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"Use of Precision Geodesic Instruments in Land Surveying"

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ABSTRACT

In calculating the original surface and volume of Earth's resources, its 3D relief base is important. There are two common methods of collecting geodata to determine the topography of a place. The most rapid and large-scale area coverage method of these is the use of SRTM space radar images. The most reliable and accurate method is a tacheometric measurement carried out in this place. One of the modern and digital models of terrain representation is the 3D terrain model. It is built using the ArcGIS software for geodata processing.

Shuttle Radar Topography Mission or SRTM (Shuttle Radar Topography Mission) is an international research project to create a digital elevation model of the Earth's surface using radar topography. The resulting digital model covered 80% of Earth's land mass (from 56°S to 60°N) and was the most complete until the release of the ASTER GDEM on June 29, 2009. The SRTM consists of a special radar system that was retrieved from Endeavor during the 11-day STS-99 mission in February 2000. The information obtained as a result of the simulation is intended for use for scientific and social purposes. As part of this mission, it acquired over 80% of Earth's surface at 1 arc-second (30 meters) of Earth's topography. Using synthetic aperture radar and interferometry, SRTM has assembled one of the most accurate digital elevation models of the Earth. This data is now available for free on USGS Earth Explorer. SRTM DEM is available in 30m and 90m resolution. Until September 2014, the best available SRTM Digital Elevation Model (DEM) was 90 meters resolution. Now a 30-meter (1 arc-seconds) resolution SRTM is available worldwide on USGS Earth Explorer. This improved version provides the full resolution of the original measurements. The Global Digital Elevation Model has a spatial resolution of approximately 30 meters, covering most of the globe with an absolute vertical height accuracy of less than 16 meters.

In late 2014, the United States released its highest-resolution SRTM data to the public. The best site to download SRTM images is the USGS Earth Explorer site. Select the desired region.

Under the Datasets tab, select Digital Elevation > SRTM > SRTM 1-ArcSecond Global.

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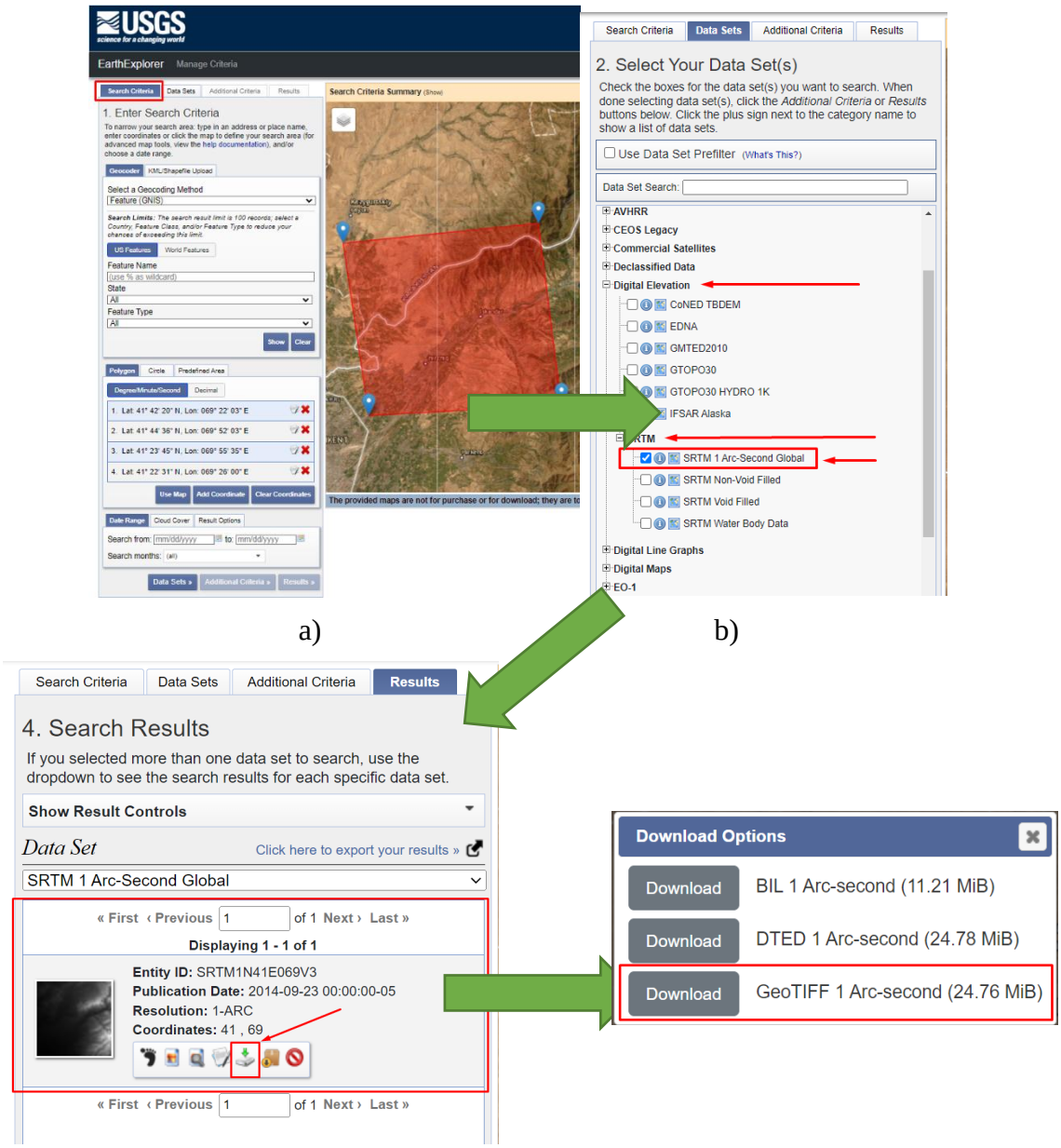

