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THE USE OF REMOTE SENSING IMAGES IN THE ANALYSIS OF LAND SURFACES

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Abstract:

In the present study, the Landsat 8 method was used to collect spectral data. These data help us understand the evolution of many natural processes, the monitoring of agricultural and forest land, can allow the longest continuous data recording of the Earth's surface seen from space. Landsat data allow the monitoring of climate change, which leads to the improvement of human health and biodiversity.

Satellite images have a very important role in the analysis of the earth's surface and important sources of extraction of stored geographical information.

The study area is located in the west of Romania and is made up of the following administrative-territorial units: **Obaha Lungă, Mănăștiur, Dumbrava, Făget, Margina, Curtea, Firdea and Tomești.** Based on the spectral information, four normalized differentiation indices for land surface analysis, namely NDMI, NDBR, NDWI and SAVI, were calculated for each study area.

Keywords: satellite images, land surface, remote sensing, normalized indices of differentiation

Introduction

Remote sensing is the technology by which the characteristics of the analyzed objects can be identified, measured and analyzed without direct contact, but from a distance. Remote sensing technology to identify objects and understand environmental conditions is the uniqueness of reflection and emission.

Satellite images are very important in the analysis of the geographic space and are important sources for extracting stored geographic information. Analyzing the parts of the electromagnetic spectrum separately, digital color images are made up of three primary colors: red, green and blue.

The multispectral digital image can be rendered visually by choosing three spectral bands and assigning one conventional color from the three fundamental colors (red, green and blue). Thus, a false composite color combination and a multitude of combinations are obtained.

Material and method

To create these maps, combinations of spectral bands were used, and with the help of the ArcMap program (figure 1.), normalized indices of differentiation were calculated for the study area.



Figure 1. ArcMap program

The territorial administrative units in the study area are within the Timis county, Banat, Romania. Timiș is a county located in the western part of Romania, in the center of the historical province of Banat.

Timișoara is the largest county in Romania, occupying 8,696.7 km², respectively 3.65% of the country's surface. It is intersected by the parallel of 46° lat. N, of the meridian of 21° long. It is also 22° long. For the study area, a mosaic of color images was used that were recorded in the visible or invisible parts of the electromagnetic spectrum to form a combination of false colors (figure 2.) and a combination of natural colors (figure 3.)

