



## **Estimation of leaf color change period, in the deciduous forests from Moldova, for touristic purpose, using the Copernicus Sentinel-2 satellite images**

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Phenology tracks the synchronization between the different stages of plant evolution and the changes that occur between the seasons and the climatic peculiarities. Changes that occur in the life cycle of plants, also called phenophases, appear as a direct response to climatic and astronomical factors, this is best seen in areas around the globe where there are several seasons that highlight temperature changes, rainfall and changes in sunshine duration. Plant phenoses have been pursued for centuries by farmers to produce as many crops, by beekeepers to anticipate the flowering times of different plants to raise honey, or more recently by tourists who are eager to see the cherry blossoms from Japan. In Romania the deciduous forests offer yearly a colorful show during the period of leaves browning. In order for this cycle of forest phenophase to be exploited from a touristic point of view, it is important to identify the period of browning of the leaves at region, country or mountain range. The purpose of this article was to obtain a map of the optimal periods of leaves browning in Romania (Moldova region) according to latitude and geographic unity. To identify such periods, we used the European Space Agency (ESA) database and Sentinel 2A images, with spectral channels ranging from VNIR to SWIR that helps us with a detailed monitoring of color changes in vegetation, but also because the images taken over have a high frequency over time. In the analysis of the yellowing period of the leaves is analyzed not the chlorophyll content of the leaves but the anthocyanin, which prints their red-yellow color. The Anthocyanin Reflectance Index (ARI) and Browning Reflectance Index (ARI) were used to identify the redness of the leaves. The study focuses on the area of Moldova (comprising part of the Eastern Carpathians, Subcarpathians and the plateau region), Romania, and the study period is from September to October 2016-2018. To minimize errors, the spectral bands were brought to a similar resolution. One problem in this analysis is that at this latitude many satellite images are covered by clouds. The final result indicates a period of 5-6 days when the leaves turn yellow and fall, and this may vary during October. Also, a variation of the browning and fall of the leaves for about 3 days between the mountain region and the plateau region was observed at the same latitude.