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2 April - Innsbruck, Austria and Casablanca, Morocco

Big Picture

Similar to last week, this week's forecast is dominated by wave breaking along the dynamic tropopause. Previous anticyclonic wave breaking over continental Europe led to the formation of a cutoff low across the Atlantic coast of North Africa. However, this feature is sheared away by an anomalously strong subtropical jet stream cutting across Morocco and throughout North Africa. On day 1, a large meridional excursion of higher $\theta_e$air moves from the eastern Atlantic all the way into the Arctic in association with cyclonic wave breaking along the coast of Newfoundland. By days 2 and 3, this air in the Arctic begins its own anticyclonic wave breaking while a new round of cyclonic wave breaking in the same area of the Canadian maritimes perturbs the polar jet even further, with three weaker fragments around 20, 40 and 70N. This results in the formation of a classic Scandenavian block by day 3, which slowly retrogresses and becomes more anomalous along the coast of Greenland. As this is occurring, further PV streamers along the European coast through the early portion of the period will help spur repeated, prolonged cyclone events along the west coast of Spain, France, and Great Britain. This same process will help to induce cyclogenesis further south along the Mediterranean coast of Morocco and Algeria. With the anomalously strong jet just to the south, these cyclones quickly track north-northeast into the Aegean Sea by days 3 and 4. As these cyclones dissipate, however, the pattern becomes much calmer as the block near Greenland and Iceland prevents the northward movement of deepening cyclones off the east coast of the US. This is turn helps to anchor the jet across the central Atlantic, creating a diffluent pattern that appears to persist through the end of the forecast period.

Day 7-10

The blocking pattern established earlier in the forecast period looks to persist due to the zonal elongation at such a high latitude. This sets up a dominant pattern for western Europe and northern Africa: a deepening trough over the west-central Atlantic that remains quasi-stationary because of the blocking to the north and east, a diffluent and zonal jet structure across the Atlantic, an anomalously weak jet-level wind speed across continental Europe, and an anomalously strong subtropical jet across northern Africa. The first few features are related in how the anomalous heights anchor the jet stream which in terms maintains their own strength. However, the lack of jet interactions and weak flow over mainland Europe will mean that the weather pattern calms down significantly with limited changes for heavy precipitation. This diffluent jet pattern will mean southwesterly flow will bring in mild Atlantic air, keeping areas north of the Alps above average. In contrast, weak upper-level shortwave trough over the Iberian Peninsula will keep the area cooler than average for much of the forecast period.

Day 4-6

The period begins with a Scandanavian high, promoting the equatorward deflection of eastward moving Atlantic lows. Anomalously low heights throughout the troposphere over western Europe provide a region of confluence offshore of Spain, advecting in Arctic originating air into Morocco due to a persistent, northwesterly flow regime throughout the period. Models appear in fair agreement on precipitation concentrated along the Adriatic coast and Greece as a result of cyclonic vorticity advection by the thermal wind aloft by a shortwave associated with the aforementioned high PV streamer present from day 1. The strengthening of the meridional, low-level temperature gradient along the northern African coast will favor the development of a Saharan cyclone on the lee side of the Atlas Mountains within a region of very weak static stability. As this features evolves and steers northeast into the central Mediterranean, thermal forcing increases the likelihood of cyclogenesis and the maintenance of a Mediterranean low throughout the rest of the period.

Day 0-3

Anticyclonic wave breaking (AWB) centered over northern Europe prior to the beginning of the period sets the stage for a PV streamer to extend from central Europe to the west of Morocco at 30N. Further upstream, an unsettled north Atlantic pattern and an associative surface cyclone deepens over the Labrador Sea and advects moisture poleward from the subtropics to Greenland from days 0-1. Simultaneously, the associated enhanced cyclogenesis induces diabatically assisted PV erosion and redistribution at the dynamic tropopause building a ridge meridionally with an axis centered over 30W. By day 2, an omega block enables Arctic air to reach 50N followed by subsequent cyclonic and anticyclonic wave breaking over the Labrador and Norwegian Sea respectively. This focuses the western and eastern flanks of PV maxima at 50N, allowing both features to interact with one another due to mutually induced velocity and axisymmetrization process, meeting a critical value of sufficient size and distance to nearly merge entirely by the end of the period. At 500-hPa, a three-core structure of lows over western Europe move anticylonically around one another, depicting a similar configuration of vertically stacked surface lows. Discontinuous ridge retrogression in the central Atlantic and a Rex like pattern over werstern Europe will aid in channeling cold air and Atlantic moisture into Morocco, inducing orographically enhanced precipitation in regions of high topography throughout the end of the period. Likewise, a broad low-level circulation centered over western Europe and a strong subtropical jet over northern Africa will strengthen a pre-frontal atmospheric river that

extends into central Europe from days 2-3, concentrating heavy precipitation along the Alps.

Probabilistic Forecasts for the period

Innsbruck, Austria

Day 0-3

High Temperature 10th: 53°F 50th: 58°F 90th: 63°F
Low Temperature 10th: 32°F 50th: 36°F 90th: 40°F
Precipitation 10th: 0.50” 50th: 1.00” 90th: 1.50”

Day 4-6

High Temperature 10th: 54°F 50th: 57°F 90th: 60°F
Low Temperature 10th: 34°F 50th: 37°F 90th: 40°F
Precipitation 10th: 0.04” 50th: 0.08” 90th: 0.12”

Day 7-10

High Temperature 10th: 56°F 50th: 57°F 90th: 58°F
Low Temperature 10th: 37°F 50th: 38°F 90th: 39°F
Precipitation 10th: 0.10” 50th: 0.20” 90th: 0.30”

Casablanca, Morocco

Day 0-3

High Temperature 10th: 56°F 50th: 63°F 90th: 70°F
Low Temperature 10th: 49°F 50th: 51°F 90th: 53°F
Precipitation 10th: 0.50” 50th: 0.70” 90th: 1.00”

Day 4-6

High Temperature 10th: 62°F 50th: 65°F 90th: 68°F
Low Temperature 10th: 45°F 50th: 47°F 90th: 49°F
Precipitation 10th: 0.00” 50th: 0.20” 90th: 0.30”

Day 7-10

High Temperature 10th: 60°F 50th: 66°F 90th: 72°F
Low Temperature 10th: 47°F 50th: 50°F 90th: 54°F

Precipitation	10th: 0.00” 50th: 0.05” 90th: 0.15”