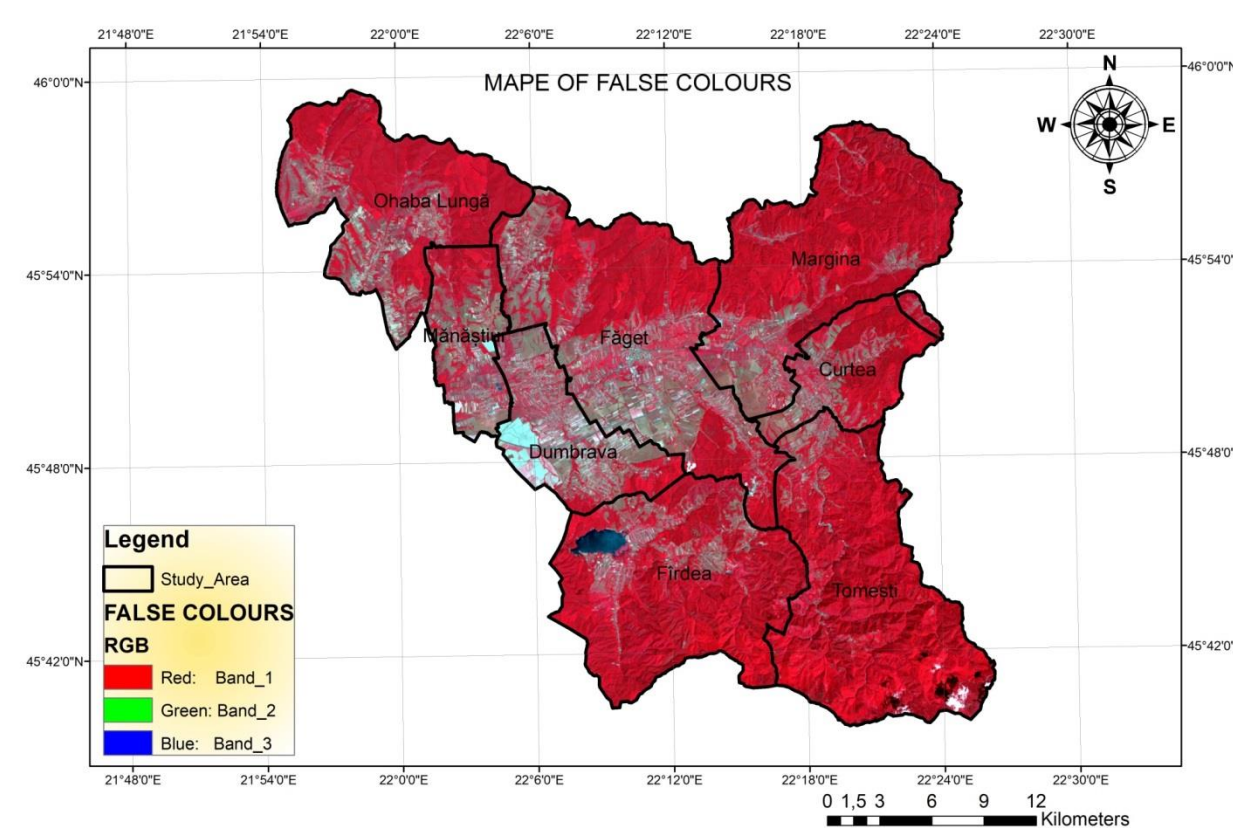


Figure 2. Combination Near Infrared-Red-Green

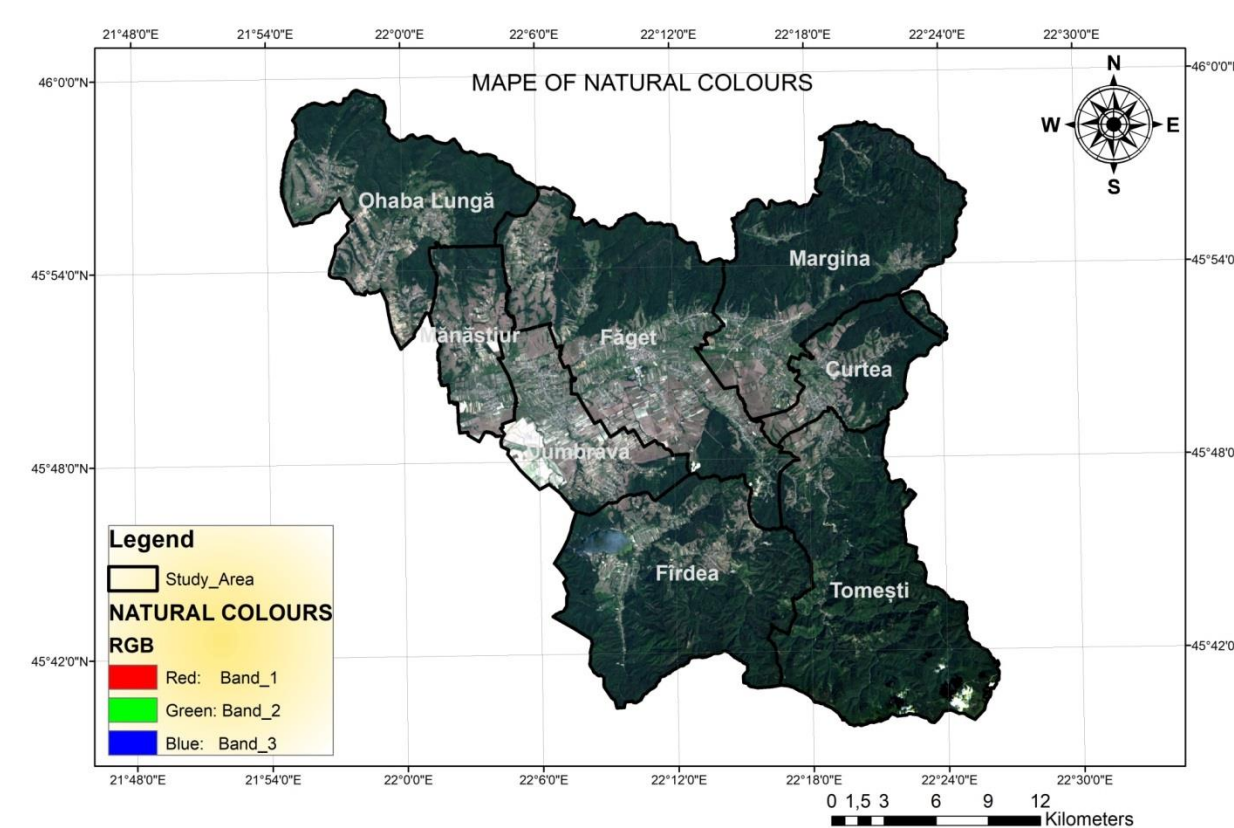


Figure 3. Combination of natural colors

Landsat 8 satellite system

Landsat 8 is an American Earth observation satellite launched on February 11, 2013. It is the eighth satellite in the Landsat program and the seventh to successfully reach orbit.

This satellite system provides medium resolution images from 15 meters to 100 meters of the land surface and polar regions. It works in the visible spectrum, near infrared, short wave infrared and thermal infrared.

Of its 11 bands (table 1), only those in the very shortest wavelengths (bands 1–4 and 8) sense visible light – all the others are in parts of the spectrum that we can't see. The true-color view from Landsat is less than half of what it sees.

Table 1. The spectral bands of the Landsat 8 satellite

Band Number	μm	Resolution
1	0.433–0.453	30 m
2	0.450–0.515	30 m
3	0.525–0.600	30 m
4	0.630–0.680	30 m
5	0.845–0.885	30 m
6	1.560–1.660	30 m
7	2.100–2.300	30 m
8	0.500–0.680	15 m
9	1.360–1.390	30 m
10	10.6–11.2	100 m
11	11.5–12.5	100 m

Results and discussions

Based on the spectral information, four normalized differentiation indices were calculated for land surface analysis, respectively NDVI (figure 4), NDBR (figure 5), NDWI (figure 6) and SAVI (figure 7).

