

Methods

Water samples were generally collected at 13 depths, i.e. 5, 10, 20, 30, 50, 70, 110, 200, 300, 500, 1000, 1500 and 2000 m, using a carousel system equipped with 12 l Niskin bottles and a CTD. However, inclement weather meant that no samples were collected in November 1999 and only from the upper 200 m in March 2000.

Abundance and biomass measurements

For pico- and nanoplankton microscopic counts, samples were fixed with glutaraldehyde (final conc. 1%). The fixed samples were always filtered within 48h of collection. Subsamples for bacteria and cyanobacteria (10-50 ml) were concentrated to ca. 10 ml onto a 25 mm, 0.2 μm pore sized polycarbonate black filter and then stained with DAPI (final conc. 0.5 $\mu\text{g ml}^{-1}$) for 10 min and then collected on the filter (Porter and Feig, 1980). Another subsample for HNF and autotrophic nanoflagellates (ANF) (50-500 ml) was concentrated to ca. 10 ml on a 25 mm, 0.8 μm pore sized polycarbonate black filter. HNF and ANF cells were stained with DAPI for 10 min (final conc. 0.5 $\mu\text{g ml}^{-1}$), thereafter with proflavine for 2 min (final conc. 0.0006%, Haas, 1982), and collected finally on the filter. The filters were mounted on slides and stored frozen (-20°C). All the slides were examined at 1250x under an epifluorescence microscope. Up to ≥ 400 bacterial cells were counted under UV excitation in at least 10 fields. Cyanobacteria were counted under blue excitation in at least 20 fields. HNF and ANF were counted and sized using an ocular micrometer under UV and blue excitations in at least 50 fields. Cell volume of HNF and ANF was calculated assuming their shape to be spherical or ellipsoidal. HNF and ANF abundance was always dominated by 2-10 μm cell size range, therefore the abundance and biomass was based on this size range.

For ciliates, 1000-5000 ml samples were fixed with acid Lugol's (final conc. 2%). Subsamples (50-5000 ml) were settled in an Utermöhl chamber, after preconcentration if necessary. The entire surface area of the Utermöhl chamber was examined at 200x with an inverted microscope. Ciliates were divided into three size groups, $<30 \mu\text{m}$, 30-50 μm and $>50 \mu\text{m}$, and up to 30 cells in each group were measured. Mean cell volume of ciliates was calculated for each size group to estimate total volume of ciliates.

In order to estimate carbon biomass, we chose the following conversion factors: 15 fg C cell⁻¹ for bacteria and 183 fg C μm^{-3} for HNF, as calculated from POC and microbial

biomass in the Sargasso Sea (Caron et al., 1995). Ciliate carbon biomass was calculated using a conversion factor of $0.19 \text{ pg C } \mu\text{m}^{-3}$, derived from oligotrichous ciliates fixed with 2% acid Lugol's (Putt and Stoecker, 1989).

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