



Diazotrophic unicellular cyanobacteria in the northwestern Mediterranean Sea: A seasonal cycle

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ABSTRACT: Unicellular diazotrophic cyanobacteria (UCYN₂-Fix lineage) were detected using whole-cell hybridization of specific Nitro821 oligonucleotide probe at the coastal and oligotrophic station SOMLIT off Marseilles (France). This station was sampled monthly, for a year and a half (June 2006–November 2007). The UCYN₂-Fix community was dominated at 99.9% by picoplankters (0.7–1.5 μm) mainly as free living in the 0.2–3-μm size fraction. They were present all the year long with a mean density of 4.6 cell mL⁻¹, except in summer 2006, when concentrations reached 1.9 × 10³ cell mL⁻¹ and 5.3 × 10³ cell mL⁻¹ in June and July, respectively. During this bloom, picoplanktonic UCYN₂-Fix represented 10.7% of the picocyanobacterial community. The larger size fractions (3–10 μm and >10 μm) were also dominated (98.9%) by picoplanktonic UCYN₂-Fix cells, associated with inert particles, or dinoflagellates. However, hardly any nanoplanktonic UCYN₂-Fix were detected (0–0.12 cell mL⁻¹), and *Trichodesmium* sp. was observed only once in summer at low concentration (0.03 trichome mL⁻¹). We hypothesize that a combination of abiotic parameters, such as elevated temperature, absence of nitrate, presence of phosphate, and an exceptionally high urban pollution event, explain the large bloom of potentially diazotrophic picocyanobacteria. Further studies are needed to confirm the identity of these small cells and their role in nitrogen cycle and marine productivity, especially since some effects of climate change (e.g., increased surface warming and upper-water-column stratification) may increase their importance in a near future.

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