

Sedimentary organic matter is a key carbon reservoir in the nature. Depending on the processes of its formation and decomposition, it may contribute to the absorption or emission of CO₂. The dynamics of organic matter biodegradation is a very complex issue connected with its molecular composition and the natural microflora. This decomposition can be a source of not only CO₂, but also other greenhouse gases - CH₄ and N₂O. This project aims to link geochemical studies of carbon and nitrogen with the analysis of natural microflora in order to better understand the decomposition processes and its products in detail. Possible pathways of organic matter biodegradation will be verified in comparative incubation experiments with agricultural soil, soil from coal-waste dump, natural organic soil, detritic lignite, xylite (fossil wood), with labile and non-labile fractions isolated from natural samples (e.g. lignin and cellulose from peat and brown coal) as well cellulose and lignin standards. The decomposition products (biogas, extracts, polymers) will be identified quantitatively and qualitatively by various geochemical methods (GC, GC-MS, IRMS). The natural microflora of different sediments will be also characterized. The results of the research improve knowledge about the natural processes currently taking place in organic-rich sediments and wetlands, and about the global carbon and nitrogen cycle.