Alex Mitchell and Tyler Leicht 14 February - Beirut and Baghdad

Big Picture

With highly amplified upstream flow, an active storm track across the northern Atlantic, and a pre-existing omega block across central Europe, much of the activity for the Middle East is related to the variability in the northern jet stream. With anticyclonic wave breaking occurring on day 0 over Scandinavia, a cutoff low develops over the eastern Mediterranean. With this sustained instability over relatively warm water, it's possible to form shallow surface cyclones. This will be the case through day 4, when the upper-level low weakens and can begin moving eastward through Iran. What allows this cutoff to start moving again is one of the aforementioned North Atlantic cyclones moving overtop the ridge and diving into western Russia. Once the cyclone enters Russia, it can easily travel south up to the subtropical jet and keep much of central Asia in anomalously cold conditions for the second half of the forecast period. As this is occurring, the omega block over Europe slowly starts to move eastward as subsequent anticyclonic wave breaking events occur, along with diabatic outflow from the progressive Atlantic cyclones. This results in much of Turkey and Greece becoming anomalously warm for the second half of the forecast period. Around day 8 to 9, the models hint at cyclonic wave breaking occurring on the right side of the omega block, resulting in a PV streamer extending from central Siberia into the Mediterranean and eventually fracturing as another cutoff low. This would set up a similar pattern as the start of the forecast period for this region, bringing much of the same conditions of cooler temperatures and the environment for cyclogenesis.

Day 7-10

Starting the period, the omega block over much of Europe begins to develop further south and east across Ukraine, the Balkans, and eventually Turkey and Greece. This broad anticyclone will bring in above average temperatures and several days without a chance for precipitation. This pattern changes toward days 8 and 9 as cyclonic wave breaking is predicted to occur over western Russia with anticyclonic wave breaking further north with an incredibly unique northeasterly jet streak over northern Europe. These wave breaks result in a PV streamer starting in central Russia and extending into the Black Sea, eventually moving further southwest and cutting off, creating another cutoff low in the eastern Mediterranean. With this, the possibility of a more organized cyclone entering the region from the Black Sea is possible, but still uncertain how that would develop. This cutoff would create onshore flow for much of the forecast region, moderating the air and creating relatively climatological temperatures.

The combination of large-scale subsidence from the left entrance region of the subtropical jet over northern Africa and the decaying upper-level low due to the associated barotropic instability will dampen the potential for significant strengthening of the secondary low that forms in the eastern Mediterannean. By day 5, the remnants of the weak low have dissipated, alleviating any ample precipitation for much of the Middle East throughout the period as high pressure begins building in ahead of the ridge. A calm, low-level westerly flow regime in combination with cold air advection aloft will inhibit any substantial precipitation throughout Lebanon. Likewise, dry air in combination with westerly downsloping will contribute to climatological conditions for Baghdad, Iraq.

Day 0-3

A quasi-stationary high amplitude ridge downstream from the breakdown of westerly flow over the Atlantic has contributed to an omega block centered over Europe to persist since February 12th. Incoming Atlantic troughs encountering the omega block will undergo meridional stretching in regards to its absolute vorticity, subsequently splitting and transferring energy into the feature, allowing this blocking pattern to continue persisting throughout the period. A highly amplitude, upstream wave pattern will continue traversing upper-level shortwaves over the European block and descend equatorward into the eastern half of the Mediterannean, priming the environment for surface cyclogenesis given sufficient baroclinic instability. At the beginning of the period, a Mediterannean surface low forms on the eastern half of the sea directly underneath the upperlevel low and slowly advects eastward. By day 2, a second relatively weaker surface cyclone forms in the initial region of the first surface low aided by another upper-level shortwave that moves over the ridge into the same region, reinforcing the potential for inclement conditions. Tropospheric cooling provided by the upper-level low and relatively warmer air in the low levels will create unstable conditions, particularly where ascent is favorable. Onshore flow into Lebanon will favor persistent precipitation along the coast as air ascends over the Lebanon Mountains. Further east, the slow progression of the initial surface low will aid in zonal flow channeled into the Tigris-Euphrates River basin in Irag, inducing orographically induced precipitation along the Zagros Mountains.

Probabilistic Forecasts for the period

Beirut, Lebanon

Day 0-3

 High Temperature 10th: 53°F
 50th: 54°F
 90th: 55°F

 Low Temperature 10th: 47°F
 50th: 49°F
 90th: 51°F

 Precipitation
 10th: 0.50"
 50th: 1.10"
 90th: 1.60"

Day 4-6

High Temperature 10th: 54°F50th: 56°F90th: 58°FLow Temperature 10th: 48°F50th: 50°F90th: 52°FPrecipitation10th: 0.00"50th: 0.10"90th: 0.30"

Day 7-10

High Temperature 10th: 56°F50th: 59°F90th: 61°FLow Temperature 10th: 48°F50th: 51°F90th: 53°FPrecipitation10th: 0.30"50th: 0.45"90th: 0.70"

Baghdad, Iraq

Day 0-3

 High Temperature 10th: 59°F
 50th: 63°F
 90th: 68°F

 Low Temperature 10th: 56°F
 50th: 58°F
 90th: 60°F

 Precipitation
 10th: 0.02"
 50th: 0.05"
 90th: 0.25"

Day 4-6

High Temperature 10th: 62°F50th: 65°F90th: 68°FLow Temperature 10th: 53°F50th: 56°F90th: 59°FPrecipitation10th: 0.00"50th: 0.00"90th: 0.00"

Day 7-10

High Temperature 10th: 65°F50th: 68°F90th: 70°FLow Temperature 10th: 52°F50th: 55°F90th: 59°FPrecipitation10th: 0.00"50th: 0.02"90th: 0.04"