

Table S1: Comparison of *Prochlorococcus*, *Synechococcus* and 2 $\mu$ m beads abundances measured with the benchtop FACSCalibur flow cytometer and the CytoSense flow cytometer on five replicates.

Sample	<i>Prochlorococcus</i>		<i>Synechococcus</i>		2 $\mu$ m beads	
	(cell.cm <sup>-3</sup> )		(cell.cm <sup>-3</sup> )		(beads.cm <sup>-3</sup> )	
	FACS	CS	FACS	CS	FACS	CS
#1	18436	18236	27766	27906	5646	5376
#2	17762	17764	27153	26758	5371	5329
#3	17469	17102	27117	27564	5362	5613
#4	17759	17953	27797	27852	5553	5679
#5	18017	17291	28214	27050	5734	5443
Mean	17888	17669	27610	27426	5533	5488
StdDev	270	357	380	418	133	126
	t.test p=0,4326		t.test p=0,568		t.test p=0,573	

Figure S1: Temperature ( $^{\circ}\text{C}$ ), salinity, Chl-*a* ( $\mu\text{g}\cdot\text{dm}^{-3}$ , converted from fluorescence) and density profiles ( $\text{kg}\cdot\text{m}^{-3}$ ) at 6 stations.

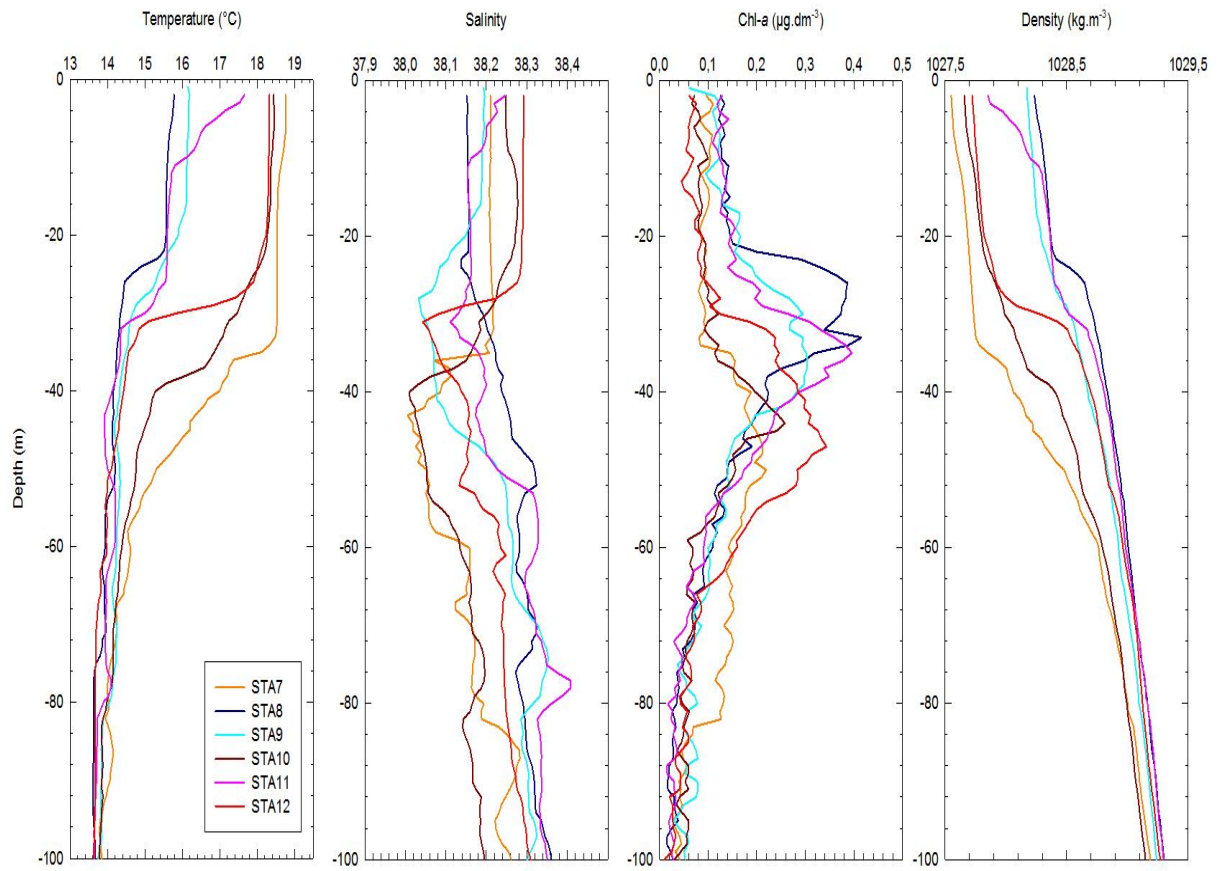


Figure S2: Temperature ( $^{\circ}\text{C}$ ), salinity, fluorescence (a.u.) and PAR ( $\mu\text{E}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$ ) profiles recorded by the CTD-Rosette, with associated *Prochlorococcus*, *Synechococcus* and picoeukaryotes abundances ( $\text{cells}\cdot\text{cm}^{-3}$ ) and nitrate, nitrite, silicate and phosphate concentrations ( $\mu\text{mol}\cdot\text{dm}^{-3}$ ) at Station 11.

