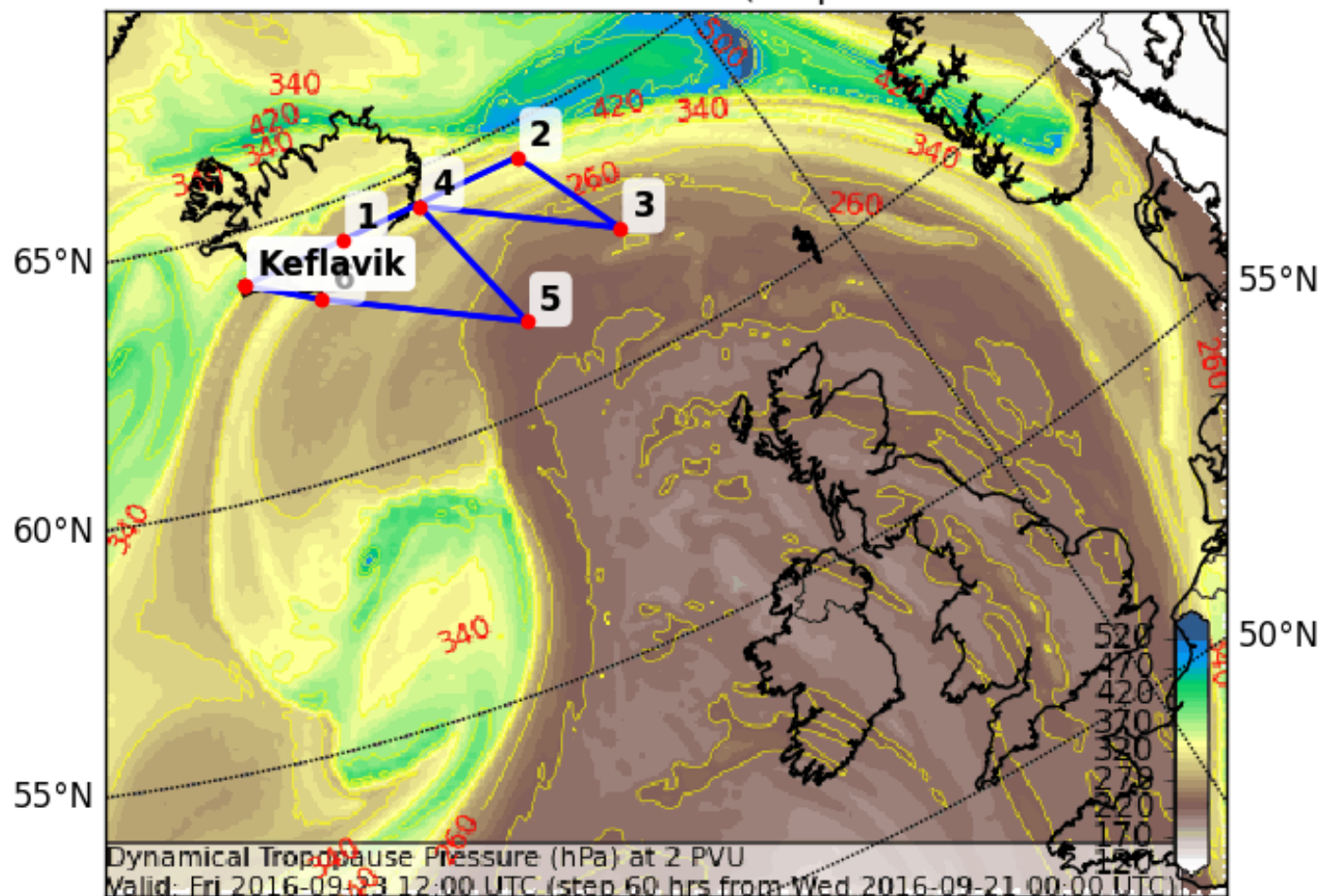


- Fly to jet maximum several times
- Coordinated with HALO leg 5- Keflavik
- Divergent outflow
- Total length: 2300km

Flight planning for Friday 23 September 2016: FALCON

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

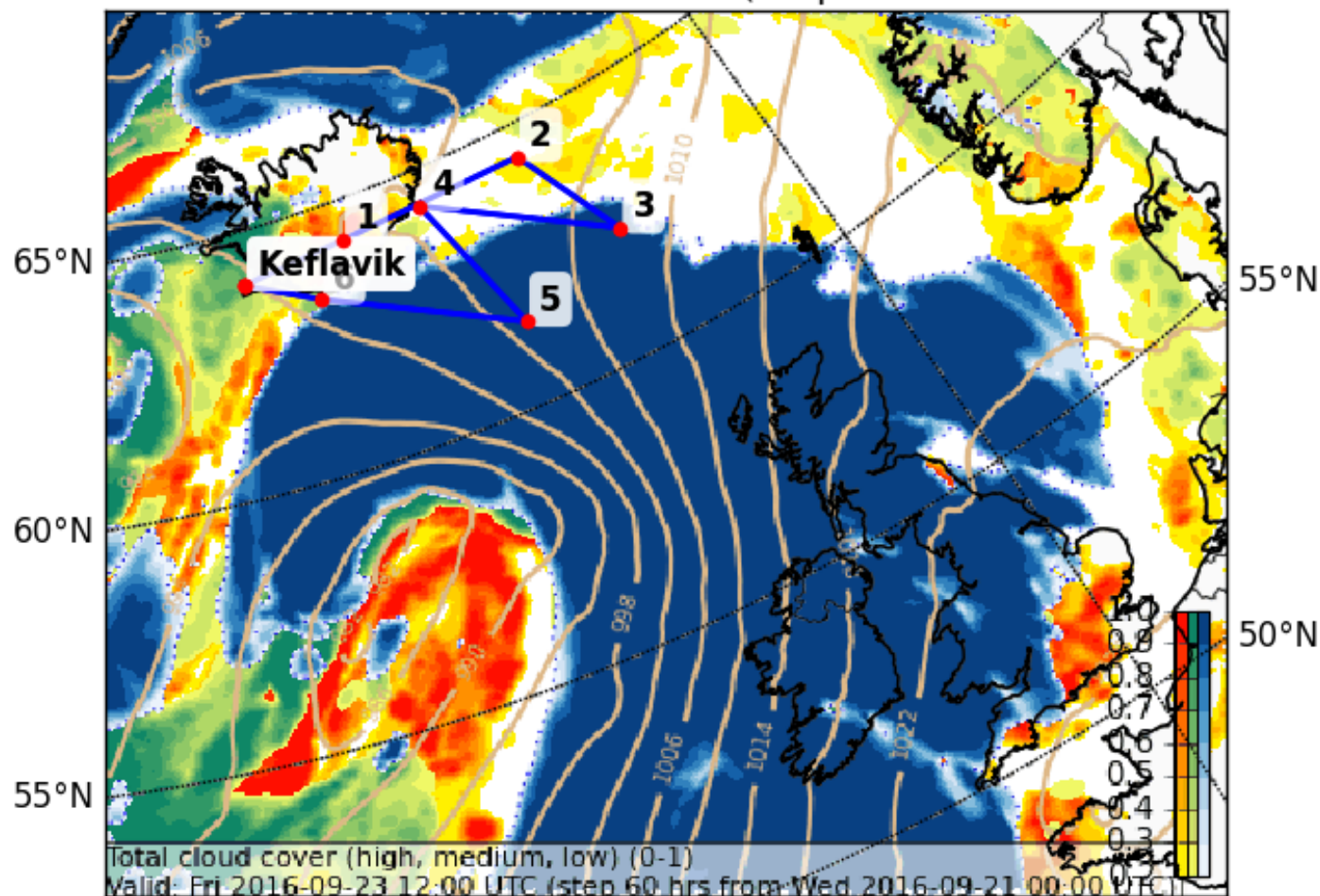
Valid: Fr 2016-09-23 12:00 UTC (step 60 hrs from Mi 2016-09-21 00:00 UTC)



Flight planning for Friday 23 September 2016: FALCON

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

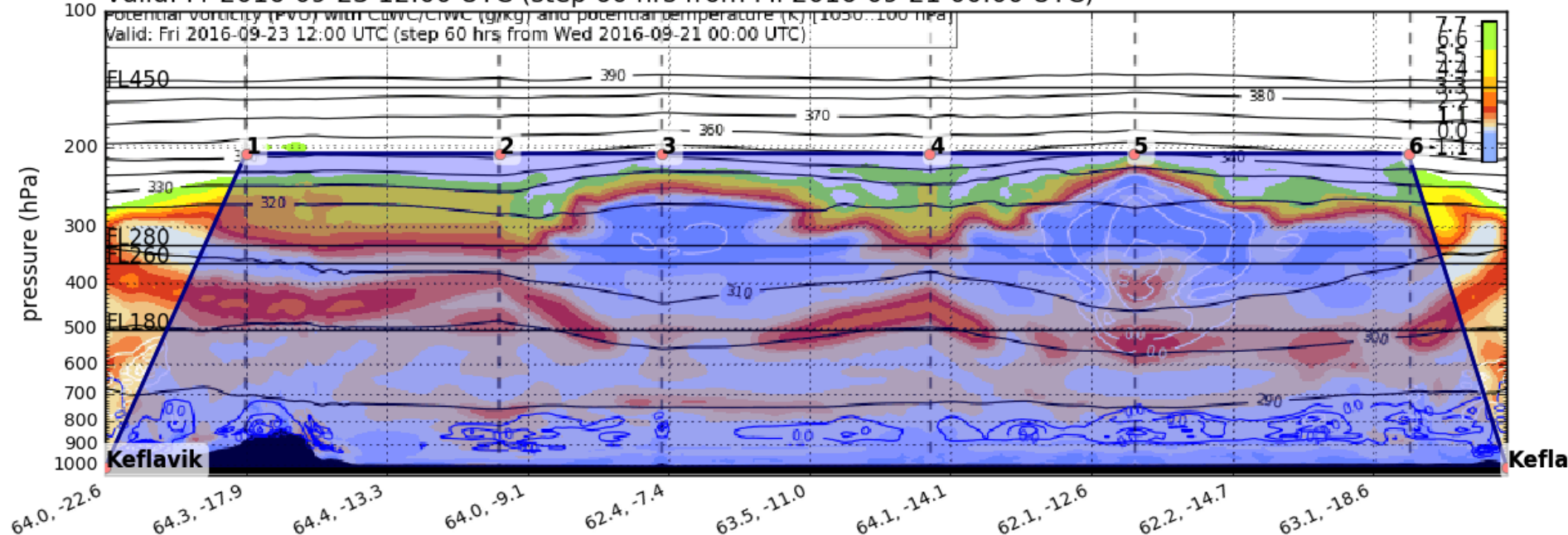
Valid: Fr 2016-09-23 12:00 UTC (step 60 hrs from Mi 2016-09-21 00:00 UTC)



