

Supplement of Biogeosciences, 14, 1493–1509, 2017  
<http://www.biogeosciences.net/14/1493/2017/>  
doi:10.5194/bg-14-1493-2017-supplement  
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*Supplement of*

## **Physiology regulates the relationship between coccosphere geometry and growth phase in coccolithophores**

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**Table S1.** Growth phase experiment days (D), mean exponential growth rates ( $\mu$ ) and summary statistics for species-specific coccosphere geometry data for exponential-phase days of growth (Exp) and non-exponential-phase days of growth (Non-exp). Minimum, mean and maximum PIC (particulate inorganic carbon) calculated for selected exponential- and non-exponential-phase days from the 22 °C experiment are shown, which were used for the calculations reported in Sect. 4.4 and displayed in Fig. 5. The full dataset of experimental conditions, daily growth rates and coccosphere geometry measurements from each individual coccosphere is available as Sheward et al. (2016) at <https://doi.pangaea.de/doi:10.1594/PANGAEA.865403>.

| Parameter                                 | <i>Helicosphaera carteri</i> |         | <i>Calcidiscus leptoporus</i> |             | <i>Calcidiscus quadriperforatus</i> |         | <i>Coccolithus braarudii</i>               |         |        |
|---|------------------------------|---------|-------------------------------|-------------|-------------------------------------|---------|--|---------|--------|
|   | Exp                          | Non-exp | Exp                           | Non-exp     | Exp                                 | Non-exp | Exp  | Non-exp |        |
| Number of values                          | 780                          | 210     | 870                           | 150         | 690                                 | 150     | 250  | 50      |        |
| Experiment days, D                        | 22 °C                        | ≤ D11   | D12-14                        | ≤ D15       | D16-23                              | ≤ D11   | D12-15                                     | -       | -      |
|   | 20 °C                        | ≤ D7    | D8                            | ≤ D11       | D12-13                              | ≤ D11   | D12-13                                     | -       | -      |
|   | 18 °C                        | ≤ D15   | D16-17                        | ≤ D17       | D18-19                              | ≤ D15   | D16-17                                     | -       | -      |
|   | 16 °C                        | ≤ D13   | D14-17                        | ≤ D18       | -                                   | ≤ D16   | D17-18                                     | -       | -      |
|   | 15 °C                        | -       | -                             | -           | -                                   | -       | -  | ≤ D10   | D11-15 |
| Mean growth rates, $\mu$ d <sup>-1</sup>  | 22 °C                        | 0.35    | -                             | 0.34        | -                                   | 0.44    | -  | -       | -      |
|   | 20 °C                        | 0.45    | -                             | 0.44        | -                                   | 0.43    | -  | -       | -      |
|   | 18 °C                        | 0.28    | -                             | 0.32        | -                                   | 0.33    | -  | -       | -      |
|   | 16 °C                        | 0.28    | -                             | 0.36        | -                                   | 0.30    | -  | -       | -      |
|   | 15 °C                        | -       | -                             | -           | -                                   | -       | -  | 0.68    | -      |
| Coccosphere diameter, $\emptyset$ $\mu$ m | Min                          | 9.35    | 11.64                         | 10.02       | 10.79                               | 13.84   | 15.28                                      | 15.18   | 16.13  |
|   | Mean                         | 14.88   | 15.52                         | 13.15       | 14.02                               | 18.44   | 19.09                                      | 20.80   | 22.14  |
|   | Max                          | 20.90   | 19.50                         | 19.72       | 17.28                               | 24.39   | 22.99                                      | 29.14   | 29.42  |
| Cell diameter, $\emptyset$ $\mu$ m        | Min                          | 6.53    | 9.26                          | 6.39        | 7.09                                | 8.64    | 10.42                                      | 11.24   | 12.48  |
|   | Mean                         | 10.18   | 10.56                         | 9.78        | 10.44                               | 13.54   | 14.55                                      | 16.51   | 17.99  |
|   | Max                          | 17.99   | 16.68                         | 16.54       | 13.96                               | 18.81   | 18.77                                      | 24.10   | 22.44  |
| Coccolith length, $C_L$ $\mu$ m           | Min                          | 6.70    | 7.05                          | 5.02        | 5.39                                | 5.67    | 7.40                                       | 8.13    | 7.92   |
|   | Mean                         | 8.05    | 8.17                          | 6.70        | 6.80                                | 9.08    | 9.18                                       | 11.73   | 11.43  |
|   | Max                          | 11.22   | 10.89                         | 8.76        | 8.61                                | 11.67   | 10.87                                      | 15.33   | 13.84  |
| Coccoliths per cell, $C_N$ $\mu$ m        | Min                          | 6       | 8                             | 10          | 11                                  | 8       | 12   | 5       | 8      |
|   | Mean                         | 15      | 17                            | 19          | 21                                  | 18      | 20   | 10      | 13     |
|   | Max                          | 30      | 25                            | 45          | 35                                  | 29      | 28   | 20      | 20     |
| 22 °C experiment days incl.               | D6, 7, 8                     | D11-14  | D7, 9, 11                     | D19, 20, 21 | D3, 5, 7                            | D13, 15 | ≤ D11                                      | D12-15  |        |
| PIC $\mu$ mol C cell <sup>-1</sup>        | Min                          | 7.79    | 13.44                         | 3.27        | 4.06                                | 15.06   | 17.16                                      | 6.97    | 7.25   |
|   | Mean                         | 25.79   | 28.68                         | 10.91       | 15.76                               | 29.31   | 31.91                                      | 27.90   | 33.80  |
|   | Max                          | 49.38   | 50.52                         | 25.34       | 29.54                               | 57.88   | 54.34                                      | 70.09   | 85.82  |
| Reference                                 | This study                   |         | This study                    |             | This study                          |         | Gibbs et al. (2013); Sheward et al. (2014) |         |        |