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Typification of the Earth's Crust

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The typification of the Earth's crust was proposed by G.I. Reisner using the example of the territory of Europe and Central Asia [1]. The Earth's crust is divided into cells of approximately equal area, each characterized by a set of geologic-geophysical parameters, such as the heat flow density, the thickness of the Earth's crust and sedimentary cover, the absolute elevation of the relief, and the magnitude of isostatic gravity anomalies. It is assumed that this set of characteristics will uniquely characterize each cell, enabling the division of cells into groups based on endogenous mode. Typification was carried out with the aim of determining the forecast parameters of seismic events - earthquake magnitudes. In other words, the maximum earthquake magnitudes recorded in cells of the same group were compared. If the magnitude in a certain cell was unknown, a forecast was made that the achievable magnitude in that cell was comparable to a known value. This methodology is not limited to forecast events. In the broadest sense, the Earth's crust is divided into oceanic and continental. Flat and mountainous regions represent the continental crust. Within the oceanic crust, the ocean basins, continental slopes, and mid-ocean ridges are distinguished. Types of Earth's crust have a hierarchical structure, so the problem of typification is expected to be addressed using hierarchical clustering methods, employing the method of hierarchical clustering in this case. Hierarchical clustering algorithms create not only a single arrangement of a sample into non-intersecting classes, but also a system of nested partitions. The result is presented in the form of a dendrogram. Each cell is characterized by an identical set of parameters, and thus occupies a defined point in space with a number of dimensions corresponding to the number of parameters. To perform the clustering procedure, rules must be established for determining distances between points in space (i.e., a metric), as well as the rule by which distances between clusters are calculated - aggregates of points. There are several ways to define the distance between clusters; the most appropriate approach will be selected in this work. The Euclidean metric is suggested for use as the metric. During G.I. Reisner's research in the 1980s, the knowledge level of Earth's crust parameters, as well as computing resources for data processing, were lower than in modern times, and there has been an increase in the volume and resolution of data on physical fields[2, 3], relief[4], sediment and the Earth's crust thickness [5]. The typification procedure can be updated for the entire surface of the Earth.

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