Flight planning for Friday 23 September 2016: FALCON

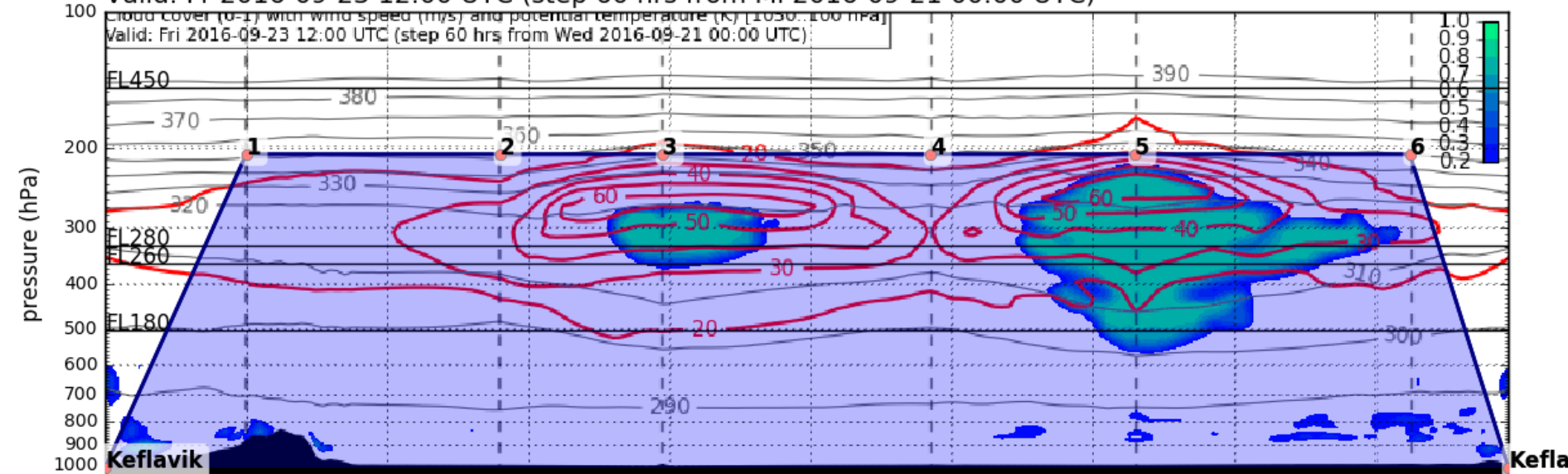
Potential Vorticity (PVU) Vertical Section (Northern Hemisphere)

Valid: Fr 2016-09-23 12:00 UTC (step 60 hrs from Mi 2016-09-21 00:00 UTC)



Cloud Cover (0-1) and Wind Speed (m/s) Vertical Section

Valid: Fr 2016-09-23 12:00 UTC (step 60 hrs from Mi 2016-09-21 00:00 UTC)

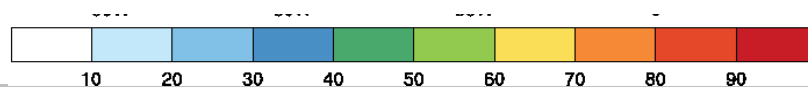
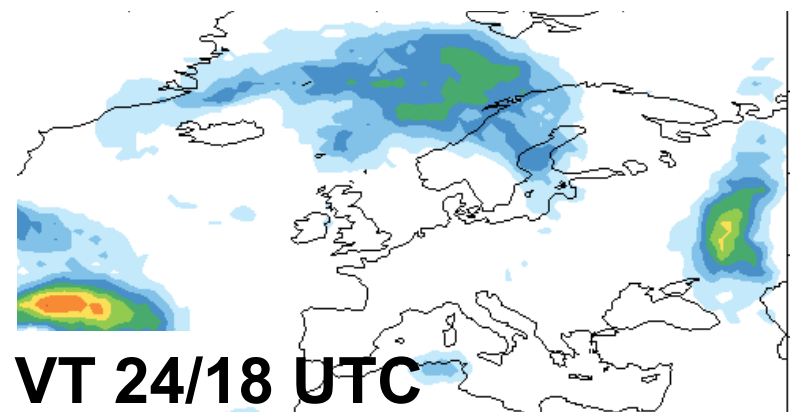
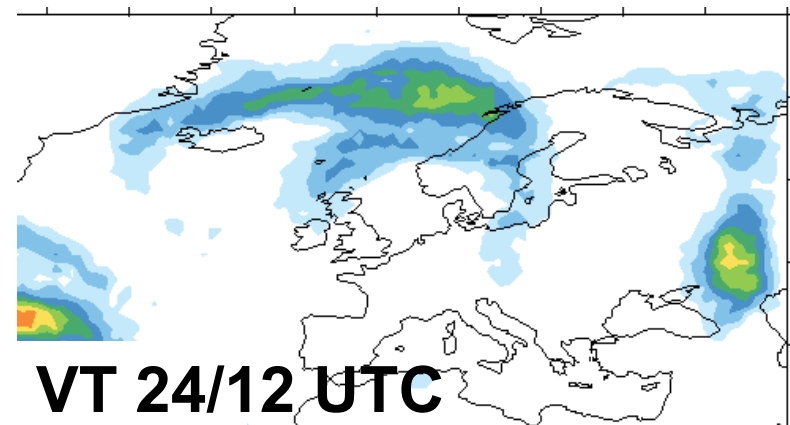
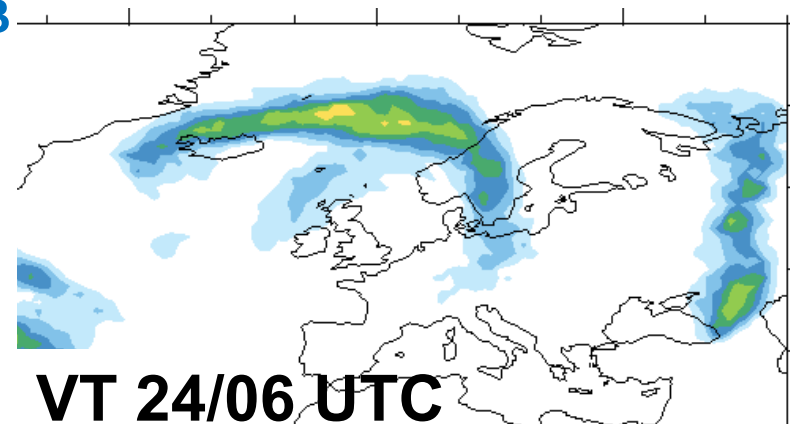


Possible Saturday flight

Friday/Saturday 23/24 September:

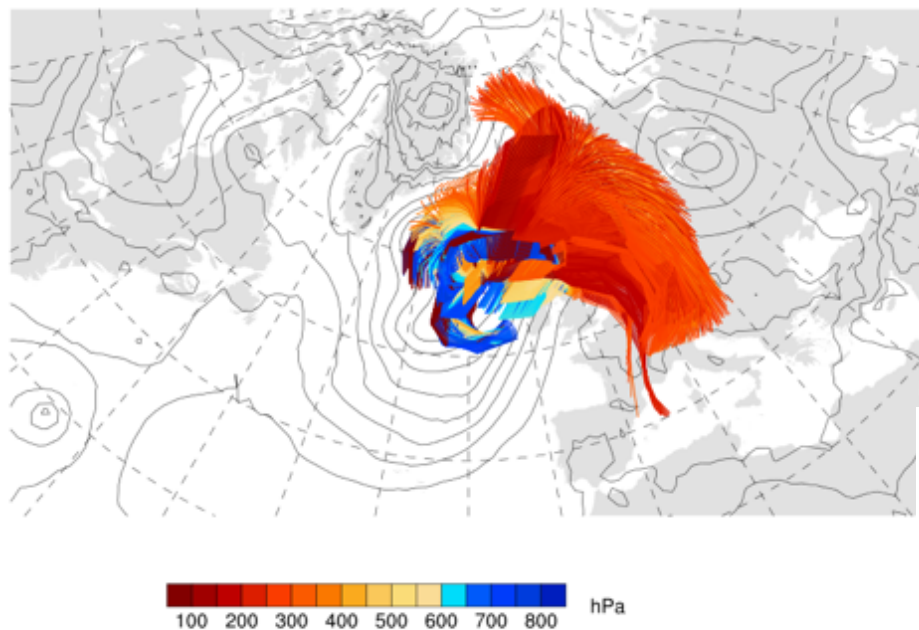
Possibility for Lagrangian measurement of a WCB

WCB outflow probabilities 24/06UTC



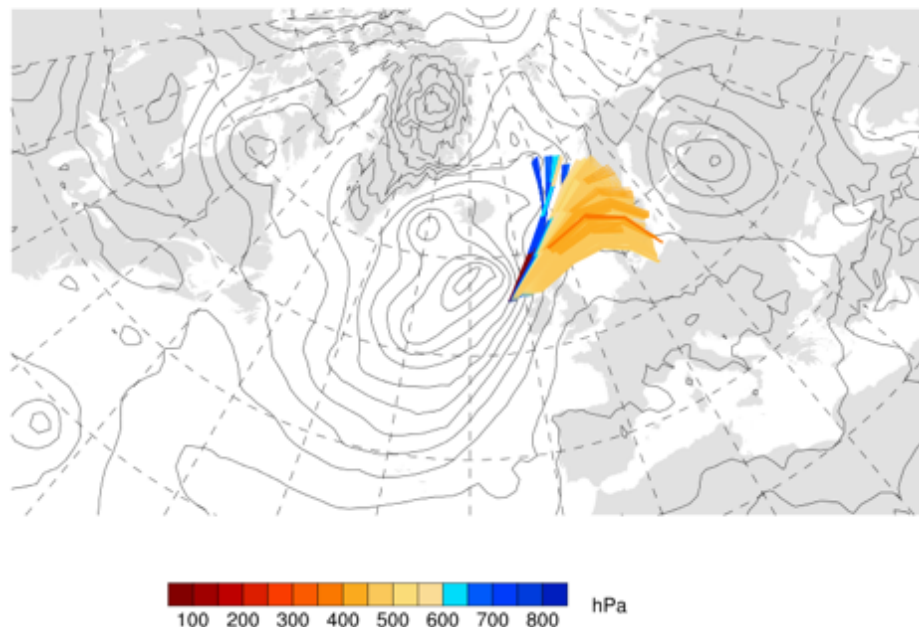
1-day forward trajectories for the Friday flights

From HALO track: Fri-Sam 18 UTC



Some Lagrangian matches possible, but overall flow situation not ideal to do this from Iceland.

