Perpendicular Drought Indices: A High Performance Drought Monitoring Method

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In this study, the performance of two remote sensing drought indices derived from MODIS satellite images (MOD13A3 V005) data include Perpendicular Drought Index (PDI) and Modified Perpendicular Drought Index (MPDI) in detecting and measuring of the intensity of drought phenomena based on temporal and spatial extension are evaluated. In this mention the correlation between these remote sensing indices and two other indices; Enhanced vegetation index (EVI) and Vegetation condition index (VCI) indices with four crop water parameters include; the climatic water balance (CL), the crop water balance (CR), the monthly reference crop evapotranspiration (ET_0), the crop evapotranspiration (ET_c) and the required irrigation water (I) in ten different agro-climatological zones of Iran during February 2000 to December 2005 are analyzed. In this research, winter wheat is selected as a major crop which grows in majority of climatic conditions in Iran. Results indicated that there is statistically significant correlation between PDI and MPDI indices and mentioned crop water indices in several climatic regions but correlations of EVI and VCI with crop water related parameters are not enough statistically significant . Further, spatial analyses revealed that both of PDI and MPDI indices had acceptable performance to detect crop water conditions but in temporal analysis, the PDI index had better results to detect water crop condition in comparing with the MPDI index in several winter wheat's growing stages. By concerning that the majority area of Iran covered by semi arid to arid climatic regions and by considering of winter wheat as a main Iranian agricultural crop, the PDI index could be used as a simple structure remote sensing based drought index in Iran and also in other developing countries which have similar climatic conditions.

Key words; drought monitoring, remote sensing, water balance model, crop water, Iran.