



WX INSIDERS

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TRADERS GUIDE TO BASIC UNDERSTANDING OF TELECONNECTIONS

(what they are.. what they mean and how they work)

SUMMARY

In this edition of THE WEATHER INSIDER we will be talking about the potential for July to turn hotter and drier over portions of the Plains the Delta and the Midwest and whether not the model depictions of this hotter and drier pattern are realistic...and if there are other possible scenarios that need to be considered.

But first we need to set up some basic ground rules.

The old adage that **“drought begets more drought”** ... and “a rainy pattern brings more rain” ... does have some meteorological basis in science. The process is known as positive feedback. Large areas of excessively wet grounds produce excessive amounts of water vapor in the atmosphere which can cause increasing cloud cover and reduce or restrict warmth. If temperatures get too warm thunderstorm development is likely to occur which again can restrict temperatures reaching their Max potential. With large areas of dry

conditions or drought the exact opposite effect occurs. The excessively hot dry conditions on the ground develop extra heat into the atmosphere which acts as a suppressing mechanism for thunderstorm development. The buildup of the heat also alters the different layers of the atmosphere and can force the jet stream to shift or build in a different direction .

Next lets briefly talk about the terms " Heat Ridge " and "Heat Dome" and what the differences are. Perhaps the best way to understand these terms is to grasp what these terms are actually referring to in the atmosphere. When meteorologists use the term RIDGE it is useful to think of physical geology formation known also known as a RIDGE. That is a bulge or rise in the land mass that is a somewhat higher than the surrounding land mass and is fairly noticeable. **So the term " Heat Ridge" simply refers to a Ridge or bulge in the atmosphere which actually has more of the atmosphere piled up in one area when compared to the other areas around it.** Typically the areas underneath the ridge will see above normal or possibly much above normal temperatures and below normal rainfall.

The term " Heat Dome" refers to a particular formation which exists within a Heat Ridge. Again making the analogy to Making an analogy to the physical geology features of mountain and ridges. We can think of the " Heat Dome" as being the summit OR peak of a mountain.

Also keep in mind that any and all heat dome features ONLY exist in embedded within a Heat Ridge. But not every Heat Ridge has a Heat Dome. Conditions under Heat Dome are usually the hottest within the Heat Ridge and are the driest. In addition a Heat Ridge which has the Heat Dome embedded within it is often much more resistant to being pushed out of the way by way approaching upper trough. The fact that the Heat Ridge has a Heat Dome increases the ridge durability and intensity. .

Now let's talk about soil moisture conditions and recent rainfall.

This image shows the latest 30D RAINFALL amounts across the CONUS. And as you can see there are significant differences Between the Plains and Midwest. This reflects the fact of the Midwest has seen far more rainfall with respect actual amounts and with respect to the percentage of normal then the Plains region has. And in between these two areas we have the WCB.

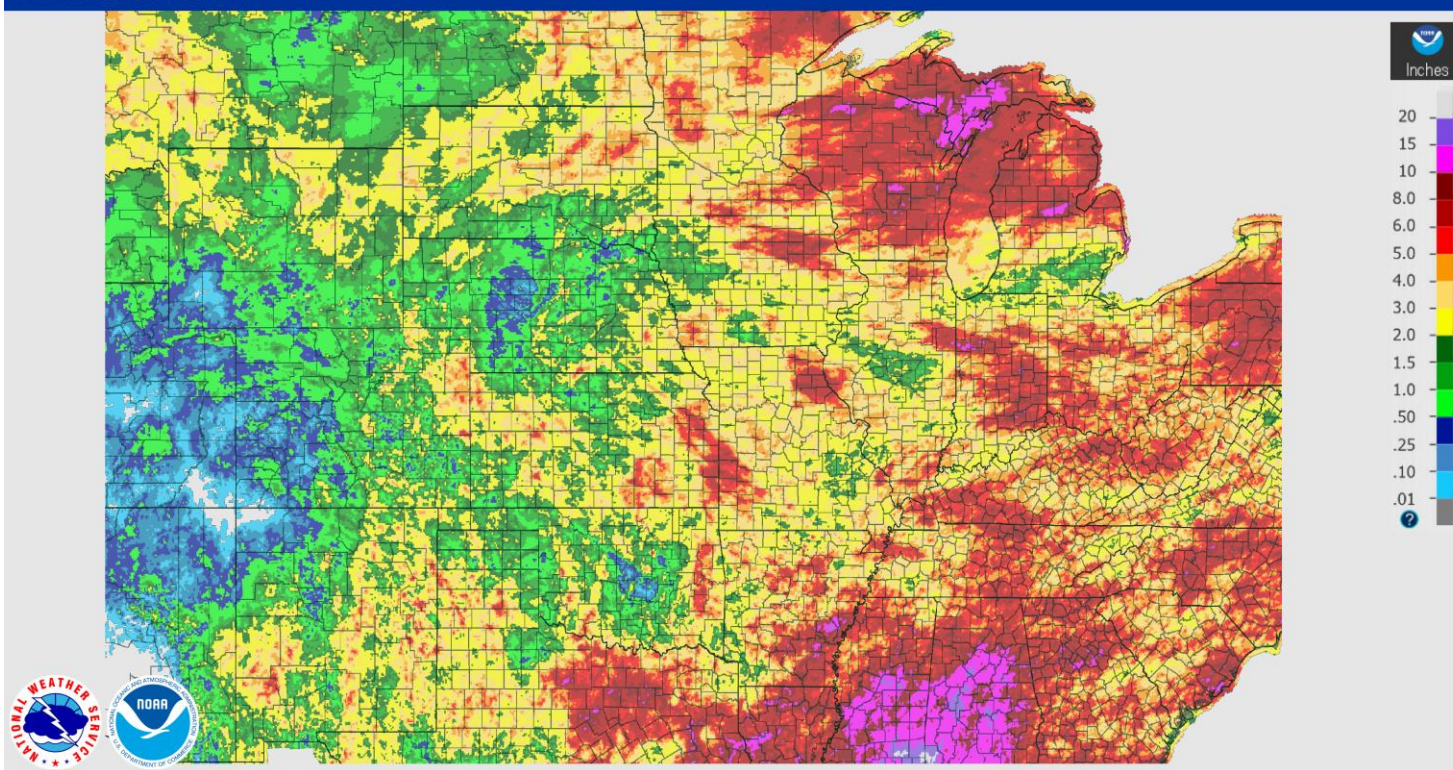
Locations such as Des Moines Iowa and Omaha Nebraska as of June 26 have only seen 1.5"/ 38mm of rain which is almost 2.75"/ 60mm below normal for the month of JUNE. Areas in the ECB such as Muncie IND has had 6.93" which is over 3" above normal rainfall and Paducah KY has reported 6.26" which is 3.65" above Normal

