



Some Long Range Forecasts

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Our forecast – Summer – 2019 (mid-MO flashback)

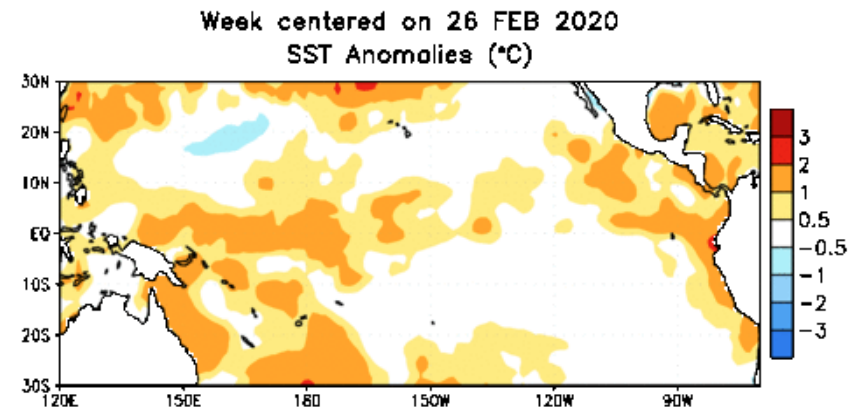
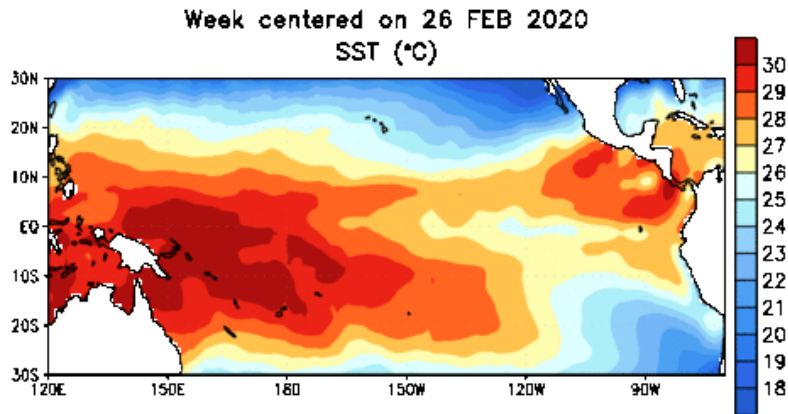
- ▶ Near normal temperatures (about +/- 0.25 sigma from normal - about 0.5 F), with more humid conditions. It was warmer by 0.4° F. A great forecast! (But September was an 'extra' summer month – still 2 points!)
- ▶ Above normal amounts of precipitation (about + 0.5 sigma – or zero to +2.5 inches) The winter and spring had been somewhat wet with excessive soil moisture conditions. (Precipitation +2.83 inches - a fairly good forecast – we could give 2 points generous, but we'll say 1 point).
- ▶ Reasoning: We are coming out of a mixed El Nino (Modaki - Classic). ENSO conditions remained warm Neutral by fall. Newberry et al., (2016) suggests these patterns are favorable for summer. All in All we did well, but we'll mark ourselves on the conservative side.

Our winter 2019-2020 forecast

- ▶ Probably similar to last year. Near normal temperatures (less than 0.5 sigma from normal), possibly warmer in December and January. Mixed news for heating bills. +3.7 F Wow, we missed, 0 .
- ▶ Normal to above normal amounts of precipitation (about 0.5 sigma), and about 15 inches of snow. On track, +1.19" and 13 " respectively. Bucket the 2.
- ▶ Reasoning: We are continuing with warm neutral conditions similar to last year's weak El Nino, could be classic, could be Modaki. If it goes toward Modaki – this would mean more blocking. We're fairly confident in this forecast (a four out of five where one is low and five is high). **The flow was zonal from Thanksgiving on – no blocking of substance!

