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FORECASTING THE DROUGHT INTERVALS IN THE SOUTH-WESTERN PART OF ROMANIA

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Abstract: *The study presents a mathematical interpretation of the drought periods from 2010 to 2015 and the relationship between the drought periods and the associated baric structures at the European level. There is an increase compared to the climatological norm of positive temperature anomalies at the level of 500 hPa for almost the entire frame of the year, the only exception being the winter period. The maximum period of time characterized by a positive temperature anomaly at the level of 500 hPa is found during the summer months, when a sustained transport of air masses of tropical origin to the western area of Romania is noted. Periods of positive temperature anomaly at the 500 hPa level range from a minimum of 10 days to nearly 50 days during the summer. The period of negative anomalies varies between 7 days and approximately 40 days, the longest duration being during the winter months. From the analysis correlated with the arrangement of the baric centres, certain trends of the drought installation periods can be established, especially in the case of interpolation between the meteorological data and the analyses at the synoptic level. Although there may be short periods characterized by atmospheric instability during the summer, there is an accentuated humidity deficit that cannot compensate for the increased rate of potential evapotranspiration. The present study represents an intermediate analysis of the situation from a longer period.*

• Introduction

Recent studies on extreme phenomena in the continental area of the northern hemisphere highlighted an area of drought formation that also includes southern Romania. This fact, as well as the importance of this territory for agricultural production, led us to try drought forecasting in the growing season. Drought represents an active threat to economic, social security and also a risk to the well-being of a country. In the increasingly pronounced context of climate change, it is considered essential to study these extreme meteorological phenomena that have a significant impact on agriculture in the western part of Romania.

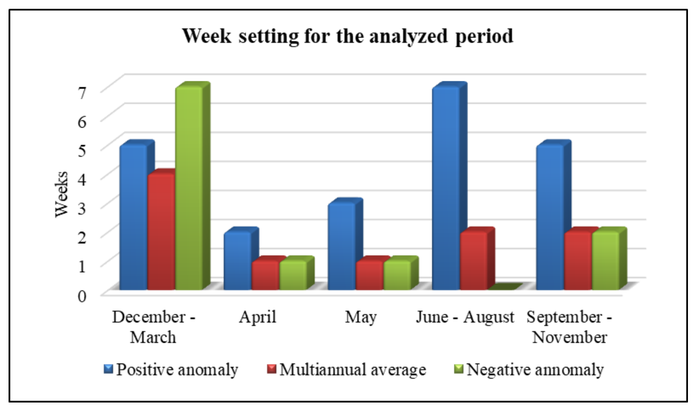
• Material and method

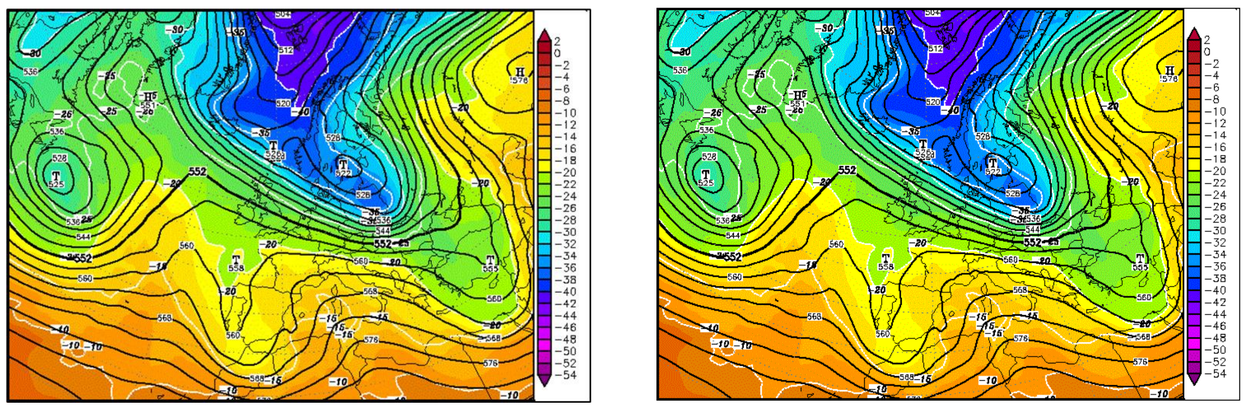
Forecasting droughts for the growing season by analogy with previous seasons is an effective way to estimate the duration and intensity of a drought. It should be noted that the analogy and collaboration with operational meteorology. Seasonal forecasts in Romania can be treated to a good extent considering as the initial state the data from the Atlantic-European region for a time interval shorter than one year. This is due to the relatively limited interannual variability of the climate in the Atlantic Ocean area and the lack of some: significant teleconnections for south-eastern Europe with pronounced interannual variability phenomena such as the Southern Oscillation. Of great importance in this sense is the arrangement at the synoptic level of the semi-permanent pressure centres. The synoptic archives for the advection temperature (TA) at the level of 500 hPa in the entire Atlantic-European region were used as materials for the preparation of this paper.

The year was divided into six homogeneous seasons, consisting of December-March, April, May, June-August, September-October and November. During these seasons, the advection temperature field at the level of 500 hPa shows relatively homogeneous variations in the nine districts of the Atlantic-European region. The range of variation of the advection temperature field at the level of 500 hPa for each season and district was divided into three ranges: the range of negative anomalies (-), the range of values located close to the multiannual mean (n), and the range of positive anomalies (+). Time intervals of approximately five days (during which synoptic macro-processes show homogeneity) called natural synoptic periods were considered.

• Results and discussions

The under posted table shows a persistence of positive temperature anomalies in all analysed periods, but there is only one exception, namely the period December - March. The decrease in relative air humidity is also noted, this fact being due to the characteristics of tropical air masses. During the winter seasons and until the beginning of spring, the highest value of the time intervals characterized by temperature values close to the multiannual average values is also noted.





The above figure shows the temperature at the geopotential height of 500 hPa for April 22, 2010. It is noted that a mass of cold air, of polar origin, is being transported to the Romanian territory, this being an extension of the Icelandic Cyclone. The geopotential height at the level of 500 hPa is also presented, and for the northern part of Romania a strong penetration of an air mass of polar origin is observed. shows the layout of the geopotential field for May 1, 2010. In this case, an air mass with tropical characteristics has advected, a fact indicated by the temperatures at the 500 hPa level. The topographic structure associated with the anticyclonic ridge accentuates the transport of tropical air masses and practically inhibits the penetration of air masses with moisture content. The distribution of semi-permanent pressure centres is narrower towards the north of the continent, and the Azoric Anticyclone shows its northern displacement, until in the southern area of Greenland a deepening of the Icelandic Cyclone is indicated.

• Conclusions

From the obtained results, it is noted that the drought periods are closely related to the disposition of the main semi-permanent baric centres in the northern hemisphere. The predominance of positive temperature anomalies at the height of 500 hPa is noted throughout the investigated interval. A single exception appears in this regard, during the winter months and at the beginning of spring, when a period of more than 6 weeks of negative anomaly is noted. This fact is normal given the disposition of the Siberian Anticyclone during the respective period of the year. The present research is part of an extended research over a longer period.