



University of Cyprus  
Department of Biological  
Sciences

*Ph.D. Thesis Defense*

## *Student Presentation*

**Monday, 13 December 2021 at 10:00**

***This seminar is open to the public via Zoom at the following link:***

<https://ucy.zoom.us/j/91675429662?pwd=S3JIL3ovK2p3alJjazFrSIRQK2xFZz09>

Meeting ID: 916 7542 9662

Passcode: 645953

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### **“Phytoplankton in the coastal waters of Cyprus (eastern Levantine): phenology, spatiotemporal variations, and microphytoplankton community structure”**

Marine phytoplankton is at the base of marine food webs and responsible for approximately half of the global primary production. The diversity and biomass of phytoplankton vary spatiotemporally and are controlled by various factors, such as competition and predator/prey interactions and by physical processes such as temperature, light availability, water-column structure, and circulation. Phytoplankton regulate the Earth’s climate over time, by transferring carbon dioxide from the atmosphere to the ocean, via the carbon cycle. Phytoplankton are also sensitive to environmental changes, responding very quickly to climate induced changes in their physical habitat, due to their short turnover times. Any changes in phytoplankton community composition can have cascading effects on marine ecosystems, affecting food web dynamics and ecosystem production. Therefore, understanding phytoplankton community dynamics, as well as the taxonomy of functional types, in relation to physical processes and nutrient inputs, is crucial in order to monitor the influence of environmental changes on phytoplankton community structure, with implications in biogeochemical cycles and the functioning of the entire marine ecosystem. This work provides, for the first time in the coastal waters of Cyprus, insights on the phytoplankton community structure and dynamics, using a combination of ocean colour remote sensing observations and a 12-month long timeseries of *in situ* data, collected from four coastal stations in Cyprus during 2016.

The results from the first complete seasonal cycle of phytoplankton phenology in the coastal waters of Cyprus, demonstrate that ocean colour remote sensing can be used to effectively monitor the marine ecosystem of Cyprus, and the eastern Levantine, where *in situ* data are scarce. The *in situ* data on phytoplankton pigments are consistent with the satellite-derived phytoplankton phenology, where the phytoplankton growth period initiates in November and

terminates in March/April, consistent with the “no bloom” classification. The remote sensing data for the sampling period of 2016 showed an earlier termination and thus, a shorter duration, when compared to the 23-year climatology. In general, the coastal waters of Cyprus reflect the ultra-oligotrophic conditions of the eastern Mediterranean since the total chlorophyll-a values recorded are extremely low. The hydrological conditions in the study area show that the water column is well mixed between December to April, and the remainder of the year the water column is stratified. The salinity in the area is very high (> 39), and temperatures reaching a maximum of 29 °C in the summer. Even though the concentrations of nutrients were generally low, some extreme values of phosphate concentrations were recorded in winter and spring, which could be attributed to localised sources of nutrient inputs along the coast (power station, desalination plant, untreated sewage). Considering phytoplankton size classes, pico- and nanophytoplankton had the highest contribution in the phytoplankton communities, consistent with the oligotrophic Levantine open waters. Specifically, the contribution of pico- and nanophytoplankton was equal throughout most of the year (~50%), whereas in the summer nanophytoplankton contributed closer to 60%. The combination of CHEMTAX algorithm and HPLC pigments analysis confirmed previous studies in the Mediterranean, where Prymnesiophytes have been recorded as the most abundant group throughout the year, in both the shallow and deeper layers. The analysis of the microphytoplankton community revealed a total of 50 taxa, with the highest number recorded in PYR station (45), followed by AKR (41), VAS2 (38) and VAS1 (35).

The results of this thesis provide a first picture of the composition and seasonal succession of phytoplankton communities in the coastal waters of Cyprus and pave the way for future research that should assess how oceanic warming is affecting phytoplankton phenology and the seasonal succession of phytoplankton pigments in the area.