.This next image shows total rainfall over the last 30 days across all of the Midwest the Deep South and the Plains. The impact of tropical storm Cindy on the Gulf coast and into the ECB can clearly be seen as well as the big thunderstorm clusters which pounded Wisconsin in the middle of JUNE. The purple areas represent rainfall amounts greater than 10 -15"/ 250-375mm and the red areas show rain amounts anywhere between 5-8"/ 125-200mm. We can clearly see that most of Iowa as well as Missouri over the last 30 days has seen anywhere from 2- 5"/50-125mm of rain yet there are many areas in central Illinois receiving less than that. Over Plains regions many areas have seen very little rain fall over the past 30 days -with the exception of the eastern Dakotas- and much of the Texas panhandle.

June 27, 2017 30-Day Observed Precipitation

Created on: June 27, 2017 - 20:12 UTC

Valid on: June 27, 2017 12:00 UTC

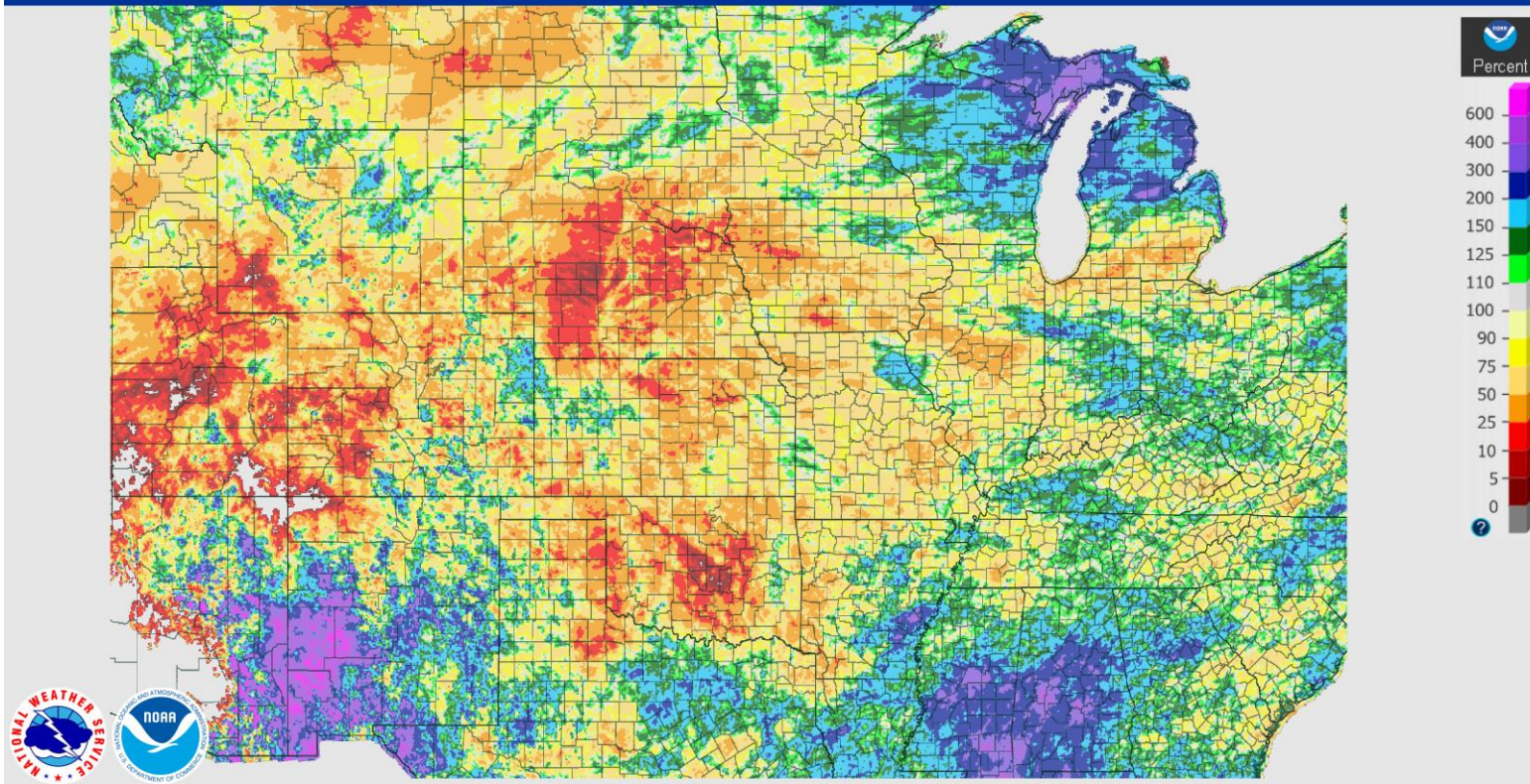


The rainfall anomalies over the past 30 days tell an equally important story and the dryness over all of the Plains except for northeastern Texas and southwestern Texas is quite noticeable. The strong negative rainfall anomalies over Missouri Iowa Illinois also pretty noticeable ranging from 25 to 75% of normal.

