**Table 1** Values for the recovery, uncertainty and means of certification of the certified plankton reference material BCR-414 (n = 10, except for Zn: n = 9). Analysed trace metals include iron (Fe), cobalt (Co), manganese (Mn), copper (Cu) and zinc (Zn). BCRI and BCRC denote indicative and certified values for BCR-414, respectively.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Element | Fe | Co | Mn | Cu | Zn |
| % recovery | 99.55 | 95.91 | 91.83 | 95.95 | 121.23 |
| % RSD BCR-414 | 2.88 | 6.33 | 9.47 | 12.09 | 24.63 |
| Certification | BCRI | BCRI | BCRC | BCRC | BCRC |

**Table 2** Concentrations of light-harvesting (chlorophyll *a* (Chl *a*), chlorophyll c1+2 (Chl c1+2), fucoxanthin) to light-protective pigments (diadinoxanthin (DD) and diatoxanthin (DT); ng L-1­) for a natural Antarctic phytoplankton community grown under moderate mixing (low Fe and low light), low mixing (low Fe and high light), and strong mixing (high Fe and low light) exposed to ambient pH or ocean acidification (OA). Values were determined at the end of the first and the second growth phase and represent the means ± SD (n = 3), except for those with a dagger (†, n = 2) or caret (^, n = 1). Significant differences relative to the moderate mixing scenario at ambient pH are denoted by \*p < 0.05. ND denotes not determined.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Scenario | Chl *a* | Chl c1+2 | Fucoxanthin | DD | DT | β-carotene |
|  | (ng L-1) | (ng L-1) | (ng L-1) | (ng L-1) | (ng L-1) | (ng L-1) |
| Initial community | 42.23 ± 9.54† | 5.41 ± 0.05† | 19.05 ± 3.12† | 7.13 ± 0.79† | 0.64^ | 1.08^ |
| End of 1st growth phase: |  |  |  |  |  |  |
| Moderate mixing ambient pH | 249.42 ± 33.17 | 72.85 ± 12.90 | 176.53 ± 21.57 | 25.04 ± 3.72 | 0.96^ | 4.68 ± 0.17 |
| Low mixing ambient pH | 244.08 ± 23.66 | 78.71 ± 50.80 | 189.29 ± 31.94 | 39.99 ± 2.88\* | 2.72 ± 0.55 | 3.24 ± 2.05 |
| Strong mixing ambient pH | 231.17 ± 72.66 | 61.80 ± 22.57 | 141.08 ± 39.13 | 17.90 ± 4.48 | ND | 4.70 ± 1.08 |
| Moderate mixing OA | 238.28 ± 32.61 | 69.25 ± 19.26 | 175.81 ± 33.83 | 25.54 ± 5.64 | 1.72 ± 0.82 | 4.92 ± 0.85 |
| Low mixing OA | 241.97 ± 59.80 | 95.48 ± 23.20 | 160.28 ± 31.10 | 39.83 ± 9.57\* | 2.67 ± 1.53 | 4.03 ± 2.22 |
| Strong mixing OA | 204.20 ± 75.35 | 50.85 ± 23.51 | 124.76 ± 49.20 | 15.70 ± 5.19 | ND | 4.39 ± 1.09 |
|  |  |  |  |  |  |  |
| End of 2nd growth phase: |  |  |  |  |  |  |
| Moderate mixing ambient pH | 364.38 ± 31.64 | 132.98 ± 30.20 | 288.69 ± 17.61 | 41.73 ± 6.83 | 2.48 ± 1.89† | 7.08 ± 1.06 |
| Low mixing ambient pH | 300.87 ± 36.38 | 113.31 ± 32.50 | 229.50 ± 36.99 | 35.90 ± 15.98 | 3.31 ± 1.11 | 6.93 ± 0.66 |
| Strong mixing ambient pH | 394.88 ± 88.57 | 120.26 ± 51.26 | 287.99 ± 49.45 | 37.32 ± 6.60 | 7.59^ | 9.41 ± 1.30 |
| Moderate mixing OA | 361.43 ± 66.11 | 139.63 ± 14.89 | 305.48 ± 63.50 | 48.28 ± 8.43 | 3.02 ± 1.03 | 6.81 ± 0.80 |
| Low mixing OA | 290.46 ± 30.51 | 102.27 ± 10.85 | 201.56 ± 14.66 | 56.45 ± 2.57 | 5.05 ± 2.25 | 6.78 ± 0.95 |
| Strong mixing OA | 369.39 ± 55.04 | 130.26 ± 32.27 | 285.76 ± 40.34 | 39.67 ± 10.59 | 3.35 ± 0.29† | 8.85 ± 1.07 |