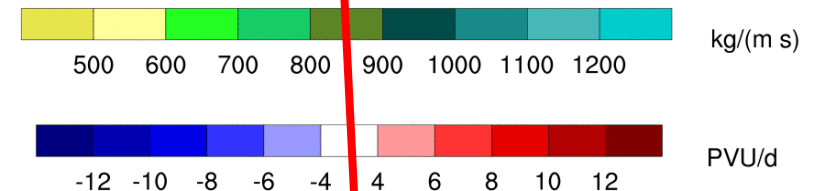
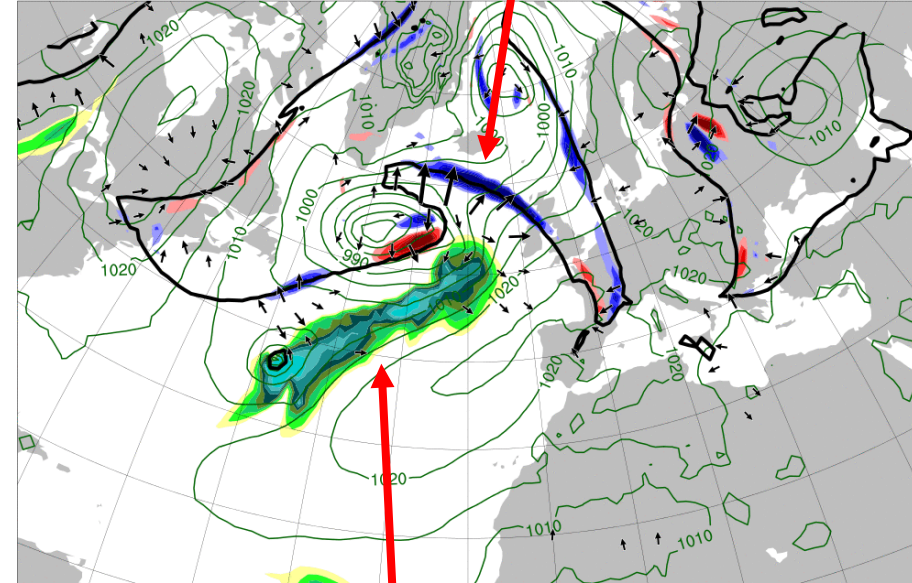
from FAAM track: Fri-Sam 12 UTC



Outlook ET Karl and DS cyclone scenarios

**Strong PV
advection by
divergent wind**

2 PVU (black contour), PV advection through divergent wind (shading),
divergent wind (vectors) @325K and MSL (green contours) at 20160926_06



Strong moisture fluxes feeds WCB

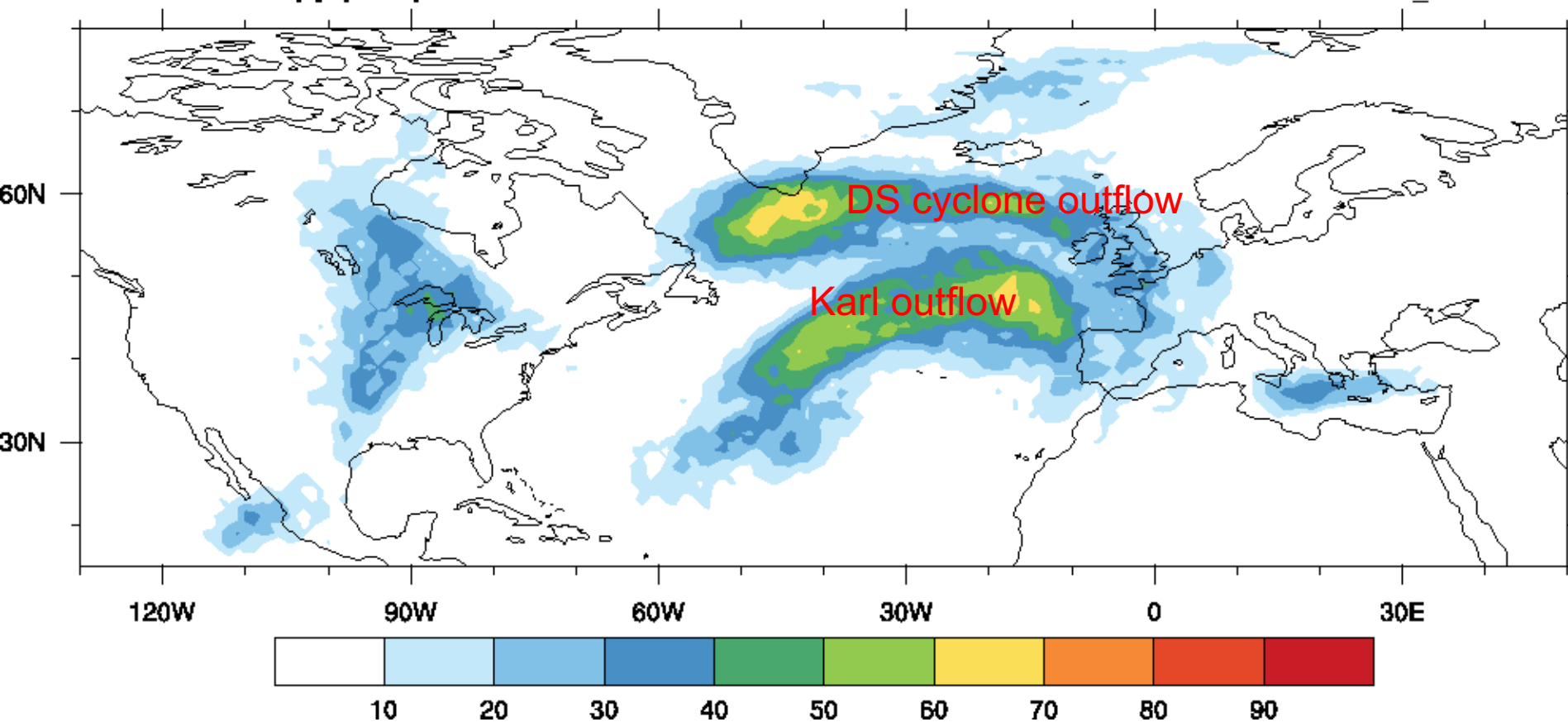
Outlook Sunday – Wednesday: DS cyclone extratropical transition of TC Karl

BT 21/00Z

VT Monday 26/06Z

ECMWF ensemble forecast
BT 20160921_00UTC
VT 20160926_06UTC

lt400hPa: Probability [%] of traj. occurrence in ENS



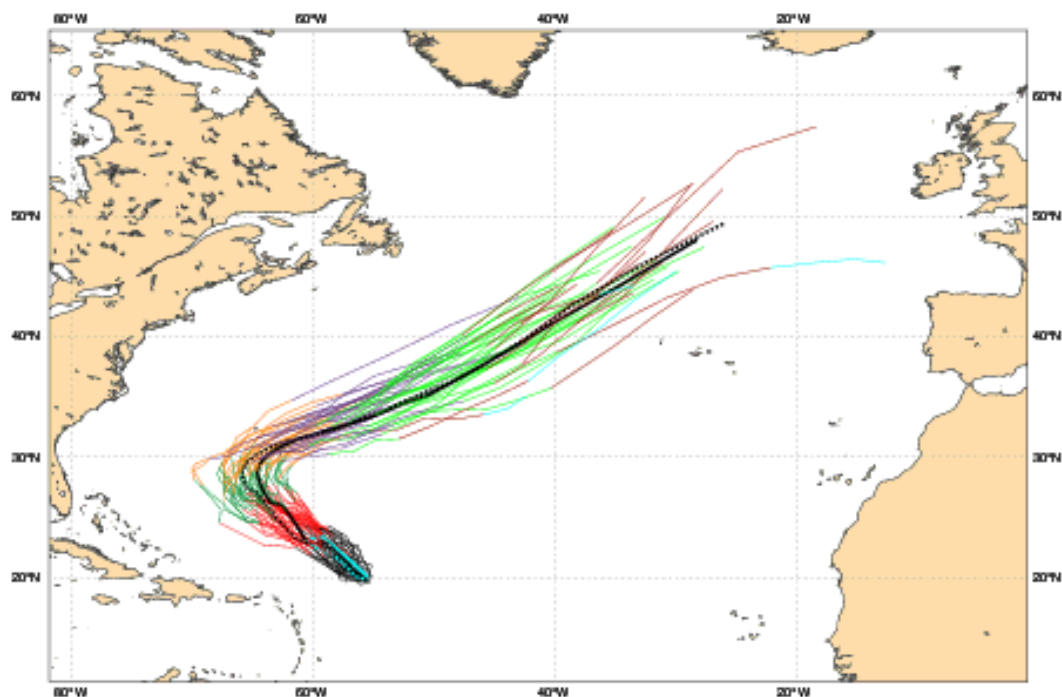
Outlook Sunday – Wednesday: extratropical transition of TC Karl

Date 20160921 00 UTC @ECMWF

Individual trajectories for **KARL** 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

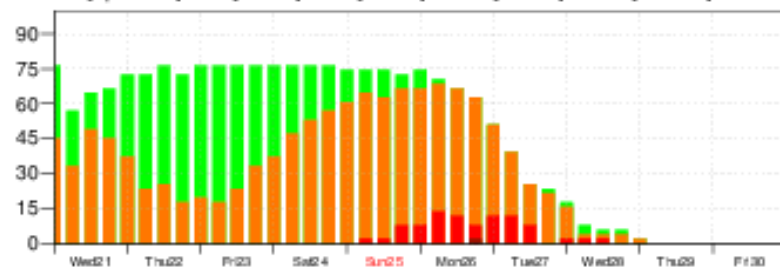


List of ensemble members numbers forecast Tropical Cyclone

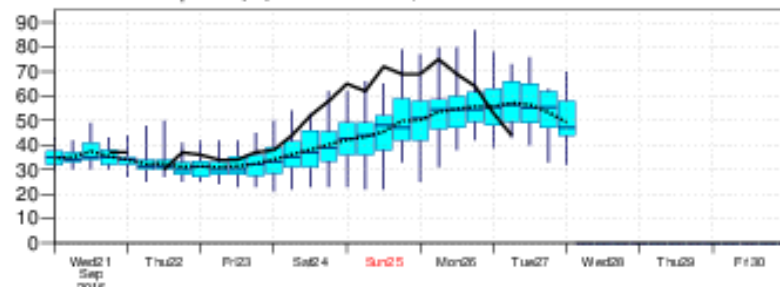
Intensity category in colours: **TD**[up to 33] **TS**[34-63] **HR1**[64-82] **HR2**[83-95] **HR3**[> 95 kt]