June 27, 2017 30-Day Percent Precipitation

Created on: June 27, 2017 - 20:14 UTC

Valid on: June 27, 2017 12:00 UTC

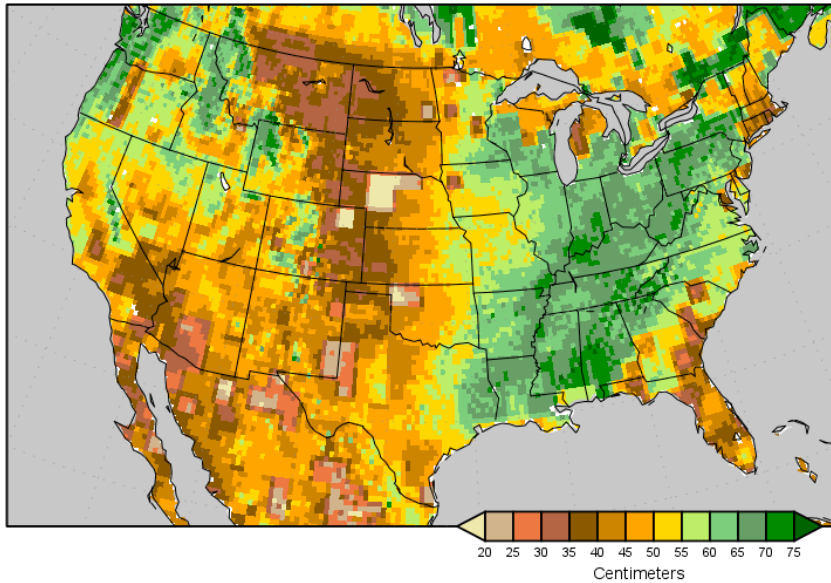


SOIL MOISTURE

This image shows the overall soil moisture for the top 2 meters of soil conditions as of June 27. Again we can clearly see that the WCB is in transition zone between a rather wet conditions over the Delta and the ECB and the very dry conditions over the Plains states

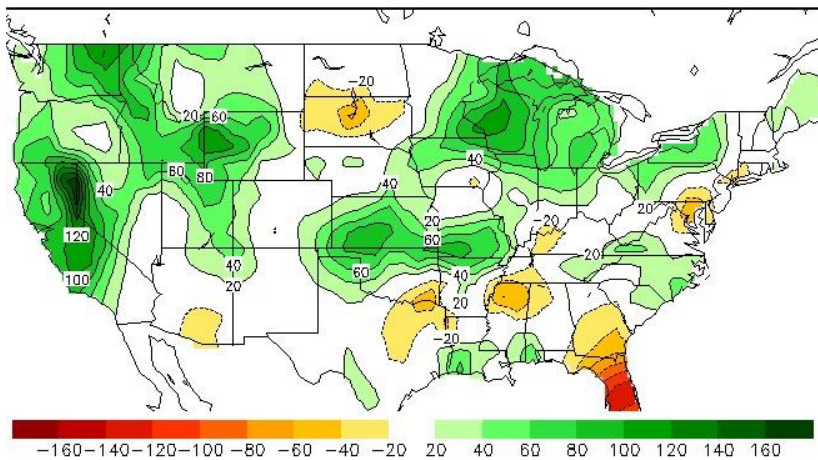
Initial Soil Moisture

Liquid Water in top 2 meters of soil
Valid time: Tue, 27 JUN 2017 at 00Z

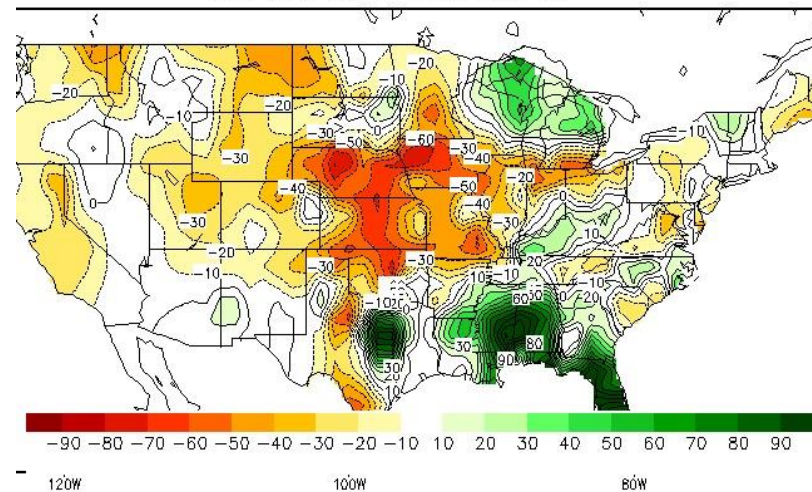


now lets take a look at the soil moisture anomalies and how they have transitioned over the past 30 days. This image on the left shows the soil anomalies as of the end of May 2017. Notice that there are very few dry areas over any portion of the plains and Midwest while the Above normal soil moisture conditions are rather plentiful. The image on the right shows the change from May 31 and June 26 and we can see major amounts of dryness occurring over all of the WCB and most of the Plains while the soil moisture conditions have improved over Eastern Texas and the gulf coast that pose a tropical storm Cindy.

