Dedolomitization processes (dolomite calcitization) are well-known processes of dolomite transformation since the mid-nineteenth century and often described in the literature on the diagenesis of carbonate rocks or, less frequently, in hydrogeology. However, it should be noted that the direct relationship between dedolomitization and / or its products and the development of karst caves (speleogenesis) is still unclear. The project will cover a case study of dedolomitization phenomena, including a cave developed in dedolomite, in the Rovte region (central Slovenia). However, we assume that the project results will have much wider implications for Earth sciences, including a better understanding of the formation processes of sulphide mineralization in southern Poland. We aim to describe new genetic (speleogenetic) processes in the development of karst caves associated with dedolomitization, which are likely common in many environments where the regional groundwater flow is realized through a evaporite-carbonate succession.

Such a mechanism could be responsible for the development of large-scale porosity (cavernosity) and instability in deep-seated carbonates. It is of great importance for the regional groundwater flow in karst aquifers and for the development of hydrocarbon and geothermal reservoirs, as well as for the initial stages of the formation of ore mineralization. The proposed research should be important for the re-evaluation and renewed interest of researchers on the relationship between the dedolomite and brecciated horizons, widespread in certain carbonate karst, but also ore mineralization developed within carbonates. Perhaps some of them, at least in the initial genetic stages, are the result of similar processes to those being the subject of the proposed research.

In the proposed research area in central Slovenia, we have a unique opportunity to perform interdisciplinary research on the processes of dedolomitization and related speleogenesis. According to the results of our preliminary hydrogeochemical studies in the Rovte region, the dissolution of calcium sulphate (gypsum) and the dedolomitization are still active processes. Thus, the selected research area is a unique testing ground for the analysis of direct relationships between the processes of calcium sulphate dissolution, currently active dedolomitization, cave development (speleogenesis), and their products in the form of sediments and minerals on cave walls.

The recognition of complex dedolomitization processes and their relationship with the processes leading to the development of caves or with the early stages of the development of ore mineralization will be carried out by an interdisciplinary team of experienced researchers from the University of Silesia in Katowice and the Institute of Geological Sciences of the Polish Academy of Sciences in Warszawa and the Research Centre of the Slovenian Academy of Sciences and Arts in Ljubljana. The team will carry out comprehensive geological, mineralogical, petrographic and geochemical studies, including the geochemistry of stable isotopes, speleology and geomorphology. The research will be carried out both, directly in the field in Slovenia and in laboratories of all partner institutions participating in the project. Numerical modelling will be performed to test the probability of speleogenesis scenarios related to dedolomitization processes. The revision of the current research results and views on the role of dedolomitization in the initial stages of the development of sulphide mineralization in southern Poland will be carried out on the basis of archival geological materials, including own laboratory analyses on archival geological samples.