RESULTS OF MONITORING OF PASTURE LANDS ON THE BASIS OF REMOTE SENSING DATA

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Relevance of the topic. "Globally, biodiversity conservation is a topical issue, and one of the most endangered resources, along with water resources, is pastureland, which is not being used wisely. 25 percent of the land area of the globe pastures [1; Electronic resource].
Therefore, it is important to prevent the degradation of pasture lands through remote sensing, to restore the productivity of pasture lands and their effective use.
The Law of the Republic of Uzbekistan "On Pastures" adopted on May 21, 2019 [2], on the implementation of the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated April 23, 2018 No 299 "On further demarcation of the boundaries of administrative units, inventory of land resources and geobotanical research in pastures and hayfields" [3] scientific and practical research was conducted by the design institute.
The aim of the study is to improve the method of monitoring pasture lands by remote sensing.
Object and methods of research. The object of the study was pasture lands in the territory of Bukhara region. Remote sensing in research [2, 3; Electronic resource], comparative comparison, monitoring, monographic research and electronic digitization of maps.
Research results and their discussion. In production practice, the process of mapping is carried out mainly for the following purposes:
Creating contour maps;
Creating a digital model of height (DEM);
Main thematic mapping, topographic mapping.
One of the most important advantages of aerospace images and digital view data obtained by remote sensing is that they can simultaneously capture information about a very large area under the same natural conditions. By remotely sensing the ground, it is possible not only to process aerospace images taken in different years, but also to study the vegetation cover using different spectral intervals. A modern single-lens mirror camera focuses the infrared light and ultraviolet light emitted from the object, creating an image and sealing it on film. Other visual imaging systems use detectors or receivers. These detectors and receivers have the ability to sense a specific wavelength of the spectrum. The combined use of photoelectric amplifiers and semiconductor photodetectors and optics-mechanical scanners allows the registration of ultraviolet and near, medium and far infrared rays by converting them into a signal. These signals form an image on the film. Microwave energy is transformed by radiometers or radiolocators.
The instruments used to create the visual image are mounted on land, airplanes, balloons, and spacecraft. A dedicated camera and television system is always used to photograph an object on land, in water, in the atmosphere, and in space.
The main part of remote sensing is the analysis of this image. Such analysis is performed visually, with partial or full use of the computer.
Remote sensing data is the main source for creating ground user maps and topographic maps.
Using remote sensing data obtained by aircraft and satellites, it is possible to accurately measure natural grasslands, vegetation in forestry, and determine its change over time.
We will analyze the method of remote sensing, which is acceptable in the implementation of monitoring work.
A model covering the sequence of these processes has been developed to automate the monitoring of pasture vegetation status over the years based on NDVI indicators. This was done using the Model Builder functional application of ArcGIS software (Figure 1).

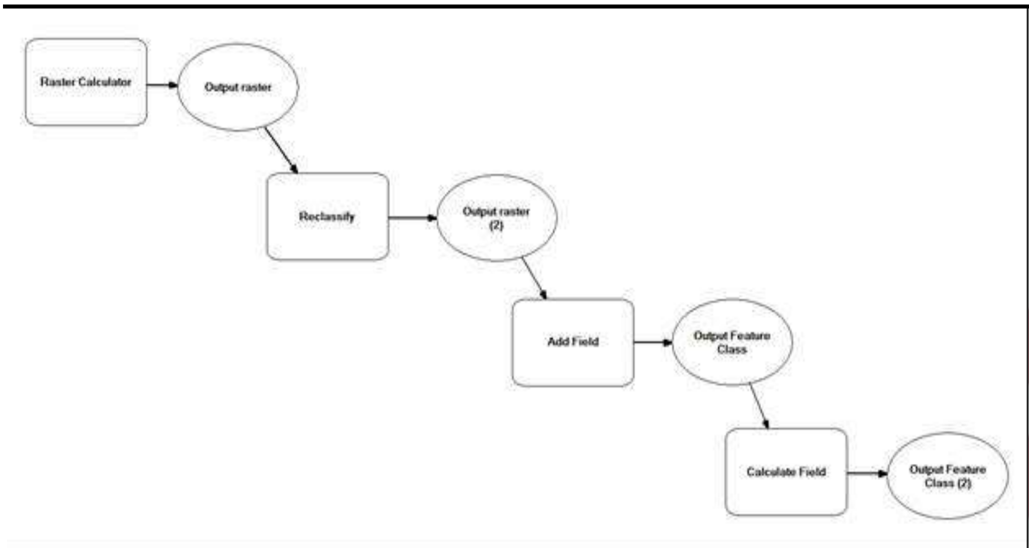


Figure 1. The sequence of steps of the remote sensing method, which is acceptable in the implementation of monitoring work.

