Water Resources Website Project Pages:
https://c3.nasa.gov/water/projects/

Example (Hain, Evaporative Stress Index):
https://c3.nasa.gov/water/projects/8/

Send updates to forrest.s.melton@nasa.gov.

Send project highlights to your Associate PM.
**Quick Drought Response Index (QuickDRI)**

**An Integrated Approach for Rapid-Response Agricultural Drought Monitoring**

**Drought Monitoring and Early Warning**

Drought is a complex natural hazard that impacts many sectors including agriculture, water resources, and the economy. In the United States, drought ranks among the most costly of all natural disasters with economic losses often exceeding $1 billion. Improved and timely drought information is needed by decision makers at the federal, state, and local scales as the drought management paradigm shifts to proactive mitigation strategies to reduce the impacts of drought. Progress has been made in developing new monitoring tools using NASA satellite remote sensing observations to assess general vegetation health and different components of the water cycle yielding useful information for characterizing general drought conditions. While these tools were useful monitoring traditional, slow-evolving drought conditions, the capability of detecting the rapid onset and intensification of “flash drought” events that can occur over a period of days to weeks has been limited despite such events having devastating impacts on the agriculture and many other sectors.

**QuickDRI Tool Development**

The NASA Applied Sciences Program has supported the research and development of an agricultural drought monitoring tool called the Quick Drought Response Index (QuickDRI), which is designed to detect the rapid onset and intensification of flash droughts. QuickDRI integrates several NASA satellite and modeled data sets associated with soil moisture, vegetation health, and meteorological conditions to collectively assess short-term changes that can lead to flash drought events.

QuickDRI was developed in a collaborative effort between the National Drought Mitigation Center and Center for Advanced Land Management Information Technologies at the University of Nebraska-Lincoln, U.S. Geological Survey, U.S. Department of Agriculture, and NASA Goddard Space Flight Center. QuickDRI is intended to serve as an “alarm” indicator of rapidly emerging and changing drought conditions across the United States that can be used for both drought early warning and flash drought detection. The goal is to provide information that can improve the response time of the U.S. Drought Monitor and other key drought response activities among federal and state agencies. An operational QuickDRI tool has been developed to produce weekly, 1-km spatial resolution maps of short-term drought intensification across the continental United States and will be publicly available by the 2017 growing season.

**Project highlights:**

- Flash drought alarm tool integrates several NASA satellite and modeled data sets to detect and monitor rapidly changing agricultural drought conditions
- Used by the U.S. Drought Monitor, which has been used as a trigger for more than $5 billion in disaster assistance programs to date
- Provides updated drought intensification information weekly for the continental United States

**Use of QuickDRI for Drought Monitoring**

A primary application of QuickDRI is the U.S. Drought Monitor, which is used as a trigger for disaster assistance of federal and state programs including the U.S. Department of Agriculture’s Range and Forage Program. To date, the U.S. Drought Monitor has been used as a trigger for more than $5 billion in drought disaster relief. Program triggers and eligibility requirements depend on the duration and intensity of drought conditions for a given area. As a result, a drought monitoring tool such as QuickDRI can improve the timing that drought is introduced into the U.S. Drought Monitor map and be used as a signal to consider increasing or decreasing the drought intensity, which in turn improves the decision making for drought mitigation and response actions that are triggered.

QuickDRI is also used as a short-term indicator of agricultural drought intensification or improvement by a suite of other decision makers at federal and state levels that are currently using a complementary drought monitoring tool called the Vegetation Drought Response Index (VegDRI: http://vegdri.unl.edu/), which is a longer-term, seasonal index of drought conditions. These decision makers include the National Integrated Drought Information System (NIDIS), which is part of the National Oceanic and Atmospheric Administration, the National Weather Service (NOAA) drought bulletins, the Bureau of Land Management (BLM) rangeland assessment programs, and several state drought task forces.

The QuickDRI map (left) for June 10, 2012 shows the widespread, rapid intensification of agricultural drought conditions across much of the U.S. Corn Belt region as shown by the dark and bright reds. In comparison, the U.S. Drought Monitor map (right) for June 12, 2012 shows most of the region in pre-drought or moderate drought conditions. The increase in drought severity depicted by the strong drought intensification signal in QuickDRI over this area was not introduced into the U.S Drought Monitor map until 2 weeks later. If QuickDRI would have been available in 2012, the U.S. Drought Monitor would have had 2 weeks lead time to introduce more severe drought conditions into that map, which would have improved the response of the drought mitigation actions triggered by the drought duration and intensity information represented in the U.S. Drought Monitor.