Contrasted release of insoluble elements (Fe, Al, REE, Th, Pa) after dust deposition in seawater: a tank experiment approach
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Tab. ES1: REE and Th GEOTRACES standard analyses

|          | light REE | medium REE | heavy REE | Thorium |
|----------|-----------|------------|-----------|---------|
|          | La | Ce | Pr | Nd | Sm | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu | 232Th | 230Th |
| BATS 2000 m_1 | 17.9 | 5.37 | 3.84 | 0.12 | 17.2 | 0.5 | 3.56 | 0.2 | 0.89 | 0.05 | 4.9 | 0.2 | 0.79 | 0.03 | 5.57 | 0.2 |
| BATS 2000 m_2 | 16.9 | 4.86 | 3.77 | 0.12 | 17.22 | 0.4 | 3.57 | 0.2 | 0.91 | 0.06 | 4.7 | 0.2 | 0.79 | 0.03 | 5.65 | 0.2 |
| BATS 2000 m_3 | 16.4 | 4.94 | 3.72 | 0.12 | 16.96 | 0.5 | 3.58 | 0.2 | 0.89 | 0.04 | 4.5 | 0.2 | 0.76 | 0.03 | 5.53 | 0.2 |
| average    | 17.1 | 5.06 | 3.77 | 0.08 | 17.12 | 0.2 | 3.57 | 0.02 | 0.97 | 0.01 | 4.7 | 0.3 | 0.76 | 0.01 | 5.57 | 0.1 |
| consensual value | 23 | 5.0 | 3.9 | 16.9 | 3.4 | 0.9 | 4.7 | 0.8 | 5.7 | 1.5 | 4.9 | 0.7 | 4.6 | 0.8 | 208 | 38 |
|          | 2.7 | 2.2 | 0.3 | 1.2 | 0.3 | 0.1 | 0.5 | 0.1 | 0.4 | 0.1 | 0.2 | 0.0 | 0.2 | 0.0 | 42 | 6 |
Tab. ES2: Dissolved Fe and Al data

| Station | tank | time (h) | DFe (nM) | DAI (nM) | Station | tank | time (h) | DFe (nM) | DAI (nM) | Station | tank | time (h) | DFe (nM) | DAI (nM) |
|---------|------|----------|----------|----------|---------|------|----------|----------|----------|---------|------|----------|----------|----------|
| TYR     | C1   | 0        | 1.54     | 46.3     | ION     | C1   | 0        | 2.49     | 69.6     | FAST    | C1   | 0        | 1.73     | 24.1     |
|         | C1   | 24       | 1.11     | 47.4     |         | C1   | 24       | 1.60     | 80.3     |         | C1   | 24       | 1.34     | 23.5     |
|         | C1   | 72       | 1.60     | 47.8     |         | C1   | 72       | 1.37     | 81.1     |         | C1   | 72       | 0.88     | 27.4     |
|         | C2   | 0        | 1.53     | 50.3     |         | C2   | 0        | 2.49     | 79.6     |         | C2   | 0        | 1.94     | 24       |
|         | C2   | 24       | 0.67     | 42.8     |         | C2   | 24       | 1.78     | 80.2     |         | C2   | 24       | 1.80     | 23.5     |
|         | C2   | 72       | 1.41     | 46.1     |         | C2   | 72       | 1.55     | 71       |         | C2   | 72       | 0.99     | 27.7     |
| D1      | 0    | 1.46     | 43.9     |          | D1      | 0    | 2.84     | 70.7     |          | D1      | 0    | 6.68     | 49       |          |
|         | 24   | 1.45     | 79       |          |         | 24   | 1.64     | 115.7    |          |         | 24   | 2.66     | 61       |          |
|         | 72   | 1.35     | 102.2    |          |         | 72   | 1.64     | 138.4    |          |         | 96   | 9.69     | 107.4    |          |
| D2      | 0    | 1.61     | 44.1     |          | D2      | 0    | NA       | 70.7     |          | D2      | 0    | 6.14     | 22.4     |          |
|         | 24   | 0.53     | 81.2     |          |         | 24   | 1.52     | 113.4    |          |         | 24   | 3.93     | 62.7     |          |
|         | 72   | 0.87     | 98.7     |          |         | 72   | 1.36     | 135.6    |          |         | 96   | 2.01     | 99.3     |          |
| G1      | 0    | 1.73     | 45.4     |          | G1      | 0    | 5.10     | 83       |          | G1      | 0    | 3.05     | 25.4     |          |
|         | 24   | 0.71     | 86.6     |          |         | 24   | 2.52     | 112.7    |          |         | 24   | 2.29     | 62.7     |          |
|         | 72   | 3.21     | 109.9    |          |         | 72   | 3.53     | 136.4    |          |         | 96   | 2.85     | 107.7    |          |
| G2      | 0    | 1.13     | 48.8     |          | G2      | 0    | 2.04     | 79.3     |          | G2      | 0    | 1.59     | 23.6     |          |
|         | 24   | 1.05     | 76       |          |         | 24   | 1.53     | 112.5    |          |         | 24   | 3.89     | 60.5     |          |
|         | 72   | 0.90     | 101.3    |          |         | 72   | 1.45     | 144.2    |          |         | 96   | 1.16     | 104.3    |          |
| Rank | time | Ba | Ce | Ce | Eu | Gd | Gd | Ho | Ho | Tb | Tb | Yb | Yb | Zr | Zr |
|------|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| ION C1 | 7.4 | 119 | 1 | 1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 |
| ION C2 | 7.4 | 119 | 1 | 1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 |
| ION C3 | 7.4 | 119 | 1 | 1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 |
| ION C4 | 7.4 | 119 | 1 | 1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 |
| ION C5 | 7.4 | 119 | 1 | 1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 |
| ION C6 | 7.4 | 119 | 1 | 1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 |
| ION C7 | 7.4 | 119 | 1 | 1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 |
| ION C8 | 7.4 | 119 | 1 | 1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 |
| ION C9 | 7.4 | 119 | 1 | 1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 | 0.4 | 0.4 | 0.3 | 0.1 |
Tab. ES4: Major elements in the sediment traps

