World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:14, No:07, 2020

Estimation of Soil Moisture at High Resolution through Integration of Optical and Microwave Remote Sensing and Applications in Drought Analyses

Authors : Donglian Sun, Yu Li, Paul Houser, Xiwu Zhan

Abstract : California experienced severe drought conditions in the past years. In this study, the drought conditions in California are analyzed using soil moisture anomalies derived from integrated optical and microwave satellite observations along with auxiliary land surface data. Based on the U.S. Drought Monitor (USDM) classifications, three typical drought conditions were selected for the analysis: extreme drought conditions in 2007 and 2013, severe drought conditions in 2004 and 2009, and normal conditions in 2005 and 2006. Drought is defined as negative soil moisture anomaly. To estimate soil moisture at high spatial resolutions, three approaches are explored in this study: the universal triangle model that estimates soil moisture from Normalized Difference Vegetation Index (NDVI) and Land Surface Temperature (LST); the basic model that estimates soil moisture under different conditions with auxiliary data like precipitation, soil texture, topography, and surface types; and the refined model that uses accumulated precipitation and its lagging effects. It is found that the basic model shows better agreements with the USDM classifications than the universal triangle model, while the refined model using precipitation accumulated from the previous summer to current time demonstrated the closest agreements with the USDM patterns.

Keywords : soil moisture, high resolution, regional drought, analysis and monitoring
Conference Title : ICABDDM 2020 : International Conference on Advanced Building Designs and Disaster Management
Conference Location : Prague, Czechia
Conference Dates : July 09-10, 2020