

Ag Blog 17 May 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. The Evaporative Stress Index (ESI) and VegDRI will be included in our analysis a bit later this season. 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 2. Driest Grid Points
- Figure 3. U.S. Drought Monitor
- Figure 4. South America Soil Moisture Index map
- Figure 5. Western Russia/Ukraine Soil Moisture Index map

Narrative:

A few weeks ago, a good portion of the Corn Belt was in need of moisture and for most places, that request was answered by Mother Nature on Mother's Day and days since. In my blog [post](#) two weeks ago, I said the concern for a repeat of 1988 or 2012 would go down significantly if the CPC precipitation forecast for May verified and so far it seems to have been spot on for much of the central U.S. While a wet May certainly doesn't mean we're out of the woods for a major flash drought episode later this summer, the recent rainfall in many places was welcome. Some places around the Great Lakes still are on the dry side as recent rains have been less generous than further south. Parts of northern Iowa and southern Minnesota were also still on the dry side but some modest improvement has occurred in those areas over recent weeks (Figs. 1-2). Unfortunately, the Northern Plains remains very dry with SMI values below -3.0 over much of North Dakota. This has allowed corn planting to be ahead of schedule but is very detrimental

to pastures and the wheat crop. If rain doesn't materialize soon, prospects for corn in the far northwestern Corn Belt aren't looking real good either.

Perhaps the question now, given the current forecast, is are we seeing too much moisture? The good news is while the pattern looks to remain active, a repeat of the excessive moisture in the last half of May of 2019 does seem to be less likely in the Corn Belt. Also, most crops are in the ground currently as opposed to at this time two years ago. Nevertheless, some producers in southeastern Iowa and western Illinois, where conditions seem to be wettest currently, may be looking at some replant in a few spots. Further south across the southern Plains though, precipitation amounts do look to be more along the lines of "2019 generous". In some cases in Oklahoma that will not be welcomed but across the High Plains of Texas, a few inches of rain in the coming week should be a blessing and help to alleviate some of the drought conditions (Fig. 3), though certainly not eradicate it.

Across the front Range in Colorado and New Mexico, the recent precipitation hasn't ended the drought, but it has brought the SMI levels to being near or above '0' for the first time in what seems like over a year. Further southeast, the area that doesn't really need any rain but is getting a lot of it anyway, is across the lower Mississippi Delta. Louisiana in particular has seen tremendous precipitation in the past few weeks. The precipitation has put cotton planting well behind the 5-year average and Monday afternoon won't help.

Outside the U.S., I'm skeptical of the precipitation forcing dataset in eastern Canada so I would take those highly negative soil moisture anomalies with a grain of salt. Conditions have gotten much wetter across western Russia, which should bode well for a good wheat crop this summer if the faucet doesn't shut off. Drought continues across southern Brazil.

