

## Highlights:

- In mid-March a bombogenesis, also called a “bomb cyclone”, struck the U.S. Great Plains and Great Lakes region.
- The storm brought both large volumes of snow and rainfall to the region leading to flooding along many rivers and across frozen ground.
- The most notable flooding occurred in Nebraska. While large areas in northern Iowa and southern Minnesota experienced temporary field saturation.
- Sowing of maize, soybeans, and spring wheat have not yet begun or entered their most active periods in most of the main producing states, where the majority of fields are sown around late April and May.
- High soil moisture levels in many areas will benefit early development of spring/summer crops.
- Forecasts for the short term will benefit sowing activities, while over the next three months there will be a slight probability of increased rains in the U.S. Great Plains and Great Lakes region, benefiting early crop development.

In mid-March, a bombogenesis, also called a bomb cyclone, struck the central plains and the U.S. Great Plains and Great Lakes region. A bombogenesis/bomb cyclone is when the barometric pressure drops by at least 24 millibars (measurement of air pressure) over 24 hours, which happens when a warm air mass collides with a cold air mass and starts moving in a cyclonic manner. These storms are associated with very strong winds and heavy rain and/or snow.

The bomb cyclone dropped heavy snow and rainfall atop of an already deep snow pack that then melted and was unable to infiltrate into the frozen ground. Excess of water then ran into the ice-covered rivers that were already at a high level due to the abundant rainfall last fall. River ice cover broke up and caused artificial dams resulting in flooding along many rivers and across many low-lying areas where the frozen ground prevented the infiltration of the rainfall in the first place (Figure 1). Since then most of the

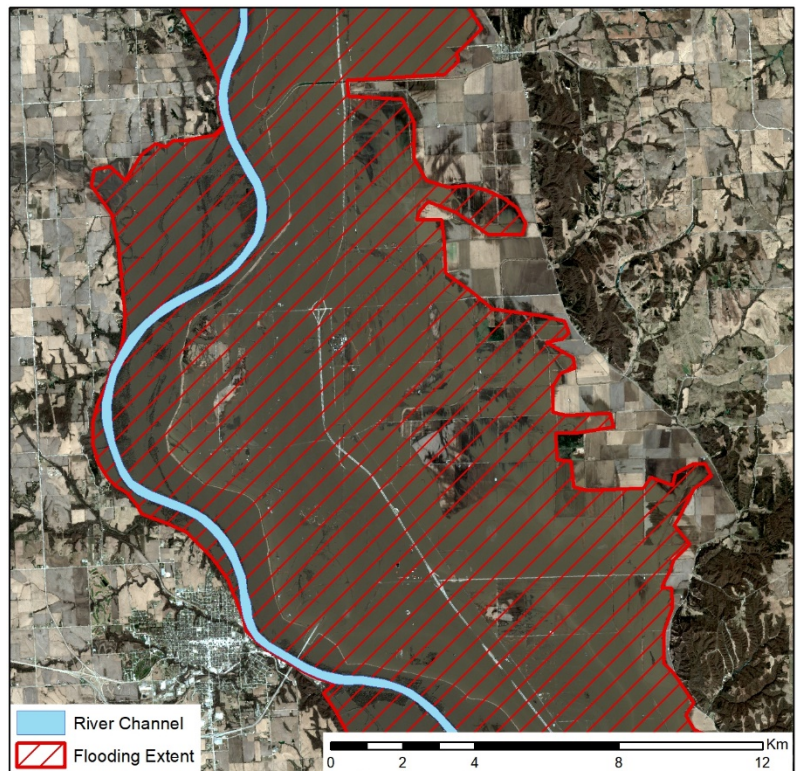


Figure 1: Sentinel 2A imagery from March 21, 2019 showing flooding on the Missouri River south of Omaha, Nebraska. Data Sources: Sentinel 2A imagery from ESA

original flooding has now subsided, but with additional precipitation events since the bomb cyclone and spring melt, some minor areas are still experiencing flooding conditions.

The flooding has not directly affected the 2019/20 summer crops, since the sowing is yet to fully begin in the main productive areas (Figure 2). However, it had a negatively impact in infrastructure, including grains storage from previous campaigns, destroying in some cases, silo bags and bins.