This model is a sequence of GAT functions starting with the appropriate NDVI input raster for a given year and ending with the output raster, which represents the corresponding change and includes the fields on the change.

The first phase of the model begins with the analysis of NDVI input rasts from two different years using the Raster Calculator function. In this case, the difference between the two raster numeric values being compared is determined by their difference (Figure 2).

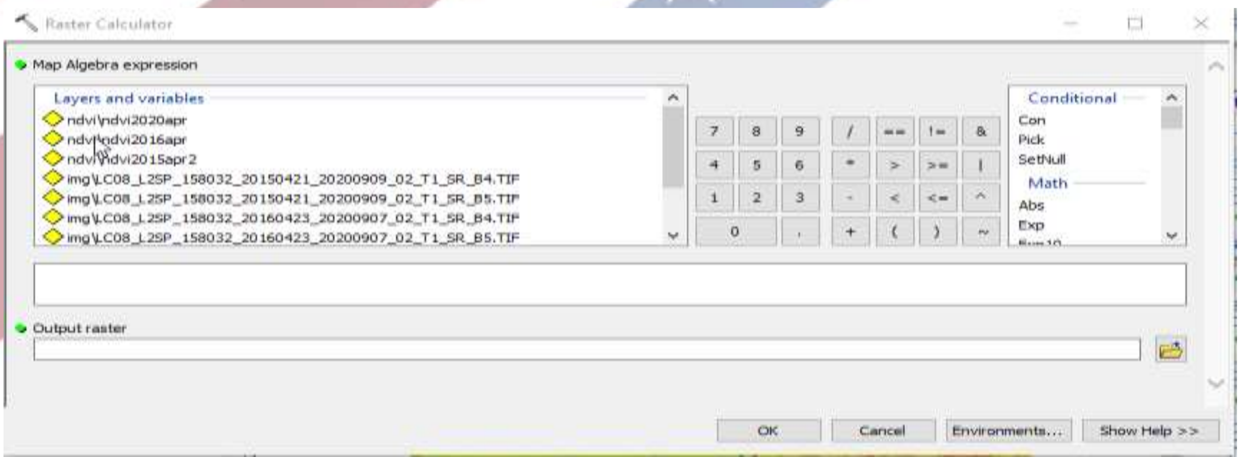


Figure 2. Analysis using the Raster Calculator function.

In the next step, the Reclassify function is used to divide the resulting raster into appropriate gradations representing the changes. The raster numerical values obtained are described in groups according to the degree of vegetation cover changes in the selected area (Figure 3).

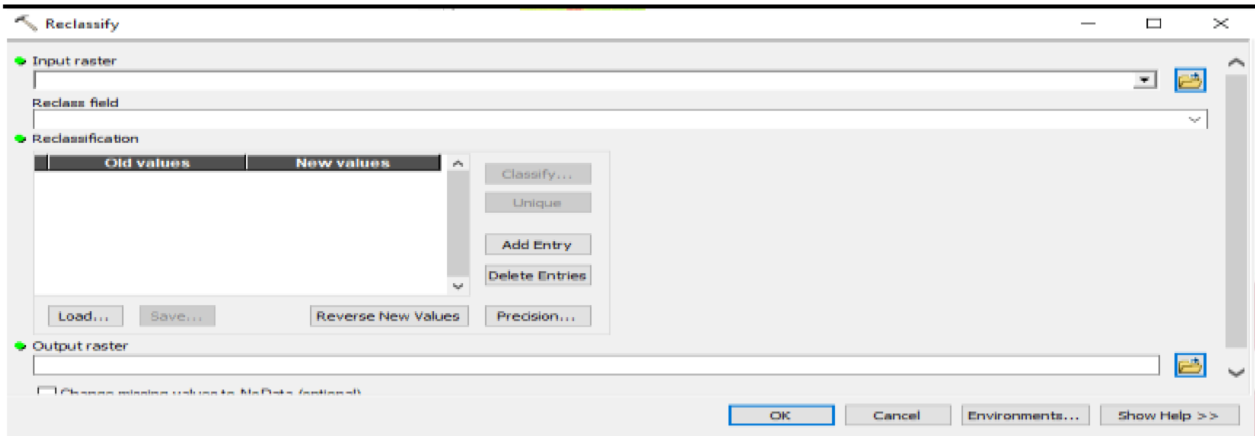


Figure 3. Using the Reclassify function.