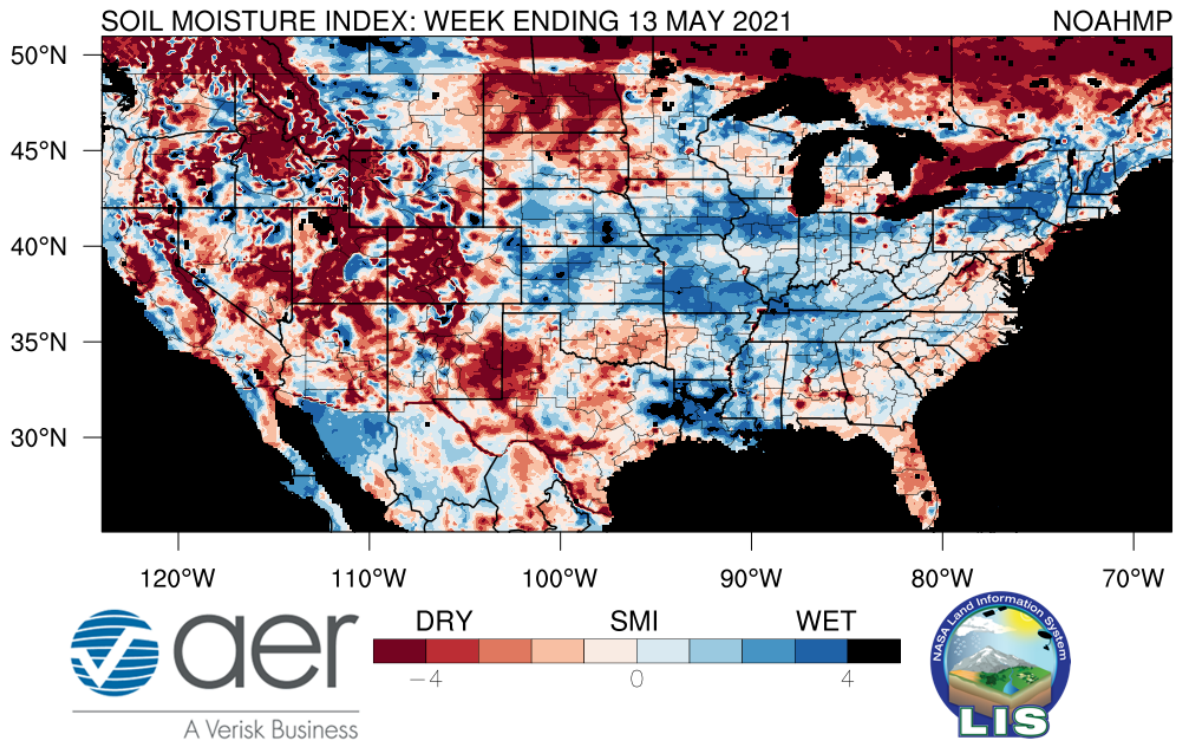


Figure 1. The Soil Moisture Index (SMI) for the 7-day period ending 13 May 2021. Results are based on output from the 0-1 m (surface to 3.23 feet) layers in the Noah-Multiparameterization ([Noah-MP](#)) land surface model. Noah-MP is run in the NASA Land Information System ([LIS](#)) framework with the 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 to calculate the SMI for the current map is 1979-present.

