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LAND SURFACE TEMPERATURE ASSESSMENT BASED ON REMOTE SENSING DATA FOR THE PERIOD FROM 2001 TO 2023: CENTRAL PART OF THE UKRAINIAN SHIELD

Abstract. *In the paper, a review of literary sources was carried out regarding the relevance of estimating the land surface temperature (LST) using remote sensing methods, mapping, and description of the average land surface temperature in the Kirovohrad oblast in the period from 2001 to 2023 was carried out.*

Keywords: Land Surface Temperature, MODIS, Remote Sensing, Google Earth Engine, ArcGis.

The problem of assessment of the land surface temperature based on remote sensing data is relevant today. Assessment of the land surface temperature is important for various negative factors that affect the state of life on our planet. Among the factors, the following stand out the most: climate change, transformation of landscapes, disruption of natural ecosystems, and indirectly or directly affecting living organisms and the biosphere as a whole. Among the biggest factors that are affected by the increased LST is climate change, increasing the level of global warming, which causes a lot of harmful processes in changing the state of the circulation of substances, the trophic chain and the habitat of various types of living organisms [1].

An important role in the understanding of various regional and global processes of the Earth's surface is played by the land surface temperature, which is closely related to the Earth's system. The study of the land surface temperature in the context of remote sensing has a wide range of interests for various environmental programs. The application of these studies has a wide impact in various fields such as agriculture, the economic sphere, biosphere processes, etc. [2].

As mentioned above, an important issue is the monitoring of the LST, which affects climate change. It was noted that this issue is widespread in scientific and educational circles, where this issue is considered in the context of climate change. Digitization of the process in the educational and scientific spheres is an important action to quickly solve this problem. It is necessary to significantly develop and develop new methods and approaches for solving environmental problems [3].

One of the options for monitoring the LST is the use of the Moderate Resolution Imaging Spectroradiometer (MODIS) satellite sensor. The spatial resolution of MODIS is about 1000 m. Among other alternatives for estimating the temperature of the earth's surface, the use of the MODIS sensor is the most popular and widely used [4, 7].

The Kirovohrad oblast, which has a good geographical location, was chosen as the research territory. It is located on a part of the Ukrainian Shield and is located near the

Dnipro River. The oblast is located in the forest-steppe zone, and it is also rich in mineral resources. In the Kirovohrad oblast, there are uranium deposits, which are among the largest in Europe [5].

In the Google Earth Engine (GEE), the Kirovohrad oblast was chosen as the research area [6]. A satellite image of these average land surface temperatures for the period from 2001 to 2023 was generated from the MODIS sensor [7], collection `ee.ImageCollection("MODIS/061/MOD11A2")`, which generates images with a spatial resolution of 1,200 by 1,200 km grid [8].

The image was uploaded in GeoTIFF format. In the application for deciphering satellite images ArcGIS [9], a satellite image of the average LST for the period from 2001 to 2023 was processed and mapped.

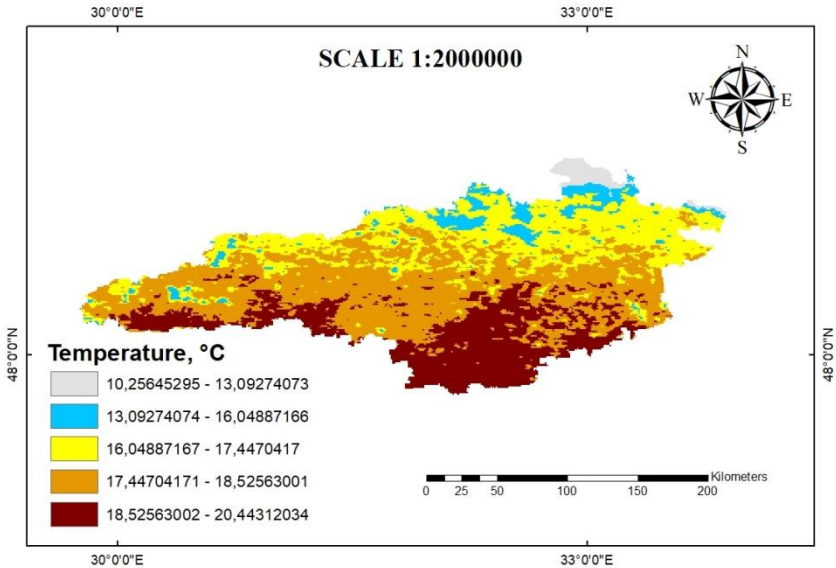


Fig. 1. Map of average Land surface temperature in the Kirovohrad oblast in the period from 2001 to 2023.

The classification was carried out according to the average land surface temperature. The map shows the ranking of average temperatures in order: I) in gray, 10.26-13.092 °C; II) blue color, 13.1-16.048°C; III) yellow, 16.05-17.447°C; IV) orange color, 17.45-18.525; V) crimson color, 18.526-20.4°C. According to the results, the lowest temperatures (I, II) were in the northern and northeastern parts of the Kirovohrad oblast. Average temperatures (III, IV) in the central and northwestern part of the Kirovohrad oblast. The highest temperatures (V) are found in the southeastern and southwestern parts of the Kirovohrad oblast.

The topic of the work is a continuation of the research from the qualification thesis [5], and in the future it is planned to further develop the topic of monitoring the land surface temperature.

Therefore, monitoring the average land surface temperature is important and relevant for solving various problems with the provision of preventive actions regarding dangerous problems and their consequences in our environment. The development of recommendations to overcome the challenges of climate change is important. The average land surface temperature in the Kirovohrad oblast in the period from 2001 to 2023 ranged from +10.256 to +20.4 °C.

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