The field attribute value is then added to the appropriate raster to calculate the fields corresponding to each group to determine the extent of changes occurring in the studied area. The Add field function is used (Figure 4).

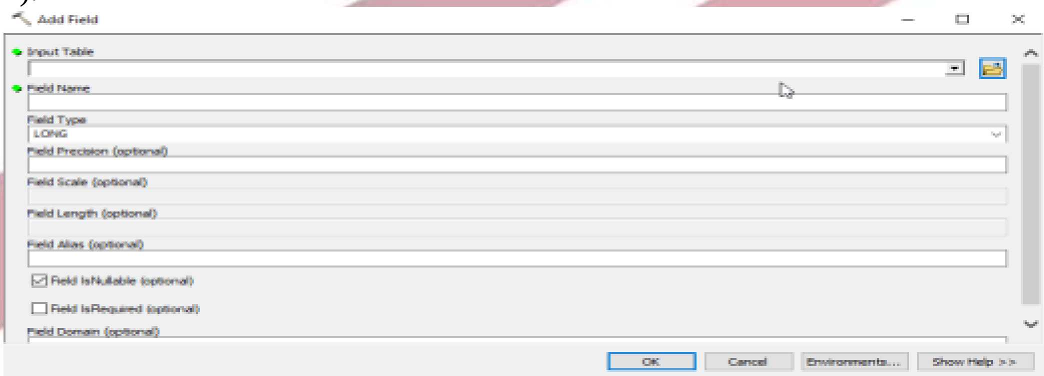


Figure 4. Using the Add field function.

Then, using the Calculate Field function, the appropriate fields for each group are calculated (Figure 5).

