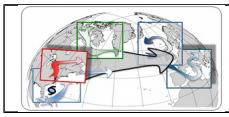
|  | **NAWDEX 2016**<br>**Weather summary** | **Date: 25/09/2016**<br>**Author: J. Quinting, H. Binder** |
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## Synoptic Analysis

A deep trough over eastern North America, a zonal flow over the North Atlantic, and a high amplitude ridge over Scandinavia characterize the large-scale flow on 25 September 2016. Ahead of the upper-level trough over eastern North America, upper-level forcing leads to the formation of a weak low-pressure system ("downstream cyclone") east of Newfoundland. At the same time, TC Karl undergoes extratropical transition and moves toward the midlatitude jet. The outflow of TC Karl contributes to the formation of an intense upper-level anticyclone that starts breaking anticyclonically over the eastern subtropical Atlantic. Extratropical cyclone "Vladinia", which was target of IOP 3, has weakened considerably and is located above Iceland.

## Forecast Day 1 (tomorrow)

Ahead of the trough over eastern North America and in a southwesterly flow, TC Karl moves toward the intensifying midlatitude jet and starts merging with the initially weak "downstream cyclone". During the merging process, former TC Karl is predicted to intensify rapidly as an extratropical cyclone to a mean sea level pressure minimum of less than 970 hPa at 18 UTC. At the same time, the jet stream will potentially intensify to wind speed of more than 85 m/s at 300 hPa.

On the eastern flank of the intensifying cyclone, warm moist air masses are transported toward the midlatitude baroclinic zone. The rapidly ascending air masses form an intense WCB that lifts the tropopause north of the cyclone centre. The cyclonically ascending branch of the WCB contributes to the formation of an upper-level PV hook and an LC2-type breaking of the upstream trough. The stratospheric branch of the LC2 wave breaking and the subtropical ridge to the south, form a remarkable tropopause fold that reaches down to the boundary layer. This tropopause will be one target of NAWDEX IOP4.

## Forecast Day 2 (day after tomorrow)

The LC2-type wave breaking continues on Tuesday. An east-west elongated tropospheric PV streamer extends from the Faroe Islands to the southern tip of Greenland. Likewise, a stratospheric PV streamer extends from the central North Atlantic to North Scotland. This stratospheric PV streamer is predicted to break apart. The breaking process will likely result in a west-east elongated upper-level cutoff to the south of Iceland. This upper-level cut-off and its associated low-pressure system (ex-TC Karl) will propagate toward Norway until Wednesday. The cut-off process is likely related to upper-level diabatic outflow associated with a baroclinic wave that develops ahead of an upper-level trough over the central North Atlantic. Though this baroclinic wave develops in a relatively moist environment, it does not intensify significantly. At upper levels, a weak downstream ridge amplifies. This ridge and its associated jet streak will be located to the south of Iceland on Wednesday.

## Forecast Outlook

After several consecutive days of high cyclone activity, the synoptic activity will likely cease at the end of the week. Some forecast scenarios indicate a next cyclone development for next weekend.

## Scientific discussion

The scientific discussion focused mainly on three flights on Monday and Tuesday.

- On Monday, HALO will capture the rapid extratropical intensification of ex-Karl, its associated WCB, and

the structure of the remarkable tropopause fold.

- On Tuesday, the DLR-Falcon and the UK FAAM BAE 146 will perform coordinated flights into the region of the upper-level cut-off. DLR-Falcon will sample the upper-level winds, whereas the UK FAAM BAE 146 will focus on the properties of a bent-back warm front to the south of the cut-off system.
- On Tuesday afternoon, HALO will most likely investigate the tropopause structure during the cut-off process, low-level moisture transport over the Atlantic, as well as the tropopause structure of the cut-off system itself.
- All Monday and Tuesday activities will be supported by additional radiosoundings from the Azores, Iceland, Norway and the Shetland Islands.
- A gravity wave IOP is planned for Tuesday and Wednesday. Additional radiosoundings will be launched from Keflavik. Possible flights associated with this IOP will be discussed on Monday.