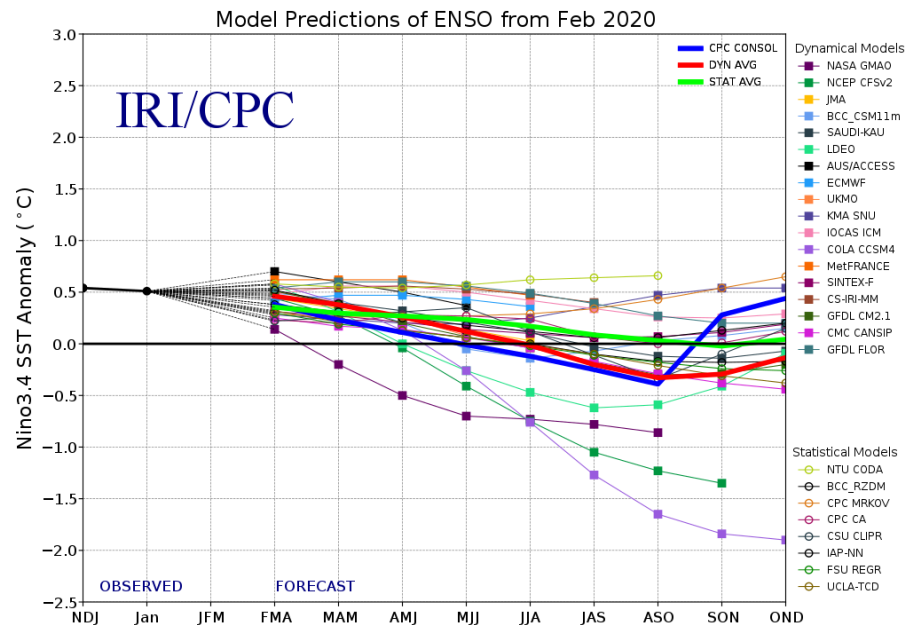
Summer Forecast 2020 (mid-MO)

- ▶ Warm Neutral(fading) conditions currently.
- ▶ 26 February 2020 (SST) Anomaly



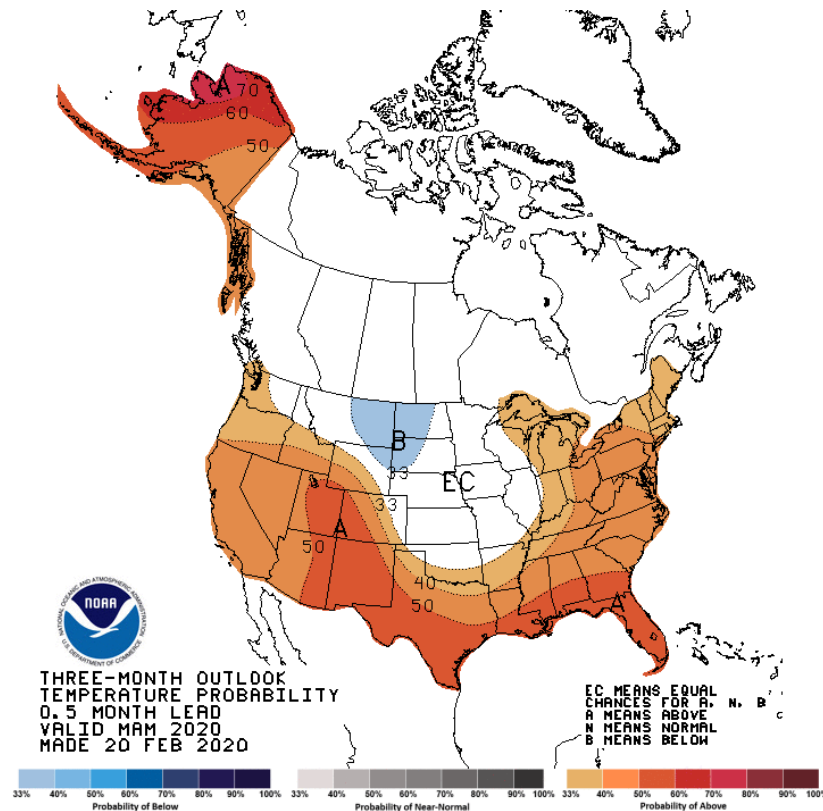
Summer Forecast 2020

- ▶ Models looking to slowly decay the current warm Neutral conditions and push toward neutral to La Nina conditions.



