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ADVANTAGES OF USING EXCEL FOR GEODATA PROCESSING (based on the example of magnetic susceptibility distribution in rocks)

In modern geological, geophysical, and environmental studies, the processing of large datasets is an integral part of scientific analysis and decision-making.

Microsoft Excel enables a wide range of operations, including complex calculations, graph and chart creation, and statistical analysis, making it a valuable tool for earth science professionals, ecologists, and related specialists.

Furthermore, Excel's capabilities in handling geospatial data, such as generating cartographic representations, significantly expand its applications within geosciences [1].

The objective of this work is to explore the capabilities and develop a methodology for processing geological and geophysical data using Microsoft Excel.

The object of study is the processing and analysis of magnetic susceptibility data obtained from the Stolyarivska-2 borehole [2].

The subject of study is the methods and tools for handling these data sets within Microsoft Excel.

Microsoft Excel proves to be a powerful instrument for geophysical data processing, supporting a wide range of tasks — from basic data structuring to advanced statistical analysis and visualization [3].

The processing of geological and geophysical data in Microsoft Excel involved several key stages: digitizing and importing the raw data, applying mathematical and statistical functions, and creating graphs and diagrams.

Stage I. Digitization of the raster image showing the distribution of magnetic susceptibility (χ) along the borehole column of Stolyarivska-2 and export of point data in .XYZ format..

Stage II. Presentation of input data in tabular form, with each column representing a separate parameter (age, depth, magnetic susceptibility χ value, lithology). Conversion of the data into numeric format without textual annotations.

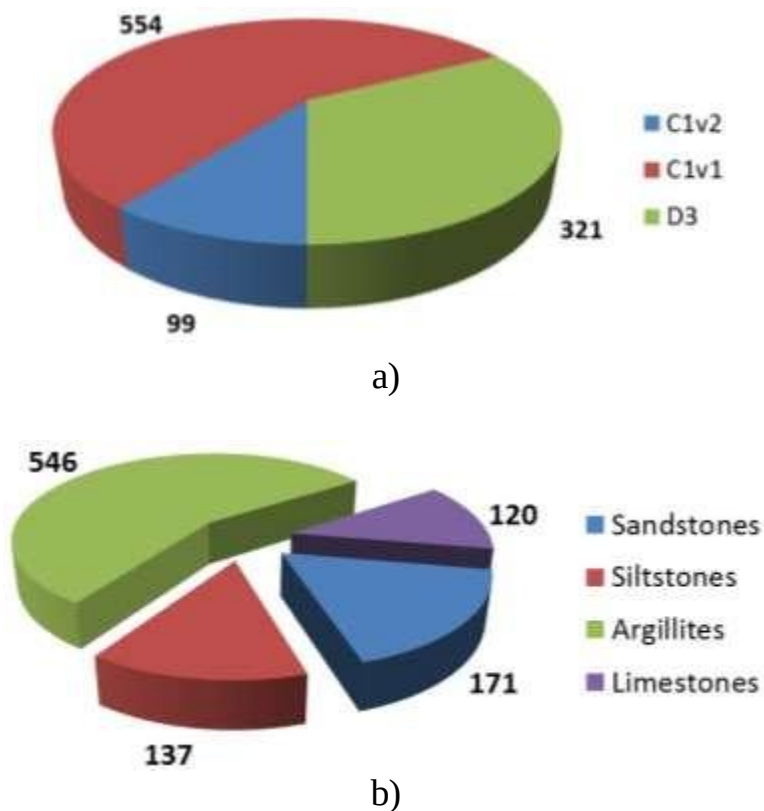
Stage III. Preliminary data processing, which included checking for missing or anomalous values, filtering, and sorting the data by depth.

Stage IV. Statistical analysis. Calculation of mean, median, mode, standard deviation, and other statistical indicators to assess data distribution (Table 1). Identification of correlations between different parameters to reveal dependencies. Development of predictive models for estimating the value of one parameter based on another.

Table 1 – Descriptive Statistics

Parameter	Value
Mean	23
Standard Error	2
Median	11
Mode	21
Standard Deviation	56
Sample Variance	3091
Kurtosis	146
Skewness	10
Range	1030
Minimum	0
Maximum	1030
Sum	22709
Count	974
Confidence Level (95.0%)	3

Stage V. Data processing and visualization. At this stage, various charts were created (Figure 1), including graphs of magnetic susceptibility versus depth (Figure 2a) and histograms illustrating the distribution of magnetic susceptibility values for rock samples from different lithological and stratigraphic levels (Figure 2b).

**Figure 1 – Diagrams of data distribution by age (a) and lithology (b)**

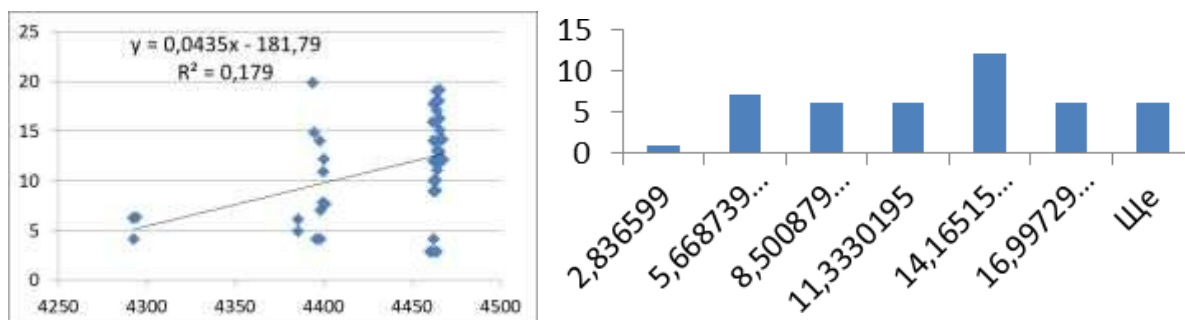


Figure 2 – Graph of magnetic susceptibility versus depth (a) and histogram of magnetic susceptibility values (b) for C_{1v1} deposits

Thus, the use of Microsoft Excel for processing geological and geophysical data proves to be an effective approach due to its versatility, accessibility, and wide range of functionalities.

However, for more complex tasks or larger datasets, the use of specialized software solutions or programming languages may be required.

References:

1. Y.O. Ivanov, V.T. Matviienko, Y.D. Popov. Fundamentals of Working with the Microsoft Excel System: A Textbook for Students of All Faculties. — Kyiv: VPC "Kyiv University", 1999. — 80 p.
2. Shurovskyi O.D. et al. Report on "High-Precision Gravimetric Profiling for the Identification of Decompaction Zones in Visean Carbonate and Clastic Deposits Prospective for Oil and Gas Exploration within the Khortytsia Area." — Ivano-Frankivsk, 2003.
3. Microsoft Excel Formulas and Functions (Office 2021 and Microsoft 365).

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ENVIRONMENTAL SAFETY IN THE DEVELOPMENT OF THE PIVNICHNO-DOLYNA OIL AND GAS FIELD

The oil and gas industry is strategically important for Ukraine's economy, as it provides a significant portion of the country's energy needs and contributes to the development of other industries. However, along with its economic importance, oil and gas activities create a significant burden on the environment. Air, water, and