Ag Blog 29June 2021

During the 2021 growing season, Dr. Eric Hunt of Atmospheric and Environmental Research, Inc. will be providing weekly updates of the soil moisture index (SMI) from the Noah-MP version 4.0.1 land surface model in the NASA LIS framework for the entire U.S. and regional analysis of the SMI over the four regions of U.S. where the majority of corn, soybean, wheat, and cotton production occurs. Additionally, soil moisture index maps of South American and western Russia are provided at the end of the blog. The analysis is intended to provide the larger agricultural and meteorological communities insight as to areas where soil moisture is excessive or deficient compared to average for that location and what that may mean for impacts. It is my goal that these maps can be an early warning signal for flash drought development or where flash flooding could be likely in the coming week if heavy precipitation materializes. Please be advised that the SMI should be viewed as complementary, not a substitute, to the U.S. Drought Monitor (USDM) and that declarations of drought or flash flood potential for a particular location should never be based on the SMI alone. Various other maps that help give insight into current conditions across the U.S will also be shown as needed.

This blog post was partially supported by NASA grant 80NSSC19K1266.

Order of Maps and Tables in today's Ag Blog

- Figure 1. CONUS Soil Moisture Index map
- Figure 2a. Driest Grid Points
- Figure 2b. Wettest Grid Points
- Figure 3. U.S. Drought Monitor
- Figure 4. Flash Drought Watch update

Narrative:

Many areas were still very dry last Thursday and still are as of this writing (Figures 1-4). Given the unprecedented heat in the Pacific Northwest, areas still had adequate soil moisture are losing it very quickly. Prospects for the spring wheat crop this year are not good and at this point the question in my mind is how low can the yields be? The latest U.S. Crop Progress report showed that only 20 percent of the spring wheat is in good to excellent condition. This is the lowest value at this point in the season since 1988. Recent years have seen national spring wheat yields in the mid-to-upper 40's range. While yields likely will be higher than 1988, a sub 30 bpa wheat yield nationally certainly seems possible, if not likely.

The drought in the northern U.S. is also having an adverse effect on the U.S. corn and soybean crop but recent rains in parts of Minnesota, Iowa, Illinois and eastern Nebraska (since the data cutoff for this map) have helped ease concerns for the time being.

Unfortunately, some places got too much of a good thing and went from being dry to flooding in less than a week. Suffice to say much of the central Corn Belt could use a break from the rain, which looks to happen later this week. While the northern Corn Belt isn't as important for corn production as say Iowa and Illinois, the widespread loss of yield that seems likely to come to fruition will keep a ceiling on corn yield this season in the 182-185 range. Any issues with excessive moisture in Illinois and Indiana will only lower that ceiling down toward "at-trend".

