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Determination of Drought Threshold for Agricultural Land-use using Satellite Image Analysis Techniques

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The climate change causes major problems in natural disasters such as storms and droughts and has significant impacts on agricultural activities. Especially, global warming changed crops cultivated causing changes in agricultural land-use, and droughts along with land-use change accompanied serious problems in irrigation management. Moreover, it is very problematic to detect drought impacted areas with field survey and it burdens irrigation management. In South Korea, drought in 2012 occurred in western area while 2015 drought occurred in eastern area. The drought cycle in Korea is irregular but the drought frequency has shown an increasing pattern. Remote sensing approaches has been used as a solution to detect drought areas in agricultural land-use and many approaches has been introduced for drought monitoring. This study introduces remote sensing approaches to detect agricultural drought by calculation of local threshold associated with agricultural land-use. We used Landsat-8 satellite images for drought and non-drought years, and Vegetation Health Index(VHI) was calculated using red, near-infrared, and thermal-infrared bands. The comparative analysis of VHI values for the same agricultural land-use between drought year and non-drought year derived the threshold values for each type of land-use. The results showed very effective detection of drought impacted areas showing distinctive differences in VHI value distributions between drought and non-drought years.