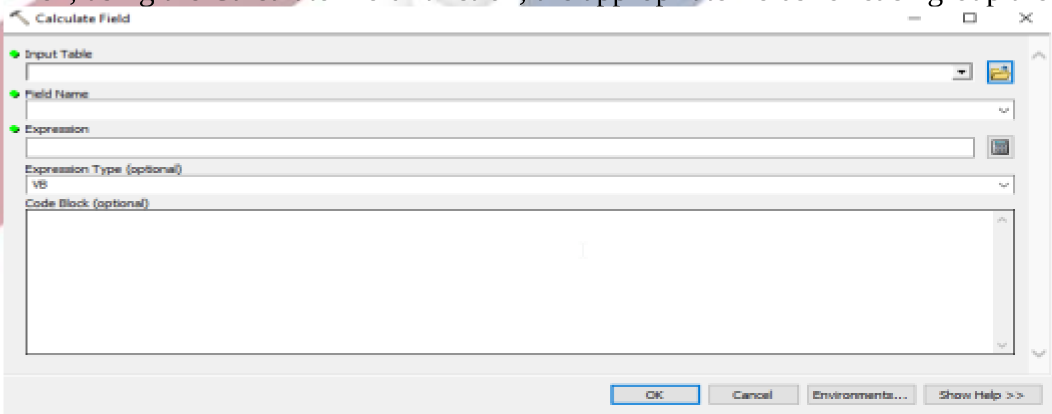


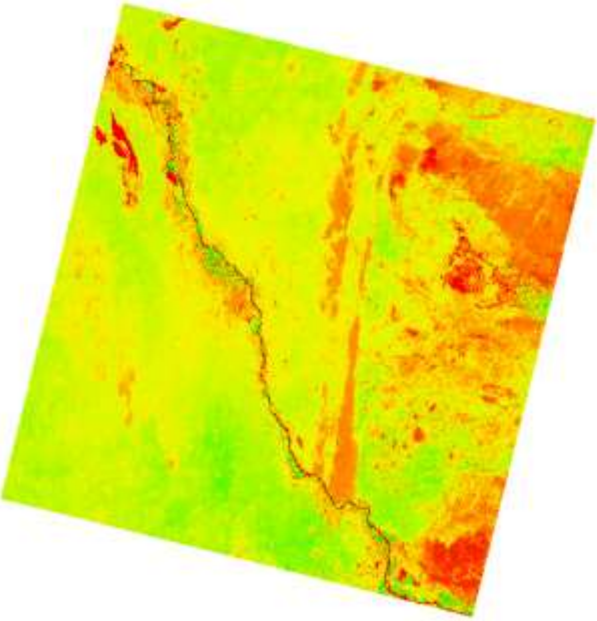
Figure 5. Using the Calculate Field function.

After all the above steps have been completed, the final result is a raster that reflects the amount and quality of vegetation cover in different years.

The analysis of the above stages was compared with the radar NDVI of the selected area from Karakul district of Bukhara region.

Initially, NDVI rasts for April 2015 and 2016 were prepared to analyze changes in this region (Figure 6).

2015 2016



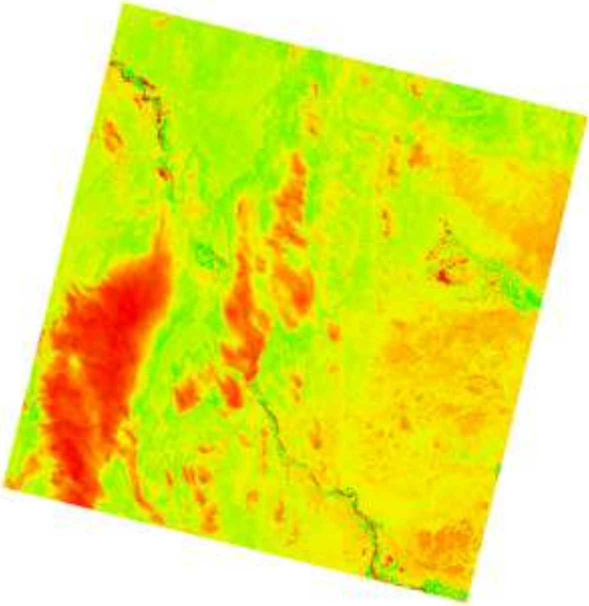


Figure 6. Expression of 2015-2016 to identify changes in vegetation cover of the studied area.

The difference between the two rasts is then found to detect changes in the vegetation cover of this area. To do this, the Raster Calculator function of the developed model was used. This results in a raster that shows the difference between the two years (Figure 7).

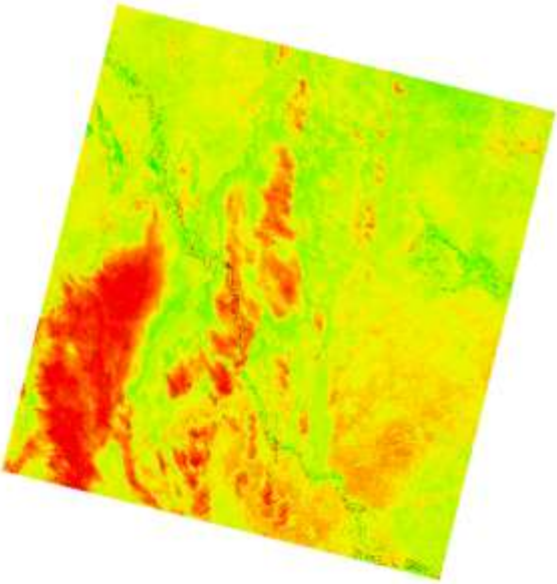


Figure 7. The difference between two years (rasts).

To study changes in plant cover in 2015 and 2016 (same vegetation period), the studied area was divided from the differences between the two rasters into gradations indicating the degree of change to represent the corresponding changes. The Reclassify function was used. The resulting raster divided into gradations is shown in Figure 8.