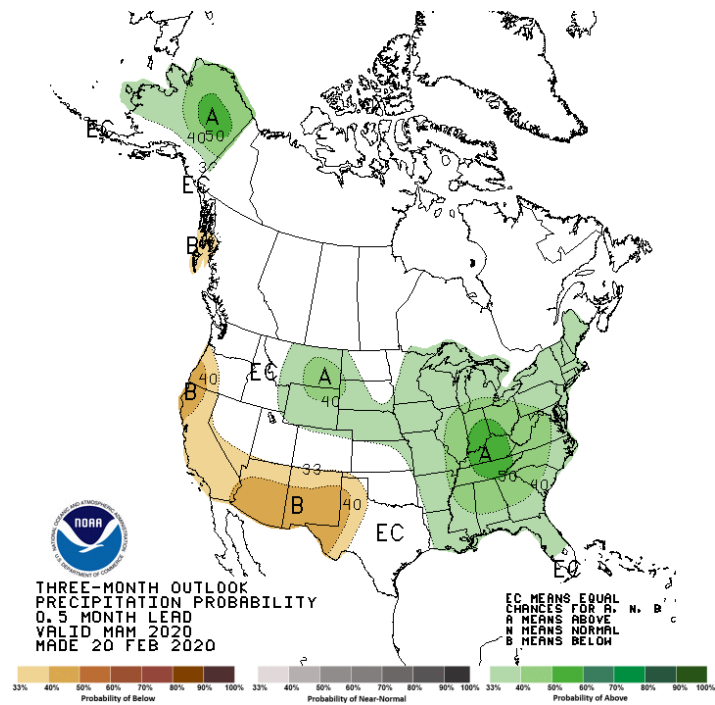
Spring 2020

- ▶ Spring Temps – MAM (near normal temperatures here – See Newberry et al. 2016.)



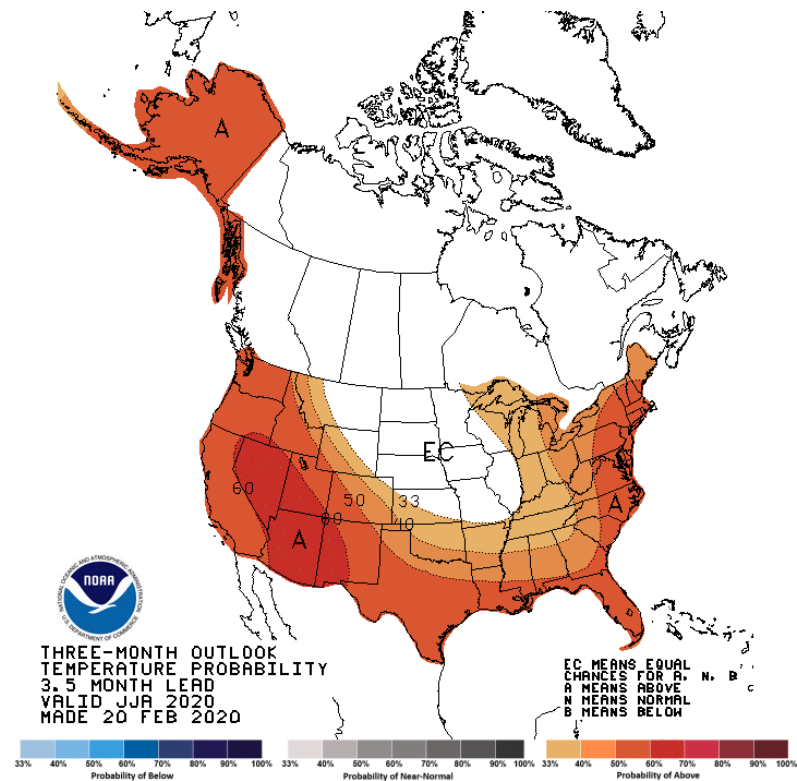
Spring 2020

- ▶ Spring Precipitation: MAM(should be near normal to continued wet here)



