

	NAWDEX 2016 Weather summary	Date: 01 October 2016 Author: C. Grams, B. Crezee

Synoptic Analysis Saturday, 1 October 2016

On Saturday at 12 UTC, the “Saturday cyclone” is located south of Iceland at about 35W, 50N. During the last 24h it strongly intensified when a the tiny upper-level cut-off became collocated with the low-level frontal wave over Newfoundland. Very dry stratospheric air is still located in the centre of the cyclone and in its cold sector. Enhanced transport of a subtropical warm air mass occurs in a narrow atmospheric river type band ahead of a strong baroclinic zone that extends from the US East Coast into the central North Atlantic. This air mass also forms the warm sector of the cyclone and reaches close to its centre. At upper-levels a pronounced zonal jet streak is located over northern Québec and Newfoundland. Further to the East the jet splits into a strong southern branch and a weaker northern branch. Along with the northern branch and tropospheric-deep westerly flow a lee cyclogenesis occurred between the southern tip of Greenland and Iceland. The small cut-off associated with the “Saturday cyclone” is located in between these jet streaks. Strong WCB activity emerged along with the intensifying cyclone and build a ridge towards Greenland and Iceland. Downstream a trough amplifies equatorward and is centred over the British Isles on Saturday.

Forecast Day 1 (tomorrow) Sunday, 2 October 2016

On Sunday, the “Saturday cyclone formerly known as Xun” merges with the Greenland lee cyclone, further intensifies, and approaches Iceland. It now expands over the entire North Atlantic region from Newfoundland, towards Iceland and the British Isles. The subtropical air mass reaches Iceland . At upper-levels very strong ridgebuilding continues, in particular in the western half of the ridge, where low-PV air starts to wrap up cyclonically into the cyclone center and a step tropopause step formed over the Greenland coast at about 70N. Likewise strong WCB activity continuous. The wrapping up of the western side of the ridge helps amplifying the upstream trough that starts extending equatorward to about 45N. At the same time anticyclonic WCB outflow help amplifying the downstream trough over the British Isles, that starts cutting off over the Netherlands. As the surface cyclone approaches Iceland strong surface winds and precipitation are expected, in particular in south(western) Iceland.

Forecast Day 2 (day after tomorrow) Monday, 3 October 2016

On Monday, the “Saturday cyclone” is located just southwest of Iceland and the strongest wind field affects KEF. We expect sustained wind speeds of 15-20 m s⁻¹ in southwestern Iceland. WCB activity still continues. The entire Rossby wave pattern (upstream trough, ridge, downstream trough) further amplifies and slightly shifts eastward. A marked cut-off cyclone forms downstream and becomes located over eastern Germany and Poland. Although tropospheric-deep southerly flow prevails from Ireland to Iceland, most of the subtropical air has been mixed up in the cyclonic system. However, in the subtropical western North Atlantic another episode of strong advection of warm moist air begins reinforcing the baroclinic zone east of Newfoundland, and an initial frontal wave is evident in surface pressure.

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Forecast Outlook

During Tuesday 4 October, the baroclinic zone strengthens and the frontal wave propagates fast eastward into the central North Atlantic. Whereas the track of this new frontal wave cyclone is quite certain amongst the last 3 initialisation times and within the ensemble, the exact timing and position feature high uncertainty. Still incipient WCB activity is evident with the frontal wave cyclone and helps amplifying the upstream trough of the “Saturday cyclone”. Very strong moisture flux occurs in the wake of the forming frontal wave cyclone.

The “Saturday cyclone” became mature south of Greenland. The upstream trough amplification initiates a final episode of WCB activity with the Saturday cyclone. The associated WCB outflow enhances a strong jet streak just to the east of Iceland and helps maintaining the ridge, that now becomes centred and blocked over Scandinavia along with a very strong surface anticyclone. The European cut-off propagated into the Balkans and triggers heavy precipitation in that region. The exact location of the cut-off and associated HIW is still uncertain.

During Wednesday to Thursday, 5-6 October, the frontal wave cyclone strongly intensifies and will be the main feature of interest. It most likely affects Iceland with heavy precipitation and very strong winds (>20m/s) on Wednesday. Along with this cyclone very intense WCB activity occurs on Tuesday-Thursday. To the end of the week, Hurricane Matthew most likely tracks along the US East coast. Strong moisture and warm air transport ahead of it produces a favourable environment for (sub-) tropical cyclogenesis in the sub-tropical western North Atlantic. Some model runs feature several cyclogenesis in this air mass to the Northeast of recurving Matthew. These cyclones feature strong outflows, and together with Matthew will affect predictability downstream over Iceland.

Scientific discussion

- The main feature of interest is the frontal wave cyclone developing from Tue-Thu and featuring very strong WCB activity.
- At the same time the frontal wave cyclone triggers intense moisture transport towards Iceland and further poleward.
- The cut-off forming downstream over Europe due to the strong WCB outflow and associated ridgebuilding might trigger heavy precipitation. This potential NAWDEX European HIW period is of interest.
- As cyclones affect Iceland surface weather in KEF is monitored. In particular wind on Monday and Wednesday are critical for flight operations.