### Start of the Most Active Sowing Period by State

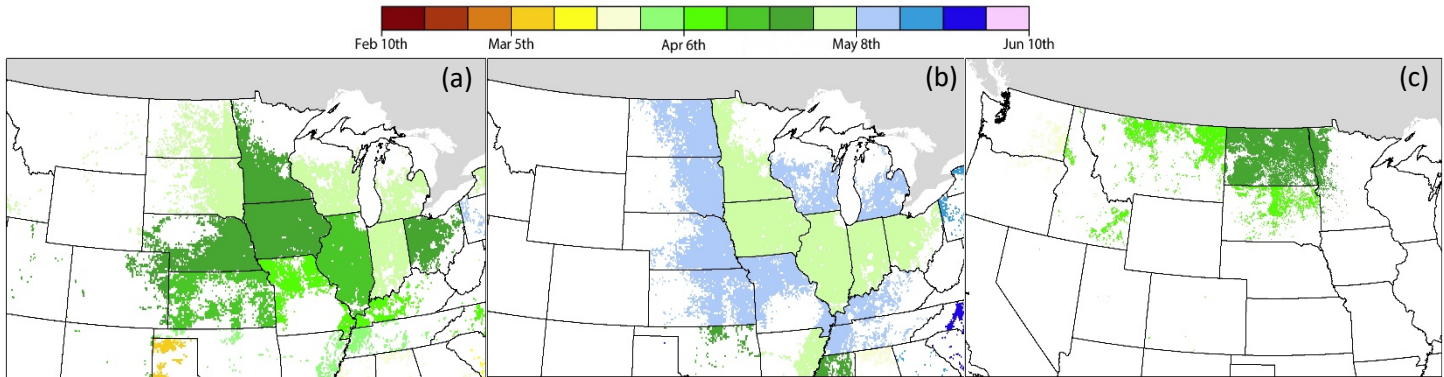


Figure 2: Start of the most active sowing periods by state for (a) Maize, (b) Soybeans, and (c) Spring Wheat. Data Source: USDA NASS Field Crops: Usual Planting and Harvesting Dates, October 2010

As the most active period of sowing is due to begin in the coming weeks for many places in the U.S. Great Plains and Great Lakes region, surface soil moisture levels are quite favourable. Figure 3 shows the most recent surface soil moisture levels across the U.S., while Figure 4 shows current levels specifically for only maize sowing areas in the main producing states (representing 65% of national production) compared to last year and historical averages.