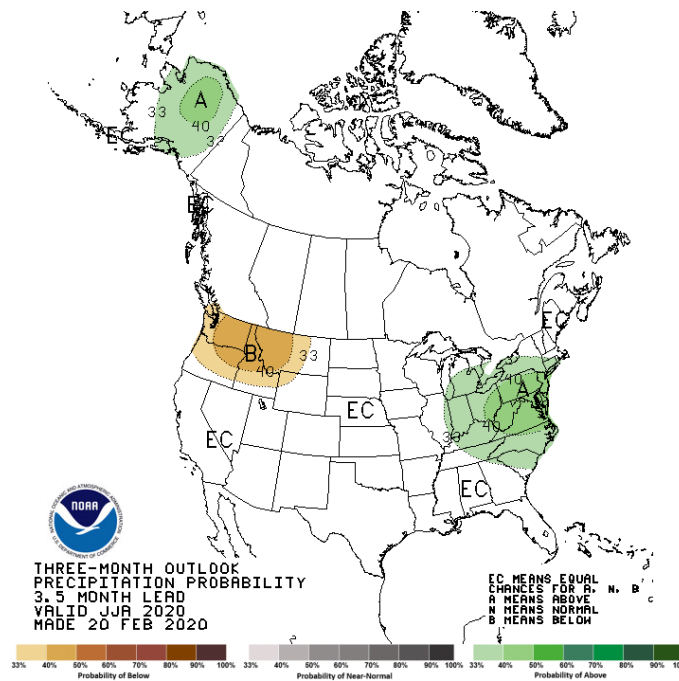
Summer - 2020

- ▶ CPC Summer temps – JJA (a bit above normal? Hot in the Southwest)



Summer - 2020

- ▶ CPC Summer Precipitation JJA (Not much to go on)



Summer - 2020

- ▶ CPC forecast is for a near normal summer temperature-wise, but with a slight hint that things may be like last year. The CPC forecast leans on the side of wet precipitation-wise to our east.
- ▶ In the Spring and Summer 2020, warm neutral ENSO is predicted to slowly move from warm to cold neutral by fall. This kind of forecast tends to show warmer than normal summers temperature-wise, but leading toward drier conditions.

Our forecast – Summer - 2020

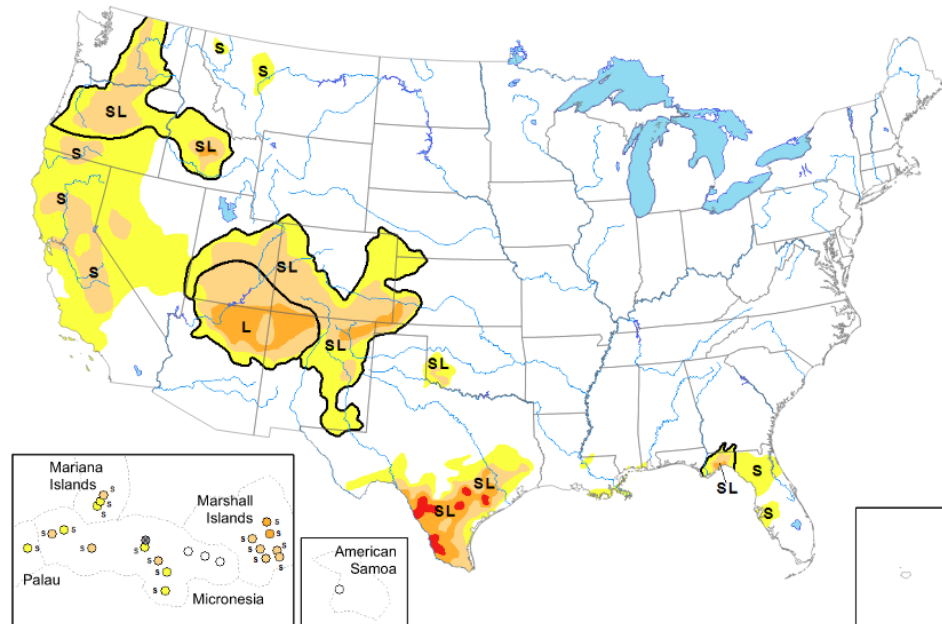
- ▶ A little above normal temperatures (about +0.5 sigma from normal – which is +1.0F), with more humid conditions. Bad news for human comfort!
- ▶ We're going to lean below normal on precipitation thinking that the system will move more toward La Nina. This could be a bust if we stay where the models are now. (about - 0.5 sigma to +0.5 sigma: about -2.5 inches to +1.25 inches), this is somewhat good news for agriculture, depending on how spring goes. The winter has been somewhat wet with wet soil moisture conditions.
- ▶ Reasoning: We are coming out of warm Neutral to close to El Nino (Modoki). El Nino forecast to go toward La Nina and it's moving that way. Newberry et al. (2016) suggests these patterns are favorable for a warmer summer. Two years that look similar summer 1995 and summer 2000, more like 1995, but will the system move more toward La Nina? But, both these summers were wet!

