

The spatial variations in biomass size spectra

between 1 μm and 10 mm based on optical measurements in the Fram Strait

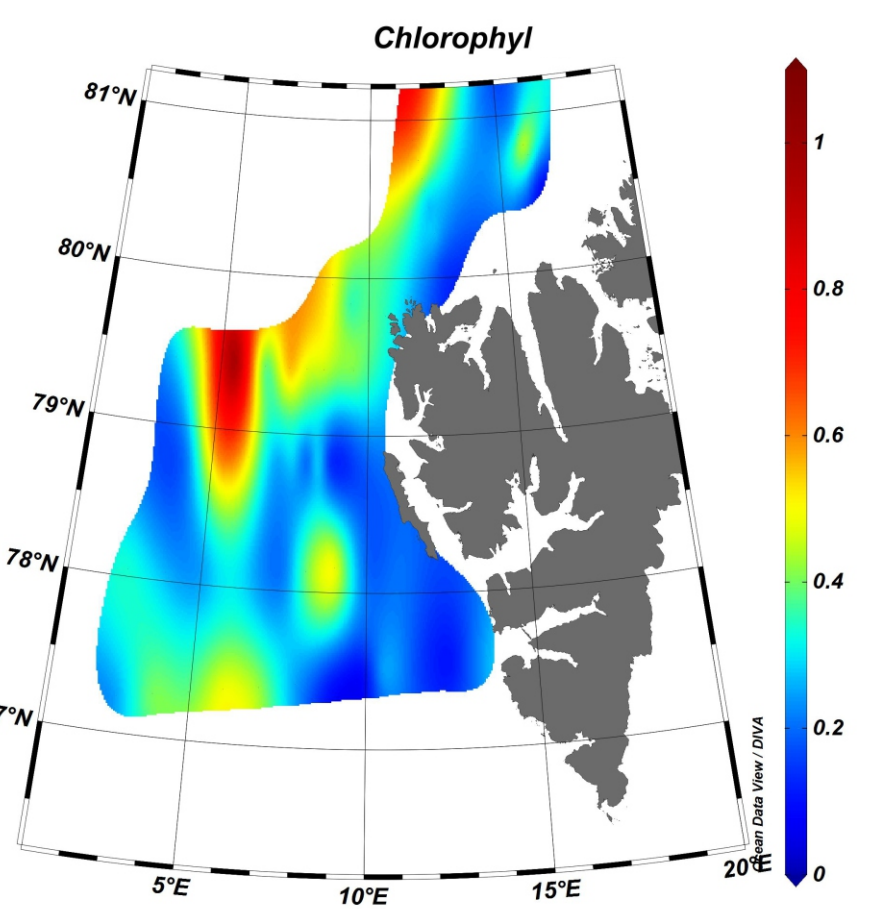
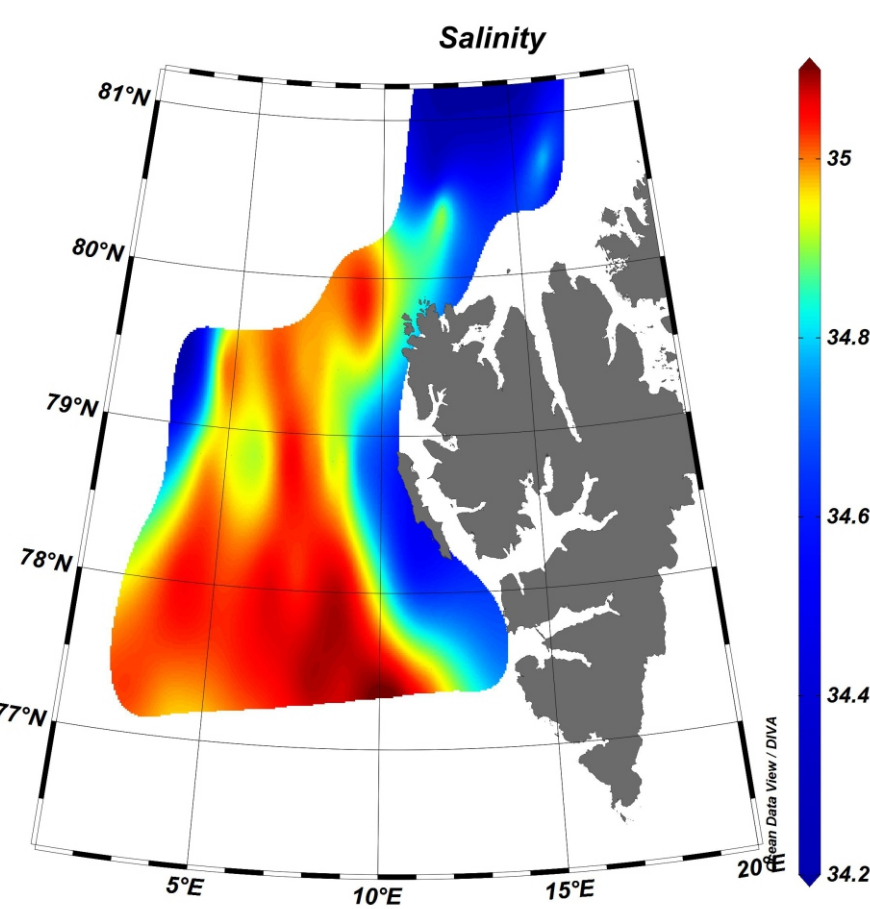
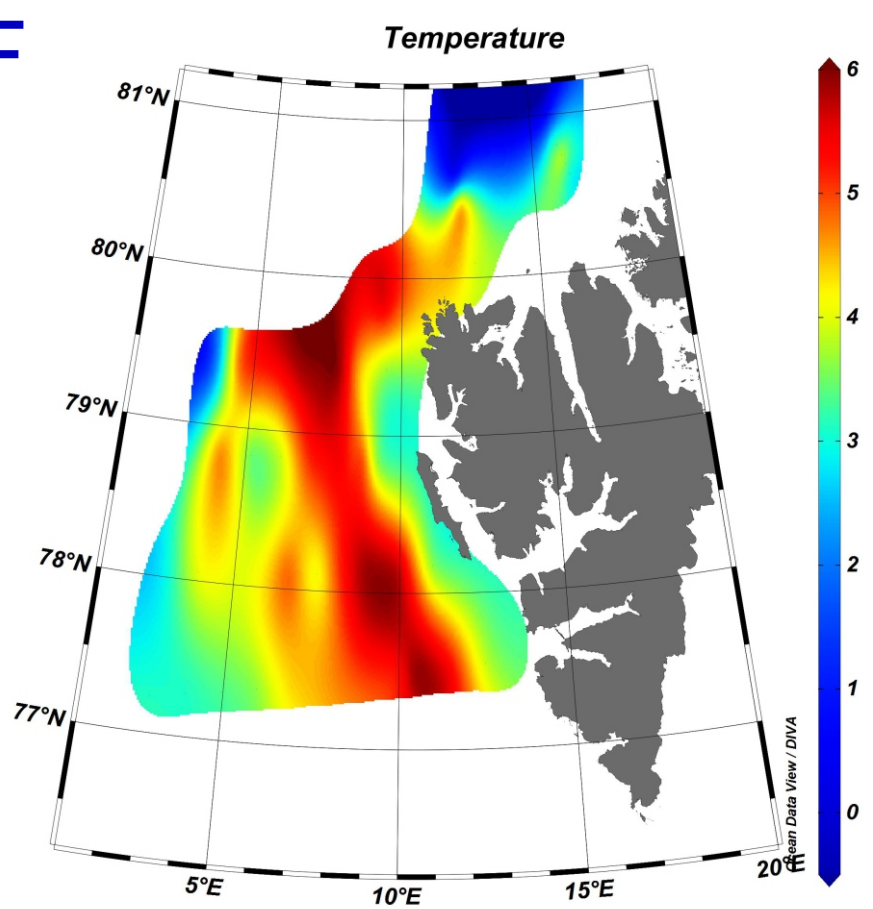


