Deep-sea environment is one of the least understood on the Earth. The main reasons are limitations of equipment necessary for work in such extreme conditions. However, geological studies gives a possibility to analyse deep-sea environments in fossil sea deposits on the land. As a result of movement of lithospheric plates, sediments which were deposited on the deep-sea floor were folded and uplifted above the sea level. Sedimentology, as a field of geological sciences, which encompasses studies on genesis of sedimentary rocks, gives a possibility to analyse environment of deposition and depositional mechanisms of deep-sea sediments. Such studies allow a better understanding of geological history of our planet with simultaneous insight in processes which take place in the modern deep-sea environment.

Heterolithic deposits are a closely interbedded deposit of sand and mud, formed under conditions where current flow varies considerably. Although they are usually attributed to tidal and shallow-marine environments, they are also known from a deep-sea environment. The aim of this project is a detailed sedimentological analysis of deep-sea heterolithic deposits, which remain poorly known today. Their detailed analysis can give insight into the fossil record of processes other than those commonly described in deep-sea depositional systems. Such processes may be traction currents, including contour currents and still poorly understood deep-sea tidal currents. The models of deep-sea heterolithic sedimentation remain the subject of discussion and the results of the proposed research can be used to develop a sedimentation model of supra-regional importance. Only recognition of the full spectrum of mechanisms taking place in a deep-sea environment, that occupies a large part of our planet's surface, will enable us to understand the dynamics of this environment.

The Carpathians are built of folded and uplifted deposits of a deep sea, which lasted from Late Jurassic to Early Miocene (152–10 million years ago). During most of its history, the bottom of the Carpathian sea was gradually covered by layers of mud which was fallen from the water suspension and by a mixture of sand and mud transported from the shallower part of the sea on a distance of hundreds of kilometres by episodic deep-sea currents and mass movements. Recently, deep-sea heterolithic deposits have been described by the author in the Carpathians, within the Late Cretaceous-Paleocene Ropianka Formation (Skole Nappe, Carpathians). The fundamental basis for this research are fieldwork, during which detailed logging of sedimentary successions and samples collection will be conducted. The study is focused on the genesis of the heterolithic deposits in the Ropianka Formation. Additional laboratory works include grain size analysis, analysis of microfacies and mineral composition. The collected data will be further characterized using statistical methods. In order to better understand the significance of heterolithic deposits in a deep-sea environment, a broader sedimentologcial analysis of deep-sea deposits, which co-occur with heterolithic deposits along with biostratigraphic studies, which enable correlation of distant outcrops of the Ropianka Formation, will be carried out. The biostratigraphic study will be based on the analysis of microfossils such as foraminifers and carbonate nannoplankton. It is possible that micropalaeontological analysis will allow additional conclusions on the palaeoenvironment, ecology and impact of the eustatic sea changes on the sedimentation in the Carpathians. Moreover, analysis of the vertical succession of deep-sea deposits as a record of the behavior of the bulk depositional system, is planned. It may allow distinguish of sedimentation changes, which took place on the local level from these which took place in the whole sedimentary basin. The research will be carried out both in detail on a microscale and in general terms of a large area such as the Skole Nappe. The results of the research will give insight into the depositional mechanisms of deep-sea deposits, with particular emphasis on the heterolithic deposits and their significance for the deep-sea depositional environment. The conclusions will not only expand knowledge about the local history of the formation of the Carpathians, but will allow to broaden general knowledge about the mechanisms of deep-sea sedimentation and the dynamics of the deep sea environment.