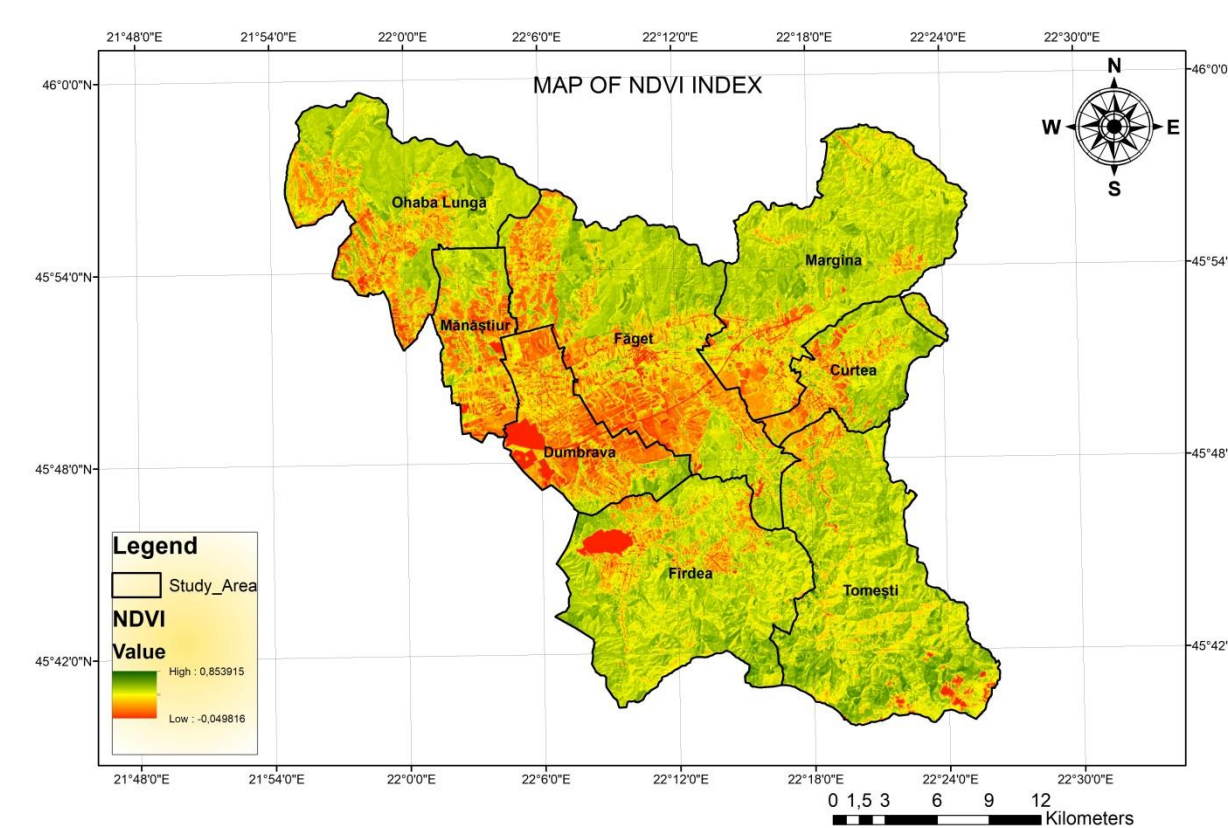


Figure 4. Normalized vegetation differentiation index **NDVI**

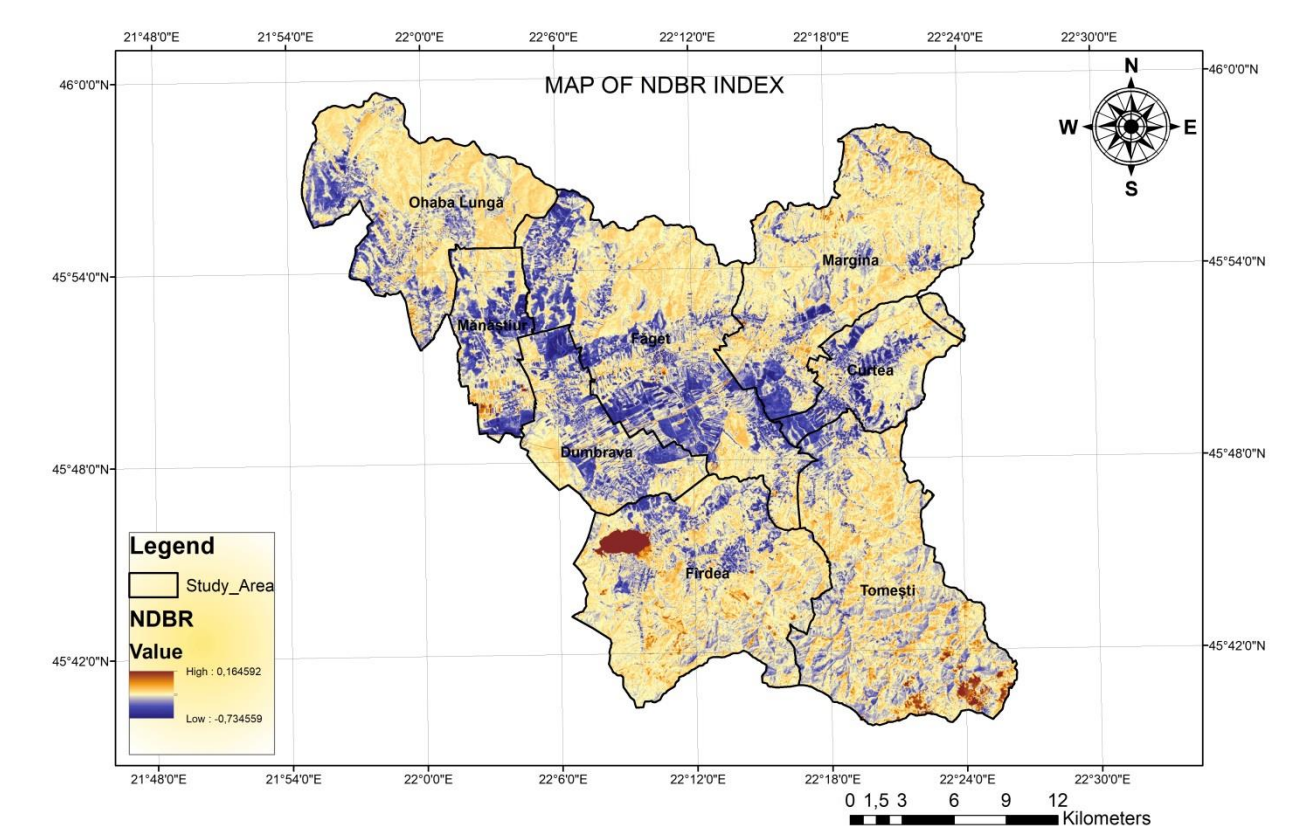


Figure 5. Normalized Differentiation Index of Vegetation Burning Potential **NDBR**

