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CULTURE LAYERS AS GEOLOGICAL OBJECTS

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ABSTRACT. The culture layers are assumed as anthropogenic sediment deposits and like any young natural deposits they should be studied with the methods of geology, geomorphology and pedology. This paper pays attention to the main stages of evolution of the culture layers when the culture horizons begin to develop as a sediment body after the abandonment of the settlement. The typical hypergenic processes following the development of the culture layers in different conditions are studied.

Introduction

Naturally the culture layers are consisted of anthropogenic deposits which are treated as materials for subrecent and recent hypergenic processes like soil formation, humification and lithification. They are young sediment deposits which consist of a lot of technogenic elements according to the cultural-geographical environment during their accumulation. Beside that, these sediments had been subjected to hypergenic geological influences like neoeluvial materials, soil cover or have been fossilized by younger deposits. The first geological investigations of the cultural deposits have been performed since the first steps of archaeology as a science. They were studying the materials of different artefacts (flints, obsidians, other lithics and ceramics). In Bulgaria the situation was similar (Baltakov, Kenderova, 2003).

Sequence of accumulation of culture layers

The main stages of the deposition of culture layers according to Siycheva (1994) are: preliminary, functional, collapsing (final) and metamorphic. Each of them is very important for the establishment of the processes, the mechanism of the deposition and the nature of the substance of the materials, which form the layers (Kenderova et al., 2002). Each of them consisted of natural or anthropogenic material.

Preliminary or preparatory stage

The preliminary or preparatory stage is connected to the beginning of the construction or other technical activity. It can be characterised with trampling of the plant cover and destroying the surface parts of the soil cover. Also, surface changes of the relief may be observed in connection of pit digging, housing construction, hydro-technical and defensive installations. During this stage the initial building horizon was formed, which should be studied as one of the sublevels of the stratigraphy of the archaeological sections.

Functional stage

The functional stage is connected to the time when the culture layers were accumulated during the lifetime of the sites. The anthropogenic sedimentation has different mechanisms of deposition of the materials – by anthropogenic or natural way. The main part of the sediments consists of different kind of rubbish and other domestic refuse. The old houses are destroyed after some time. Along with that new houses were built. A large part of these layers consist of demolished fillings, sanitary features, pits etc. All of this leads to an entire change of the natural soil cover and most of the soil is related to a change of the chemical contents. The change depends of the extent of the filling, the number of inhabitants, the density of population, the traditions and duration of inhabitation, the economic activity, the palaeoclimatic conditions etc. The formation of culture layers is different in dry and in humid palaeoclimatic situations. For example, the wood materials are preserved for longer in wet landscapes. It is just the opposite with the metals. Also, when the habitation is prolonged, the thickness of the layers is substantially larger.

Finalization or final stage

The finalization or final stage is related with the abandonment of the site when the buildings began to collapse. Since that moment begins their fossilization. Unlike the previous stage, only the natural processes and phenomena have the main role here. The observed processed are infilling of the pits, ditches and moats with sediments, denudation of the banks, ramparts and other positive stuctures. Very often the destructions are in connection to slope processes as erosion, landslides etc. It depends on the topographic and geomorphic situation, the flow regime, the palaeoclimatic conditions, the soil cover, animal behaviour, land use etc. In these circumstances the processes connected to the micro- and mesorelief are also taking place. On the other hand, the soil cover could be partly restored or form a new kind of soil on the substrate of the culture layers. The places with hypergenically modified culture layer bring a lot of information about climatic, hydrogeological, palaeoecological and palaeogeographic etc. conditions, in connection to soil origin processes, vegetation and so on.

Metamophogenic stage

During the metamophogenic stage of the formation of culture layers they are constantly fossilising and in such conditions a number of diagenetical processes are taking place. The culture layers could be "buried" by soil horizon or younger sediment deposits. The culture layer always has to be viewed in two directions. Firstly, the soil covers acquire the features of the culture layer, and gain the specificity of the soil profile. But on the other hand, the culture layers also are changing because of different hypergenetic and soil formation phenomena. Part of the layers could loose some of their primary indications; others transform themselves, suggesting some new diagenetic indications.

Of great importance for preservation of the fossilised culture layers are the topographic features, the erosion and slope processes, flow regime, and other geomorphic phenomena. During the metamorphic period, a sterile soil or sediment horizon without any artefact or trail of human activity is possible to be formed.

Classification of the ancient culture layers

So far there is no official geological and geoarchaeological classification of culture layers. All known schemes are based on the age, stratigraphic position, geomorphologic base and the type of sedimentation of the deposits (Siycheva, 1995; Baltakov, Kenderova, 2003). According to age, the layers could be divided to layers adjacent to a fixed archaeological site or system (settlement, defending constructions, sacred sites, road systems), to definite archaeological culture. Very often some of the sites have a number of layers and they could be referred to different cultures (Çatalhöyük, Karanovo, Troy etc.).