Calculated Soil Moisture Anomaly (mm)
MAY, 2017

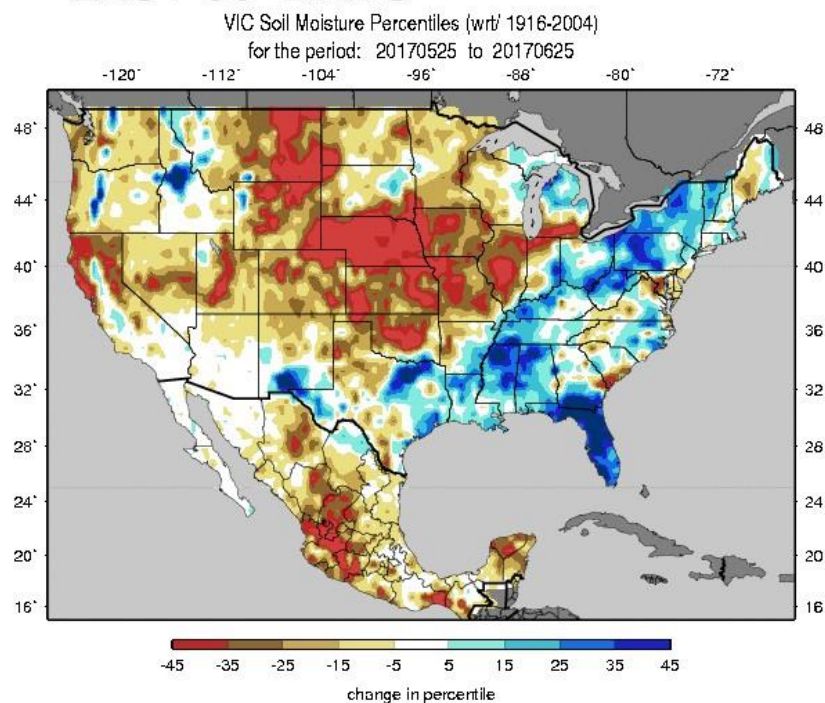


Calculated Soil Moisture Anomaly Change
JUN 26, 2017 from MAY 31

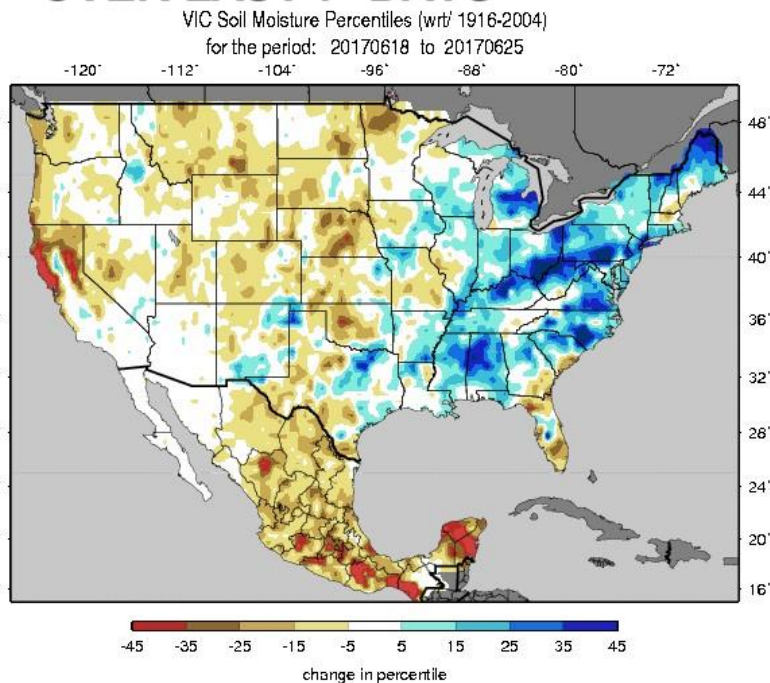


Finally these soil moisture maps are in percentiles and again we can see huge changes over the last 30 days since the Memorial Day weekend with a major increase in below normal soil moisture conditions over all of the Plains and WCB except for the eastern Dakotas and Minnesota. And over the last 7 days conditions continue to deteriorate over the Plains but are holding steady over most of the Midwest and the Delta region

CHANGES IN SOIL MOISTURE LAST 30 DAYS



SOIL MOISTURE CHANGES OVER LAST 7 DAYS



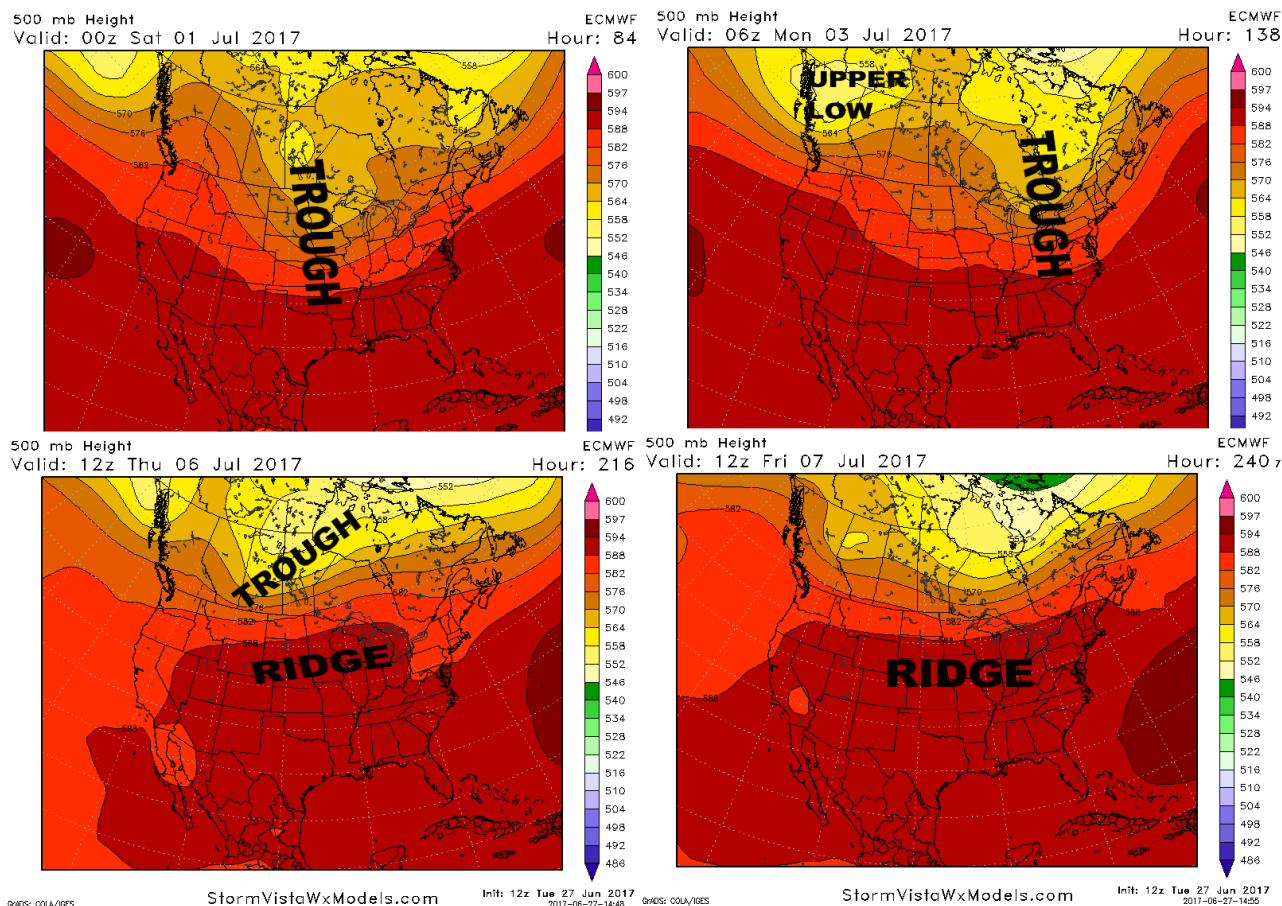
However as you may know by now the WCB region is expecting a major rain event to close out the month of JUNE and into the first few days of July. These rains are critically important and even though the weather models are forecasting significant rain amounts and coverage for the WCB these rains really have to show up as forecasted.