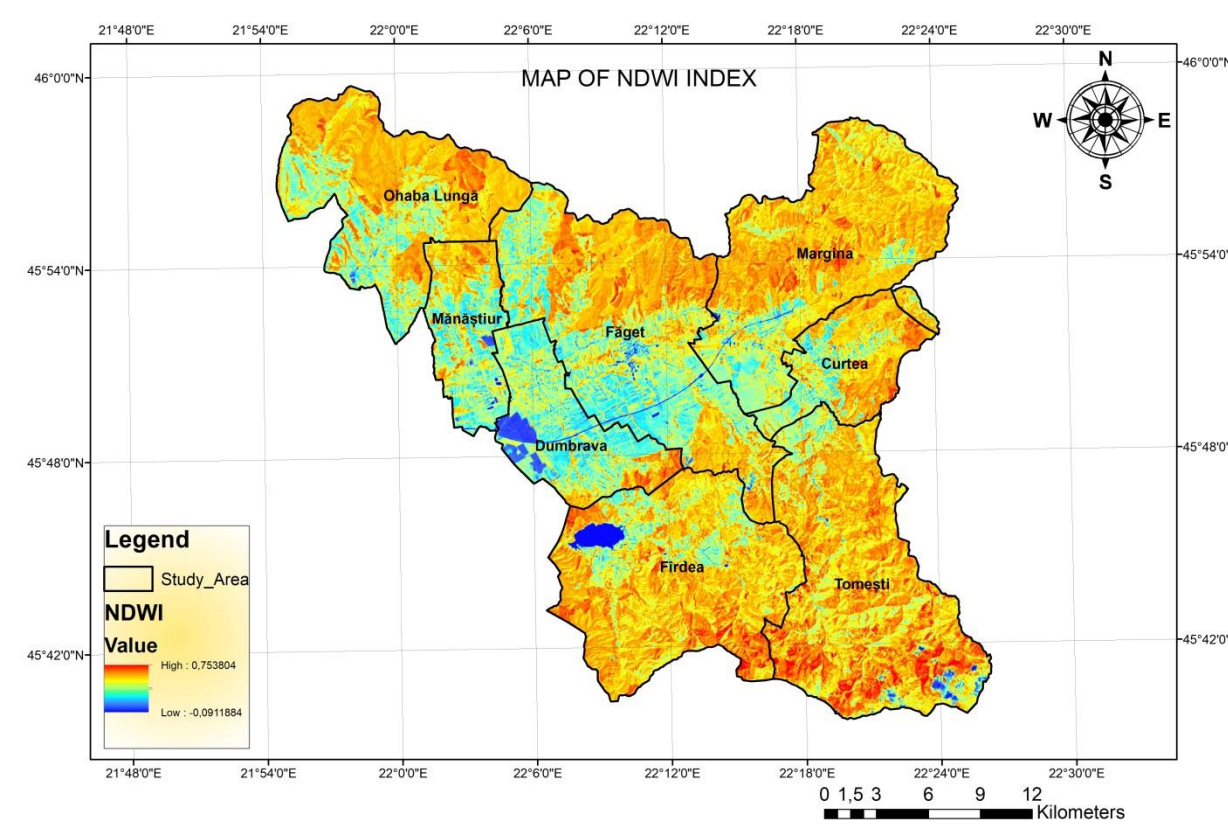


Figure 6. Normalized Water Differentiation Index **NDWI**

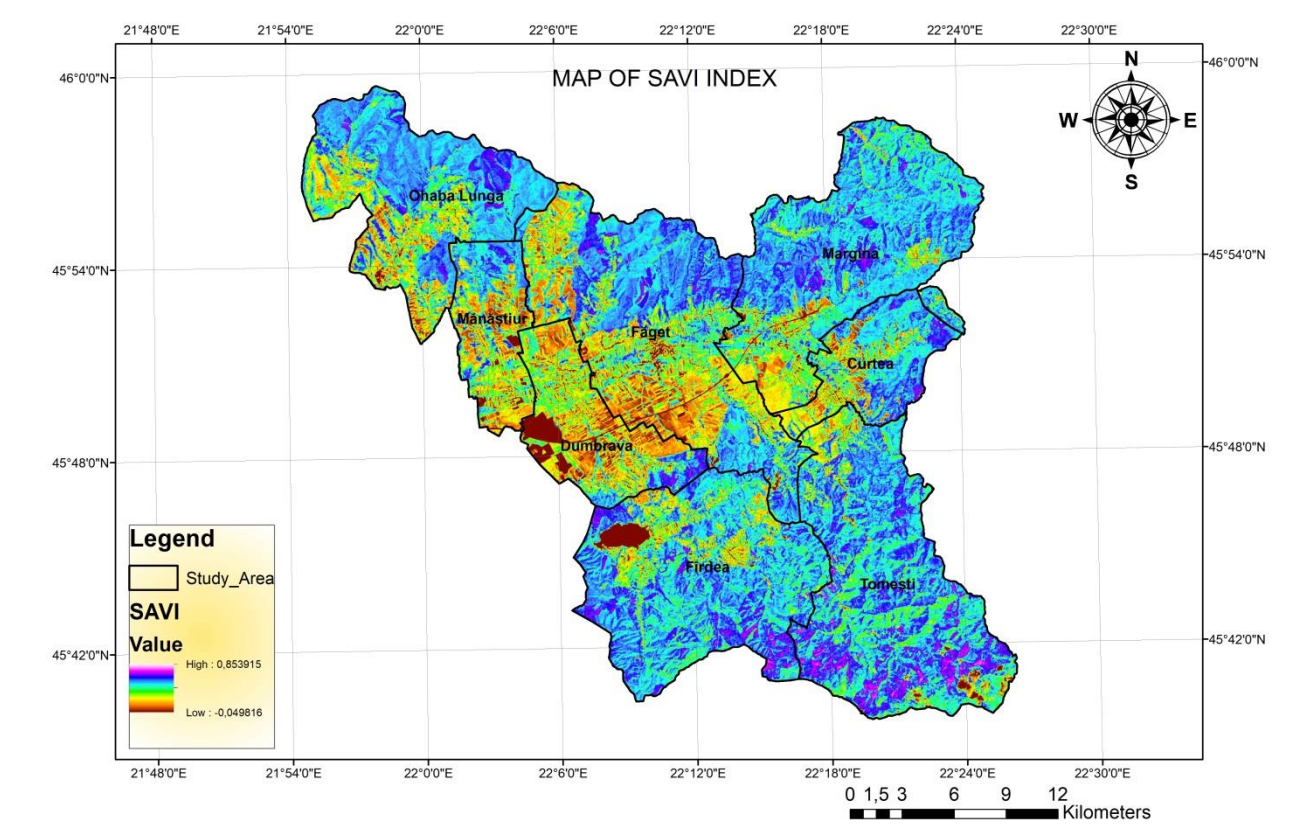


Figure 7. Soil adjustment index of the vegetation **SAVI**

Conclusions

This study aims to analyze the earth's crust by obtaining geospatial information, detecting, measuring and recording the emitted or reflected electromagnetic radiation by the bodies on the surface of the earth's crust.

This paper presents the way of using the information obtained from the remote sensing systems, the combinations of spectral bands and the way of calculating some indicators that can characterize and provide useful information for the management of the vegetation cover.