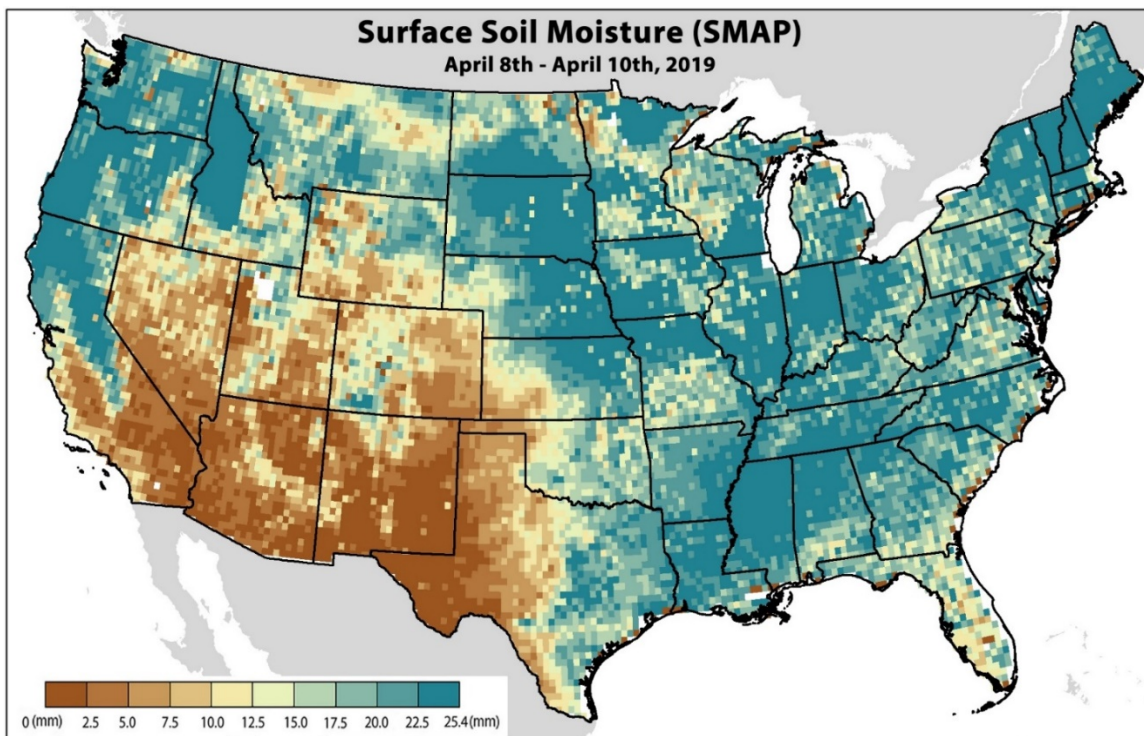


Figure 3: Surface soil moisture levels for the April 8<sup>th</sup> – 10<sup>th</sup>, 2019 time period showing favourable soil moisture levels across much of U.S. Great Plains and Great Lakes region Data Source: NASA Soil Moisture Active Passive (SMAP).

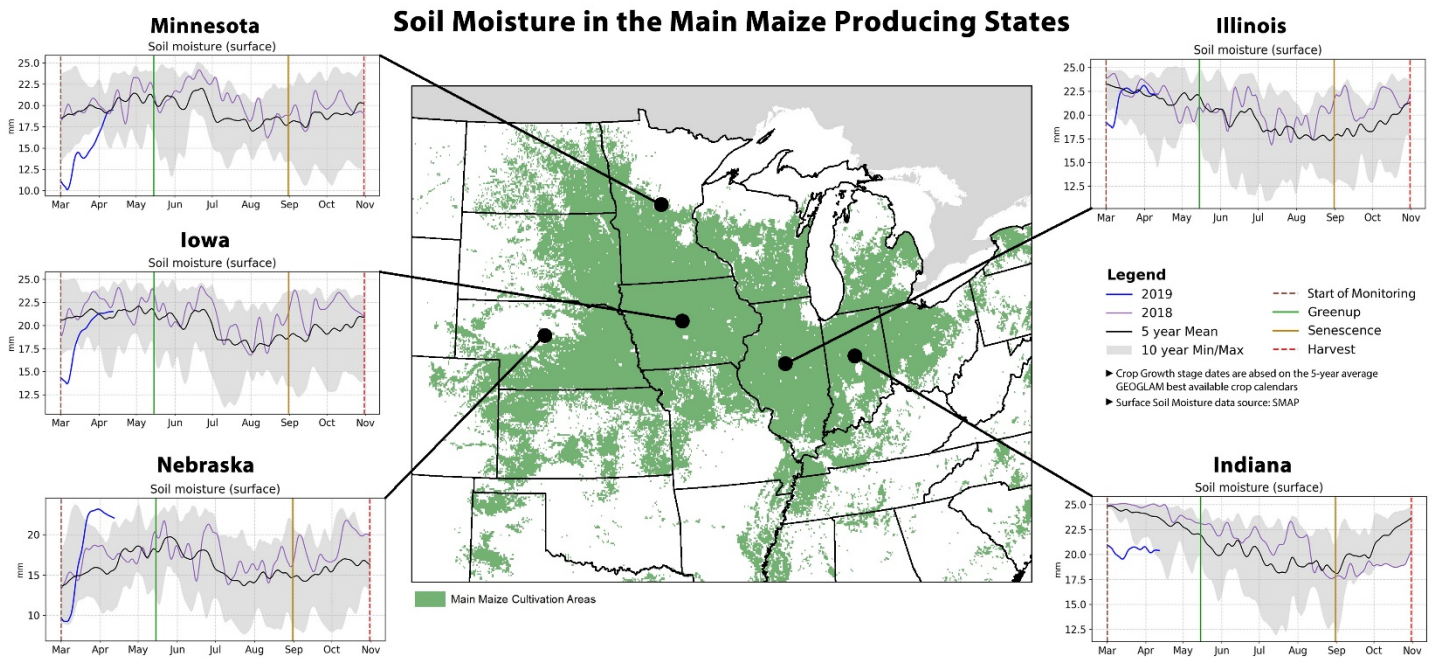


Figure 4: Soil moisture (surface) levels from March 1<sup>st</sup> until present in maize growing areas within the top producing states. Data Source: NASA Soil Moisture Active Passive (SMAP)

Short term forecasts for precipitation bring additional rainfall for the southern Great Lakes region, the South, and much of the East Coast (figure 5). Rainfall to across much of central and southern Indiana will help raise surface soil moisture levels, while drier conditions elsewhere will be beneficial for sowing actives.