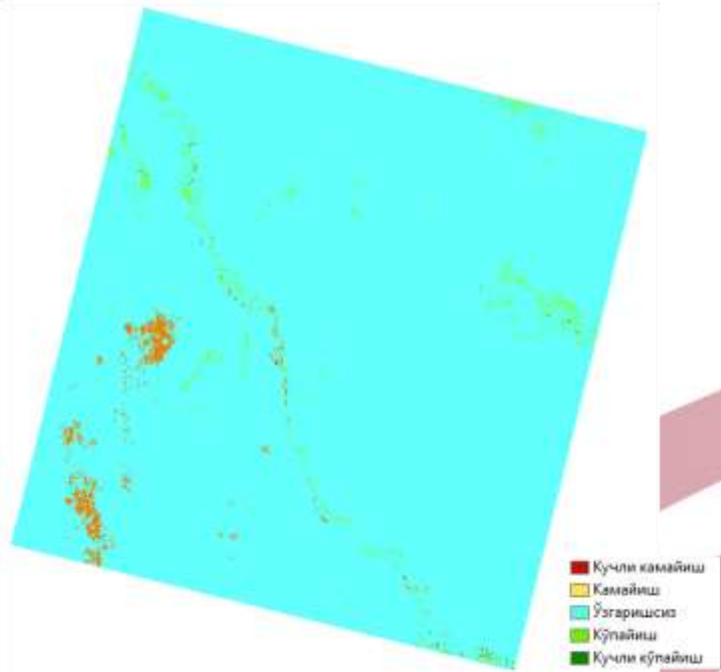


Figure 8. Changes graded by changes using the Reclassify function (2015-2016).

Using the Reclassify function, color gradations according to the level of change are interpreted as follows:
Red - Strongly reduced area;
Yellow - Decreased area;
Blue - Unchanged area;
Green - Increased area;
Dark green - Strongly multiplied area.
Then the corresponding field column is added to it to identify the fields specific to each gradation level. This uses the Add Field function (Figure 9). (9-расм).

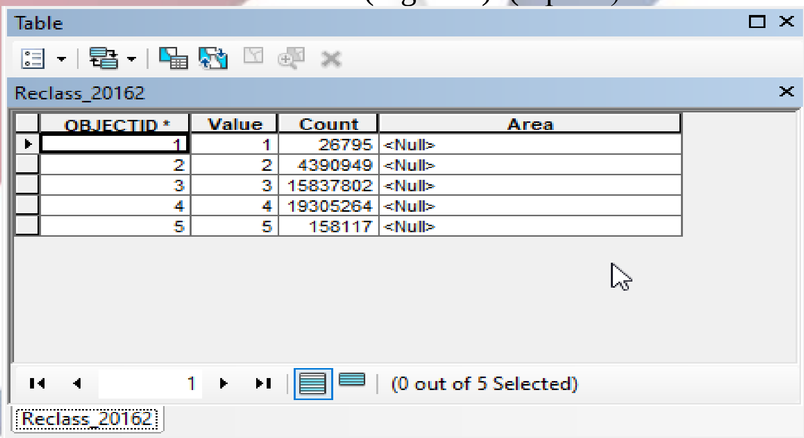


Table
Reclass_20162

OBJECTID *	Value	Count	Area
1	1	26795	<Null>
2	2	4390949	<Null>
3	3	15837802	<Null>
4	4	19305264	<Null>
5	5	158117	<Null>

(0 out of 5 Selected)
Reclass_20162

Figure 9. Add the appropriate field column to each gradation level to determine the specific fields.

It then calculates the area for each level from the Field Calculator function to calculate the appropriate fields. These data are presented in Table 10

Areas of the studied area calculated using the Field Calculator

Raster values	Raster color	Gradation rate	Area	
			Hectare	%
1	(red)	Strongly reduced	9,20	0,01

2		Decreased	1159,96	0,97
3		Remained unchanged	116220,35	97,54
4		Increased	1752,50	1,47
5		Strongly multiplied	14,77	0,01

When analyzing the data of remote sensing of a total of 119,156.78 hectares of pasture land monitoring processes at the site selected by us, in 2016 compared to 2015, the vegetation cover belonged to the 3rd raster value, with an unchanged gradation level of 97.54% (116,220.36 hectares). was observed. Also, in terms of gradation, the area of "strongly decreased" was only 0.01% (9.20 hectares) and the area of "strongly increased" was 0.01% (14.77 hectares). The remaining "decreased" fields of raster value 2 and "increased" fields of raster value 4 occupy intermediate positions.

