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ASSESSMENT AND MITIGATION OF AGRICULTURE DROUGHT AND WATER AVAILABILITY IN THE SOUTHEASTERN UNITED STATES USING SPACE SCIENCE TECHNOLOGY

Abstract

Though our changing and volatile climate system can produce many disasters and crises worldwide, drought is considered by some to be the most devastating. The potential of longevity for this gradual climatic phenomenon reaps major social and environmental impacts. A quick look over the past century provides ample evidence of its destructive nature, whether in the African famine of the late 1980's or the dust bowl of the 1930's in the American prairie. However, minor and seasonal droughts that occur every year around the globe have major impacts as well.

The severity of drought has many implications to society, both environmental and economic. However, its impact on agriculture and water availability is especially direct. Several projects conducted through the Earth System Science Center at the University of Alabama in Huntsville are taking advantage of this prodigious opportunity to use the technology of space science using satellite derived data to better asses, mitigate and understand agricultural drought and better manage the water resources in the Southeastern United States.

The primary tools used are the Decision Support System for Agro-technology Transfer (DSSAT) crop model and the Water Supply Stress Index (WASSI) model. These tools are equipped with high resolution data from satellite derived variables that include: Satellite derived insolation, temperature and dew points from GOES to enhance evapotranspiration algorithms and provide accurate real-time input for the crop model; ALEXI, a thermal IR based land surface model that will be used for soil moisture and ET validation; and eMODIS, a 7 day spectral data set that will be used for vegetation indices.

These high resolution tools will produce near real time information of the agricultural crops throughout the region including crop water stress, potential yields and soil moisture. The incorporation of an enhanced WASSI model will increase the spatial and temporal detail of drought and water stress maps and have the potential to apply short term forecast and future climate scenarios. This information, made possible by satellite data, will be made available to stakeholders and policy and decision makers throughout the region.

This paper will express the usefulness of satellite and remotely sensed data, and how it is needed to create drought products of this detail. A thorough review of these products and example results up to date will be presented. In addition, how these tools could be extrapolated and used in other regions around the world will be explored.