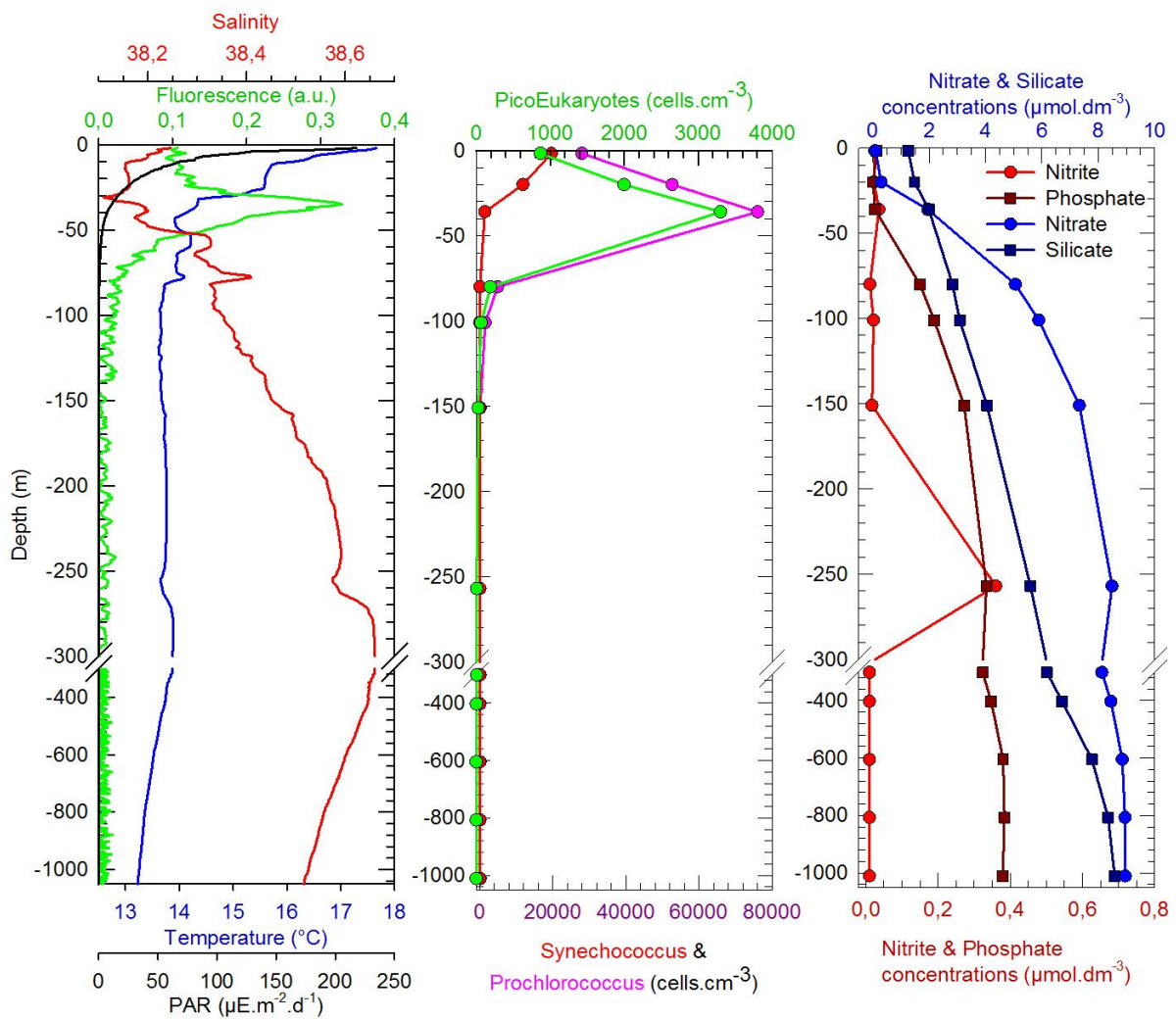


Figure S3: Mean abundances and standard deviation (green circles and error bars) during and at the vicinity of fixed stations 1 to 11 of *Prochlorococcus*, *Synechococcus* and picoeukaryotes (cells.cm<sup>-3</sup>) by the CytoSense AFM in surface waters compared to abundances recorded by benchtop flow cytometry at the 