These rains will help keep the WCB grounds more saturated and become somewhat more resistant to the idea of the heat dome coming east. If for any reason the rains over the next several days in the WCB underperform (either in terms of percentage of

coverage or actual amounts) this could have significant implications for what happens later on in July across the Midwest with respect to the possibility of any sort of Heat Ridge / Heat Dome moving eastward from the Rockies.

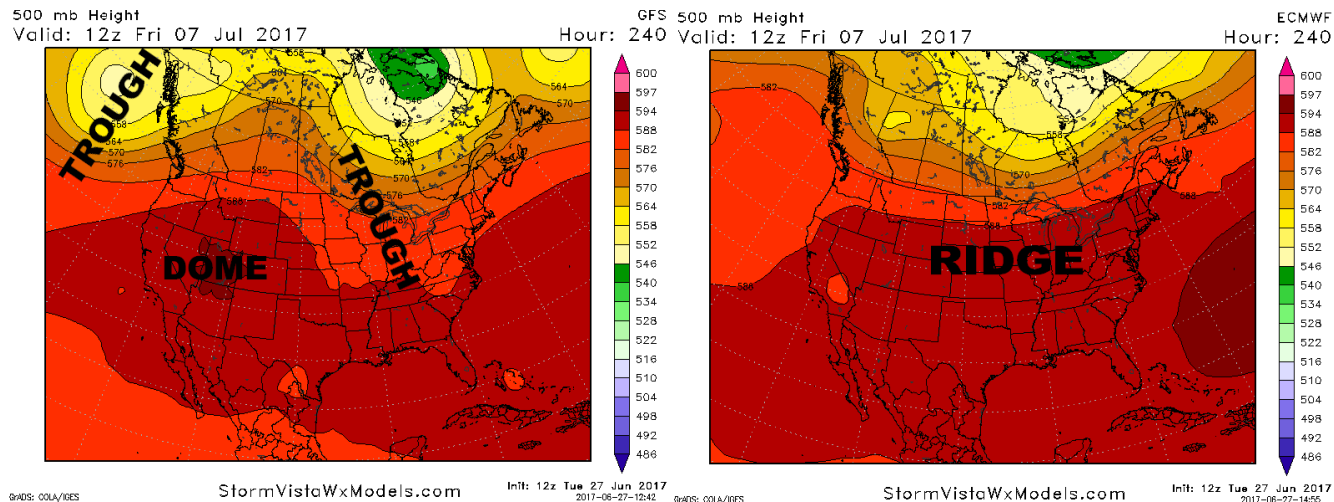
Lets assume for the sake of argument that the weather models are correct in showing a significant widespread rain for the WCB all the next several days.

HOW CERTAIN IS IT THAT THIS RIDGE IS GOING TO EXPAND AND COME EAST INTO THE PLAINS AFTER JULY 4



The confidence that the Heat Ridge over the western CONUS is going to expand from the Rockies and push into the Plains states and possibly into Midwest is pretty high and we can see why on these maps. These 4 maps are from the 12z Tuesday European model, from 6/30 to 7/7. On 7/1 we can clearly see the massive trough moving through the Midwest. It is this feature which is going to bring about the significant / heavy rains. On 7/3...the Midwest trough has moved into the Northeast. But over in northern Br Columbia there is large Upper LOW. This feature moves into central Canada by 7/6 and as it does so it will cause the ridge over the Southwestern states to expand rapidly eastward into the Plains. By JULY 7 the Ridge has clearly expanded from the Rockies into the central Plains and has move moved into the heart of the Midwest.

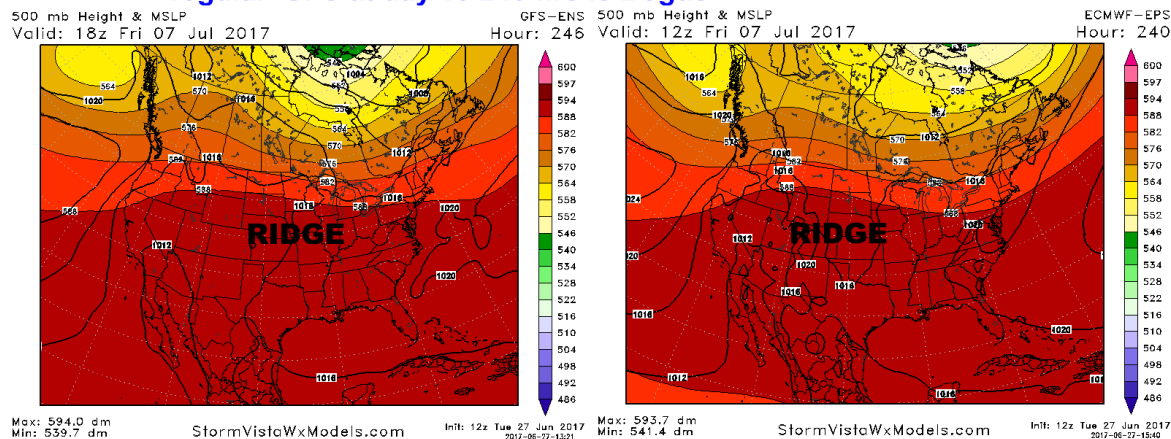
The 12z Tuesday GFS operational or regular GFS does NOT do this. This model only has the ridge reaching the WCB for 2-3 days then it collapses.. retreats back west and new major trough moves into the Midwest with cooler temps and rain. But the GFS ENSEMBLE clearly favor the EURO and Euro ensemble pattern in the 6-10n day