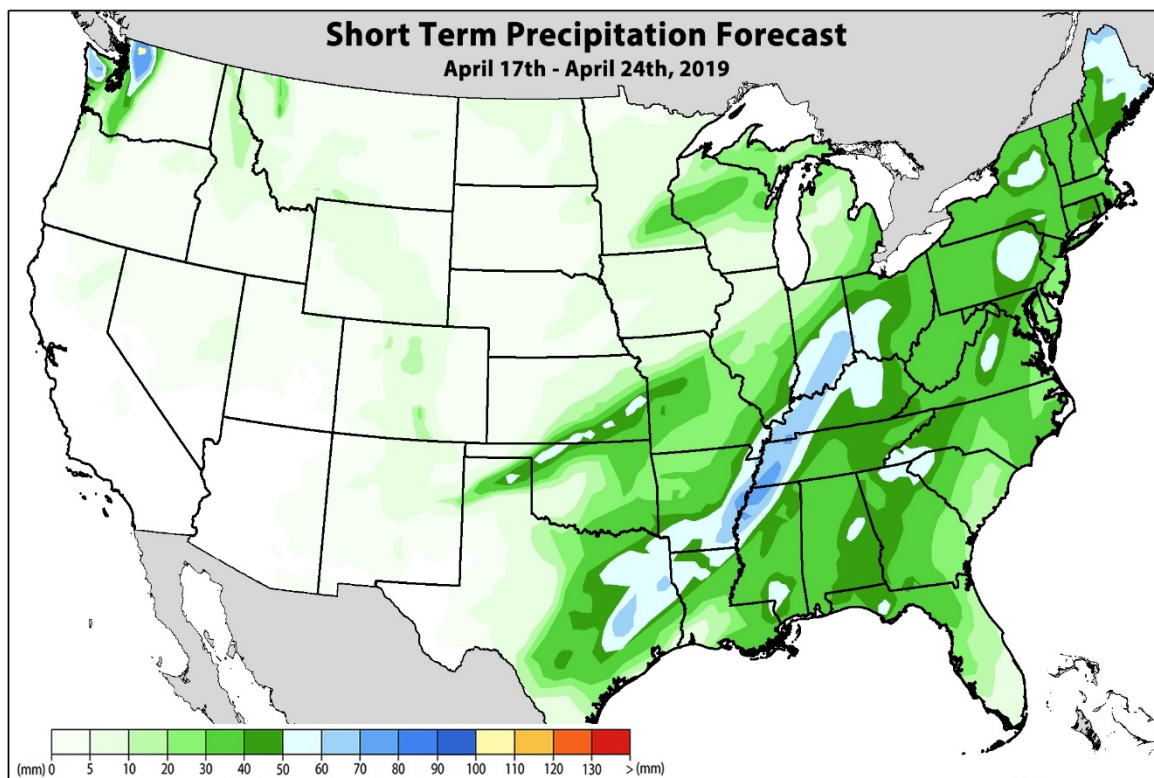


Figure 5: Short term precipitation forecast April 17<sup>th</sup> – 24<sup>th</sup>, 2019. Data Source: NOAA WPC Quantitative Precipitation Forecast.

The most recent three-month outlook from NOAA, covering the spring and early summer, shows a slight probability of above average precipitation across most major maize and soybean growing areas with the exception of northern Minnesota and North Dakota (figure 6). Most spring wheat areas in Minnesota, North Dakota, and northern Idaho will most likely receive average precipitation while Washington and Oregon have a probability of receiving below average precipitation.

