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4 April - Innsbruck, Austria and Casablanca, Morocco

Big Picture

The forecast period begins with a major wave breaking event across the north Atlantic and Arctic. A relatively strong cyclone riding up the east coast of the United States will merge with a shortwave traveling across interior Canada, leading to rapid cyclogenesis along Labrador. This will induce cyclonic wave breaking in the Labrador strait, as anticyclonic wave breaking is already underway over Greenland and the Norwegian Sea. This helps to form a zonally-elongated Scandinavian block that will highly perturb the flow pattern across Europe. As this is occurring, repeated cyclogenesis is occurring across western and southern Europe, as fragments of vorticity from a large-scale trough in the eastern Atlantic remains quasi-stationary. The subtropical jet stream is also anomalously active, meaning fragments located in the polward exit region can develop more quickly. Upstream, additional wave breaking and cyclogenesis will acto to perturb the jet stream once again on days 4 and 5. However, this example will have subtropical anticyclonic wave breaking underneath the cyclogenesis so rather than a dual wave breaking structure, the anticyclonic wave breaking will act to deform the cyclone and stretch it zonally. Meanwhile, the blocking feature near Scandinavia retrogresses with two accelerated jumps around days 2 and 7. This deformation by the end of day 5 will create a highly perturbed S-shaped jet stream, a highly anomalous flow pattern. With the perturbed flow, the end of the forecast period looks to feature a stronger southerly branch of the jet stream and cutoff troughs over the Mediterranean much like in the beginning of the forecast period.

Day 7-10

With so much amplification earlier in the forecast period, this final forecast period is significantly calmer. The western edge of the domain (Iberia, France, Great Britain, and Morocco) will remain under the influence of an upper-level cutoff low, while the central and eastern and central portions will have anomalous warmth from a strong southerly component to the winds due in part to the anomalously strong subtropical jet. This jet positioning also allows for continuous onshore flow across Croatia and much of the Balkan peninsula, allowing for continual orographic precipitation. However, the complexity of the features earlier in the forecast has led to significant variation between model runs. Because of this, this forecast is quite uncertain this far out and it is possible the large-scale flow evolves into a very different solution.

Day 4-6

Two vertically stacked lows propagate eastward over western Europe and the central Mediterranean throughout days 4-5 provided by a more progressive pattern resulting

from a large anticyclone centered over Iceland throughout the period. Arctic originating air advected into the Mediterannean enables cyclogenesis due to the interaction of enhanced low-level baroclinicity and an upper-level PV anomaly centered over central Europe. Orographically enhanced precipitation is expected along the Adriatic coast and concentrated in the Balkans. By the end of the period, a vertically stacked cyclone offshore of western Europe and previously depicted at the beginning of the period moves into central Europe, further enhancing the precipitation distribution along the coast of the Mediterranean.

Day 0-3

Cyclonic wave breaking in the Labrador Sea and AWB in the Norwegian Sea aid in providing a region of confluence west of Europe at 40N, depicted from the surface to the upper troposphere with equatorward cold air advection in the lower troposphere due to the combination of low-level northerlies and a zonal thermal gradient. This process will aid in enhancing orographically dirven precipitation in Morocco, below average temperatures and the deepening of an upper-level trough downstream of a central Atlantic ridge, thus shifting it further equatorward over Spain from days 0-1. Slightly downstream, a shortwave originating from a broad low centered over western Europe moves eastward into the Alps, characterized by appreciable moisture and instability. Quasi-geostrophic forcing induced by the shortwave depicts ascent downstream of the feature as evidenced by the Q-vector analysis in tandem with a surface cyclone centered south of the UK. Additionally, a broad PV maxima offshore of western Europe merges with an upstream PV maxima in the east Atlantic associated with the aforementioned deepening trough and AWB, further enhancing the surface cyclone centered south of the UK. By day 2, the central Atlantic ridge is enhanced by a Labrador cyclone, thus retrogrades and shifts anonymously high heights further west over Greenland and breaking down highly meridional flow aloft along 40N. Consequently, upstream Atlantic upper-level lows are deflected equatorward and are able to progress eastward through the Atlantic basin along 40N. Similarly, a quasi-stationary PV maxima over western Europe begins advecting east in response to the change of the flow pattern, aiding in scattered showers along the northern Mediterranean coast due to surface cyclogenesis in the Gulf of Lion.

Probabilistic Forecasts for the period

Innsbruck, Austria

Day 0-3

High Temperature 10th: 57°F 50th: 60°F 90th: 63°F
Low Temperature 10th: 36°F 50th: 40°F 90th: 44°F
Precipitation 10th: 0.75” 50th: 0.90” 90th: 1.05 ”

Day 4-6

High Temperature 10th: 58°F 50th: 60°F 90th: 62°F
Low Temperature 10th: 40°F 50th: 42°F 90th: 44°F
Precipitation 10th: 0.20” 50th: 0.35” 90th: 0.50”

Day 7-10

High Temperature 10th: 59°F 50th: 61°F 90th: 63°F
Low Temperature 10th: 41°F 50th: 43°F 90th: 45°F
Precipitation 10th: 0.25” 50th: 0.50” 90th: 0.75”

Casablanca, Morocco

Day 0-3

High Temperature 10th: 58°F 50th: 61°F 90th: 64°F
Low Temperature 10th: 43°F 50th: 46°F 90th: 48°F
Precipitation 10th: 0.40” 50th: 0.60” 90th: 1.00”

Day 4-6

High Temperature 10th: 64°F 50th: 66°F 90th: 69°F
Low Temperature 10th: 46°F 50th: 49°F 90th: 51°F
Precipitation 10th: 0.00” 50th: 0.10” 90th: 0.20”

Day 7-10

High Temperature 10th: 64°F 50th: 68°F 90th: 71°F
Low Temperature 10th: 47°F 50th: 50°F 90th: 53°F
Precipitation 10th: 0.05” 50th: 0.20” 90th: 0.30”