+024 h: td	02	03	04	05	06	07	08	09	10	11	12	13	15	16	18	19	20	21	22	23	25	27	28	29	30	31	32	33	34	35	37	38	39	42	44	46	48	50
+048 h: td	02	03	04	05	06	07	08	09	10	11	12	13	15	16	18	19	20	21	22	23	25	27	28	29	30	31	32	33	34	35	37	38	39	42	44	46	48	50
+072 h: td	02	03	04	05	06	07	08	09	10	11	12	13	15	16	18	19	20	21	22	23	25	27	28	29	30	31	32	33	34	35	37	38	39	42	44	46	48	50
+096 h: td	02	03	04	05	06	07	08	09	10	11	12	13	15	16	18	19	20	21	22	23	25	27	28	29	30	31	32	33	34	35	37	38	39	42	44	46	48	50
+120 h: td	02	03	04	05	06	07	08	09	10	11	12	13	15	16	18	19	20	21	22	23	25	27	28	29	30	31	32	33	34	35	37	38	39	42	44	46	48	50
+144 h: td	02	03	04	05	06	07	08	09	10	11	12	13	15	16	18	19	20	21	22	23	25	27	28	29	30	31	32	33	34	35	37	38	39	42	44	46	48	50
+168 h: td	02	03	04	05	06	07	08	09	10	11	12	13	15	16	18	19	20	21	22	23	25	27	28	29	30	31	32	33	34	35	37	38	39	42	44	46	48	50
+192 h: td	02	03	04	05	06	07	08	09	10	11	12	13	15	16	18	19	20	21	22	23	25	27	28	29	30	31	32	33	34	35	37	38	39	42	44	46	48	50
+216 h: td	02	03	04	05	06	07	08	09	10	11	12	13	15	16	18	19	20	21	22	23	25	27	28	29	30	31	32	33	34	35	37	38	39	42	44	46	48	50
+240 h: td	02	03	04	05	06	07	08	09	10	11	12	13	15	16	18	19	20	21	22	23	25	27	28	29	30	31	32	33	34	35	37	38	39	42	44	46	48	50

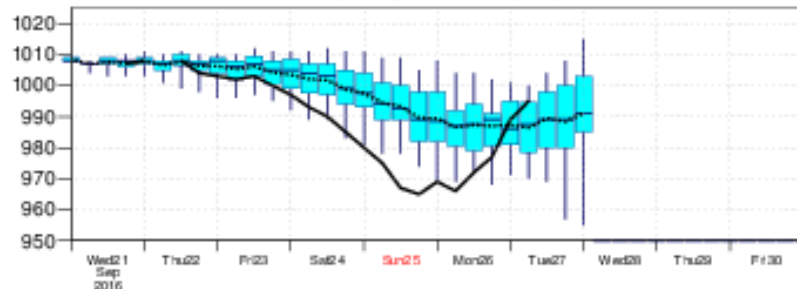
Probability (%) of Tropical Cyclone Intensity falling in each category
TD[up to 33] **TS** [34-63] **HR1**[64-82] **HR2** [83-95] **HR3** [> 95 kt]



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



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



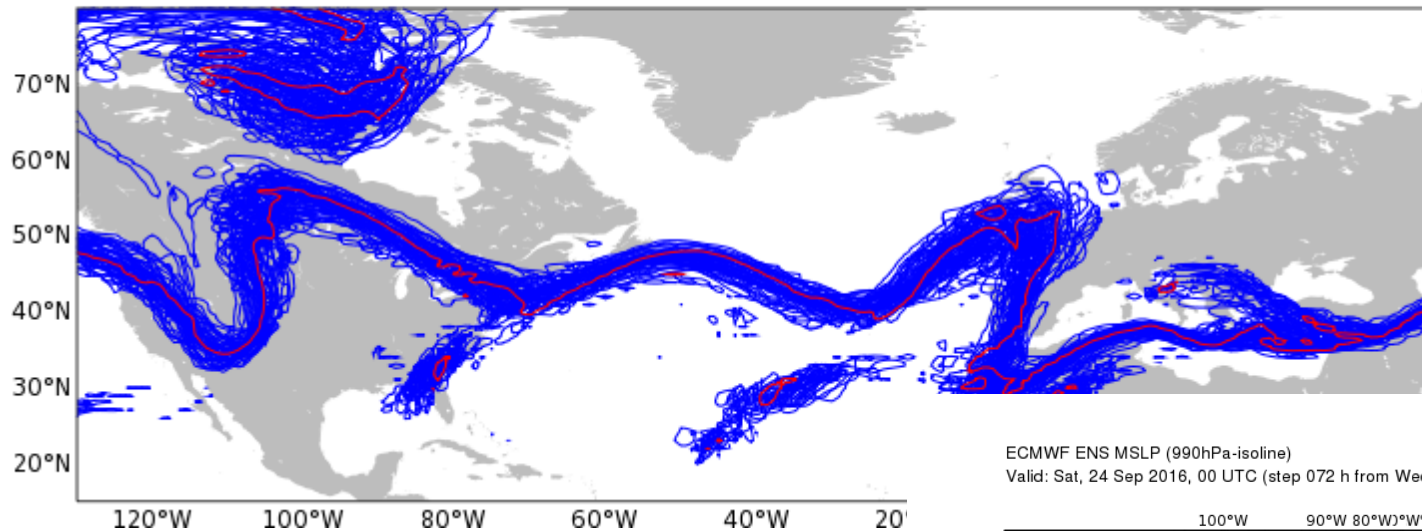
Outlook Sat 24/00Z to Thu 29/12Z : 2PVU@340K, MSLP 990-hPa isoline (based EC Ens 21/00Z)

Sat 24/00Z

ECMWF ENSEMBLE FC

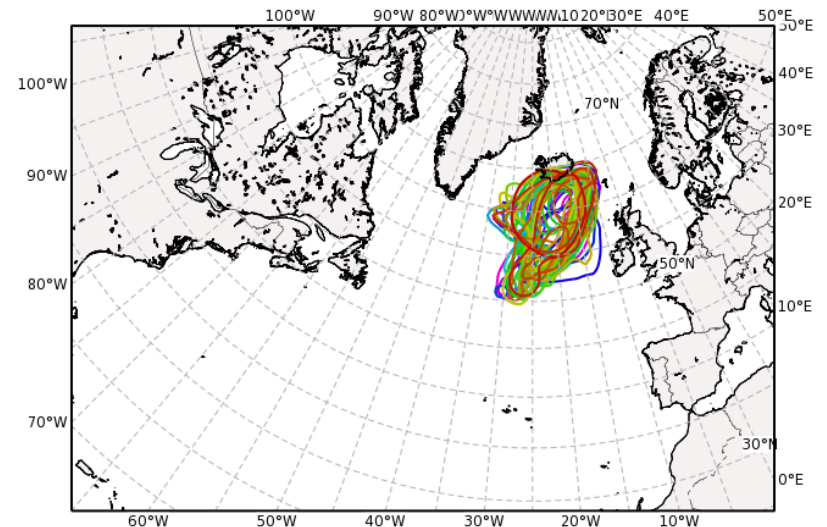
BT: 20160921 00UTC, VT: 20160924 00UTC

blue: perturbed, red: control



ECMWF ENS MSLP (990hPa-isoline)

Valid: Sat, 24 Sep 2016, 00 UTC (step 072 h from Wed, 21 Sep 2016, 00 UTC)



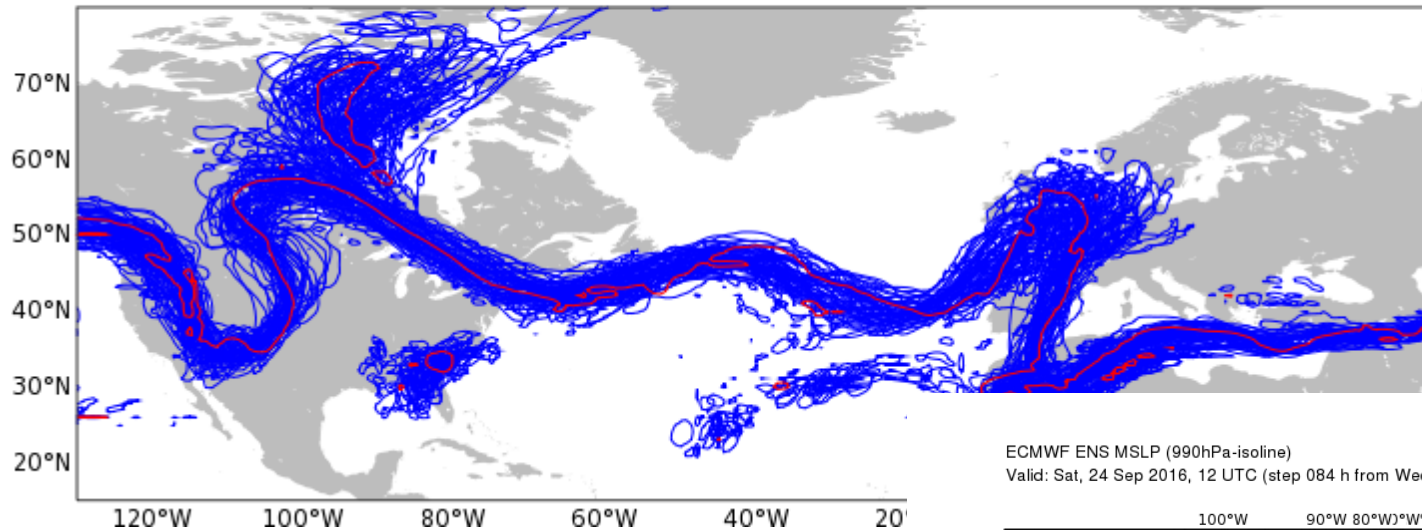
Outlook Sat 24/00Z to Thu 29/12Z : 2PVU@340K, MSLP 990-hPa isoline (based EC Ens 21/00Z)

