

## Dissolution of Iron from Sea ice-derived Particles in Seawater

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Sea ice contains high concentrations of iron (Fe), and melting of sea ice is one of the possible processes that supplies Fe to surface waters. To provide an insight for understanding the contribution of particulate Fe (PFe) derived from sea ice to the phytoplankton growth, leachable Fe (LFe) from sea ice particles was quantified by a time-dependent leaching experiment. Two sea ice samples used for the experiment were collected from a subarctic marginal sea of the North Pacific. Filtered seawater (FSW) ( $<0.2\text{-}\mu\text{m}$ , Fe concentration 0.5 nM) under Antarctic sea ice was used as a leaching solution. First, melted sea ice was filtered through a  $0.2\text{-}\mu\text{m}$  filter mounted on the Teflon filter holder to collect Fe particles. 100 mL of the FSW was then poured onto the holder to leach the Fe particles retained by the filter. The filter was allowed to sit at room temperature for the prescribed leaching time of 0, 0.2, 0.5, 1, 4, 24, and 48 hours. The LFe was sequentially collected at the end of the each time step. The results showed that the LFe (%) increases with increasing leaching time in all cases and ranges from 1.0 – 6.8% over 48 hours of leaching (Figure 1 and Table 1). Our results indicate that the some labile Fe fractions of PFe in sea ice can constitute a bio-available source of Fe when the Fe is released from the melting sea ice to seawater.

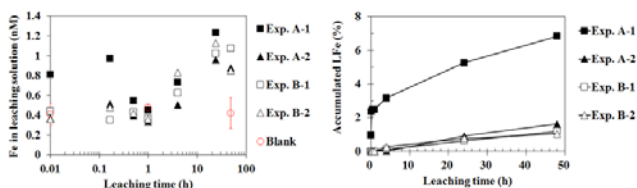


Figure 1: (a) Fe concentration in FSW as leaching solution. The procedural blanks ( $n = 2$ ) are also presented. (b) LFe (%) in particle from sea ice accumulated at each time step.

Experiments	Samples	Total Fe (TFe, nmol)	PFe/TFe (%)	LFe/Pfe (%)
Exp. A-1	Sea ice-A	3.6	96	6.8
Exp. A-2	Sea ice-A	5.3	89	1.6
Exp. B-1	Sea ice-B	10.8	93	1.0
Exp. B-2	Sea ice-B	13.1	94	1.2

Table 1: Results from the leaching experiment.