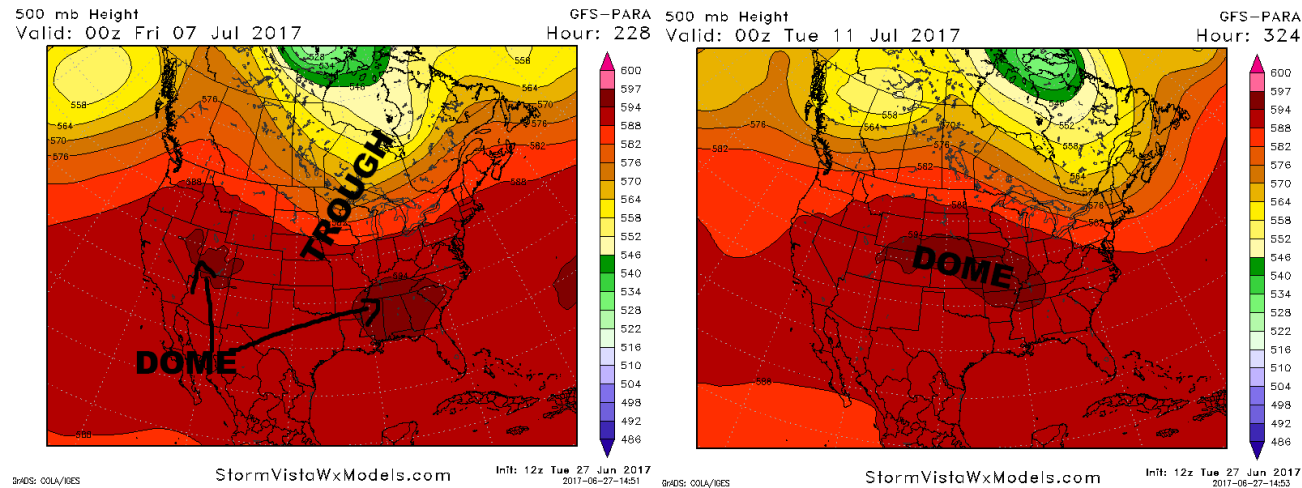
This image shows a comparison between the GFS ensemble and the European ensemble valid D10. As you can see the pattern overall is quite similar. Again the fact that the GFS ensembles supports the European and the European ensemble is the key point

here. This leaves more support to the idea that the heat ridge is going to expand and cover into the Midwest and possibly even into the ECB 4 least a few days after July 4

Clearly the GFS ensemble & EURO ensemble support the "regular" EURO at 240 hrs/D10 idea of stronger long lasting RIDGE... and the "regular" GFS at day 10 240 hrs is Bogus

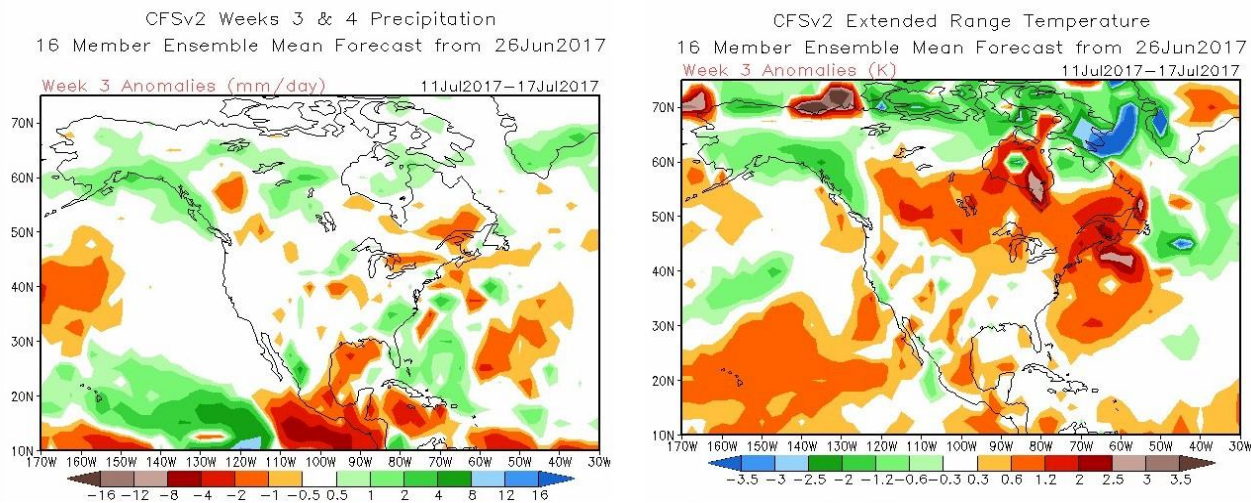


In addition NWS is running a parallel or experimental GFS model which oppose supposedly has a number of upgrades with it. It is available for a small fee for private meteorologist look at which we are presenting to you here. At day 9.5 the parallel GFS model also brings a moderate trough into the Midwest and splits the heat ridge into two pieces --with one centered over the Southeastern states and the other centered over Utah. But by July 10 and 11th that trough rapidly leaves and we end up seeing a significant Heat Dome over the heart of the Midwest. This of the extremely significant if in fact the GFS parallel model is correct