Sat 24/12Z

ECMWF ENSEMBLE FC

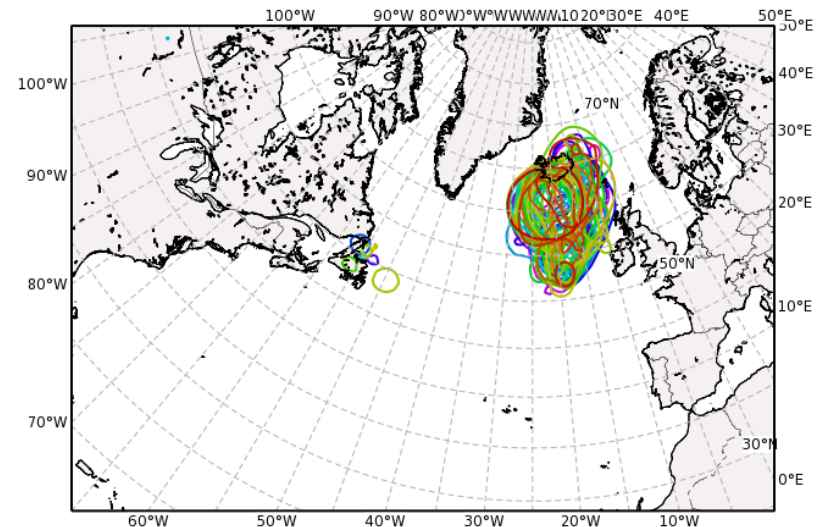
BT: 20160921 00UTC, VT: 20160924 12UTC

blue: perturbed, red: control



ECMWF ENS MSLP (990hPa-isoline)

Valid: Sat, 24 Sep 2016, 12 UTC (step 084 h from Wed, 21 Sep 2016, 00 UTC)



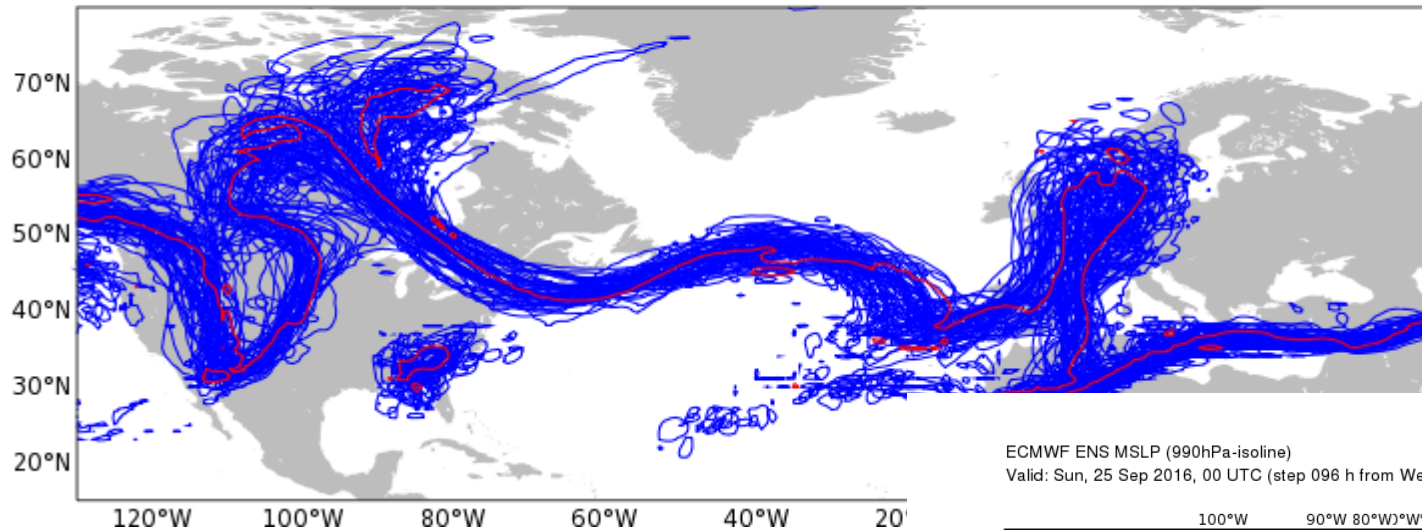
Outlook Sat 24/00Z to Thu 29/12Z : 2PVU@340K, MSLP 990-hPa isoline (based EC Ens 21/00Z)

Sun 25/00Z

ECMWF ENSEMBLE FC

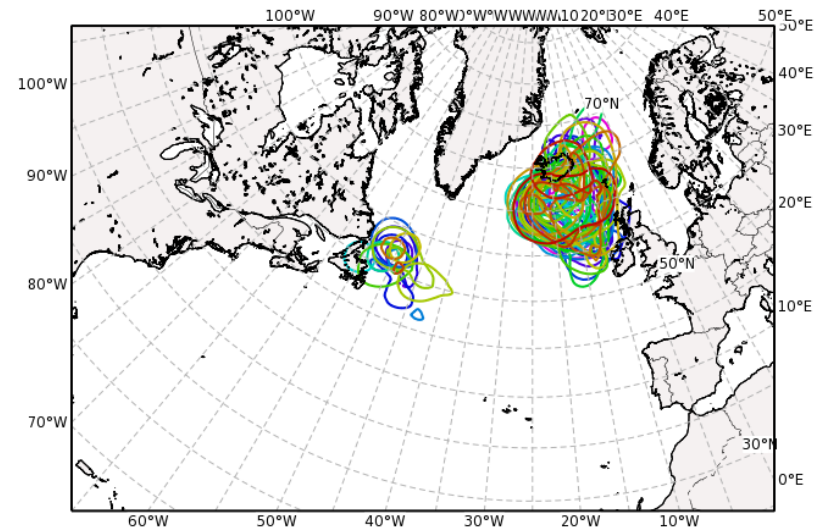
BT: 20160921 00UTC, VT: 20160925 00UTC

blue: perturbed, red: control



ECMWF ENS MSLP (990hPa-isoline)

Valid: Sun, 25 Sep 2016, 00 UTC (step 096 h from Wed, 21 Sep 2016, 00 UTC)



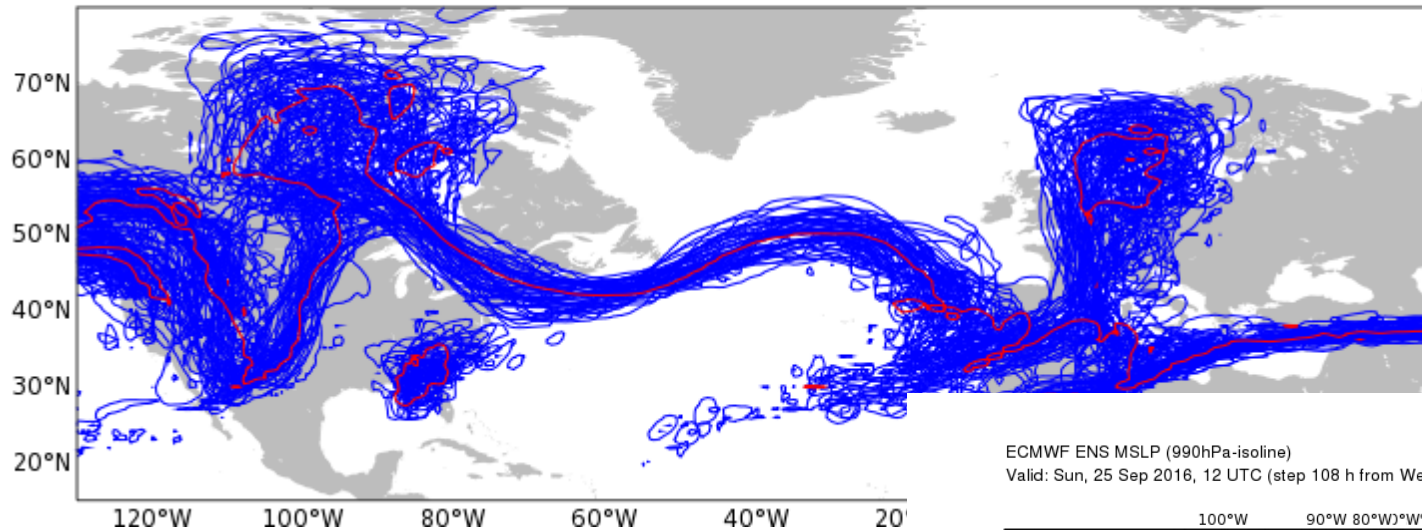
Outlook Sat 24/00Z to Thu 29/12Z : 2PVU@340K, MSLP 990-hPa isoline (based EC Ens 21/00Z)

Sun 25/12Z

ECMWF ENSEMBLE FC

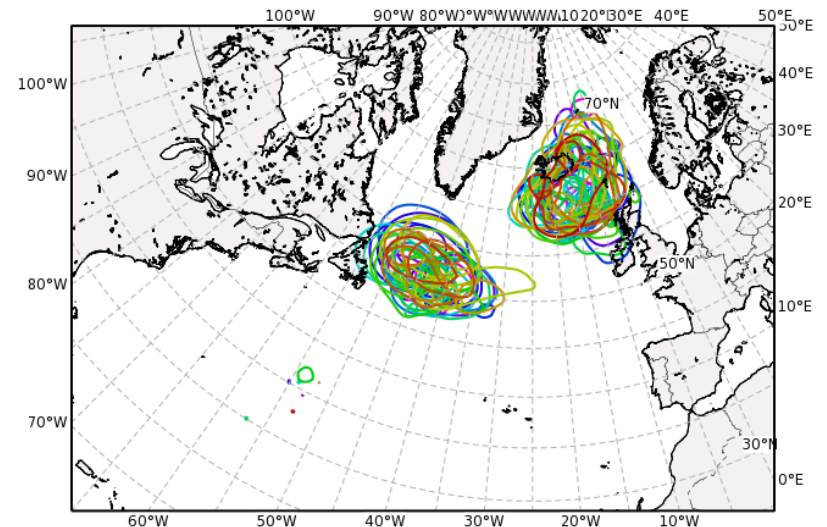
BT: 20160921 00UTC, VT: 20160925 12UTC

blue: perturbed, red: control



ECMWF ENS MSLP (990hPa-isoline)

Valid: Sun, 25 Sep 2016, 12 UTC (step 108 h from Wed, 21 Sep 2016, 00 UTC)



