# Supporting Online Material for

## Mesoscale Iron Enrichment Experiments 1993–2005:

## Synthesis and Future Directions

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**Electronic Table captions**

Table 1 A summary of the initial conditions for each FeAX. Mean mixed-layer concentrations are given for nutrients, POC, DOC, chlorophyll and grazer stocks. Dom. Phyto. denotes the dominant phytoplankton group. $F_v/F_m$ is algal photosynthetic competence and is dimensionless. # denotes that different microzooplankton groups were sometime included under the term microzoo. biomass. Green denotes green algae. + denotes an estimate of POC derived from algal C only. Blank cells indicate that no data are presently available.

Table 2 A summary of the responses of key components of the pelagic foodweb during FeAX's. *d*BB denotes (maximum bacterial biomass/initial), BP is bacterial production, Mic is microzooplankton, Meso is mesozooplankton, G is grazing rate and B is biomass. Microzooplankton and mesozooplankton grazing rates are based on mortality and ingestion rate, respectively. The terms floristic and faunistic shift denote a significant change in the phytoplankton and microzooplankton community structure, respectively. HNan denotes heterotrophic nanoflagellates, HCil denotes heterotrophic ciliates and HDino denotes heterotrophic dinoflagellates. Cyano is cyanobacteria, hapto is haptophyte, and * denotes some temporal variability in changes in algal stocks. Algal growth/dilution is calculated from ((net algal growth+ dilution rate)/ dilution rate). nc denotes no significant change (relative to the surrounding HNLC waters). The ratio of maximum to minimum primary production is based on column integrals. Blank cells indicate that no data are presently available.

Table 3 A summary of observed biogeochemical signals during FeAX's. Si upt/Si inv = ratio of mixed-layer silicate uptake / mixed-layer silicate inventory, nc denotes no significant change (relative to surrounding HNLC waters), nm denotes not measured. ** denotes that supply of silicate due to dilution of the patch doubled the initial upper water column inventory of silicate (*50*). & denotes an initial increase in DMS concentration followed by a decline by the end of the study, # denotes increase in nitrous oxide was at the base of the mixed-layer only. FeBL production denotes the onset of increases in FeBL concentrations.

| **Property** | **IronEX I (*6*)** | **IronEX II (*29*)** | **SOIREE (*47*)** | **EisenEx (*48*)** | **SEEDS I (*49*)** | **SOFEX S (*50, 56*)** | **SOFEX N (*50*)** | **EIFEX (*45*)** | **SERIES (*16*)** | **SEEDS II (*51*)** | **SAGE (*51*)** | **FeeP (*51*)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temp. (C) | 23 | 25 | 2 | 3-4 | 11 | -1 | 5 | 4-5 | 13 | 9-12 | 10.5 | 20.7 |
| MLD (m) | 35 | 25 | 65 | 40 | 13 | 35 | 45 | 100 | 10 | 30 | 70 | 30-40 |
| $NO_3$ (mmol/ m3) | 11 | 11 | 25 | 22 | 18 | 28 | 22 | 25 | 11 | | 600 | <10 nM |
| Si (mmol/m3) | 4 | 6 | 8 | 10 | 34 | 62 | 3 | 19 | 14 | | 50 | |
| $PO_4$ (mmol/ m3) | 0.9 | | 1.9 | 1.6 | | | | 1.8 | 1.1 | | 48 | ~10 nM |
| DFe (nmol/l) | 0.07 | 0.08 | 0.1 | 0.1 | 0.04 | 0.1 | 0.09 | 0.08-0.2 | 0.08 | | 0.09 | 0.25 |
| $F_v/F_m$ (max) | 0.31 (0.60) | 0.24 (0.57) | 0.22 (0.65) | 0.25 (0.55) | 0.19 (0.31) | 0.25 (0.65) | 0.20 ( 0.52) | 0.3 (0.57) | 0.24 (0.5) | | 0.27 (0.31) | |
| Chlorophyll t=0 (max) (mg/m3) | 0.2 (0.6) | 0.2 (3.3) | 0.2 (2.3) | 0.5 (2.8) | 0.9 (23.0) | 0.2 (2.5) | 0.3 (2.4) | 0.6 (3.0) | 0.4 (5.5) | 0.8 (2.4) | 0.4 (0.8) | 0.06 (0.07) |
| POC (mmol/m3) | 1.5+ | 2.5+ | 3 | 6 | 12 | 5 | 2 | 8 | 6 | | 4 | |
| DOC (mmol/m3) | | | | 47 | 54 | | | | 50 | | | |
| Dom. phyto | cyano | cyano | Pico euks | diatoms | Green/ pennates | diatoms | flagellates | diatoms | cyano | mixed | cyano | cyano |
| Het bact # (x $10^5$ /ml) | | 9.5 | 3.7 | 4.0 | 2.5 | 4 | 4 | | 3.5 | | | |
| Microzoo. (µg/L) | | 1.9 | 11.3 | 8.3 | 16.0 | | | 6.0 | 4.8 | | | |
| Mesozoo. (mg C/m3) | | 4.0 | 2.1 | | 10.1 | | | | | | | |