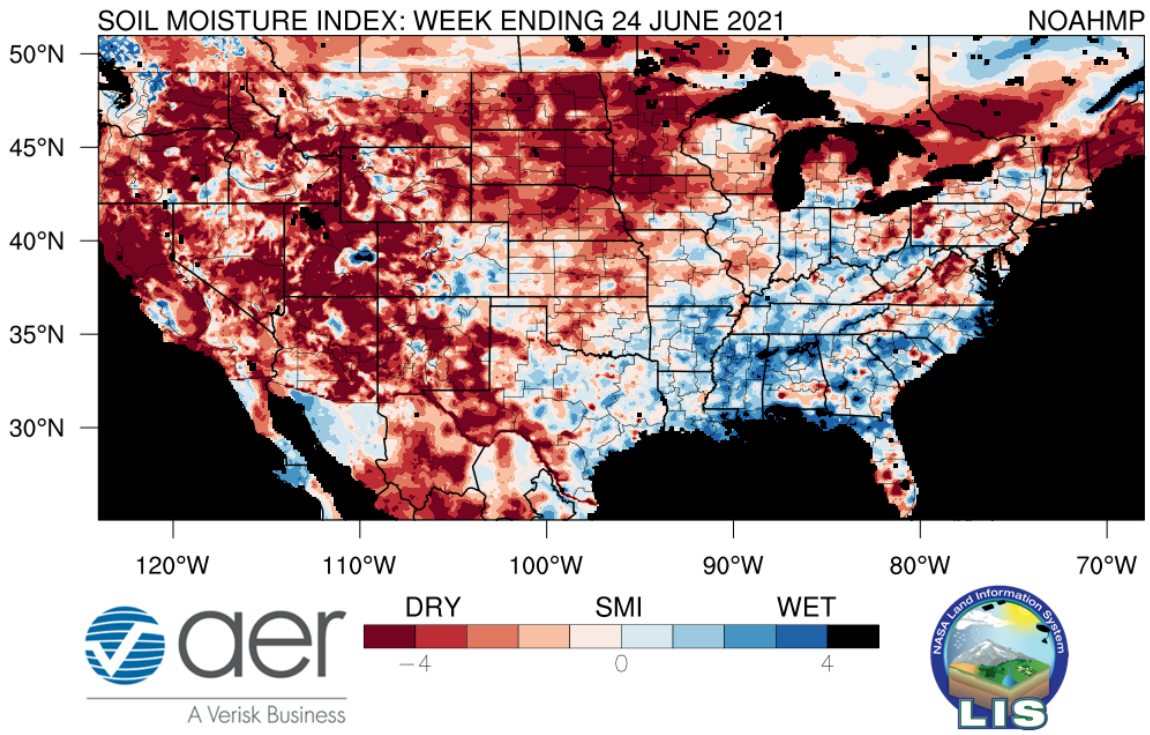

Figure 1. The Soil Moisture Index (SMI) for the 7-day period ending 24 June 2021. Results are based on output from the 0-1 m (surface to 3.23 feet) layers in the Noah-Multiparameterization (Noah-MP) land surface model. Noah-MP is run in the NASA Land Information System (LIS) framework with the North American Land Data Assimilation Version 2 (NLDAS-2) forcing dataset. The SMI calculation is based on the soil moisture index created in Hunt et al. (2009) such that '5'(dark blue) is the wettest and '-5' (dark red) the driest for the period of record. The period of record used calculate the SMI for the current map is 1979-present.

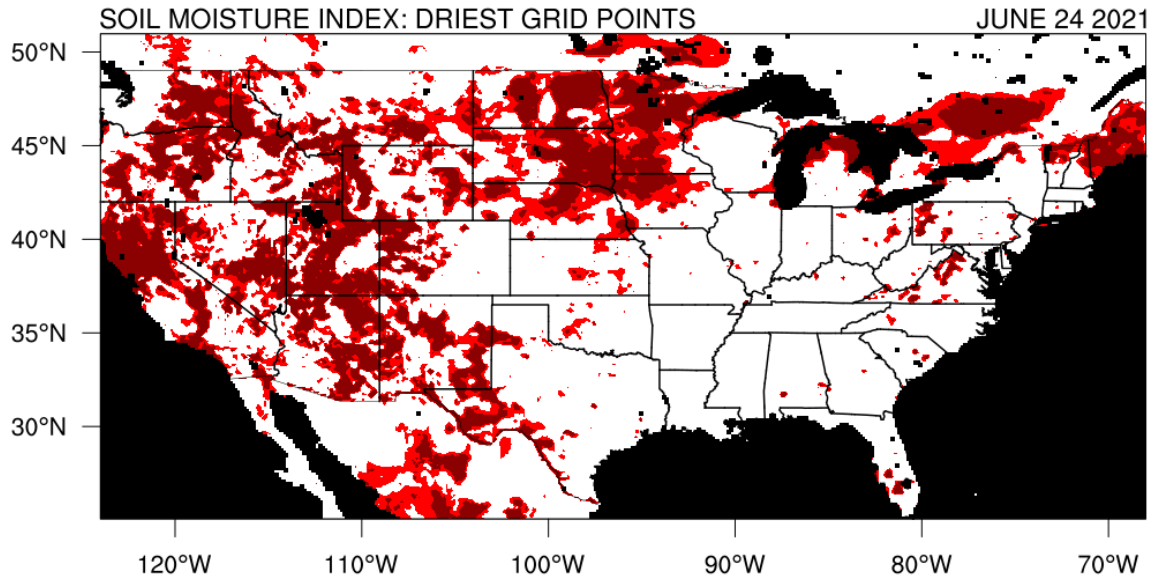

Figure 2a. Lowest 20th (10th) percentile of soil moisture as depicted by red (dark red) pixels for the week ending 17 June 2021.