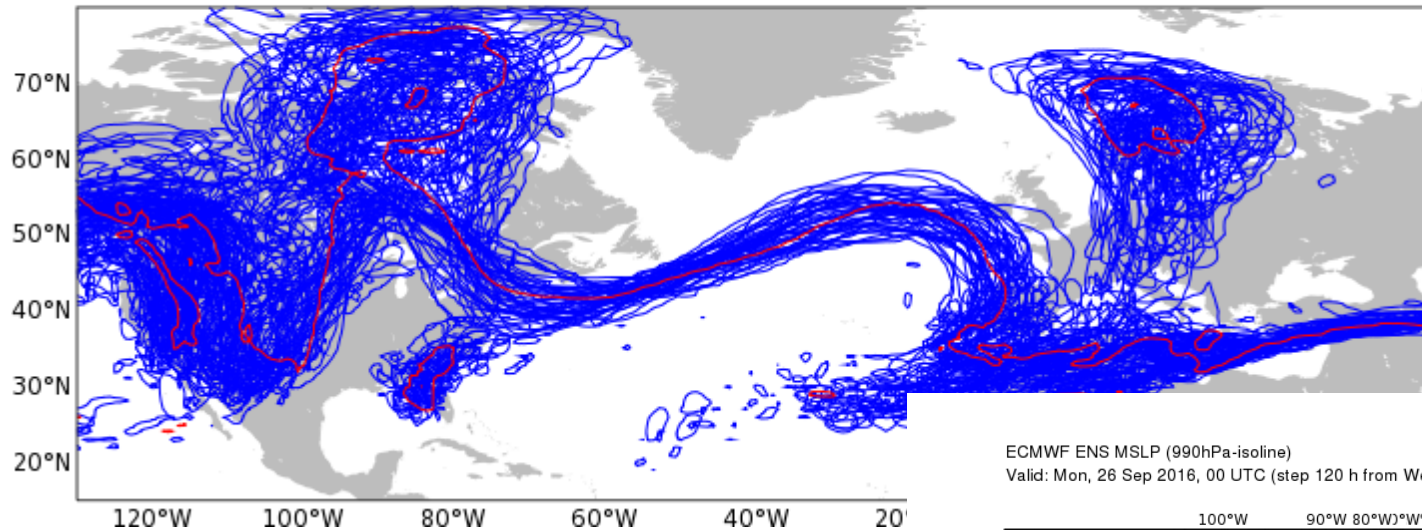
Outlook Sat 24/00Z to Thu 29/12Z : 2PVU@340K, MSLP 990-hPa isoline (based EC Ens 21/00Z)

Mon 26/00Z

ECMWF ENSEMBLE FC

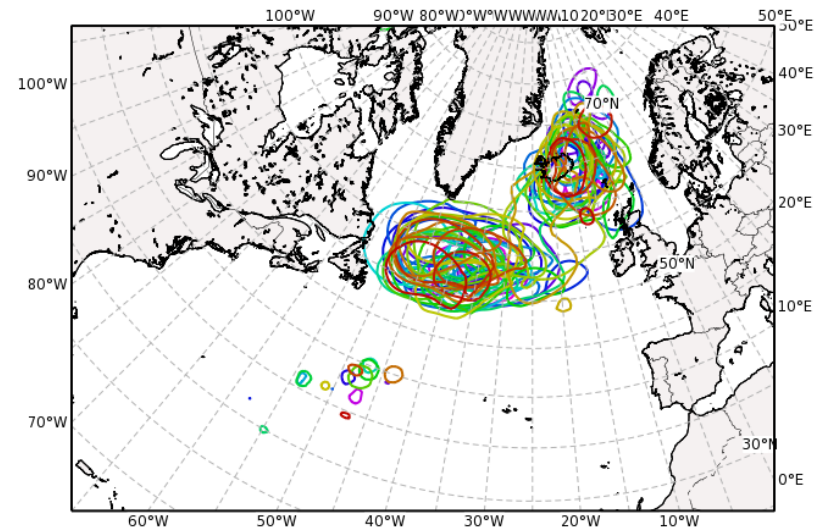
BT: 20160921 00UTC, VT: 20160926 00UTC

blue: perturbed, red: control



ECMWF ENS MSLP (990hPa-isoline)

Valid: Mon, 26 Sep 2016, 00 UTC (step 120 h from Wed, 21 Sep 2016, 00 UTC)



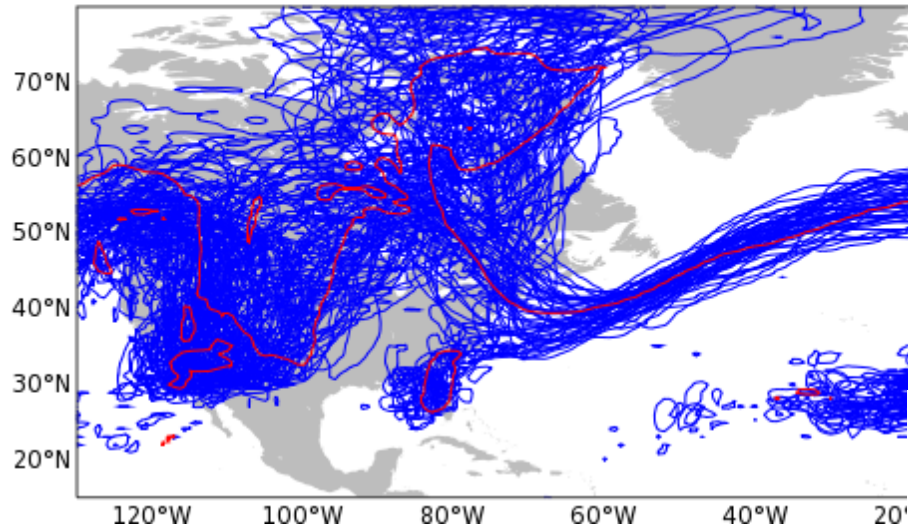
Outlook Sat 24/00Z to Thu 29/12Z : 2PVU@340K, MSLP 990-hPa isoline (based EC Ens 21/00Z)

Mon 26/12Z

ECMWF ENSEMBLE FC

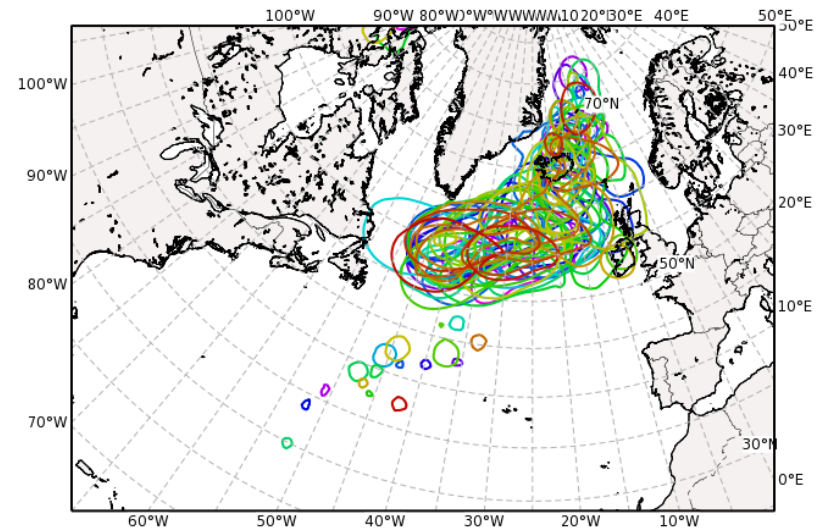
BT: 20160921 00UTC, VT: 20160926 12UTC

blue: perturbed, red: control



ECMWF ENS MSLP (990hPa-isoline)

Valid: Mon, 26 Sep 2016, 12 UTC (step 132 h from Wed, 21 Sep 2016, 00 UTC)



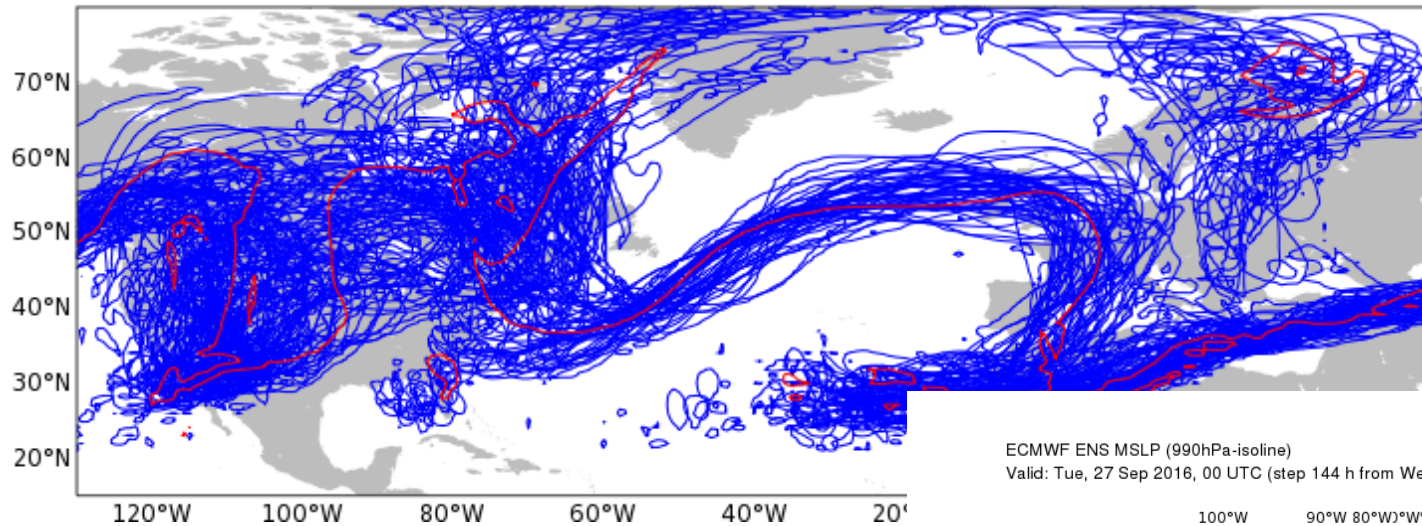
Outlook Sat 24/00Z to Thu 29/12Z : 2PVU@340K, MSLP 990-hPa isoline (based EC Ens 21/00Z)

