Exploring the Rhone delta canyons in Lake Geneva since François-Alphonse Forel

In the late 19th century, F.-A. Forel led investigations of the Rhone River delta area of Lake Geneva that resulted in the discovery of a textbook example of a river-fed delta system containing impressive subaquatic channels. Well ahead of the marine counterparts, scientific observations and interpretations of water currents shaping the delta edifice for the first time documented how underflow currents carry cold, suspension-laden waters from the river mouth all the way to the deep basin.

These early investigations of the Rhone delta laid the basis for follow-up studies in the 20th and 21th centuries. Sediment coring, water-column measurements, manned submersible diving, seismic reflection profiling and bathymetric surveying eventually provided a rich database to unravel the key erosional and depositional processes, further documenting the impact of human-induced changes in the catchment.

With the merging of old and new scientific knowledge, today a comprehensive understanding prevails of how a delta changes through time, how its channels are formed, and what potential natural hazards may be related to its evolution. New and efficient bathymetric techniques, paired with novel coring operations, provided a time-series of morphologic evolution showing and quantifying the high dynamics of the delta/channel evolution in an unprecedented temporal and spatial resolution.

Ongoing investigations continue to further quantify these dynamic processes and to link the evolution of the subaquatic domain with changes and processes in the catchment and with natural hazards. Its size, easy access, and large variety of states and processes will continue to make the Rhone delta area a perfect 'laboratory' in which general processes can be studied that could be upscaled or downscaled to other ancient marine and lacustrine deltas. This opens new perspectives for the interpretation of similar deposits in the geological records, which are difficult to predict with conventional well-log and seismic reflection datasets.