**Boyd et al. Electronic Supplementary Table 1**

| **Property** | **IronEX I (*6*)** | **IronEX II (*29*)** | **SOIREE (*47*)** | **EisenEx (*48*)** | **SEEDS I (*49*)** | **SOFEX S (*50, 56*)** | **SOFEX N (*50*)** | **EIFEX (*45*)** | **SERIES (*16*)** | **SEEDS II (*51*)** | **SAGE (*51*)** | **FeeP (*51*)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *d*BB (max./initial) | | 1.6 | 1.6 | 1.6 | 2.7 | 1.8 | 2.1 | | 10.6 | | nc | |
| *d*BP | | 3 | 3 | 2 to 3 | | 2 | 4 | | 14.9 | | nc | |
| *d*MicB | 1.5 | 10.3 | 2.6 | 2.2 | 1.7 | | | 1.7 | 11.9 | | | |
| *d*MicG | | 3-4 | 7 | | | | | 1.5 | | | | |
| Floristic shift | Cyano to diatoms | Cyano to diatoms | Pico-euks to diatoms | nc | Green algae to centrics | nc | Flags to diatoms | nc | Cyano to diatoms | more diatoms | nc | nc |
| Faunistic shift | nc | HNan to HCil | HNan to HCil | | HNan to HDino | | | | | | | |
| *d*MesoB (max./initial) | nm | 3 | nc | | nc | | | | increased | | | |
| *d*MesoG | nm | 2-3 | nc | | 18 | | | | | | | nm |
| *d*cyanoB | | 2* | 3* | | | | | | | | | |
| *d*haptoB | | 4* | 6* | | | | | | | | | |
| *d*diatomB | | 100 | 10 | 5.1 | 50 | | | 2.9 | | | | |
| Prim Prod Max/min | 4 | 6 | 9 | 4 | 4 | 6 | 10 | 2 | 10 | | 2 | |
| Algal net growth (max, per day) | 0.40 | 0.90 | 0.15 | 0.20 | 0.60 | 0.15 | 0.10 | <0.10 | 0.40 | | 0 | 0 |
| Algal growth/dilution | 2.5 | 10.0 | 3.0 | 1.5-6.1 | 14.0 | 2.8 | 2.1 | | 3.5-6.7 | | | |

**Electronic Supplementary Table 2**

| **Property** | **IronEX I (*6*)** | **IronEX II (*29*)** | **SOIREE (*47*)** | **EisenEx (*48*)** | **SEEDS I (*49*)** | **SOFEX S (*50, 56*)** | **SOFEX N (*50*)** | **EIFEX (*45*)** | **SERIES (*16*)** | **SEEDS II (*51*)** | **SAGE (*51*)** | **FeeP (*51*)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| dChla (mg m3) | 0.3 | 2.5 | 1.8 | 2.5 | >22 | 2.5 | 2.2 | 2.3 | 5.1 | 1.6 | 0.4 | nc |
| dPOC (mmol/m3) | 1.5 | 8.5 | 30 | 10 | 75 | 10 | 15 | 7 | 15 | | nc | |
| dDOC (mmol/m3) | nm | nm | nm | | 3 | | | | <1 | | nm | nm |
| C:chla T=0 (final) | | 150 (65) | 90 (30) | | 230 (68) | | | 180 (60) | 135 (40) | | nc | |
| $NO_3$ upt/N inventory | nc | 0.35 | 0.3 | | 0.8 | <0.2 | 0.2 | | 0.65 | | | |
| Si upt/Si inventory | nc | 0.8 | 0.45 | | 0.9 | <0.1 | >1** | | 0.95 | | | |
| $PO_4$ upt/P inventory | nc | | 0.1 | | | | | | | | | |
| *d*DIC (mmol /m3) | 6 | 26 | 17 | 14 | 58 | 21 | 13 | | 36 | | nc | |
| *d*DMS (µmol/m3) | 0.8 | 1.8 | 2.9 | 1.3 then to 0& | nc | Not measured | | | 8.5 then to -5.7& | nc | nc | |
| $dCH_4$ (nmol/l) | nm | nm | nm | nc | | | | | nc | | | |
| $dN_2O$ (nmol/l) | nm | nm | 0.8# | nm | | | nc | nc | | nc | nc | nm |
| Export (max/initial) | nm | 7 | nc | nc | nc | 3 | increase | increase | 2 | | nc | nm |
| Atm. $CO_2$ drawdown (mmol/m2/d) | nc | 6 | 2 | 3 | 5 | 3 | 3 | | | | nc | |
| Timing of FeBL prod | nm | 2 | 11 | 2 and 10 | nc | | | | nc | | nm | nm |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (d) | | | | | | | | | | | | |

**Electronic Supplementary Table 3**
**Additional References – for Supplementary Tables**

S-Table 1


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S-Table 2


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