Tue 27/00Z

ECMWF ENSEMBLE FC

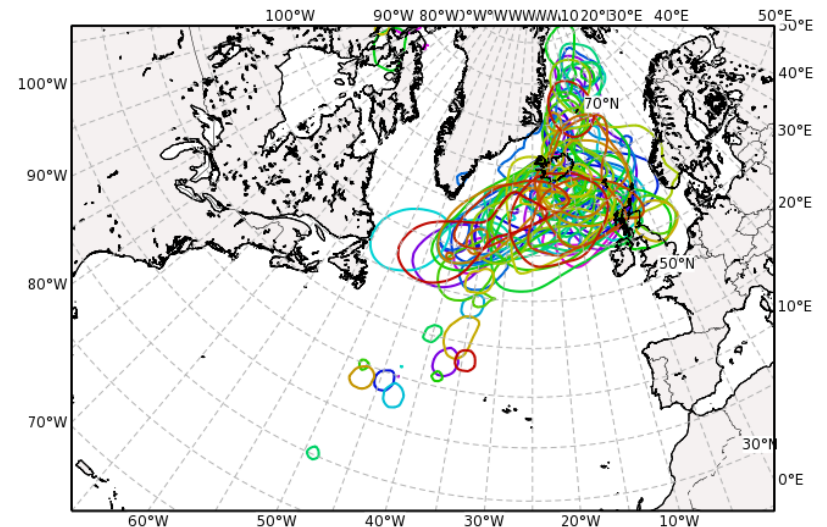
BT: 20160921 00UTC, VT: 20160927 00UTC

blue: perturbed, red: control



ECMWF ENS MSLP (990hPa-isoline)

Valid: Tue, 27 Sep 2016, 00 UTC (step 144 h from Wed, 21 Sep 2016, 00 UTC)



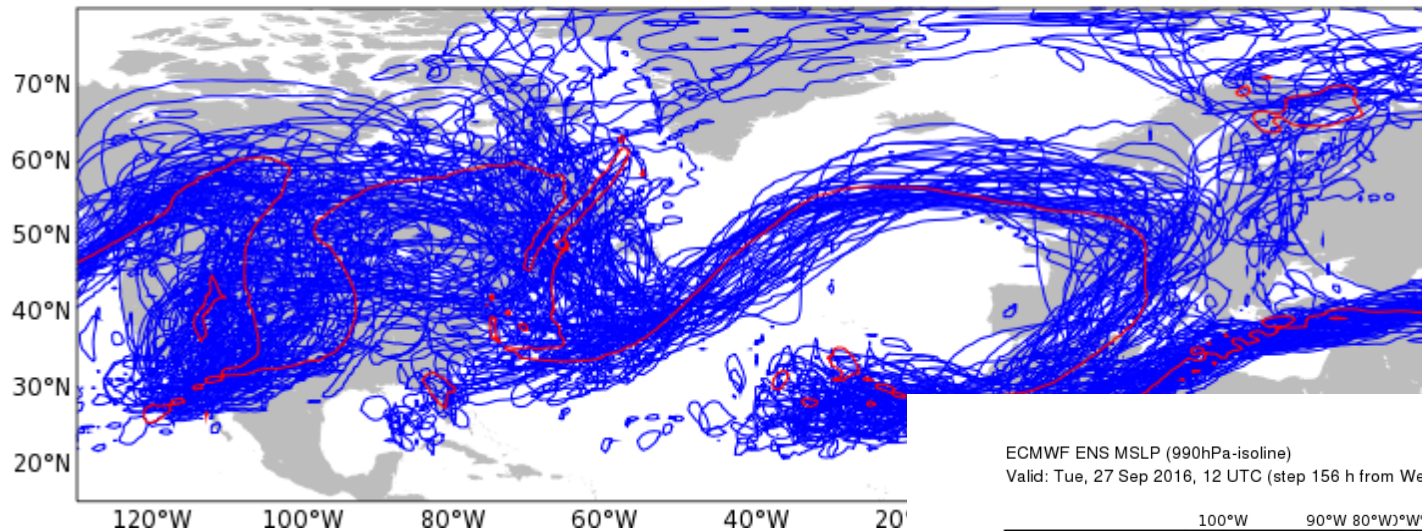
Outlook Sat 24/00Z to Thu 29/12Z : 2PVU@340K, MSLP 990-hPa isoline (based EC Ens 21/00Z)

Tue 27/12Z

ECMWF ENSEMBLE FC

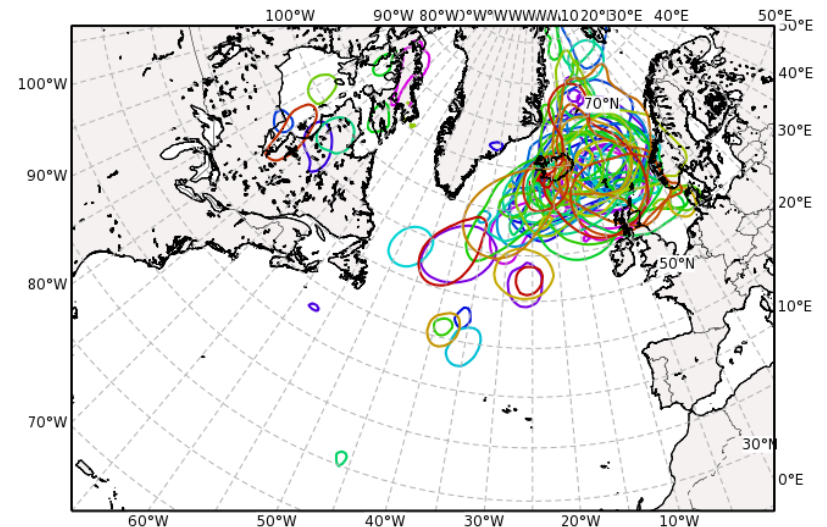
BT: 20160921 00UTC, VT: 20160927 12UTC

blue: perturbed, red: control



ECMWF ENS MSLP (990hPa-isoline)

Valid: Tue, 27 Sep 2016, 12 UTC (step 156 h from Wed, 21 Sep 2016, 00 UTC)



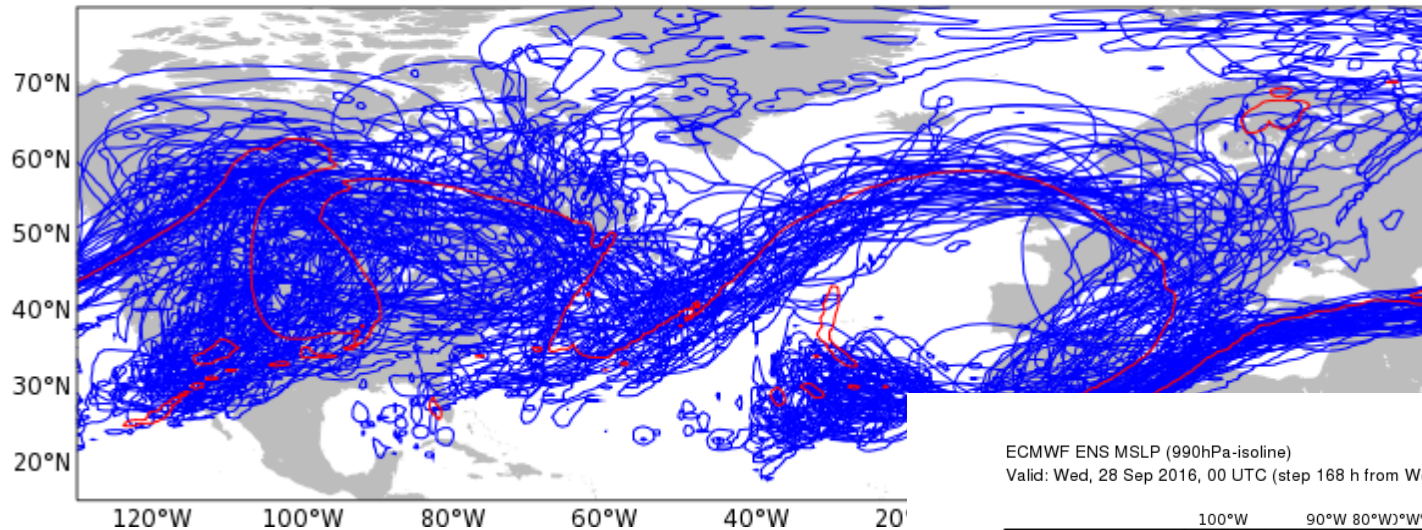
Outlook Sat 24/00Z to Thu 29/12Z : 2PVU@340K, MSLP 990-hPa isoline (based EC Ens 21/00Z)

Wed 28/00Z

ECMWF ENSEMBLE FC

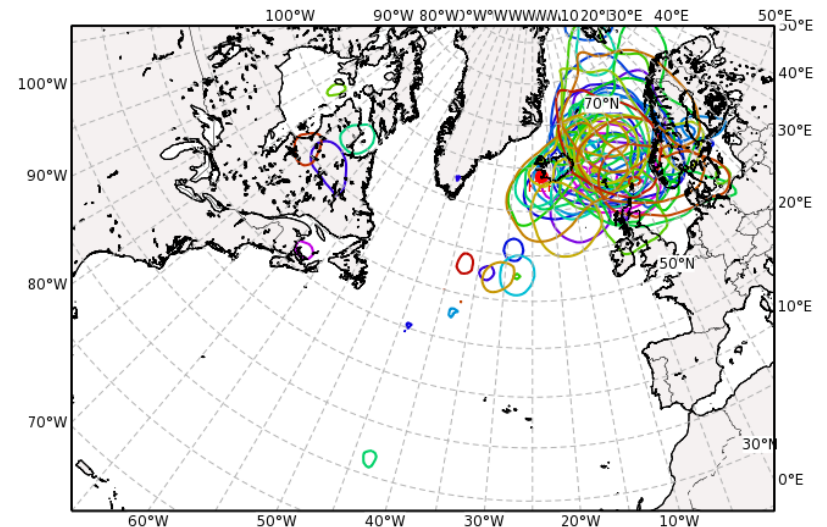
BT: 20160921 00UTC, VT: 20160928 00UTC

blue: perturbed, red: control



ECMWF ENS MSLP (990hPa-isoline)

Valid: Wed, 28 Sep 2016, 00 UTC (step 168 h from Wed, 21 Sep 2016, 00 UTC)



