Phytoplankton as biodiversity indicators: sample storage time affects quantification of phytoplankton lifeforms

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Key indicators of environmental change

Accuracy in its quantification is essential in biodiversity and conservation studies

Aims

- Evaluate the effects of:
  a) storage time on the abundance of microphytoplankton in samples fixed with acid Lugol's solution, analysed using inverted microscopy;
  b) storage time on the abundance of pico- and nanophytoplankton in frozen microscopy slides (-20ºC), analysed using epifluorescence microscopy;
  c) storage time on the abundance of pico- and nanophytoplankton in fixed refrigerated samples (4ºC), analysed using epifluorescence microscopy;
  d) storage protocol (refrigerated *vs.* frozen) on the abundance of pico- and nanophytoplankton.

Strategy

Epifluorescence microscopy
Pico- and nanophytoplankton (<20 µm)

Days of observation: 0, 1, 2, 4*, 7*, 14*

Storage – 4ºC

Sub-samples fixed with glutaraldehyde (2 %)

Slide preparation

Storage – - 20ºC

Days of observation: 3*, 7*, 14*, 30, 90, 180, 365

Inverted microscopy
Microphytoplankton (>20 µm)

Sub-samples fixed with acid Lugol's solution (0.2%)

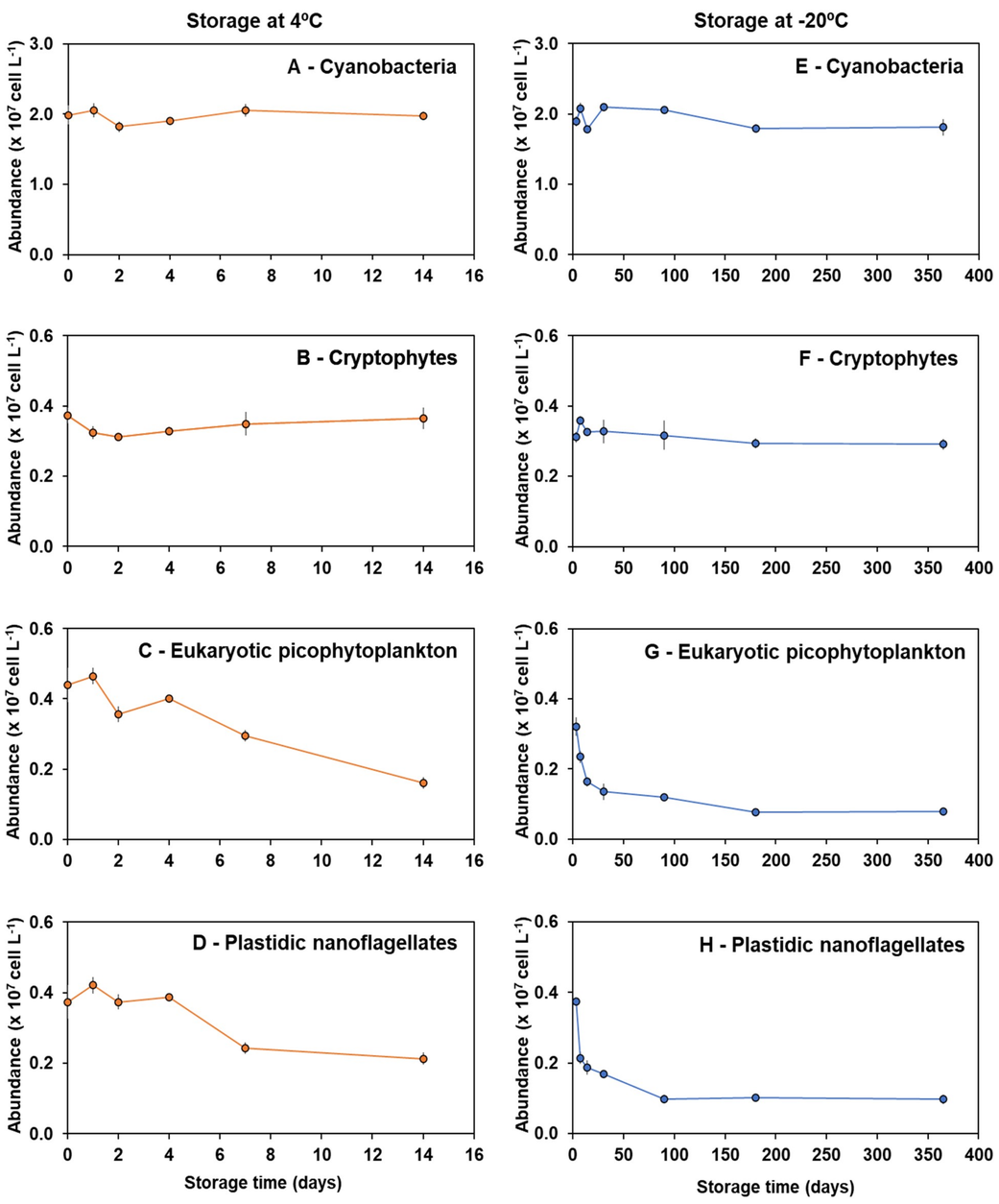
Storage – 15 – 20ºC Dark

Days of observation: 7, 14, 30, 90, 180, 365