In general, the area of declining and strong declining areas is small. There are relatively more cases of reproduction and strong reproduction. However, compared to 2015, in 2016, 97.54% of the area in the same period (April) vegetation indices was unchanged. Thus, 2936.43 hectares (2.46%) were found to have undergone varying degrees of change.

Analytical work was also carried out for April 2015 and 2020 using the above model. The resulting raster obtained from the analysis results is shown in Figure 11 and related data in Table 12.

In the analysis of remote sensing data of 119,156.78 hectares of pastures of the studied object, it was noted that in 2020, compared to 2015, the vegetation cover belonged to the 3rd raster value, and 99.53% (118,593.48 hectares) remained unchanged in gradation.

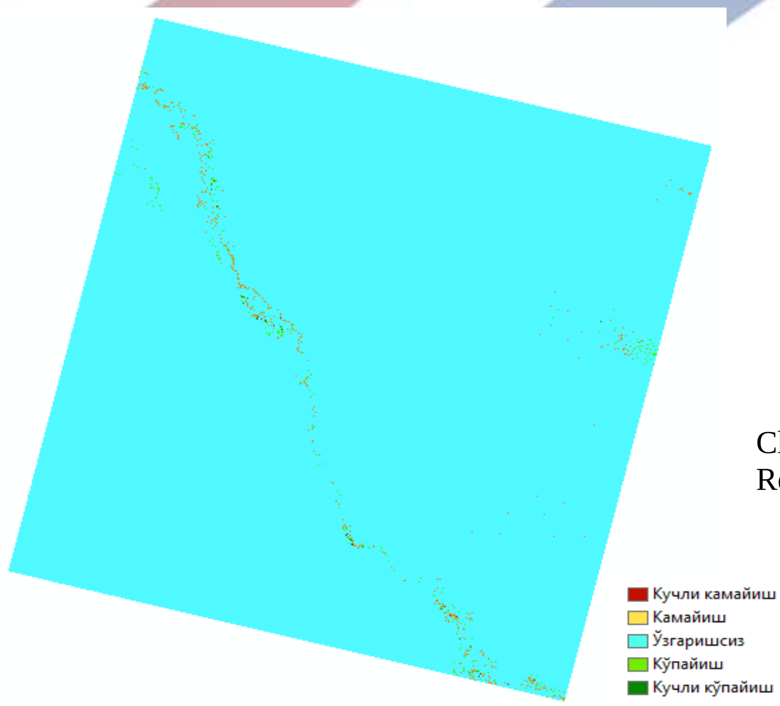


Table 11. Changes graded by changes using the Reclassify function (2015-2020).

Table 12 Areas of the studied area calculated using the Field Calculator

Raster values	Raster color	Gradation rate	Area	
			Hectare	%
1		Strongly reduced	16,15	0,01
2		Decreased	346,18	0,29
3		Remained unchanged	118593,48	99,53
4		Increased	188,54	0,16
5		Strongly multiplied	12,43	0,01

The areas of the study area calculated using the Field Calculator show that in 2020, the “strongly reduced” areas in terms of gradation level will be only 0.01% (16.15 hectares), and the “strongly reduced” areas will be only 0.29% (346.18 hectares). The "increased" area was 0.16% (188.54 hectares) and the "strongly increased" area was 0.01% (12.43 hectares), for a total of 563.30 hectares (0.47%). were found to have changed to varying degrees.

Conclusion. Based on the above, it should be noted that the total area (tablet) selected by us is estimated at 119,156.78 hectares (100%) of pasture area based on remote sensing monitoring data, compared to 2015, 2936.43 hectares (2.46%) in 2016, 2020 and 563.30 hectares (0.47%) of the year.

So, it is precisely these problems that go to the place where they exist,
indicates the need to inventory and clarify the area of pasture lands that have been degraded to one degree or another in terms of land management.

These cases indicate that improving the method of monitoring pasture lands through remote sensing is one of the most pressing issues today.беради.

List of used literature

1. http://www.un.org/russian/ga/unep
2. Law of the Republic of Uzbekistan "On pastures" May 21, 2019.
3. Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated April 23, 2018 No 299 "On further improvement of the procedure for demarcation of administrative units, inventory of land resources and geobotanical research in pastures and hayfields."
4. https://www.esri.com/en-us/home
5. https://earthexplorer.usgs.gov