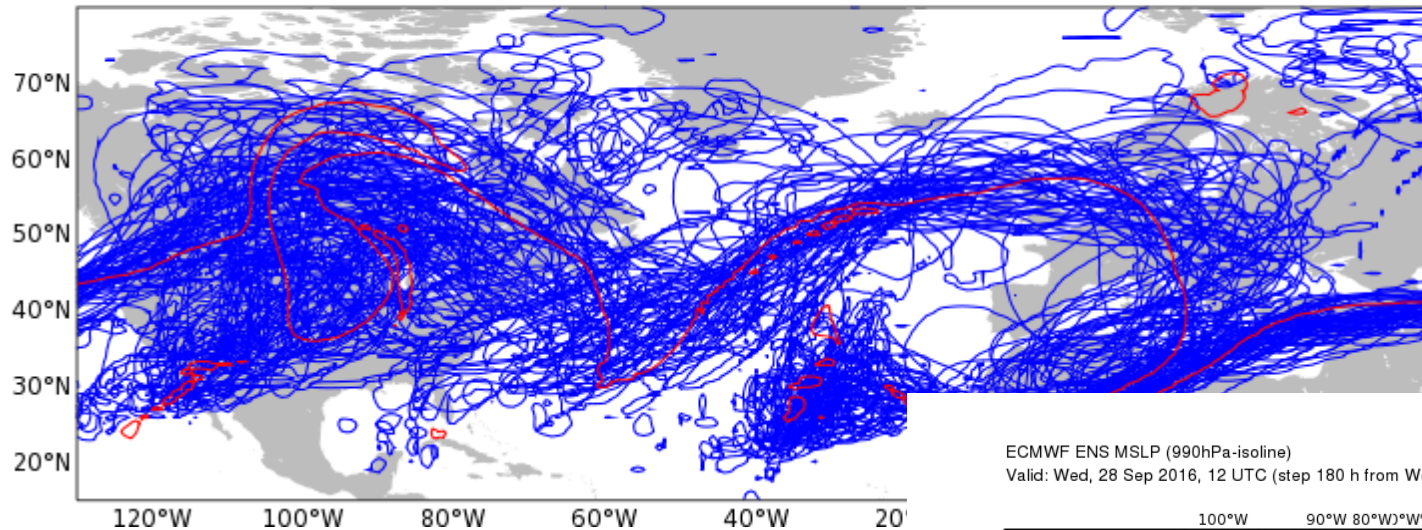
Outlook Sat 24/00Z to Thu 29/12Z : 2PVU@340K, MSLP 990-hPa isoline (based EC Ens 21/00Z)

Wed 28/12Z

ECMWF ENSEMBLE FC

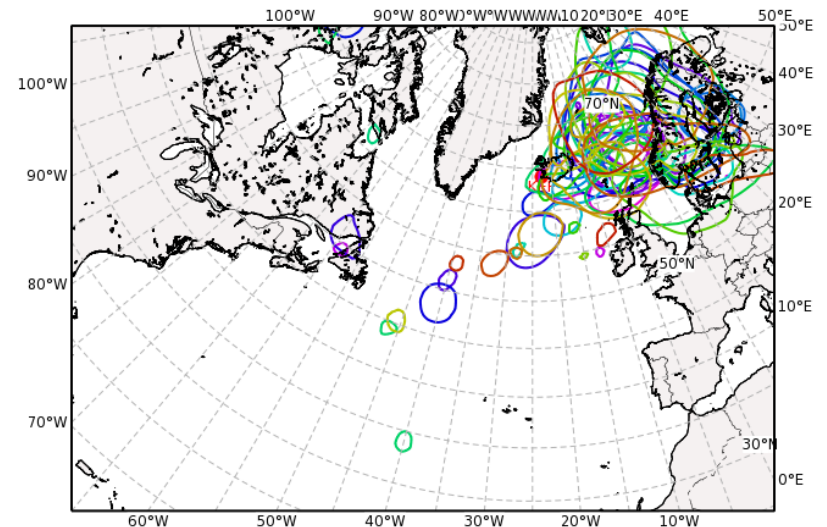
BT: 20160921 00UTC, VT: 20160928 12UTC

blue: perturbed, red: control



ECMWF ENS MSLP (990hPa-isoline)

Valid: Wed, 28 Sep 2016, 12 UTC (step 180 h from Wed, 21 Sep 2016, 00 UTC)



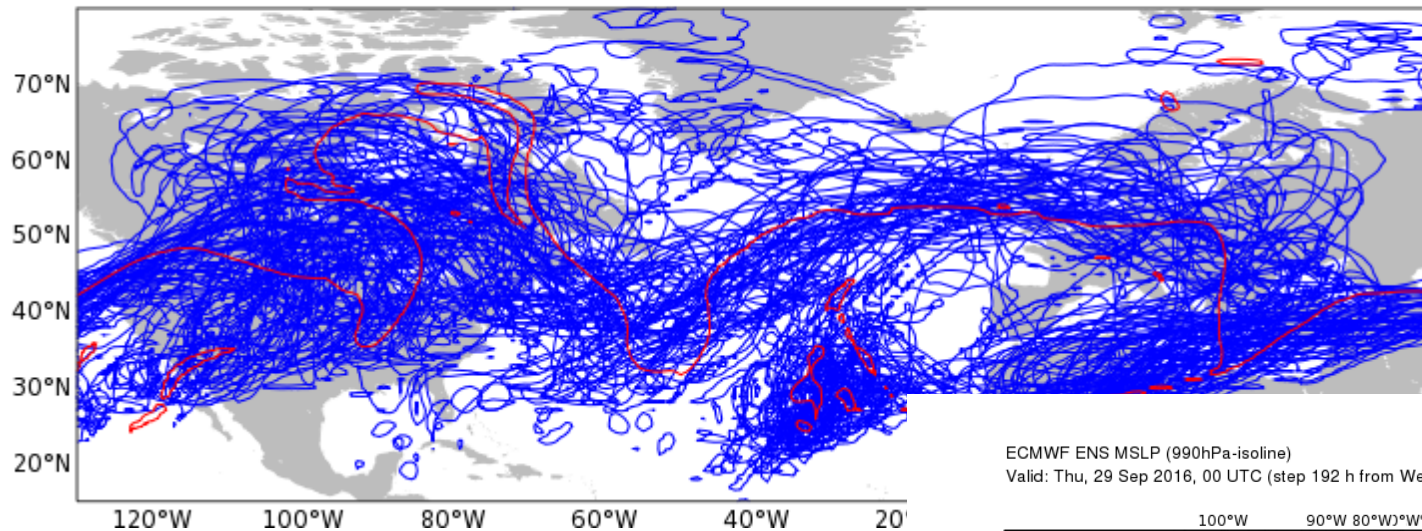
Outlook Sat 24/00Z to Thu 29/12Z : 2PVU@340K, MSLP 990-hPa isoline (based EC Ens 21/00Z)

Thu 29/00Z

ECMWF ENSEMBLE FC

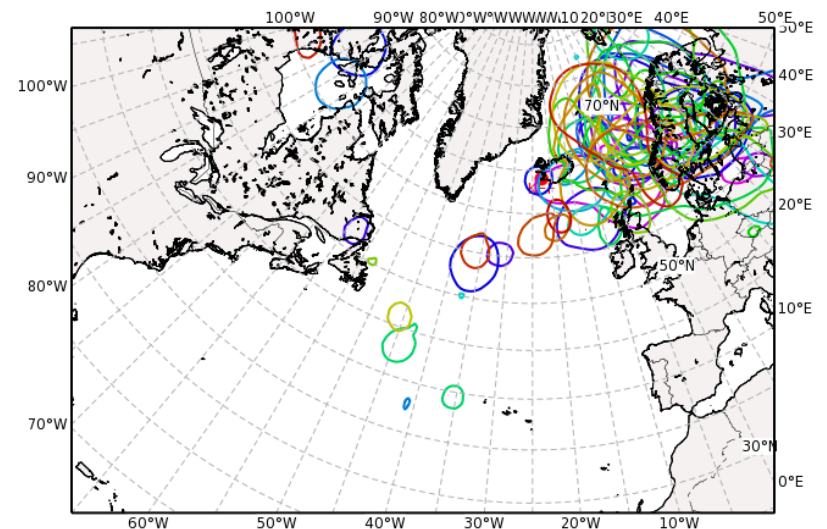
BT: 20160921 00UTC, VT: 20160929 00UTC

blue: perturbed, red: control



ECMWF ENS MSLP (990hPa-isoline)

Valid: Thu, 29 Sep 2016, 00 UTC (step 192 h from Wed, 21 Sep 2016, 00 UTC)



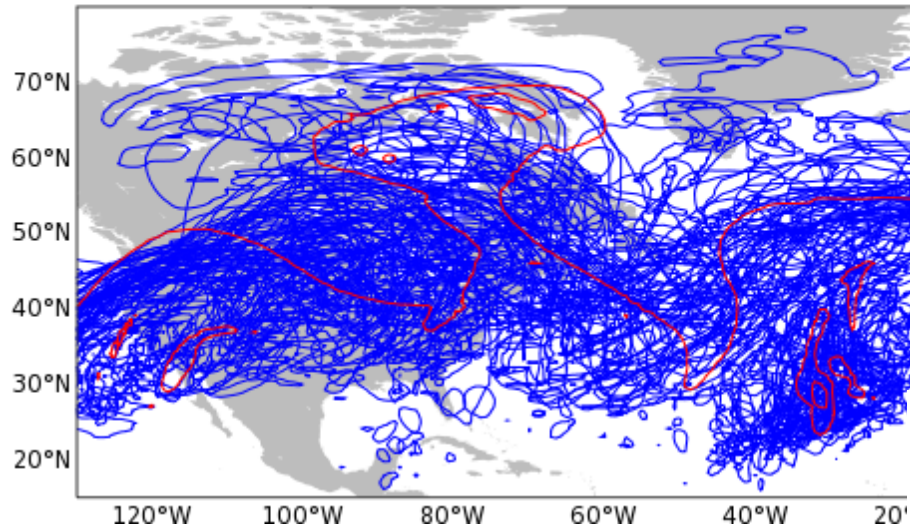
Outlook Sat 24/00Z to Thu 29/12Z : 2PVU@340K, MSLP 990-hPa isoline (based EC Ens 21/00Z)

Thu 29/12Z

ECMWF ENSEMBLE FC

BT: 20160921 00UTC, VT: 20160929 12UTC

blue: perturbed, red: control



ECMWF ENS MSLP (990hPa-isoline)

Valid: Thu, 29 Sep 2016, 12 UTC (step 204 h from Wed, 21 Sep 2016, 00 UTC)

