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Drought Risk Identification: Early Warning System of Seasonal Agrometeorological Drought

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By considering drought as a hazard, drought types are classified into three categories, namely meteorological or climatological, agrometeorological or agricultural and hydrological drought and as a fourth class the socioeconomic impacts can be considered. This paper addresses agrometeorological drought affecting agriculture within the risk management framework. Risk management consists of risk assessment, as well as a feedback on the adopted risk reduction measures. And risk assessment comprises three distinct steps, namely risk identification, risk estimation and risk evaluation. This paper deals with the quantification and monitoring of agrometeorological drought, which constitute part of risk identification. For the quantitative assessment of agrometeorological or agricultural drought, as well as the computation of spatiotemporal features, one of the most reliable and widely used indices is applied, namely the Vegetation Health Index (VHI). The computation of VHI is based on satellite data of temperature and the Normalized Difference Vegetation Index (NDVI). The spatiotemporal features of drought, which are extracted from VHI are: areal extent, onset and end time, duration and severity. In this paper, a 20-year (1981-2001) time series of NOAA/AVHRR satellite data is used, where monthly images of VHI are extracted. Application is implemented in Thessaly, which is the major agricultural region of Greece characterized by vulnerable and drought-prone agriculture. The results show that every year there is a seasonal agrometeorological drought with a gradual increase in the areal extent and severity with peaks appearing usually during the summer. Drought monitoring is conducted by monthly remotely sensed VHI images. Drought early warning is developed using empirical relationships of severity and areal extent. In particular, two second-order polynomials are fitted, one for low and the other for high severity drought, respectively. The two fitted curves offer a seasonal forecasting tool on a monthly basis from April till October each year. The results of this drought risk identification effort are considered quite satisfactory offering a prognostic potential for seasonal agrometeorological drought.

Key words: agrometeorological drought, risk identification, remote sensing.