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Remotely Sensed Mapping of Agricultural Productivity

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Identifying vulnerable agricultural production areas is essential for any sustainable development/farming plan. Climate is among the most important factors that determine the agricultural potential of a region and the suitability of an area for a specific crop or land management, followed by soil characteristics and geomorphology. Temperature and rainfall in terms of quantity and spatiotemporal variability are the two climatic variables that determine the agricultural potential of an area and the risk involved in any new agronomical use. Also, extreme weather events, such as droughts, have to be taken into account. In this paper, two satellite derived indices are combined in GIS environment with soil maps and a Digital Elevation Model (DEM) in order to identify the agricultural potential of areas. Namely, these indices are the Vegetation Health Index (VHI) and the Degree Days (DD) (also known as Heat Units). VHI represents overall vegetation health and is used for agricultural drought monitoring and mapping. DD units (oC d) are often used in agriculture in order to estimate or predict the lengths of the different phases of the development in crop plants, since temperature has a primary role in the growth of many organisms (plants and insects). The two indices are computed for 20 hydrological years, from October 1981 to September 2001, from NOAA/AVHRR ten –day composite images with 8x8 Km spatial resolution. DD is examined for crops of great commercial importance. The soil maps are digitized according to fertility (appropriate or not for agricultural use) and desertification vulnerability, whereas altitude based limitations are provided by the DEM. The study area is the water district of Thessaly, the largest lowland formation of Greece and the country's largest agricultural centre, located in Central Greece. The superposition of the two indices along with the soil and elevation data had led to the identification of vulnerable agricultural production areas. The derived map represents the appropriate agricultural use per pixel and implies that in the 35% of Thessaly water district, agriculture is not a sustainable use. Crops of commercial importance can be grown to the rest 65%.