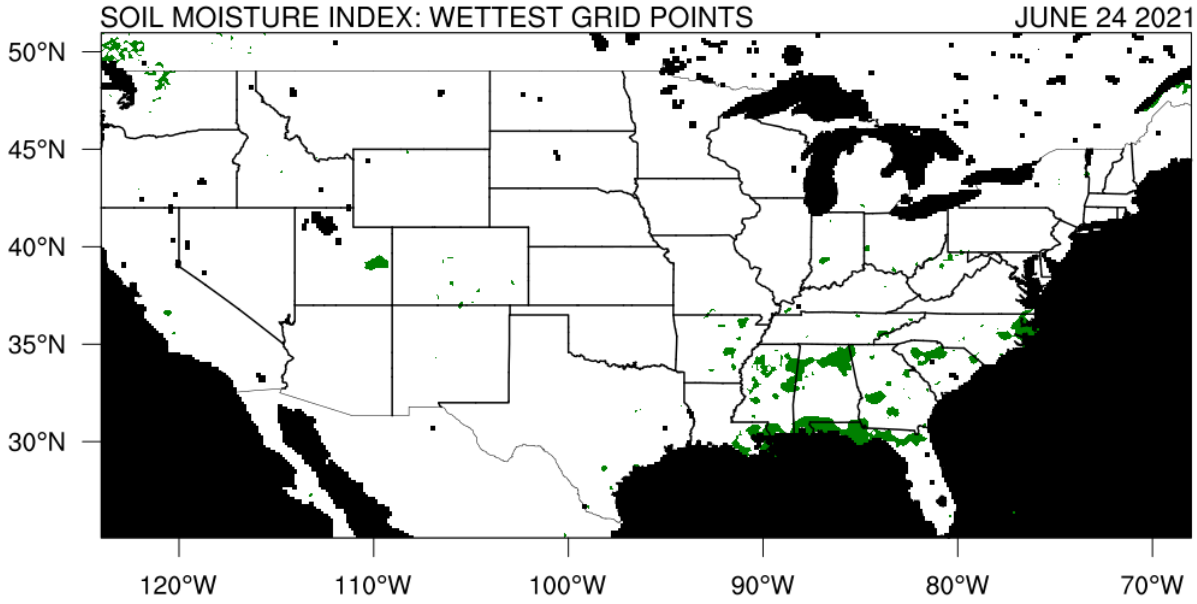

Figure 2b. Highest 20th (10th) percentile of soil moisture as depicted by green pixels for the week ending 17 June 2021.

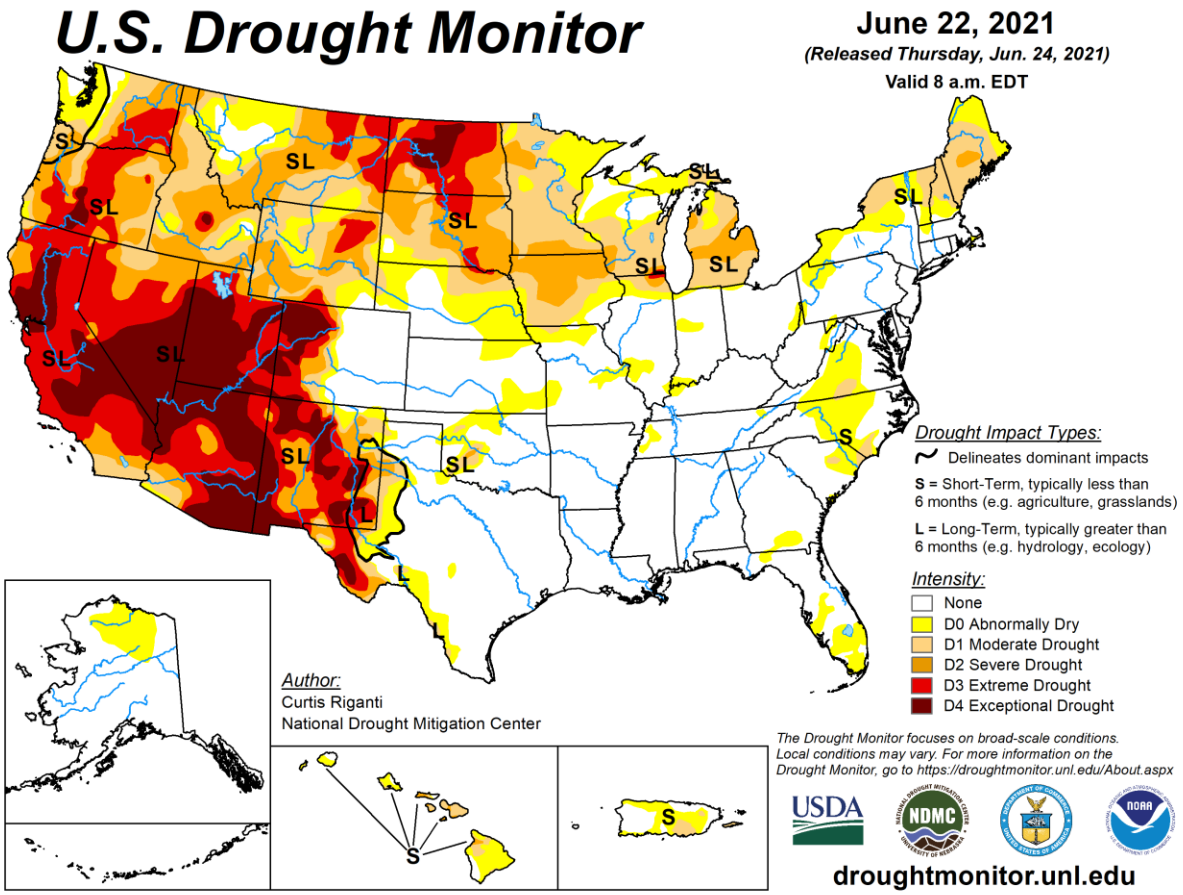

Figure 3. U.S. Drought Monitor map as of 15 June 2021. Map courtesy of the National Drought Mitigation Center.