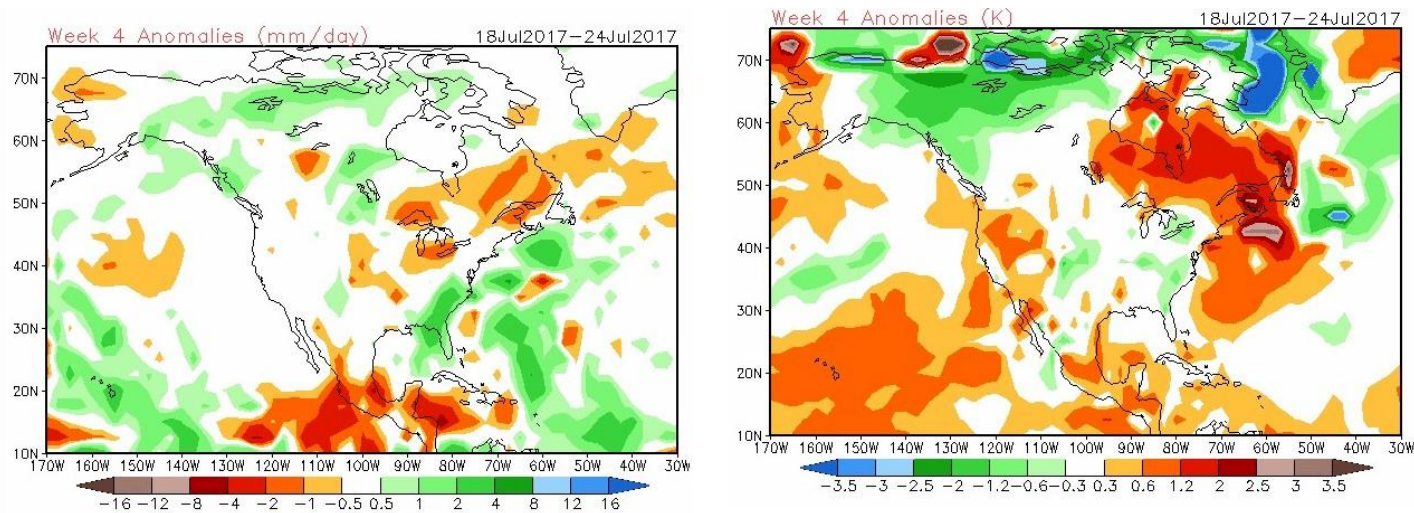


something like this show up on the CFS model in many weeks.

The weekly CFS models also turning drier. Here we can see h precipitation and temps at week 3 and for the first time a while the CFS model shows large areas of below normal rainfall over portions of the Midwest and the central Plains and above normal temperatures. Nothing too extreme mind you but it is the first time we have see

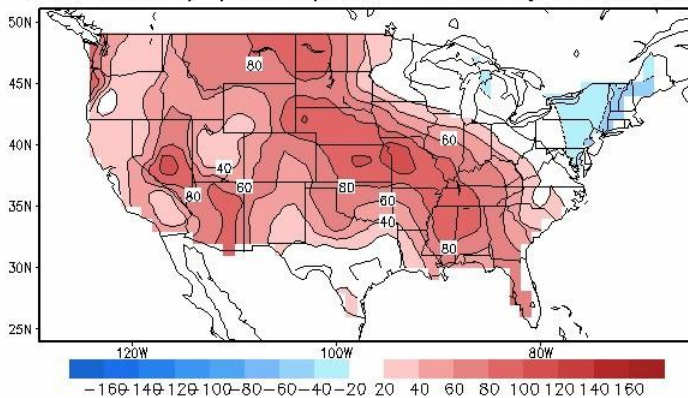


This trend continues a weak four with large areas of the Midwest and the plains quite dry but temperatures are near normal.

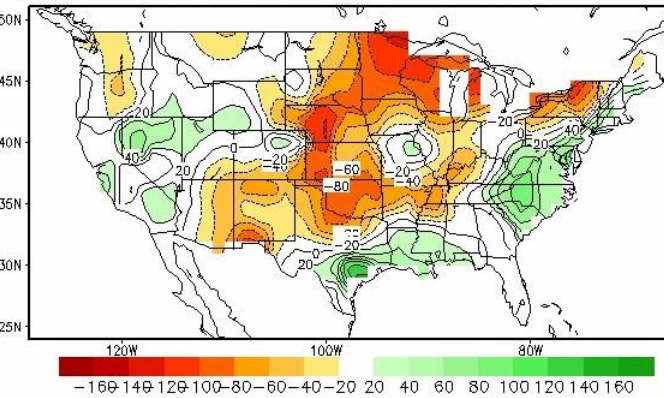


Finally one of the interesting climate models out there which has some value is the constructed soil analog model or CAS model. This model is updated every other day so it's useful picking out trends for the next 30 days. In addition it also has more validity when you have large areas of excessive soil moisture conditions and or large areas of excessively dry soil moisture conditions. In this case we have both factors at play. So keep that being kept in mind here is the latest July forecast from the CAS model with regard to temperatures and precipitation. Remember this model is based upon the latest soil moisture trends.