* Days of observation used to evaluate the effects of storage protocol (refrigerated *vs.* frozen)

Results

Abundance of pico- and nanophytoplankton along the storage time

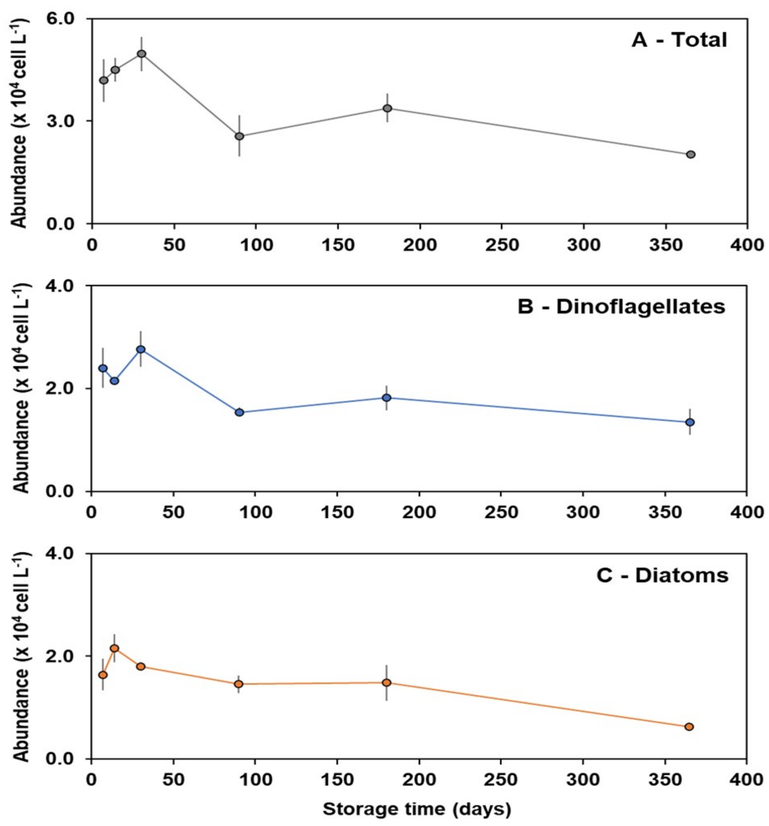


Storage time caused a **negative impact** in the abundances of all phytoplankton sizes classes, with group specific responses

For **higher accuracy** in abundance estimates of **picoeukaryotes**, its suggested that glutaraldehyde fixed samples should be kept **refrigerated up to 4 days**, and slides should be **prepared immediately** before observation.

For samples fixed with acid Lugol's solution it is suggested that analysis is conducted within **30 days for dinoflagellates and total microphytoplankton,** while for **diatoms** higher accuracy on abundance estimates can be obtain **up to 180 days** after sample collection/fixation.

Abundance of microphytoplankton along the storage time



Take home message:

Methodological choices should be carefully considered in studies that aim to evaluate phytoplankton diversity, since they have the **potential to influence results** and consequently **impair the comparability** of biodiversity studies.

It is highly recommended that authors clearly state their methodological approaches to facilitate studies comparability.

Download full paper here:

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