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1/29 AFD-Reykjavik and Barcelona

Big Picture

A preliminary shortwave trough present on day 0 situated south of Greenland moves southeast and merges with the pre-existing trough over Europe. This merging allows for the trough to become negatively tilted, making it favorable for subsequent shortwaves to intensify the large-scale trough. As a result, 500 mb heights reach -3 to -4 sigma values by day 3 as two separate shortwave troughs propagate around the predominant Rex block in the central Atlantic. The cutoff low associated with the aforementioned Rex block slowly weakens due to the less favorable environment in the subtropical Atlantic. At the surface, a deepening cyclone over the eastern Atlantic moves onshore by day 3, with an associated AR stretching across the entire basin. Precipitation throughout days 4 and 5 will induce diabatic outflow, which by day 5 and 6 will help to amplify the existing ridge over eastern Europe. Simultaneously, the northern storm track shifts from western Europe to just south of Greenland, creating a favorable environment for cyclogenesis in the far northern Atlantic. From day 7 onward, the jet becomes meridionally oriented, extending from north of Scotland to the base of the upper level low situated over the Mediterranean. This pattern of westerly flow in the Atlantic and northerly flow over western Europe into north Africa persists through the end of day 10.

Day 7-10

A shift in the zone of greatest baroclinicity across the far north Atlantic means a greater likelihood of cyclones impacting Iceland. The greatest uncertainty as of now is whether a ridge sets up across western Europe. Latest model guidance suggests that instead of weaker cyclones amplifying the flow with diabatic outflow, the cyclones themselves may be strong enough to break down the ridge. The greatest uncertainty in ridge strength is across the British Isles, while southern France and the Iberian Peninsula are expected to have above average 500 mb heights. With the uncertainty in ridge formation, surface temperatures are expected to be above average throughout the southern portion of the forecast domain while Britain, Ireland, and Iceland remain more uncertain.

Day 4-6

The superimposed deep cyclone and upper level trough continues advecting eastward into central Europe bringing along negative vorticity advection and upper level ridging inducing net divergence over the western region of the continent. Orographic upslope will favor both liquid and frozen precipitation due to a low-level northwesterly regime in parts of Spain, France and the UK. By the end of the period, ridging occurs over western Europe switches from anonymously cold to warm surface temperatures. Notable standardized temperature anomalies in the low levels (1000-850mb) of Iceland are within -1 to -3 sigma throughout the beginning of the period under the direct influence of advected continental arctic air. Smaller low pressure disturbances upstream connected with a broader upper level trough will favor warm anomalies

towards the end of the period and enhance the probability of frozen precipitation as relatively warmer air is advected onshore into the region.

Day 0-3

The beginning of the forecast period will be dominated by relatively weak large scale flow across Iceland and a strong developing trough across western Europe. The antecedent trough across central Europe to start the period will allow northerly flow and below average temperatures across France, England, and Iceland. Spain, on the other hand, remains dominated by westerlies and milder Atlantic air until day 3 when the large-scale trough becomes the biggest determiner of weather conditions. As discussed above, several consecutive shortwave troughs propagate overtop the existing Rex block, each helping to deepen the trough situated in central Europe. In conjunction, a surface cyclone develops and deepens to about 970 hPa or -3 to -4 sigma by day 3. With a long atmospheric river in the warm sector of the cyclone stretching all the way to the southeast coast of the US, precipitation will be heaviest in regions favored by orographic uplift from westerly winds, namely the northwest Iberian Peninsula, western Pyrenees, and western Alps.

Probabilistic Forecasts for the period

Reykjavik, Iceland

Day 0-3
- High Temperature 10th: 25F 50th: 27F 90th: 30F
- Low Temperature 10th: 17F 50th: 21F 90th: 25F
- Precipitation 10th: 0.00” 50th: 0.02” 90th: 0.05”

Day 4-6
- High Temperature 10th: 29F 50th: 32F 90th: 36F
- Low Temperature 10th: 18F 50th: 25F 90th: 28F
- Precipitation 10th: 0.10” 50th: 0.45” 90th: 0.70”

Day 7-10
- High Temperature 10th: 33F 50th: 37F 90th: 40F
- Low Temperature 10th: 30F 50th: 33F 90th: 36F
- Precipitation 10th: 0.20” 50th: 0.60” 90th: 0.80”

Barcelona, Spain

Day 0-3
- High Temperature 10th: 54F 50th: 57F 90th: 60F
- Low Temperature 10th: 50F 50th: 53F 90th: 55F
- Precipitation 10th: 0.05” 50th: 0.45” 90th: 0.70”

Day 4-6
- High Temperature 10th: 50F 50th: 53F 90th: 55F
- Low Temperature 10th: 44F 50th: 46F 90th: 48F

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

Day 7-10

High Temperature 10th: 52F 50th: 54F 90th: 57F

Low Temperature 10th: 46F 50th: 49F 90th: 52F

Precipitation 10th: 0.00” 50th: 0.02” 90th: 0.10”