UPPER MISSOURI RIVER BASIN SOIL MOISTURE AND SNOWPACK DATA VALUE STUDY

Under Congressional direction, NOAA's National Integrated Drought Information System (NIDIS) is leading an interagency team on the ***Upper Missouri River Basin (UMRB) Soil Moisture and Snowpack Data Value Study***. This high-profile study will provide a systematic examination of how the soil moisture and snowpack data generated by an expanded monitoring network in five UMRB states will support improved monitoring of drought and flood conditions in the Basin, as well as other climate and weather applications.

While the specific focus of the study is the UMRB, study findings are expected to broadly inform our understanding of how soil moisture and snowpack data can improve hydrological and climatological applications. As such, it is a keystone project for NIDIS and the NIDIS-sponsored National Coordinated Soil Moisture Monitoring Network.

Background

The UMRB has recently experienced a series of extreme hydrological events (both high and low water) that were not forecasted well, including the historic flood of 2011 and the equally historic flash drought of 2017. After-action reports pointed to the **need for more and better observational data** to support improved forecast operations, particularly soil moisture and lowlands (plains) snow measurements.

Congress has responded to this need by establishing a set of three complementary projects in the UMRB for improved monitoring, data acquisition, and data application. Taken together, these projects represent **transformational change for weather and hydrological monitoring** in the Basin and have the potential to redefine the state-of-the-art in soil moisture and snowpack monitoring.

Network Build-out *U.S. Army Corps of Engineers*	**Data Acquisition & Use Pilot** *National Weather Service (NWS)*	**Data Value Study** *NIDIS*
The Corps is funding the build-out of over 500 soil moisture and plains snow monitoring stations by state mesonets in Montana, North Dakota, South Dakota, Wyoming, and Nebraska. This network will provide high-quality "total water" monitoring data across the basin, with stations spaced in a 25x25 mile grid system.	This pilot program within the NWS National Mesonet Program will: 1) establish a data acquisition process for the enhanced UMRB Network data. 2) develop an improved data server platform to manage the broader range of UMRB data, provide data quality checks, and support user-friendly public access.	While the Weather Service leads the data acquisition pilot program, NIDIS has been tasked to organize an interagency team to evaluate how the UMRB data can support improvements to water resource models, drought monitoring capabilities, and other applications.

Data Value Study Approach

The Data Value Study was authorized in Sec 511(b)(3) of the Water Resources Development Act of 2020 and funded under the Bipartisan Infrastructure Law at $1 million over a 4-year period (FY22-FY25). The Study includes both a formal report to Congress due by the end of FY25 as well as a subsequent Government Accountability Office Audit to confirm study objectives were met. These requirements highlight the importance Congress is putting on the results of this study.

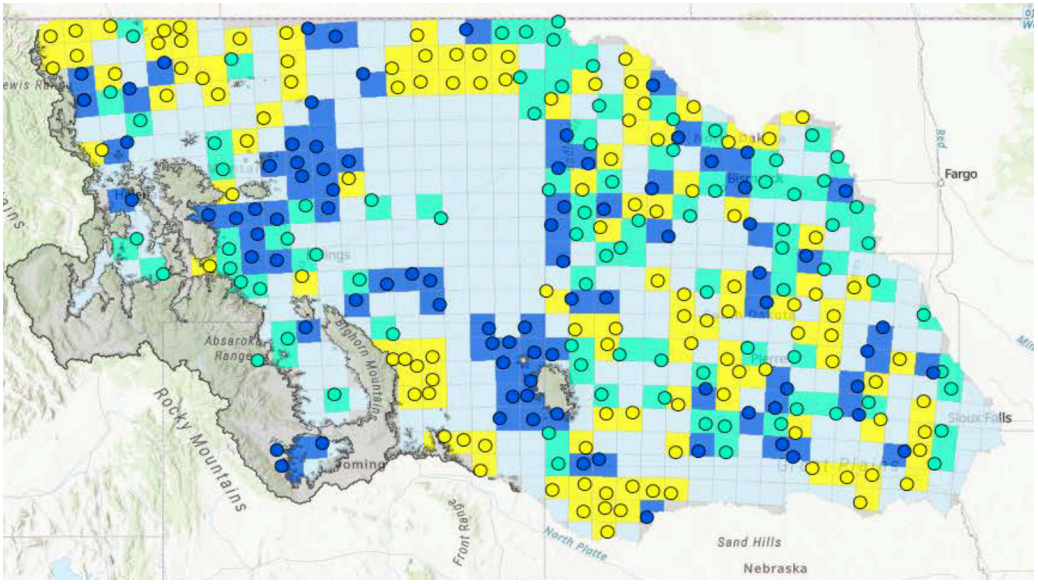

Figure: Status of UMRB buildout as of January 2023; Station grid coding: completed in teal, in-process in blue, candidate in yellow.

Congress has identified a wide range of objectives for the Study:

1. To evaluate the application of data generated by the UMRB Network to:
    a. Improve weather and climate forecasting products on the local, regional, and national levels
    b. Enhance NIDIS, the U.S Drought Monitor, the National Water Model, and other models
    c. Contribute to remote sensing products
    d. Support any other appropriate topic
2. To assess the viability of the NWS Data Acquisition Pilot Program operational structure.

For study planning and execution, NIDIS is coordinating a Working Group comprised of representatives from the U.S. Army Corps of Engineers (USACE), the U.S. Department of Agriculture (USDA), the U.S. Geological Survey (USGS), the U.S Bureau of Reclamation (USBR), the National Aeronautics and Space Administration (NASA), other offices within NOAA, and the five state mesonets involved in the build-out.

The mesonet ribbon cutting ceremony to celebrate the expansion of the mesonet at South Dakota State University, as part of the Upper Missouri River Basin Soil Moisture and Plains Snow Build-Out project. From left to right: Karla Trautman, Elizabeth Wakeman, Reno Red Cloud (hidden), Jerry Schmitz, Col. Mark Himes, Governor Kristi Noem, Dr. Bill Gibbons, Senator Mike Rounds, Nathan Edwards, Dr. Barry Dunn, Kevin Low, Marina Skumanich, and Andrew Berg. Photo credit: SDSU.