Cyclic sedimentation is well known from differently aged depositional systems, especially coal-bearing strata. It provides unique view into physiographic and geotectonic evolution of sedimentary basins as well as climate and biodiversity of the worlds that passed by. Moreover, as formation of particular stratigraphic sequences is controlled by factors (i.e. climate, subsidence, clastic supply, vegetation cover, changes in water sea level, glacio-eustasy) having their own cause in changes in the Earth's movements (Milankovitch cycles), cyclic sedimentation also reflects the nature of the Solar System and laws of planetary motion. As a result, high-resolution sequence stratigraphy, cyclostratigraphy and astrochronology have become one of the fundamental tools for palaeogeographic and palaeoenvironmental interpretations.

The Carboniferous was the first period in geological history when continental deposits and terrestrial biota became widespread and the diversity and ecological adaptations of organisms evolved to patterns comparable to the modern world. Intra- and inter-basinal correlations of these deposits as well as their correlation to the marine Standard Global Chronostratigraphic Scale are, therefore, vital if we are to gain a full understanding of the climatic and related biotic changes of this time. The Pennsylvanian to Early Permian was a time of considerable climate dynamics marked by substantial changes in the precipitation/evaporation balance and vegetation cover on both multi-Myr and Milankovitch timescales. In Carboniferous paralic basins located on coastal lowlands, the cyclic structure (cyclothems) forms by glacioeustatically-driven sea-level fluctuations of magnitudes up to ~ 100 m as a far-field response to waxing and waning of high latitude Gondwana ice cap.

Hence, the project aims to investigate the differential roles of glacio-eustasy, climate and tectonic subsidence in controlling cyclic deposition of the selected stratigraphic intervals of some Late Paleozoic basins centred in the Czech Republic and Poland and elsewhere in former eastern equatorial Pangea. Thanks to radioisotopic calibration of sedimentary cycles a high-resolution correlation between basins will be possible as well as reinterpretation of their facial history, depositional architecture and palaeogeography. Palaeoclimatic data will be integrated with fossil record in order to monitor the changes of biodiversity in eastern Pangea during Late Paleozoic.

The proposed research can be divided into five separate targets: (i) **cyclicity in paralic and continental environments and high-resolution inter-basinal correlations**, which is the major target that addresses the role of climate, basin subsidence, sediment supply, vegetation cover and glacio-eustasy on generation/preservation of cyclic record, (ii) **climatic signal associated with the cyclic record**, this target addresses mainly the climatic signal recorded in the paleosols and potentially in lacustrine sediments, (iii) **high resolution macrofloral biostratigraphy**, (iv) **architecture and depositional environments of the cycles**, (v) **terrestrial carbon storage through the Pennsylvanian**.

Aims of the project will be achieved due to the use of many complementary methods of analysis, including classical facial analysis, precise dating of tufogenic rocks (CA-ID-TIMS, SHRIMP) and geochemical studies of paleosols (ICP-OES/ICP-MS/WD-XRD). Implementation of the project will start with collection of archival data, detailed sedimentological characterization of borehole cores and sampling for stratigraphic analysis, sedimentology, petrography and geochemistry. Selected stratigraphic intervals will be tested to differentiate allo- and autocycles. Tufogenic rocks are planned to be dated by means of radioisotopic methos (CA-ID-TIMS, SHRIMP) to calibrate previous stratigraphic boundaries (biozones). Those rocks will be subjected to petrographic and geochemical analysis with the use of various instrumental techniques. Paleosols sampled from selected boreholes will be identified, described and classified according to the Mack’s et al. (1993) criteria. The most promising material will be subjected to more detailed geochemical and mineralogical (X-ray diffraction) analysis. The rate of climatically-controlled pedogenesis will be defined due to the commonly used weathering indices and also trace elements ratios, like Rb/Sr and Sr/Cu. Mineralogical analysis of paleosols will be supported by microscopic observations *via* polarized light microscopy and scanning electron microscopy.

Based on available literature, the project’s objectives are original and innovative. Results obtained during the course of the project will clarify the gaps in the present stage of knowledge about cyclic sedimentation in coal-bearing basins. Those results will be thus a subject of numerous international publications and conference presentations.