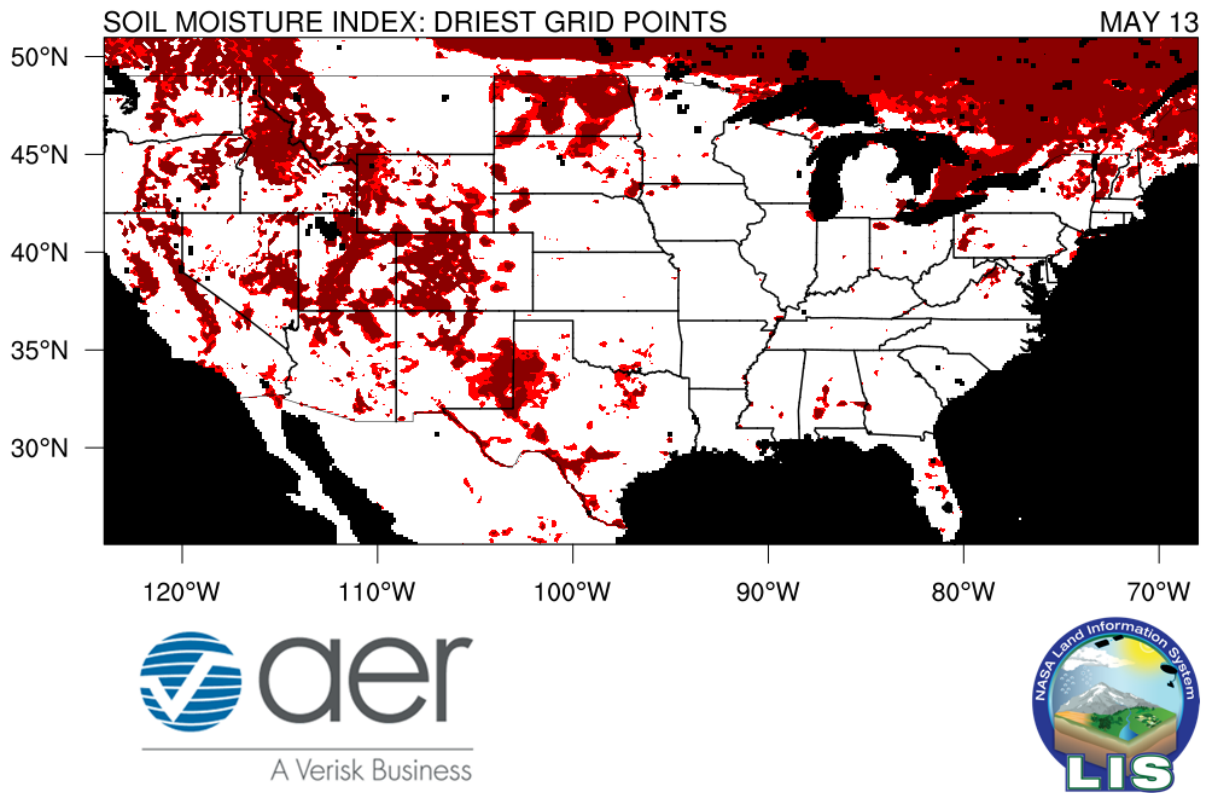


Figure 2. Lowest 20th (10th) percentile of soil moisture as depicted by red (dark red) pixels for the week ending 29 April 2021.

U.S. Drought Monitor

May 11, 2021
 (Released Thursday, May. 13, 2021)
 Valid 8 a.m. EDT

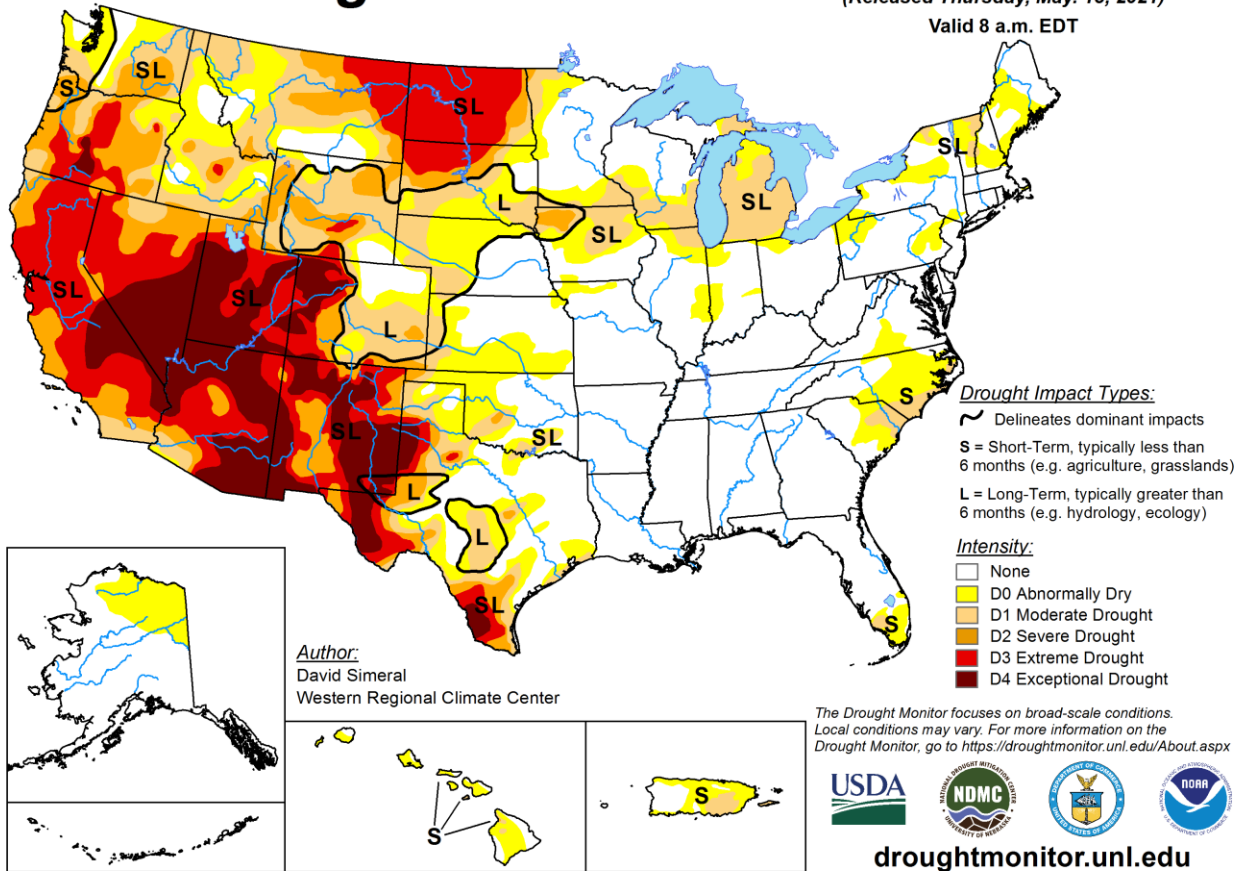


Figure 3. U.S. Drought Monitor map as of 11 May 2021. Map courtesy of the National Drought Mitigation Center.