Lagged Averaged Temperature Outlook for JUL 2017
units: anomaly (sdX100), SM data ending at 20170626



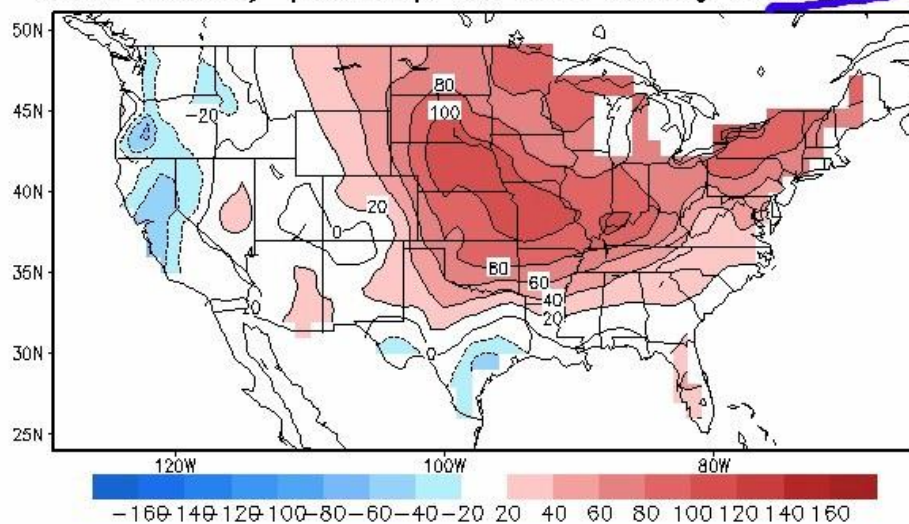
Lagged Averaged Precipitation Outlook for JUL 2017
units: anomaly (sdX100), SM data ending at 20170626



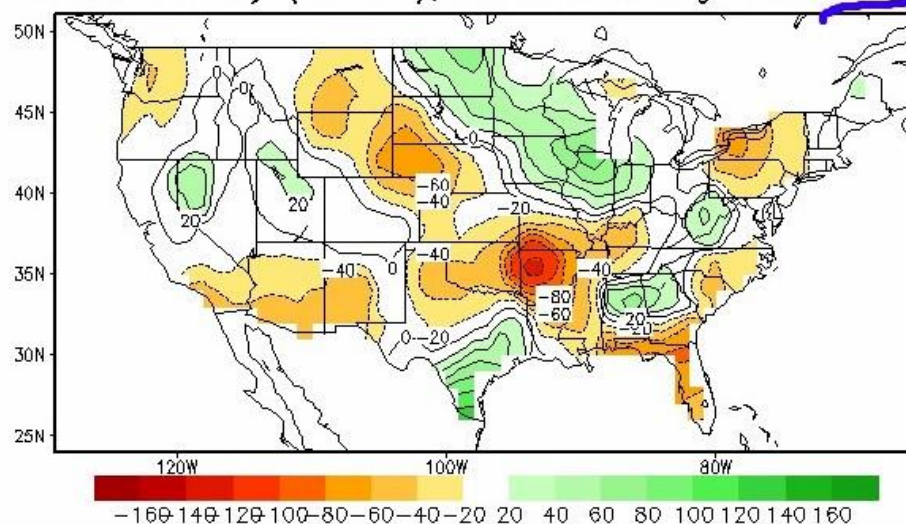
As you can see it shows a pretty hot July and large area of below normal precipitation over most of the WCB and the plains and to a lesser degree into portions of the ECB. This is valid as of June 26.

The next image on the CAS is for August and as you can see it is a pretty hot looking map. The precipitation is not extreme as it still shows near normal precipitation over much of the Midwest but drier than normal over the Plains and the upper Delta. Beyond two months the CAS models are not very useful and again it really only has any skill when you have large areas of excessively wet and were dry soil moisture conditions.

Lagged Averaged Temperature Outlook for AUG 2017
units: anomaly (sdX100), SM data ending at 20170626



Lagged Averaged Precipitation Outlook for AUG 2017
units: anomaly (sdX100), SM data ending at 20170626



SUMMARY

1. After the July 4 holiday the data indicates that the Heat Ridge over the Rockies and the Southwestern states will attempt to slide eastward and expanded into the Plains and towards the WCB. At this point in time there is some uncertainty as to how hot and how dry this new expanded Heat Ridge will be and how long it will last.
2. Not only to the model support this but the development of a large pool of warm ocean where temperatures in the western half of the Indian Ocean -- which is refer to in the weather business as the positive phase of the IOD (Indian Ocean Diople). When the IOD is strongly positive phase like it is now ...it often seems to indicate a hotter than normal pattern over the Midwest and the Plains. This correlation is not overwhelming however and it does not always work out.
3. The saturated grounds over the Mississippi Valley and especially over the ECB make us extremely reluctant to buy the idea that the Heat ridge Dome making it into Kansas and or southern Illinois through JULY 15 as some of the weather models were depicting on Monday afternoon. Instead we believe that this Heat Ridge /Dome scenario will feature a surge for few days into the central Plains and the WCB ...then it will retreat back to the Rockies for several days. Then it will surge back to the east later in July and again in early August.
4. The area that will be most impacted by the Heat Ridge Dome pattern will be the Plains and possibly the WCB. Because of the large area of much below normal rainfall over the Plains into a lessor degree over the WCB ...these areas will be the least able to stand a hotter and drier normal July weather pattern. For the Plains area this heat and dryness does not have to be extreme heat or extreme dryness.
5. Long term the development of this Heat Ridge Dome formation over the Rockies and the western CONUS has significant implications for late July and all of August. Assuming that the weather models are correct in their depiction of this Heat Ridge Dome over the Rockies ...the very presence of this feature now raises the possibility that it could surge east towards the Mississippi River several times in the second half for July and August. Indeed it was the lack of any sort of heat ridge over any portion of the country which is one the reasons why the troughs have been so deep over much of the Midwest and brought about much above normal rain.

6. There is some evidence to suggest that the Heat Ridge Dome after a retreat back to the western CONUS by July 12 will make another run surge eastward in late July and early August. These images clearly show that tendency and given the strongly negative AAM as the positive IOD Tele connections or weather patterns... it seems likely that the Heat Ridge Dome pattern will ATTEMPT to surge eastward a least a few more times over the next 45 to 60 days Whether not it the Heat Ridge Dome ever manages to "lock in position" over the central Plains ...will depend on how fast the ECB region can dry out. If the period from July 15 to July 30 is wetter than normal... then the odds are that western Heat Ridge Dome expanding and locking into position over the central Plains and or lower Midwest would be greatly decreased. If on the other hand the middle and late July are drier than normal over the ECB.... that would greatly increased the chances of the Heat Ridge Dome surging eastward and locking into position.

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