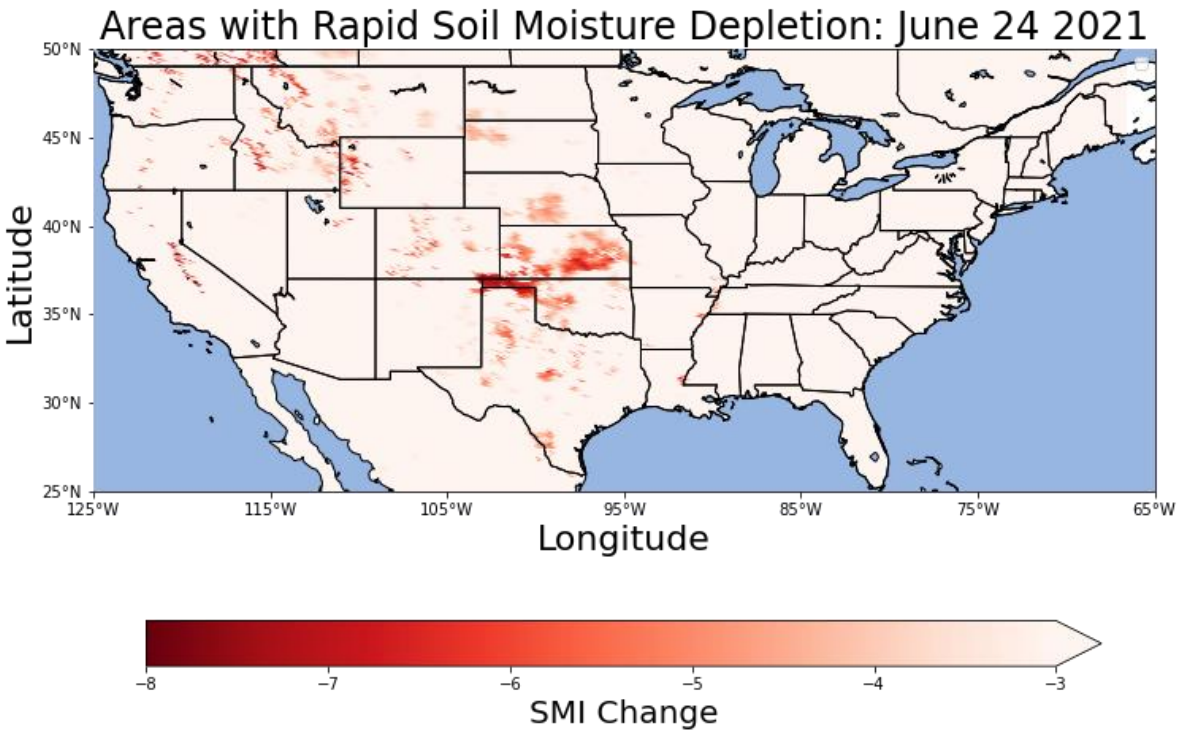

Figure 4. Areas to watch for flash drought as of 17 June 2021. The experimental product is based on a portion of the Flash Drought Intensification Index, which was proposed in Otkin et al. (2021). The criteria are as follows: A minimum drop of -3 in the SMI over previous 3 weeks and a current SMI of < -2. In this case, the SMI is based on the 0-40 cm layers from NASA LIS. For more information, refer to Figure 1.

About the author:

Eric Hunt is an agricultural climatologist from Lincoln, NE and has several members of his extended family actively farming in Illinois and Nebraska. Eric has been with AER since 2012 and received his Ph.D. from the University of Nebraska. Among other activities, he is currently working on NASA funded projects to study the evolution of flash drought. He routinely blogs about agriculture and weather on the AER website. He can be reached via email at ehunt@aer.com and @DroughtLIS on Twitter.

About AER:

Founded in 1977, Atmospheric and Environmental Research is an award-winning environmental research, consulting and weather information services company with demonstrated expertise in numerical weather prediction, climate dynamics and radiation, circulation diagnostics, atmospheric chemistry, air quality and risk assessment, planetary sciences, remote sensing, satellite meteorology, and systems engineering. Consulting services are available. AER is a business unit of Verisk Analytics (VRSK). For more information, please visit our web site at www.aer.com.