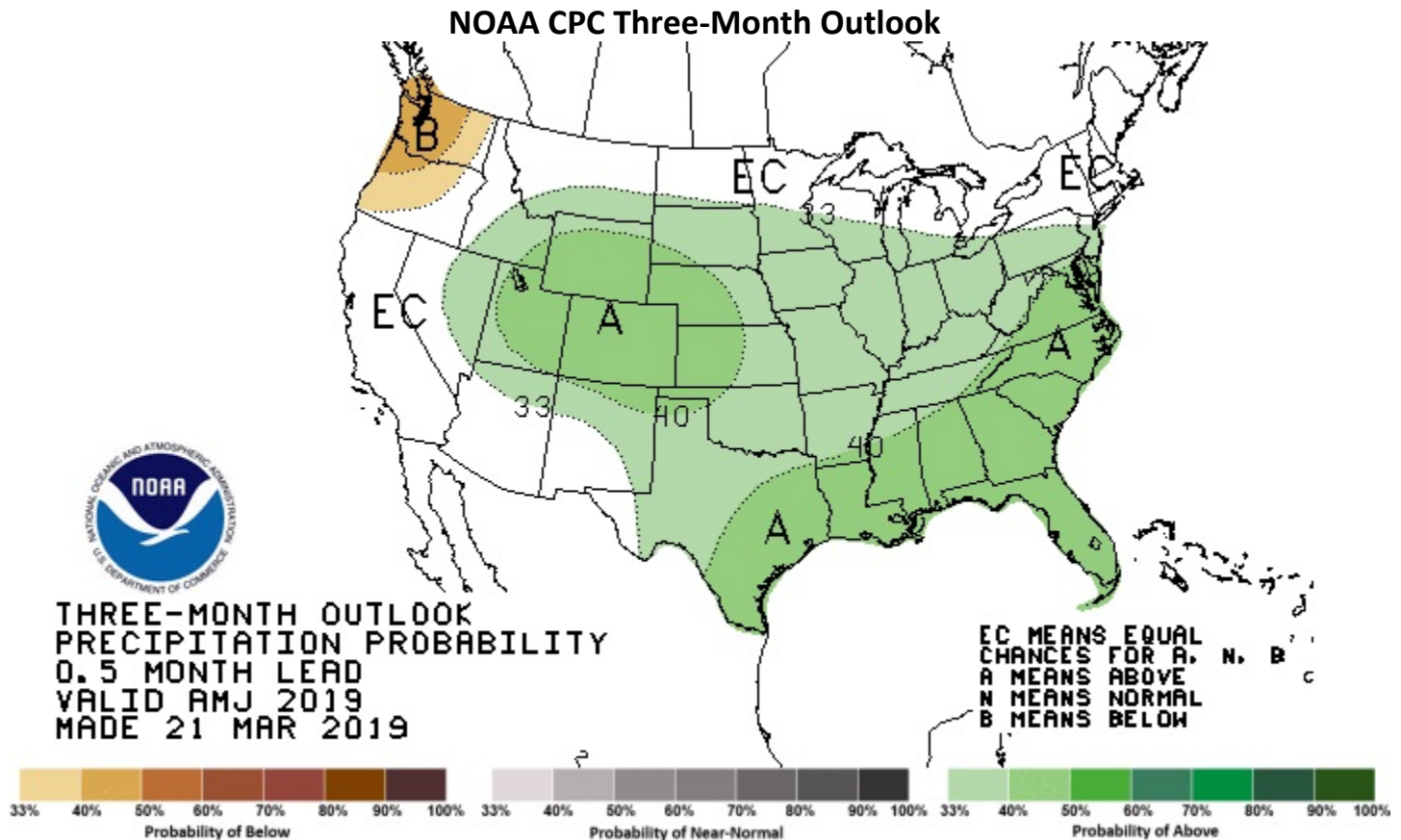


Figure 6: Three-month outlook precipitation probability. Image Source: NOAA Climate Prediction Center (CPC) Long Range Forecasts <https://www.weather.gov/hun/climateforecast>



Prepared by members of the GEOGLAM Community of Practice  
Coordinated by the University of Maryland with funding from NASA Harvest  
The Crop Monitor is a part of GEOGLAM, a GEO global initiative.

<https://cropmonitor.org/>

@GEOCropMonitor

#### Disclaimer

Disclaimer: The Crop Monitor special report is conducted by GEOGLAM with inputs from the following partners (in alphabetical order): United States (USDA NASS). The findings and conclusions in this joint multiagency report are consensual statements from the GEOGLAM experts, and do not necessarily reflect those of the individual agencies represented by these experts. GEOGLAM accepts no responsibility for any application, use or interpretation of the information contained in this report and disclaims all liability for direct, indirect or consequential damages resulting from the use of this report.