Biological impact of iron on the primary production in the surface water

aeolian dust input from land

river

organic Fe(III)-L

Fe release

precipitation of solid $Fe(OH)_3$

Fe(II)' – Fe(III)'

organic Fe(III)-L

photoreduction

photosynthesis

phytoplankton

zooplankton

bacteria

vertical water mixing

upwelling

decomposition of biogenic organic matter

Input and cycling of Fe in the ocean

Research cruise (MR 08-04) on the R/V *Mirai* during September 2008 in the western Arctic Ocean

[Sampling stations]

Basin region: Canada Basin (B1, bottom depth: 3897 m)
Slope region: Chukchi Sea (B2, B3, S2, S5, 1293~2153 m)
Shelf region: Chukchi Sea (S1, S3, S4, 196~222 m)

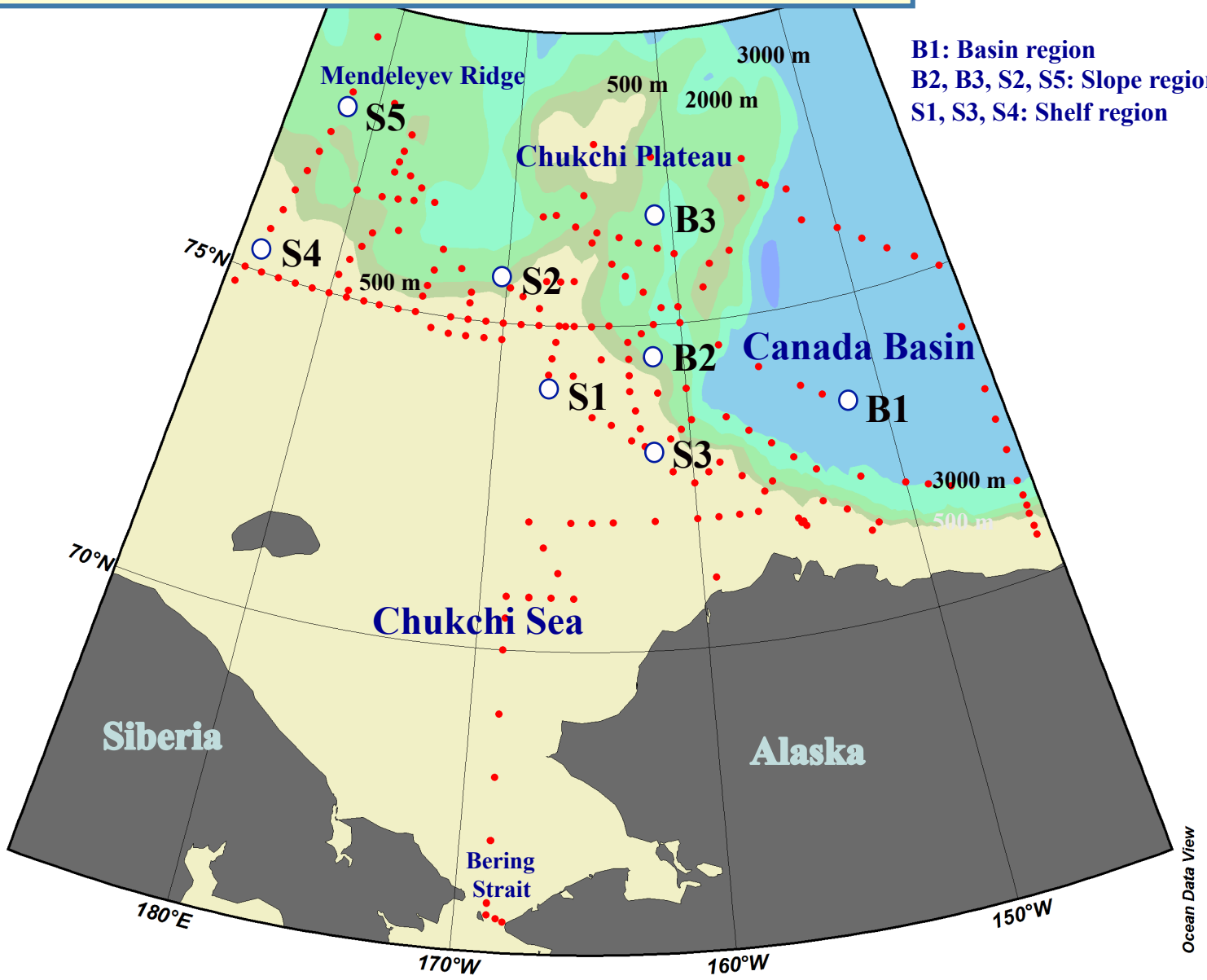
[Methods]

