



CARBONATE AND EVAPORITE DEPOSITS: GENESIS AND DIAGENESIS

Non terrigenous sedimentary rocks, such as evaporites and carbonate orthochemical and allochemical rocks, are born within sedimentary basins and therefore are very sensitive recorders of chemical and physical conditions (i.e. depth, chemistry, oxygen content, nutrients, temperature etc.) occurring both in the water column and at the sea bottom. Moreover, microbial communities may also play a crucial role in the genesis of these deposits. Lastly, they are often prone to important changes in chemical and mineralogical composition and even structure due to diagenetic processes taking place from soon after deposition through the whole burial history. These kinds of rocks are thus complex to study and require a multidisciplinary approach including frontier disciplines such as geomicrobiology and advanced geochemistry.

The sedimentary geology group of the Torino Earth Science Department is actively involved in two main research projects dealing with evaporites and carbonates. 1) Stratigraphy, sedimentology and geobiology of Messinian Mediterranean evaporites; 2) Petrography, geochemistry and dating of hydrothermal carbonates in Mesozoic distal continental margins of the Western Tethys.

1. In the geological past climate oscillations of different amplitude and periodicity were responsible for cyclic modification of the hydrological budget of sedimentary basins, leading to the advent of extreme environmental conditions, both hypersaline and anoxic, in which only extremophile microbial communities were able to survive. We are particularly interested on the mutual interdependence between microbial ecology and hypersaline habitats and to constrain the possible role of microbes on evaporite formation, using the products of Miocene environmental crises (Messinian and/or Badenian salinity crises) and their comparison with modern hypersaline settings as case studies. (francesco.delapierre@unito.it)
2. The main purpose of this research is to develop models of fluid circulation within sedimentary successions occurring over the distal parts of extensional margins in relation to the activity of detachment faults within continental crust or even to exhumation of mantle rocks. Recrystallization, dolomitization, hydraulic brecciation, and veining are the main phenomena which may be met especially within the carbonate rocks of which the extensional allochthons are made. Cathodoluminescence, fluid inclusion microthermometry, stable isotopes (O, C, Sr), trace elements and REE geochemistry, radiometric datings are the main techniques to be applied to achieve the expected goals. (luca.martire@unito.it)

Any project concerning one of the two main research areas are welcome! To learn more, please visit the research section of the Department web site.