SOIL MOISTURE INDEX: 13 MAY 2021

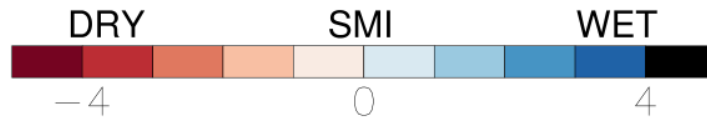
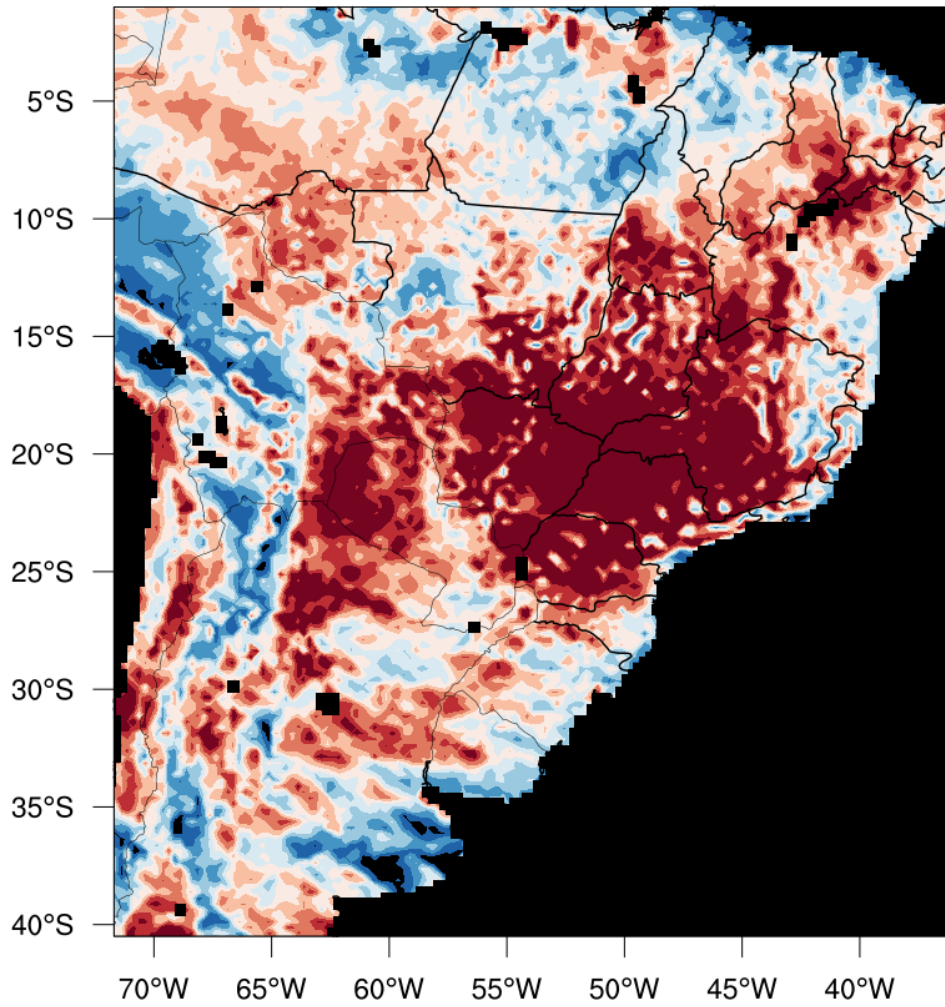


Figure 4. Soil moisture index (SMI) map) for the 7-day period ending 13 May 2021 over South America. Refer to the caption in Figure 1 for more details