National drought map

Great news! For about a year there are no drought conditions found anywhere in Missouri! This is very unusual. This looks like last Year.

Map released: February 27, 2020

Data valid: February 25, 2020



Summer 2020 Crop Forecast

- ▶ Summer 2020 – Crop Yield Projections
- ▶ IRI/CPC Ensemble Plume of ENSO Predictions for Fall 2020
- ▶ Jan. 2020: Dynamical and Statistical Model average NINO3.4 SST Anomaly is roughly $+0.5^{\circ}\text{C}$.

Summer 2020 Crop Forecast

► Missouri Climate Divisions



Summer 2020 Crop Forecast

- ▶ Feb. 2020: Dynamical and Statistical Model average NINO3.4 SST Anomaly is roughly +0.5.
- ▶ The IRI/CPC outlook is leaning towards Neutral-La Niña for Fall 2020.
- ▶ (iri.columbia.edu/our-expertise/climate/forecasts/enso/current/)

Summer 2020 Crop Forecast

- ▶ According to the JMA definition of La Nina (used in my research), an anomaly below -0.5°C is considered an El Niño event. Therefore, projections for crop yields are based on the projection of La Nina being cold neutral by Fall 2020.
- ▶ Also according to the JMA, PDO has been near zero throughout 2019 (<http://research.jisao.washington.edu/pdo/PDO.latest.txt>) Therefore, crop yield projections will be based on the assumption that Fall 2020 will be a negative **PDO**.

Summer 2020 Crop Yield Forecasts

- ▶ Corn Yields: (1.0 sigma is 23 BU/Acre (1990-2013 data) for Div 1, and 26,26,23,19, and 17 BU / Acre for Divs 2,3,4,5,6)
- ▶ Climate Division 1: 0.2 sigma above - 0.4 sigma below average
- ▶ 2: 0.2 sigma above – 0.2 sigma below average
- ▶ 3: 0.1 sigma above– 0.4 sigma below average
- ▶ 4: 0.1 sigma above – 0.2 sigma below average
- ▶ 5: Same as Division 1
- ▶ 6: Same as Division 4

Summer 2020 Crop Yield Forecasts

- ▶ Soybean Yields (1.0 Sigma is 5.5 BU / Acre (1990-2013 data) for Div 1, and 5, 6.5, 6.7, 4.1, and 5.3 BU/Acre for Divs 2,3,4,5,6)
- ▶ Climate Division 1: 0.0 – 0.3 sigma below average
- ▶ 2: 0.0 – 0.2 sigma below average
- ▶ 3: 0.2 – 0.4 sigma below average
- ▶ 4: 0.1 – 0.3 sigma above average
- ▶ 5: 0.1 sigma above – 0.3 sigma below average
- ▶ 6: 0.2 sigma above – 0.4 sigma below average

Summer 2020 Crop Yield Forecasts

- ▶ For Summer 2020, Missouri corn and soybean yields are projected to be near average to 0.4 sigma above average. One exception: soybean yields for climate division 3 are projected to be near average to slightly below average. Also, for corn, climate division 6 will be close to normal.

CoCoRaHs

- ▶ Please consider joining CoCoRaHs. This data will be used by agencies to decide crop loss information. It's worth it to you to join Missouri CoCoRaHs. (State Climatologist Patrick Guinan)
- ▶ <http://www.cocorahs.org>
- ▶ Email: lupoa@missouri.edu

