During my doctoral research, I focused on deciphering the interactions between sea-level and climate change during the Late Barremian–Early Aptian, their expression in the Tethys basin and in the Helvetic carbonate platform. The research highlights are summarized here in three points:

In the Helvetic Alps, the transition between the Lower Schrattenkalk (Upper Barremian) and the Rawil Member (Lowermost Aptian) is characterized by a change from a predominantly photozoan to a heterozoan carbonate-producing system, which coincides in time with a general increase in detrital and nutrient input. The clay mineral record shows the appearance of kaolinite within the Rawil Member, whereas this mineral is absent from the uppermost Lower and lowermost Upper Schrattenkalk Members. This indicates the installation of a warmer and more humid climate during this time period. A negative peak in $\delta_{13}C$ is recorded at the top of the Lower Schrattenkalk Member, and correlates with the well-known negative excursion of -1‰ occurring in other basins and dated as latest Barremian, thus confirming a latest Barremian and earliest Aptian age for the Lower Schrattenkalk and Rawil Members, respectively. Furthermore, a sequence stratigraphic framework has been defined for the Rawil Member, based on both the ecology of faunal and floral assemblages, and their palaeoenvironmental interpretation, as well as on the stacking pattern of limestone beds observed during field prospection. The presence of a sequence boundary is postulated near the top of the Lower Schrattenkalk Member, which is correlated with the earliest Aptian SbA1 defined in Vercors (France). The SbA1 is characterized by a maximum of proximal assemblages and by the disappearance of several benthic foraminiferal species. Within the Rawil Member itself, the stacking pattern and microfacies trends are interpreted to represent the TST of the first Aptian sequence.

With regards to the pelagic setting in the Tethyan realm, I investigated the Gorgo a Cerbara section (central Italy). There, thin organic-rich layers occur episodically in pelagic carbonates of the upper Barremian portion of the Maiolica Formation. They are associated with high Corg:Ptot ratios, which indicate the presence of intermittent dysoxic to anoxic conditions. Coarse correlations are also observed between TOC, P and biogenic silica contents, indicating links between P availability, productivity, and organic matter preservation. The corresponding $\delta_{13}C_{carb}$ and $\delta_{18}O$ records remain, however, quite stable, indicating that these brief periods of enhanced TOC preservation did not have sufficient impact on the marine carbon household to deviate $\delta_{13}C$ records, and are probably not the consequence of major climate change. On the other hand, organic-rich layers become more frequent around the Barremian–Aptian boundary in both pelagic and hemi-pelagic environments (Gorgo a Cerbara and La Bédoule, France), which are correlated with negative excursions in $\delta_{13}C_{carb}$ and $\delta_{13}C_{org}$ records. During the earliest Aptian, at Gorgo a Cerbara, the frequency of organic-rich intervals progressively increases and redox-sensitive trace-element enrichments become more frequent, until the highest TOC-enriched level just below the “Livello Selli”, indicator of Oceanic Anoxic Event 1a (OAE1a). The latter is associated with the well-known negative spike in $\delta_{13}C_{carb}$ and $\delta_{13}C_{org}$ records, a diminution in the $\delta_{18}O$ record interpreted as the consequence of a warming interval, an important peak in P accumulation and high C_{org}:P_{tot} ratios indicating the prevalence of anoxic conditions. The Selli Level (OAE1a) documents a general cooling phase and coincides with maximum RSTE enrichments as well as high C_{org}:P_{tot} ratios, which confirm the importance of anoxic conditions during OAE1a at this site.

During the Early Aptian, environmental change on the platform is expressed by orbitolinids proliferation that may be induced by both climate change and sea-level rise. In the basin, the successive black shales horizons from the Late Barremian until the OAE 1a are interpreted as the progressive impact of palaeoenvironmental change probably linked to the formation of the Ontong-Java plate-basalt plateau.