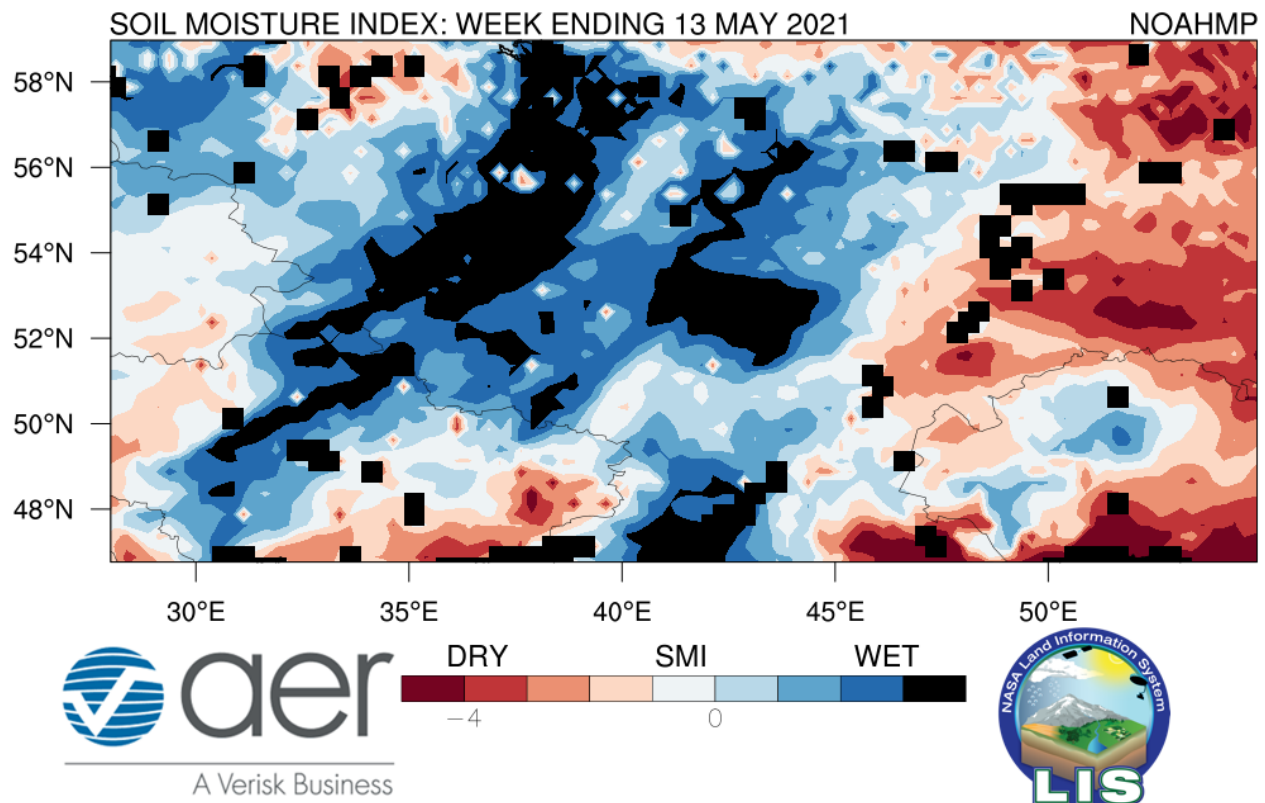


Figure 5. Soil moisture index (SMI) map) for the 7-day period ending 13 May 2021 over western Russia, Ukraine, and northwestern Kazakhstan. Refer to the caption in Figure 1 for more details. Black squares are missing data points.

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.

Disclaimer: *This report and the information and data contained herein (the Report) are wholly advisory in nature and are provided AS IS. AER makes no representations, covenants or warranties of any kind, either express or implied, with respect to the Report, including, without limitation, warranties of condition, quality, durability, suitability, merchantability or fitness for a particular purpose, or in respect of any warranty arising by statute or otherwise in law or from a course of dealing or usage of trade. The information included in the Report may be statistical samples and/or actuarial calculations and AER makes no warranties or representations, either express or implied, that the Report will accurately reflect, predict or resemble experience for an entire industry or any member or members of any industry. AER shall have no liability and shall not be responsible for business and legal conclusions, judgments and decisions made with respect to the Report. AER does not warrant and makes no representations regarding the completeness, currency, accuracy or predictive value of the Report. AER makes no representations and assumes no responsibility for the accuracy of the Report and is not responsible for errors resulting from omitted, misstated or erroneous information or assumptions.*