The late Devonian and Mississippian was a time of extremely significant global changes in marine environments which can be detected worldwide by the occurrence of organic-rich facies associated with repeated climatic-eustatic perturbations characterised by sea-level rise, eutrophication, and the development of anoxic conditions. Enhanced volcanic activity, led to significant changes in the global climate and biosphere, and is widely thought to have caused the extinction event known as the Hangenberg Crisis. However, recently, the volcanic control of this biotic overturn was questioned by some researchers. A relatively strong correlation between Hg anomalies and increased volcanic activity of large igneous provinces (LIPs) during mass extinctions and biotic crises allows the use of Hg chemostratigraphy as an indicator of volcanic activity. Recently mercury isotopes have been used as a tracer of Hg sources in marine sediments. However, the Late Devonian Hangenberg event and Devonian–Mississippian boundary are not as advanced as the other ones, and still need intensive research, especially in terms of more refined Hg isotope geochemistry. Additionally, tellurium has been successfully used to confirm Siberian volcanism at the end of the Permian, and end-Cretaceous Decan volcanism in addition to mercury anomalies. Tellurium is one of the least common elements on Earth. Generally, crustal Te values are extremely low, reaching an average value in the upper crust of 3 ppb, making it rarer than many rare earth elements like gold. Today, the global volcanic tellurium flux amounts to 98 tons/year, often showing greater enrichment in Te compared to other volatile elements like mercury, arsenic, thallium, and bismuth. Our preliminary results on Te contents and Te/Th ratios at the Devonian–Mississippian boundary in the Tian-Shan are promising. We have a lot of investigation of the mercury chemostratigraphy at crucial intervals during Phanerozoic, while our knowledge on tellurium cycles during intervals of the mass extinctions, LIPs emplacements, and biotic crises is completely lacking. Therefore, this is one of the themes of the present project in conjunction with the Hg isotope record, in profiles where mercury anomalies have previously been identified (Carnic Alps – Austria/Italy and Uzbekistan).

Another important debate concerning biotic crises and oceanic anoxic events in Earth's history is whether the main source of organic-rich sediments was the high productivity of phytoplankton or the increased preservation of organic matter in oxygen-depleted restrictive basins with poor circulation and low rates of bottom water exchange. Therefore, investigating in which sedimentary regime the organic-rich sediments of the late Devonian anoxic events in the studied rock successions were formed based on the interrelationships of selected Mn, Co, Cd/Mo, Mo_{EF} vs U_{EF} indicators will be another objective of the presented proposal.

The end of the Devonian was characterised by significant climatic changes leading to the expansion of anaerobic zones in marine environments. Interestingly, nowadays we are witnessing similar effects caused by human industrial activity, leading to a drastic increase in dead zones in marine environments. Understanding the past can provide valuable insights into the present and future. Therefore, synthesizing the findings of these studies will be beneficial in explaining the factors responsible for eutrophication and water column stratification. These processes are of great significance in contemporary environments due to the extensive supply of nutrients by human activities and the influence of climate change.