3rd Workshop to develop CRT (Climate Resilience Toolkit) Case Studies [1]

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Event: Winter Meeting 2017 [2]
Session Type: Workshop [3]
Room Location: Glen Echo [4]
Expertise Level: Beginner [5]
Collaboration Area: Climate Education Working Group [6]
Energy and Climate [7]
Information Quality [8]
Science Communication [9]
Abstract/Agenda:
This Workshop continues the theme of similar sessions at two previous ESIP meetings on CRT (Climate Resilience Toolkit) and ongoing work that could form the bases for CRT Case Studies.

Workshop agenda:

- [5 min] Introduction to the workshop, logistics, larger goal to establish a CRT pipeline at the ESIP level

- [5 min] LuAnn Dahlman, NOAA, Introduction to CRT

- [5 min] Ken Burns video on story telling
https://www.youtube.com/watch?v=VlZYgPllKNU [10]

- Brief descriptions of work related to agriculture that forms the basis for a potential CRT Case Study

[15 minj] --- Ying Sun, Cornell University, Drought onset mechanisms revealed by solar-induced chlorophyll fluorescence (SIF): Insights from two contrasting extreme events

The droughts of 2011 in Texas and 2012 over the central Great Plains were used as case studies, to explore the potential of satellite-observed solar-induced chlorophyll fluorescence (SIF) for monitoring drought dynamics. For both drought events, the spatial patterns of negative SIF anomalies from the Global Ozone Monitoring Instrument 2 (GOME-2) closely resembled drought intensity maps from the U.S. Drought Monitor. In the Texas event, the drought-induced suppression of SIF occurred throughout 2011 but was exacerbated during the summer. This event was characterized by a persistent depletion of root-zone soil moisture caused by year-long below-normal precipitation. In contrast, in the central Great Plains event, warmer temperatures and relatively normal precipitation boosted SIF in the spring of 2012. However, a sudden drop in precipitation coupled with unusually high temperatures rapidly depleted soil moisture through evapotranspiration, leading to a rapid onset of drought in early summer. As a result, SIF reversed from above to below normal. For both event regions, the GOME-2 SIF anomalies were significantly correlated with those of root-zone soil moisture, indicating that the former could potentially be used as a proxy for the latter, for monitoring agricultural droughts with different onset mechanisms. Further analyses indicated that the contrasting dynamics of SIF during these two extreme events were caused by changes in both the fraction of absorbed photosynthetically active radiation (fPAR) and fluorescence yield, suggesting that satellite SIF is sensitive to both structural and physiological/biochemical variations of vegetation. We conclude that the emerging satellite SIF has excellent potential for dynamic drought monitoring.

[15 min] --- John Bolten, Associate Program Manager of Water Resources for the NASA Applied Sciences Program, Enhancing the USDA Global Crop Assessment Decision Support System using satellite-based soil moisture estimates obtained from the Soil Moisture Active Passive mission

The primary goal of the U.S. Department of Agriculture Foreign Agricultural Service (FAS) is to

provide timely information on current and expected crop supply and demand estimates. Inter-annual variability in crop condition and crop productivity is largely controlled by the amount of available water to the plants. Thus, knowledge of the root-zone soil moisture is critical for the USDA's crop analysts. This information is currently provided by the modified Palmer model (PM). The PM is a two-layer, water balance-based hydrologic model that is driven by daily precipitation and daily minimum and maximum temperature observations based on ground meteorological station measurements from the World Meteorological Organization (WMO) and gridded weather data from the U.S. Air Force 557th Weather Wing (formerly U.S. Air Force Agency, AFWA). A data assimilation (DA) unit was added to the model to allow the integration of satellite-based soil moisture observations. The DA system was initially developed using retrievals from the Advanced Microwave Scanning Radiometer for EOS (AMSR-E). The AMSR-E soil moisture estimates were ingested into the PM using a 1-D Ensemble Kalman Filter Approach. After the failure of AMSR-E in Ocober 2011, the DA system was updated, and it is currently set to ingest Soil Moisture Ocean Salinity (SMOS)-based retrievals. Operational delivery of the SMOS-based soil moisture product for USDA FAS began in spring 2014. This talk will demonstrate the added value to FAS of assimilating satellite-based data and focus on work that is being done in preparation for updating the DA system by ingesting soil moisture observations from the Soil Moisture Active Passive (SMAP) mission. Soil moisture estimates derived using data obtained from SMOS and the Advanced Scatterometer (ASCAT) instrument on MetOp have been used as a proxy for the SMAP radiometer and radar products, respectively. The performance of this dual assimilation system will be assessed by examining the lagged rank cross correlation between the Normalized Difference Vegetation Index (NDVI) and the PM soil moisture estimates acquired before and after the assimilation.

[40 min] - Two concurrent breakout groups, one for each of the presenters and led by them. The groups discuss and draft the incipient stories that would become CRT Case Studies, using the CRT "templates."

[5 min] - The groups recombine and share results and thoughts.

Attachments/Presentations: JDBolten_ESIP011317.pdf [11]
SIF_drought-ESIP-final.pdf [12]
Dahlman-3rd CRT Case Study Workshop.pdf [13]

Teaser: Unlike Congressional sessions, in this CRT session, it's good to see how the sausage is made!
Accepted:
Keywords: agriculture [14]
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