

The current understanding of carbonate minerals precipitation is mainly based on abiotic or biotic (bacterial) precipitation of carbonate minerals. The additional virus participation in carbonate marine and freshwater environments and its scale is essentially unknown and in fact has only been reported from several localities where carbonate precipitation takes places in microbial mats and stromatolites or methane seeps.

The main objective of the project is to determine and characterise in a broad study for the first time mineralised and natural virus distribution in carbonate microbially-rich systems in Europe, Qatar and Bahamas from cold to hot-spring and from normal to mesohaline carbonate settings. Such a multidisciplinary study involving biomineralogy, petrography and microbiology will help to distinguish and compare various mineralised shapes of capsids and viral-precipitated nanoparticles/nanospheroids, VLPs, distribution of virus strains in the temperature- and salinity-different carbonate settings and thus helping to establish virus-based environmental proxies, and the distribution of viral strains, their capsids and shapes. Microscopic techniques (scanning and transmission microscopes), diffractometry and molecular microbiology methods will be used to carry out the project.

The obtained results of the project will integrate the available data from hypersaline settings, which will complement and strengthen the final results. Revealing the distribution of viruses, their shapes and strains will lead to establishing virus proxies characteristic for carbonate freshwater-marine environments and help to understand factors controlling virus distribution in modern carbonate environments characterised by active microbial activity (bacteria and archaea) and origin of carbonate nanoparticles and nanospheroids.