The most reliable and accurate way to collect data on the terrain is definitely a topographical survey. In the process of surveying, the tachyometer stands at the point (station) where the instrument is installed and looks at the ruler installed at a point on the ground, and the distance (line) to this point, its direction angle and the height of the points relative to each other are measured. Based on these, three coordinates of the point in the place are determined: the plan position (X, Y), height (h) in relation to the station. In this method of planing, horizontal angles and distances are measured with a tachymeter, and the relative height is determined by a tachyometric level. Preparatory work for the acquisition of a tacheometric plan: the work performed on site consists of reconnaissance of the place where the plan will be taken, choosing the locations of the station points of the plan, setting them on the spot, creating the station of the plan, putting the details and relief of the place on the plan, and checking the result of the plan on the spot. Checking and preparing the results of on-site measurements (journal or electronic memory), uploading the coordinates and marks of points to a flash card, and drawing up a topographical plan of the place are considered camera works.

The geodata obtained in the tacheometer is saved in the form of a file in CSV format in order to transfer it to a computer. This file is a text format for representing tabular data. A table string

matches a string of text containing one or more fields separated by commas. Therefore, to create a 3D terrain model in ArcGIS, its two applications ArcMap and ArcScene are used.

First of all, by clicking on the directory icon, the folder containing the geodatabase stored in the computer memory is found, added to the program, and the CSV file in it is opened. Second, the coordinates of the first point are placed in the coordinate fields in the correct order so that the following coordinate fields (X field, Y field, Z field) set the necessary sizes.

Thirdly, enter the Edit window from the "Sistema koordinat vkhodgyx dannyx" (Coordinate system of input data) section. In this window, the coordinate system selected as the basis for the toposcope in the tachyometer is also selected for the program. Click OK. In the cartographic image window, it is checked that the points fall correctly.

The Master Operational Geostatistics window from the Geostatistical Analyst suite opens from the toolbar. It is essential to obtain reliable and relevant data for land surveying and cadastre tools are geodesy. Traditional results of geodetic measurements mathematical processing and methodology for land surveying and cadastral needs not suitable for processing the results. Land formation and cadastre in our country The current scientific and practical problem in the field is up-to-date and reliable information need; impact on usable and land development activities. Mathematical processing. General processing of geodetic data the process can be divided into the following stages:

- primary processing;
- preliminary processing;
- Balancing accounts.

Primary processing is carried out directly in the process of measuring in the field calculations are included. At this stage, to regulations defined by regulatory documents the conformity of measurement results is controlled. During satellite measurement primary processing is performed on redundant controllers, including satellites characterizing the number, factor, geometry of satellite constellations signal-to-noise ratio, quality of radio signals, reception of radio signals absence of loss of cycles is controlled during Primary processing is on the roads, part of the network or in the facility performed in order to quickly assess the quality of measurements. In this case, the accuracy assessment internal similarities, double measurements, closed forms it is performed on the basis of non-binding. Further measurements are in the catalog comparison with values or with the results of previous work (for example, measured angles with the difference of directional angles or with an electronic tacheometer control distances between measured or coordinate points with satellite receivers) is performed. At this stage direct measurement results to the center of the points and the plane (for example, Gauss projection) is provided, for this, normative documents for measurement results detected by, corrections are made. This is also a satellite measurement measurement results (coordinate addition, short distances) are brought to the plane, this is the most important feature of the proposed scheme. Satellite and covariance matrices of its error to the Gauss-Kruger projection reduction can be carried out according to the methodology proposed by V. Astapovich.

The essence of this methodology is explained below. Because, based on experience, satellite baselines about 10% of them need to be re-determined due to the inconsistency after completing the initial processing of measurements for the current day then it is desirable to implement it immediately. The equation is the optimal estimation of the sought and measured quantities elimination of inconsistencies between the measurement results and the function of the pulse performed when there are excess measurements for Satellite initial processing and equalization of measurements is artificial in most cases according to the programs of companies that manufacture satellite receivers and, if necessary, change the coordinates.

Alignment of satellite and surface measurements in a flat coordinate system covered below. The obtained theoretical and practical research results are not only cadastre and land in the field of construction, but also in any direction of using geodetic measurements also increased the efficiency

of mathematical processing of geodetic measurements and optimized.

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