According to the stratigraphy, the culture layers could be divided as monostratus, duostrata and polystrata. Sometimes in the monostratus layers several horizons and subhorizons could be found. The different subdivisions could be separated by geomorphological and lithological indications. Their lithogenesis is connected to the compound history of the lifetime of the sites and also to the permanent changes of the lithodynamics and pedogenetic processes.

The culture layers besides their functions can be divided also according to whether they are fossilized or excavated. The latter, because of geomorphologic or anthropogenic phenomena, were exposed on the surface.

In a geomorphic aspect, on the base of position of the material of the layers on appropriate surface landforms, they could be divided to layers on terraces, floodplains, watersheds, seacoast, on anthropogenic deposits and so on.

The layers located on valley bottoms, especially floodplains, can be linked to channels overflow and subsequent covering of landforms with sands, clays, or pebbles. The volume and granulometry of the material depends on the speed, depth and the duration of the high waters. If the floods were very frequent and with long duration, the population was forced to abandon the floodplain and to move higher on the slopes or river terraces. The abandoned settlements or other constructions had been gradually fossilised by alluvial, prolluvial or colluvial deposits.

The culture layers placed on slope surfaces depend on the inclination, exposition, type of denudation and the thickness of soils. Because of the surface exodynamic processes, the layers could be seen on the surface, partly or entirely exposed on the slope foot or in the periphery of the valley bottoms. In the zone of slope denudation they could be partially removed, secondary engraved or preserved only at some negative parts of the slopes or artificial fittings as excavations, wells, pits etc.

On watershed areas and river terraces the origin of culture layers is connected only to anthropogenic sedimentation – constructions, defence features, walls, embankments. The processes of weathering here are of high importance, as well as the eolic accumulation and animal transport of material. But they also could be denudation processes, if the layers are placed in the periphery parts of the landform.

Hypergenic processes on the old culture layers

In the beginning of the settlement appearance several changes of the environment began because of human activity. The natural vegetation is gradually substituted by weeds, which have specific features and last very long time. During construction work the nano- and microrelief were changed. Because the old cultural layers are placed on existing topographic surface, the upper soil horizons are much modified with increased density, reduced porosity and altered air and water regime. This leads to a local clay enrichment and to transformation of the form of iron and changing the components of the humus (enriched in phosphorus and sodium). At the same time several inclusions and new substances related to the human activity also appear. All these transformations generate unique morphological face of the cultural horizons that distinguishes them from the sterile natural sediment layers.

During the metamorphic stage in fossilised condition various hypergenic processes are taking place which cause physical and chemical changes of the layers. New essential indication changes are observed including in their structure, appearance, variation of clay inclusions of manganese and iron neoformations, non-typical for the appropriate geographical conditions. The cultural horizons convert to soil cover similar to luvisoils, alfasoils, entisoils etc., but affluent of different carbonate phases, sodium and potassium. Some of them have been described wrongly as traces of human activity like ashes, plasters and mineral pigments. In the metamorphic culture horizons are possible transformations of mutual disposed separated elements and artefacts in the layers. The genesis of the disposition is related to and depends on various phenomena like zoogenic removal, soil creep, cryogenic processes etc.

In the loess horizons the ancient boundary surfaces of the culture layers very often are diffusive. Also, often is very difficult to fix the low and upper boundary of the culture layers, fossilised in diluvia deposits. Similar problems could be seen at culture layers in landslide areas.

Geoarchaeological researches

Usually the geoarchaeological researches of the culture layers take place during archaeological excavations. The investigation and description of the culture remains, traces of living and economic activity of the population, and the

chronology of the layers, horizons and subhorizons are research questions for archaeologists and various specialists in archaeometry. Detail description and scientific interpretation of the visual remains like crusts, grains, animal bones, shells, seeds, lithophytes, concretions, fossilised spills, lens, carbonate inclusions etc. can be made. All of them have to be described after a number of sedimentological analyses in connection to geoarchaeological researches. In this way, geoarchaeology has to be a kind of "Geology of the culture layers". Recently it is applied and accepted as a science with a number of geological methods selected for complex research of the culture sediment deposits. It should develop as a boundary science between geology and archaeology and with a very good understanding of soil science and physical geography. During the geoarchaeological study of culture layers much attention is paid to the filler of the materials, including their granulometry, colour, structure, texture, new formed materials like clay and iron phases, subhorizons, microarkstein, pieces of plaster and carbonates. Only a few of these could be a result of human activity.

During the geoarhaeological research it is very important the sedimentological, geomophological and pedological investigation to take place in adjacent areas at places with sterile natural layers.

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