**Table 3** Molar ratios of carbon to nitrogen (C:N) for a natural Antarctic phytoplankton community grown under moderate mixing (low Fe and low light), low mixing (low Fe and high light), and strong mixing (high Fe and low light) exposed to ambient pH or ocean acidification (OA). Values were determined at the end of the first and the second growth phase and represent the means ± SD (n = 3). There were no significant differences relative to the moderate mixing scenario at ambient pH.

|  |  |
| --- | --- |
| Scenario | C:N |
|  | (mol mol-1) |
| Initial community | 12.74 ± 1.57 |
| End of 1st growth phase: |  |
| Moderate mixing ambient pH | 9.74 ± 2.09 |
| Low mixing ambient pH | 9.27 ± 0.97 |
| Strong mixing ambient pH | 9.22 ± 0.24 |
| Moderate mixing OA | 6.80 ± 2.17 |
| Low mixing OA | 9.10 ± 0.75 |
| Strong mixing OA | 12.87 ± 3.14 |
|  |  |
| End of 2nd growth phase: |  |
| Moderate mixing ambient pH | 8.70 ± 0.93 |
| Low mixing ambient pH | 6.96 ± 0.71 |
| Strong mixing ambient pH | 7.65 ± 0.46 |
| Moderate mixing OA | 8.31 ± 0.07 |
| Low mixing OA | 8.36 ± 0.73 |
| Strong mixing OA | 10.40 ± 1.87 |

**Table 4** Effects of mixing scenarios and pH as well as interactions among the two parameter on the end of the first and second growth phase. Significant differences using a two-way ANOVA are denoted by \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001 and \*\*\*\*p < 0.0001, respectively.

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Mixing scenario | pH | Mixing scenario x pH |
| End of 1st growth phase: |  |  |  |
| Fe:C | \* |  |  |
| Fv/Fm | \*\*\*\* |  |  |
| Net POC production rates | \*\*\* | \*\* |  |
| LH:LP | \*\*\*\* |  |  |
| pH | \* | \*\*\*\* | \*\* |
| TA | \* |  |  |
| Nitrate | \*\*\*\* | \* |  |
| Phosphate | \*\*\*\* |  |  |
| Silicate | \*\*\*\* | \* |  |
| Diatoms | \*\* | \*\* | \*\* |
| Nanoflagellates | \*\* | \*\* | \*\* |
| Co:C |  |  |  |
| Mn:C |  |  |  |
| Cu:C | \*\* | \* |  |
| Zn:C | \*\*\* | \*\*\* | \*\* |
| σ*PSII* | \*\* |  | \* |
| τ*Qa* | \* | \* |  |
| *P* | \*\*\* |  |  |
| ETR*max* | \*\* |  | \*\* |
| *Ik* |  |  | \* |
| α | \* |  |  |
| End of 2nd growth phase: |  |  |  |
| Fe:C |  |  |  |
| Fv/Fm |  |  |  |
| Net POC production rates |  |  |  |
| LH:LP | \*\* | \*\* |  |
| pH |  | \*\*\*\* |  |
| TA | \*\* |  | \* |
| Nitrate | \*\* |  |  |
| Phosphate | \*\* |  |  |
| Silicate | \*\* |  |  |
| Diatoms |  |  |  |
| Nanoflagellates |  |  |  |
| Co:C | \*\*\*\* |  | \* |
| Mn:C |  |  |  |
| Cu:C |  |  |  |
| Zn:C | \* |  |  |
| σ*PSII* | \*\*\*\* |  |  |
| τ*Qa* |  |  |  |
| *P* |  |  |  |
| ETR*max* | \*\* |  |  |
| *Ik* | \* |  |  |
| α | \*\* |  |  |
|  |  |  |  |