2 first depths (from 1 to 5 m depth) during PASTIS-HVR vertical samplings (yellow triangles).

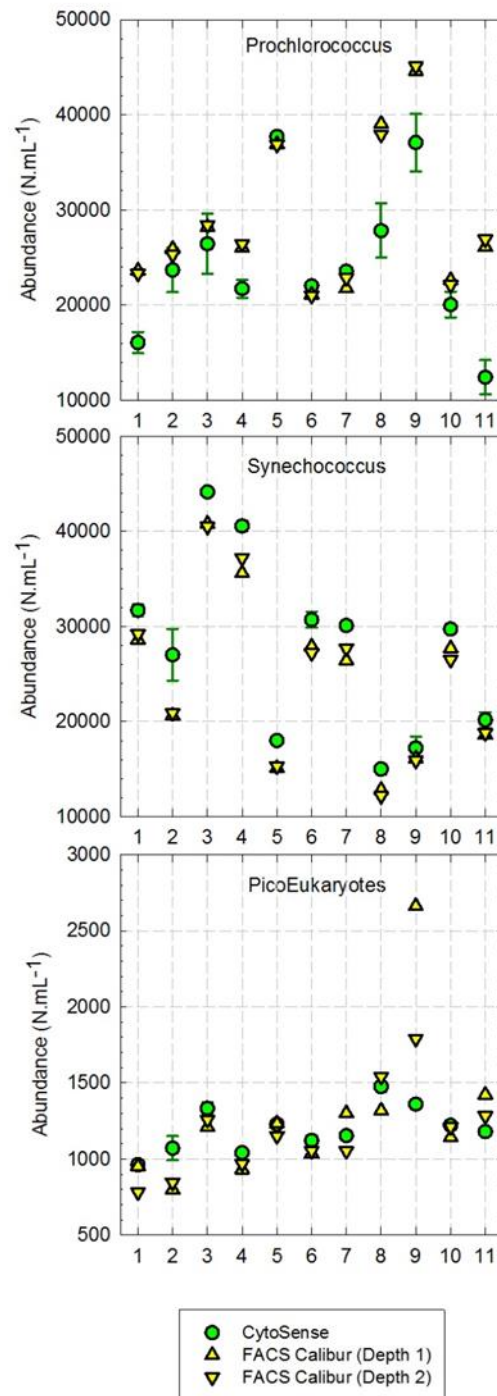


Figure S4: Mean SWS and FLR of *Prochlorococcus* and *Synechococcus* recorded by benchtop flow cytometry at fixed station 6 to 11 from PASTIS-HVR vertical samplings and at Station 11 (SWS : black circles, FLR : with squares).

