

	NAWDEX 2016 Weather summary	Date: 03 October 2016 Author: A. Schaefer, B. Crezee, J.Riboldi

Synoptic analysis (Monday 3 Oct)

After having brought strong winds (gusts >25m/s) over Keflavik on Sunday 02 and Monday 03 October, the occluded “Saturday cyclone” is gradually weakening and is centered at 12Z southwest of Iceland, around 37 W, 61 N. WCB activity and meridional moisture transport are still present just W of the British Isles, associated with a broad PV streamer extending southward until 40N. The ridge enhanced by the multiple WCBs of the cyclone extends in the North Atlantic up to 75N: the circulation associated with it promotes the downstream elongation of a narrow PV streamer over central Europe and its subsequent breaking. This latest system leads during the forecast period to heavy precipitations in a broad region between Germany, Poland and the Carpathians.

A new frontal wave is developing off the coast of Newfoundland around 55W, 40N in a region which is very rich in subtropical moisture. It exhibits a weak 1005 hPa surface low, has a low level PV signature and it is not directly linked to upper level PV structures: the peculiar structure of this storm identifies it as a so-called “Diabatic Rossby Wave” (DRW). The explosive and rapid evolution of this weather system and the transport of the moisture associated with it will become objects of investigation in the incoming days.

Forecast Day 1 (Tuesday 4 Oct)

During the evening and the night on Tuesday the “frontal wave cyclone” undergoes explosive intensification: the ECMWF model predicts its central pressure to be already 975hPa at 12UTC and 965hPa in the evening. The storm develops also a strong PV tower at its center, with low level values of PV higher than 3pvu. This very rapid intensification coincides with a northward acceleration of the system, that rapidly approaches 60N during the day and starts to affect Iceland. The motion of the cyclone carries high values of subtropical moisture at its eastern flank and this very moist air mass, advected northward, is expected to produce heavy rain over Iceland between Wednesday and Thursday. The remainants of the “Saturday cyclone” merge with this new system during the day. A very rapid ridgebuilding, associated with a WCB, occurs downstream of the cyclone: the ridge reaches Iceland in the evening. The sudden ridgebuilding promotes also the erosion of the pre-existing PV streamer over the Atlantic, which evolves into a PV cut-off over the Bay of Biscay.

Forecast Day 2 (Wednesday 5 Oct)

The “frontal wave cyclone” deepens again slightly during the night to 960hPa, then gradually starts to weaken during the day. It is centered near the southern tip of Greenland, around 35W,60N and remains almost stationary. The cyclone is now embedded in a PV streamer over western Atlantic: it is bounded at the eastern flank by a meridionally aligned jet streak, which brings the very broad WCB

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outflow directly above Iceland. Moisture transport at low levels continues under the jet from South to North and is associated to heavy rain and strong winds (>15m/s) over West Iceland. The ridgebuilding initiated in the previous day also is ongoing and brings temperate air masses up to 75N: this massive ridge originated from the diabatic outflow of the cyclone occupies now the whole North Atlantic, west of Iceland, and almost all scandinavian countries, and translates itself into a strong blocking anticyclone over Scandinavia (>1045hPa) that persists during the whole forecast period.

Forecast Day 3 (Thursday 6 Oct)

The situation depicted at Day 2 does not vary significantly on Thursday: the “frontal wave” cyclone remains stationary and keeps weakening near Greenland, the jet remains stationary just west of Iceland and keeps a straight S-N orientation, moisture transport continues along the same direction and brings again rain to the South of Iceland. WCB outflows are still present in the morning over the North Atlantic, but no further WCB activity associated to the cyclone develops.

The cut-off originally located over the Bay of Biscay moves into the Mediterranean Sea during the morning and leads to cyclogenesis and heavy rain over Southern France and, during the day, Northern Italy. The interplay of this system with the cut-off over Central Europe brings precipitations over a broad area encompassing France, Italy, the Balkans and the Alpine region.

Forecast Outlook

The situation over Iceland and the North Atlantic remains similar during the following days, with the development of another weaker frontal wave cyclone between 40 and 50N that remains out of reach. Iceland is always located at the edge of the PV streamer and the flow over Europe is blocked and constrained by the big blocking anticyclone over Scandinavia. Persistence of the circulation pattern can lead to heavy precipitation events over various regions of Europe.

Scientific discussion

- The cyclone developing over the North Atlantic on Tuesday is associated with severe weather, strong diabatic outflow and moisture transport to Iceland. It moves rapidly northward to the southern coast of Greenland.
- The strong diabatic outflow promotes a ridgebuilding that merges with a pre-existing ridge over Scandinavia: this contributes to the creation of a very broad blocking anticyclone and has consequences for the weather over Europe.