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1/31- Reykjavik and Barcelona

Big Picture

A previous deep, anomalous cyclone affiliated with the TPV currently across the northeastern US begins progressing eastward into the Atlantic and diabatically amplifies a pre-existing ridge downstream, consequently breaking down a long-lived Rex block that has contributed to consistent troughiness over 35-45N east of 0E. An anomalous upper level cyclone (-4 sigma at 500-hPa) contributed by an upstream shortwave that traversed over the Atlantic ridge, dives into western Europe and slowly moves into the Mediterranean Sea. By day 3, the aforementioned pattern allows the North Atlantic ridges and troughs to begin propagating downstream allowing for higher anomalies to occur over western Europe. Throughout day 4-6, an amplified trough poleward of 40N generates a surface cyclone south of Greenland downstream of its axis, allowing lower to mid-tropospheric vertical motion, as diagnosed by Q-vector convergence ahead of the disturbance. Downstream, the previous trough over western Europe is advected eastward and deepened by strong northerlies entering the upstream side of its axis and generally detaches from the main flow followed by ridge building into western Europe. Shortly after day 6, a secondary upper level shortwave quickly propagates upstream over the Atlantic and interacts with the preexisting surface cyclone that potentially generates a subsequent deeper surface cyclone south of Iceland and advects in moist, subtropical air. By the end of the period, a signal for anticyclonic Rossby wave breaking over 50N will potentially create an environment for high pressure to build into western Europe.

Day 7-10

With the storm track being shifted further north toward Iceland, it looks like diabatic outflow from the eastern edge of these cyclones will help to induce ridge formation across northern Europe. Models have disagreed on the exact location of this blocking, which has major implications for conditions across central and western Europe. The potential is there for a more climatological Scandinavian blocking pattern which would, coupled with the cutoff low in the Mediterranean, would induce easterly flow and bring anomalous cold into much of mainland Europe. A ridge situated further south would have a greater localized impact on the weather, with more climatological or even positive surface temperature anomalies. Forcing for these ridges has to do with the exact location of diabatic forcing from the cyclone track, so there is still uncertainties in the forecast. Further north, there is an increased chance of progressive cyclones poised to impact Iceland, Ireland, and Scotland as the jet is generally poleward-shifted with ridging beginning to dominate western and central Europe. At the end of the forecast period there is the potential for anticyclonic wave breaking with an associated PV streamer across the central and eastern Atlantic basin, potentially aiding in ridge building across the eastern Atlantic around day 10.

Day 4-6

This period begins the change in general flow pattern across Europe as predominantly negative 500 mb height anomalies are replaced with positive anomalies. This pattern change is aided by Q-vector divergence at 700 mb starting at 00z on the 4th, centered around Great Britain, acting to build the ridge further north. Additionally, a cyclone formerly associated with the tropopause polar vortex over eastern North America reaches -4 sigma just south of Greenland, as the incredible cold over relatively mild waters act as favorable conditions for cyclone intensification. With a large associated atmospheric river downstream, there is also diabatic ridge building into western Europe in conjunction with the Q-vector forcing. With the jet stream shifted further poleward and a strong ridge in place across eastern Europe into Russia, the anomalous surface cyclone becomes cutoff and remains in the Mediterranean for several days, bringing below average temperatures to much of southern Europe and northern Africa. This cutoff low acts to further build the ridge across eastern Europe through day 6 due to further diabatically-driven height rises.

Day 0-3

A vertically stacked upper level trough and intense surface cyclone begins merging with an upstream negatively tilted trough over central Europe, bringing along a predominant westerly flow into Spain. This low level wind pattern favors orographically enhanced precipitation in areas where upslope is prominent throughout the Iberian Peninsula and allows the advection of relatively warmer, moist air from the Atlantic to create anomalous temperatures to occur, particularly in regions of downslope. Followed by the progression of the surface low into the Mediterranean Sea, enhancement along the Alps will favor high precipitable precipitation amounts in surrounding countries as well. Dominating northerlies in the wake of the downstream deepening cyclone towards the end of the period will act to advect below average Arctic air in the region bringing about a switch of cold temperature anomalies throughout the British Isles, France, Spain, and parts of northern Africa. Forecasts have trended towards a surface cyclone originating from the western hemispheric TPV to form south of Iceland towards the end of the period which increases the likelihood for precipitation in the region along with persistent below average temperatures for the region.

Probabilistic Forecasts for the period

Reykjavik, Iceland

Day 0-3

High Temperature	10th: 24F	50th: 27F	90th: 30F
Low Temperature	10th: 21F	50th: 23F	90th: 25F
Precipitation	10th: 0.20”	50th: 0.50”	90th: 0.70”

Day 4-6

High Temperature	10th: 33F	50th: 36F	90th: 39F
Low Temperature	10th: 32F	50th: 34F	90th: 36F
Precipitation	10th: 0.35”	50th: 0.55”	90th: 0.65”

Day 7-10

High Temperature	10th: 39F	50th: 42F	90th: 45F
Low Temperature	10th: 30F	50th: 35F	90th: 40F
Precipitation	10th: 0.01”	50th: 0.15”	90th: 0.40”

Barcelona, Spain

Day 0-3

High Temperature	10th: 54F	50th: 56F	90th: 58F
Low Temperature	10th: 48F	50th: 50F	90th: 52F
Precipitation	10th: 0.00”	50th: 0.10”	90th: 0.25”

Day 4-6

High Temperature	10th: 52F	50th: 54F	90th: 56F
Low Temperature	10th: 43F	50th: 46F	90th: 49F
Precipitation	10th: 0.00”	50th: 0.00”	90th: 0.00”

Day 7-10

High Temperature	10th: 55F	50th: 57F	90th: 59F
Low Temperature	10th: 49F	50th: 52F	90th: 55F
Precipitation	10th: 0.05”	50th: 0.15”	90th: 0.40”