(1) [D-Fe]: Dissolved Fe concentration (<0.22 µm size fraction)
[T-Fe]: Total dissolvable Fe concentration (unfiltered)
([P-Fe]: Particulate Fe concentration =[T-Fe] – [D-Fe])
by automated Fe analyzer using a combination of chelating resin concentration and luminol-hydrogen peroxide chemiluminescence detection

(2) Nutrient concentration (NO_3, NO_2, PO_4, SiO_2)

(3) Humic-type fluorescence intensity as humic-type FDOM
by fluorescence spectrophotometer with 320nm excitation and 420nm emission

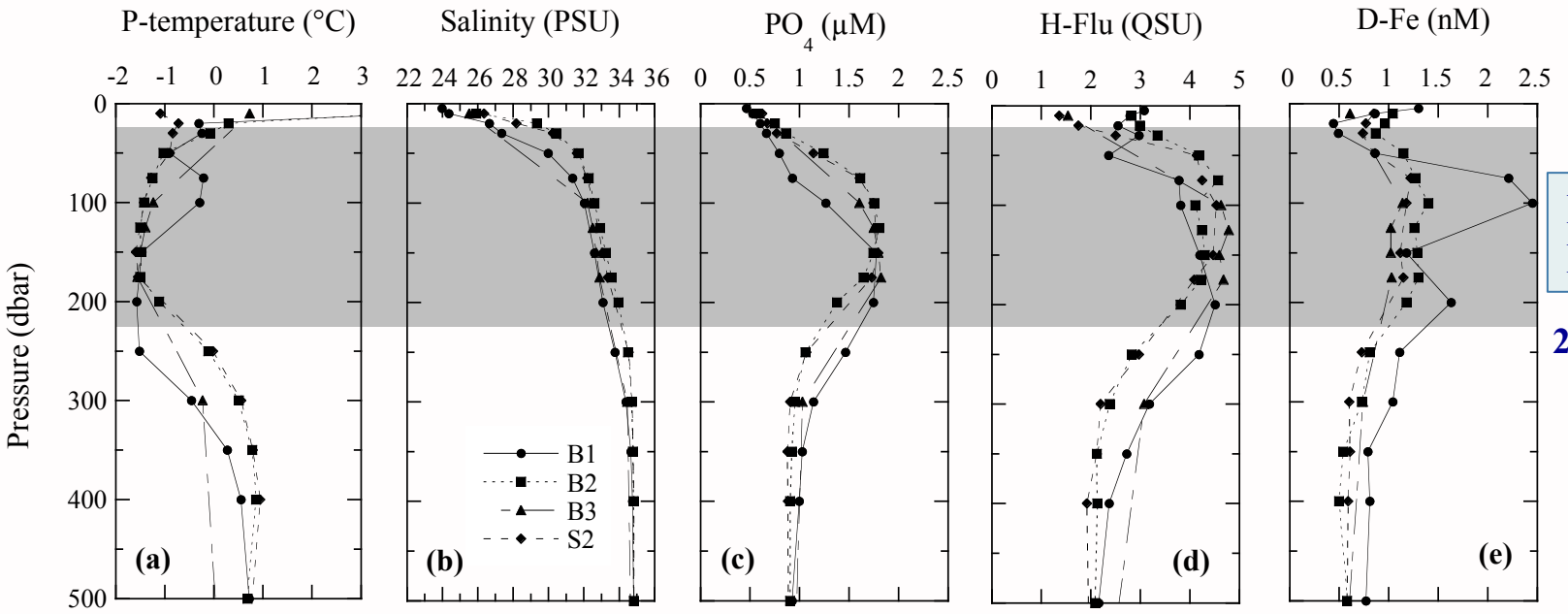
Sampling stations in the Chukchi Sea and Canada Basin of the Arctic Ocean in September 2008



Vertical distributions of T, S, PO_4, humic-type F-intensity, and [D-Fe] in the surface water (0–500 m) of the slope and basin regions

Fig. 3

(1) Surface mixed layer: **S < 30** due to inputs of fresh water from rivers and melting ice during summer



Halocline Layer

25–225 m

Halocline Water

(2) Cold upper halocline layer (Upper HL): –1.0~–1.7°C, S=32–34
Low-salinity Pacific-origin water via Bering Strait
**** Maxima of nutrient, humic F-intensity and [D-Fe] in Upper HL**

(3) Lower halocline layer (Lower HL): S=34–34.6
High-salinity Atlantic-origin water