| Sample  | sampling period | Particulate mass flux | POC flux | total Al flux | total Fe flux | BSi flux | BioFe flux | Delta Fe | BioAl flux | DeltaAl | fraction of seeded Al in the trap |
|---------|-----------------|-----------------------|----------|---------------|---------------|---------|------------|----------|------------|-------|--------------------------------|
| Tyr C1  | 3 day           | mg/m²/d               | mg/m²/d  | mg/m²/d       | mg/m²/d       | mg/m²/d | mg/m²/d    | nmol/L   | mg/m²/d    | nmol/L |
| Tyr C2  | 3 day           | 0.8                   | 0.3      | ND            | ND            | ND      | 0.0001     | 0.01     | 62%        |
| Tyr D1  | 3 day           | 1.5                   | 0.5      | ND            | ND            | ND      | 0.0003     | 0.02     | ND         |
| Tyr D2  | 3 day           | 1.652                 | 22.7     | 78            | 42            | 34      | 0.0106     | 0.68     | 57%        |
| Tyr G1  | 3 day           | 1.841                 | 24.4     | 87            | 48            | 40      | 0.0113     | 0.73     | 64%        |
| Tyr G2  | 3 day           | 1.805                 | 27.2     | 89            | 47            | 41      | 0.0126     | 0.82     | 65%        |

Bio-Fe-flux calculated based on a Fe/C ratio of 100 μmol/mol. Bio-Al-flux calculated based on an Al/Si ratio of 8000 μmol/mol.
Fig. ES1: Transect of the PEACETIME cruise. 10 short stations are numbered from St.1 to St.10. Stars named TYR, ION, and FAST indicate the 3 long stations where tank experiments were conducted. This map was drawn with General Mapping Tool (Wessel et al., 2019) using the General Bathymetric Chart of the Oceans data (https://www.gebco.net/).
Fig. ES2: Shale-normalized concentrations of filtered seawater and trapped particles. Note the scale break in the middle of the graph.
Reference:
Wessel, P., Luis, J. F., Uieda, L., Scharroo, R., Wobbe, F., Smith, W. H. F., & Tian, D. (2019). The Generic Mapping Tools version 6. *Geochemistry, Geophysics, Geosystems*, 20, 5556–5564. https://doi.org/10.1029/2019GC008515