Trudnowska E., Sagan S., Basedow S., Zhou M., Blachowiak-Samolyk K.

Importance

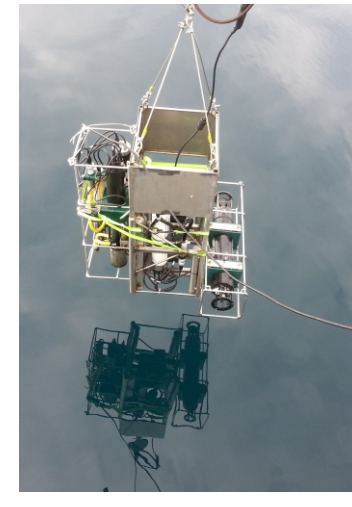
The analysis of zooplankton size variability in the main passage of Atlantic Water into the Arctic ocean, the Fram Strait, is a prerequisite for modelling and predicting changes in marine pelagic ecosystem dynamics in a warming Arctic.

CTD - F

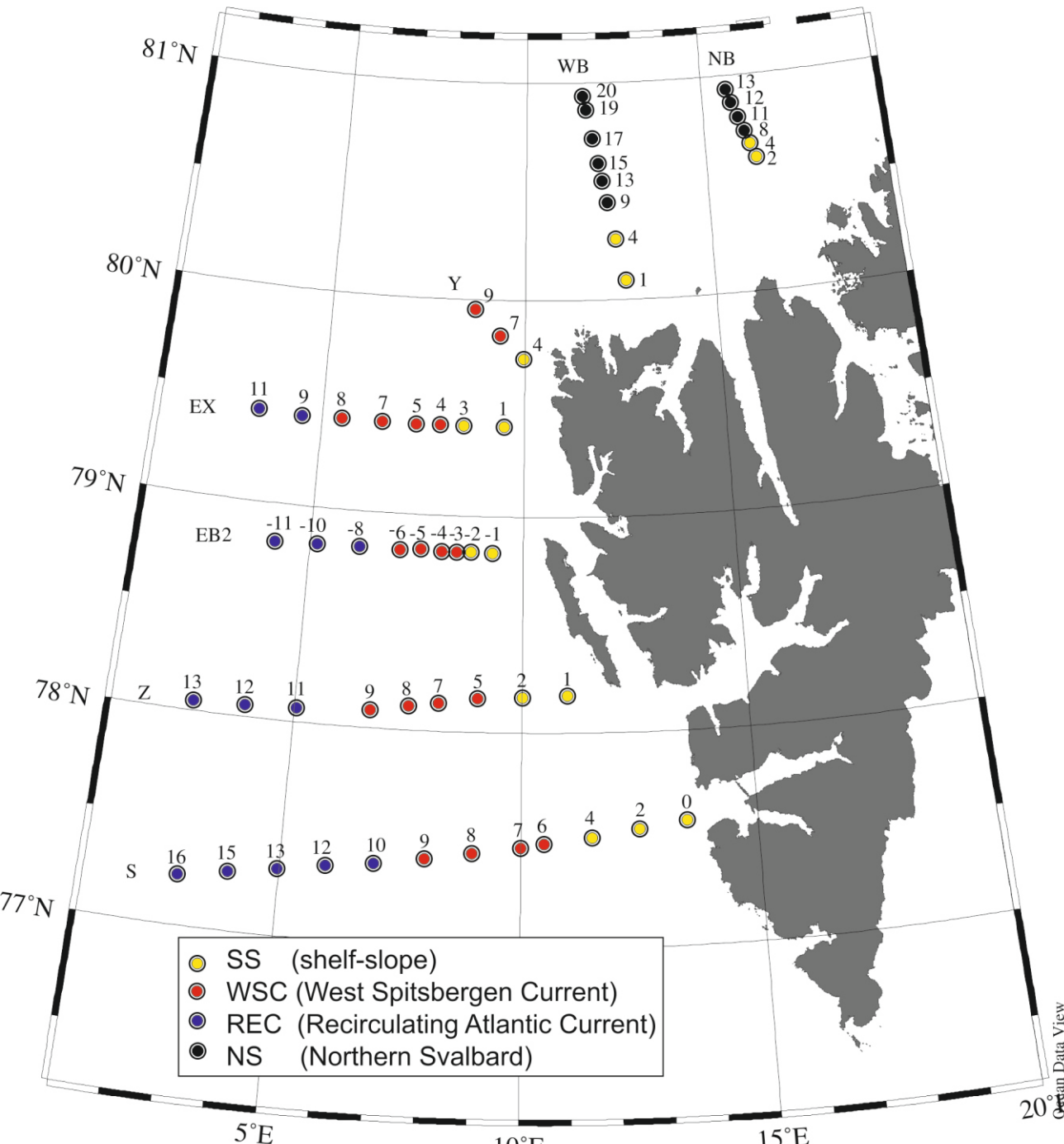


Methods

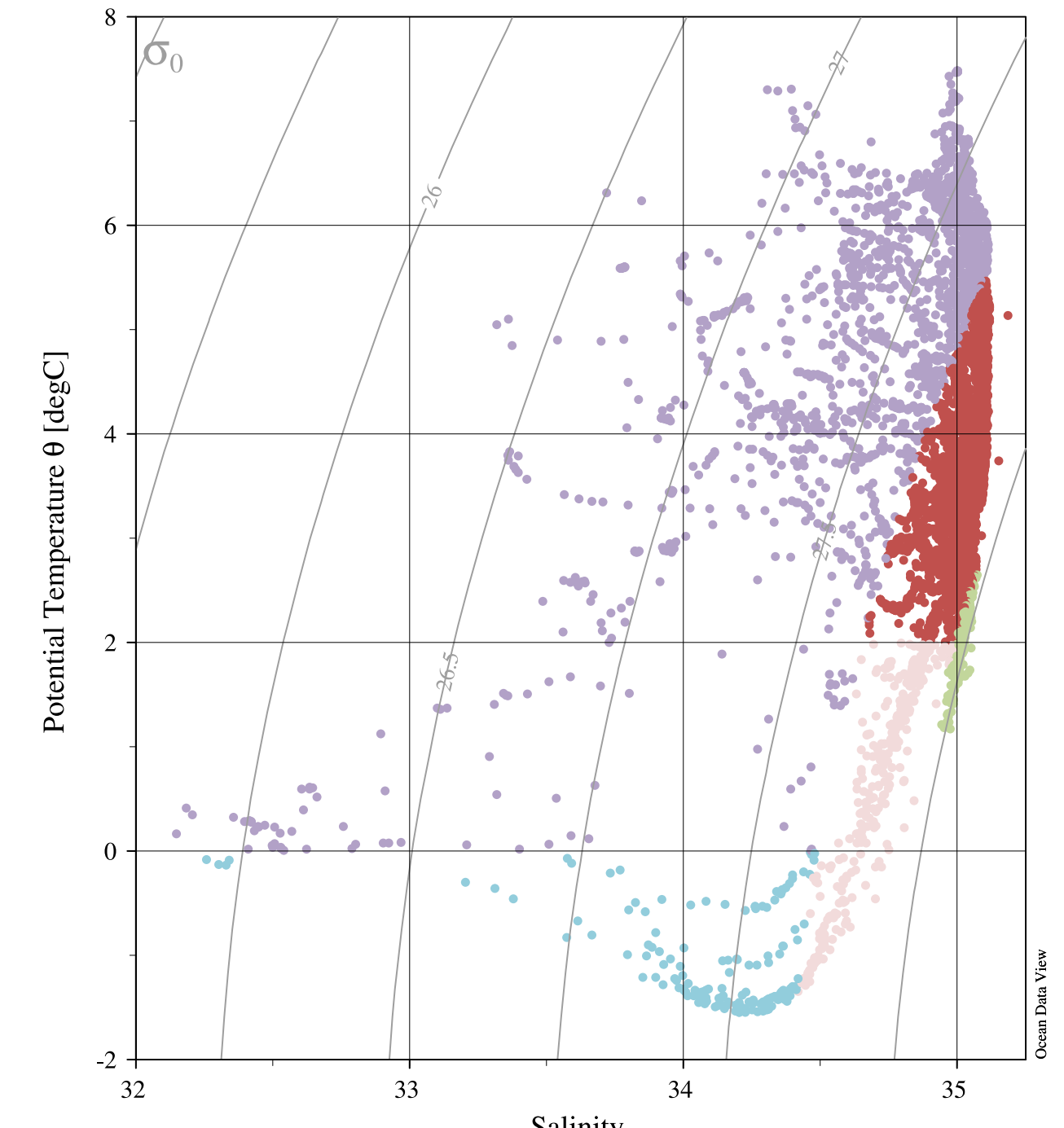
LISST (Laser In Situ Scattering and Transmissometry instrument)
LOPC (Laser Optical Plankton Counter)
CTD (Conductivity - Temperature - Depth)
Fluorometer (Chlorophyll fluorescence)
55 vertical profiles - upper 100 m



Region

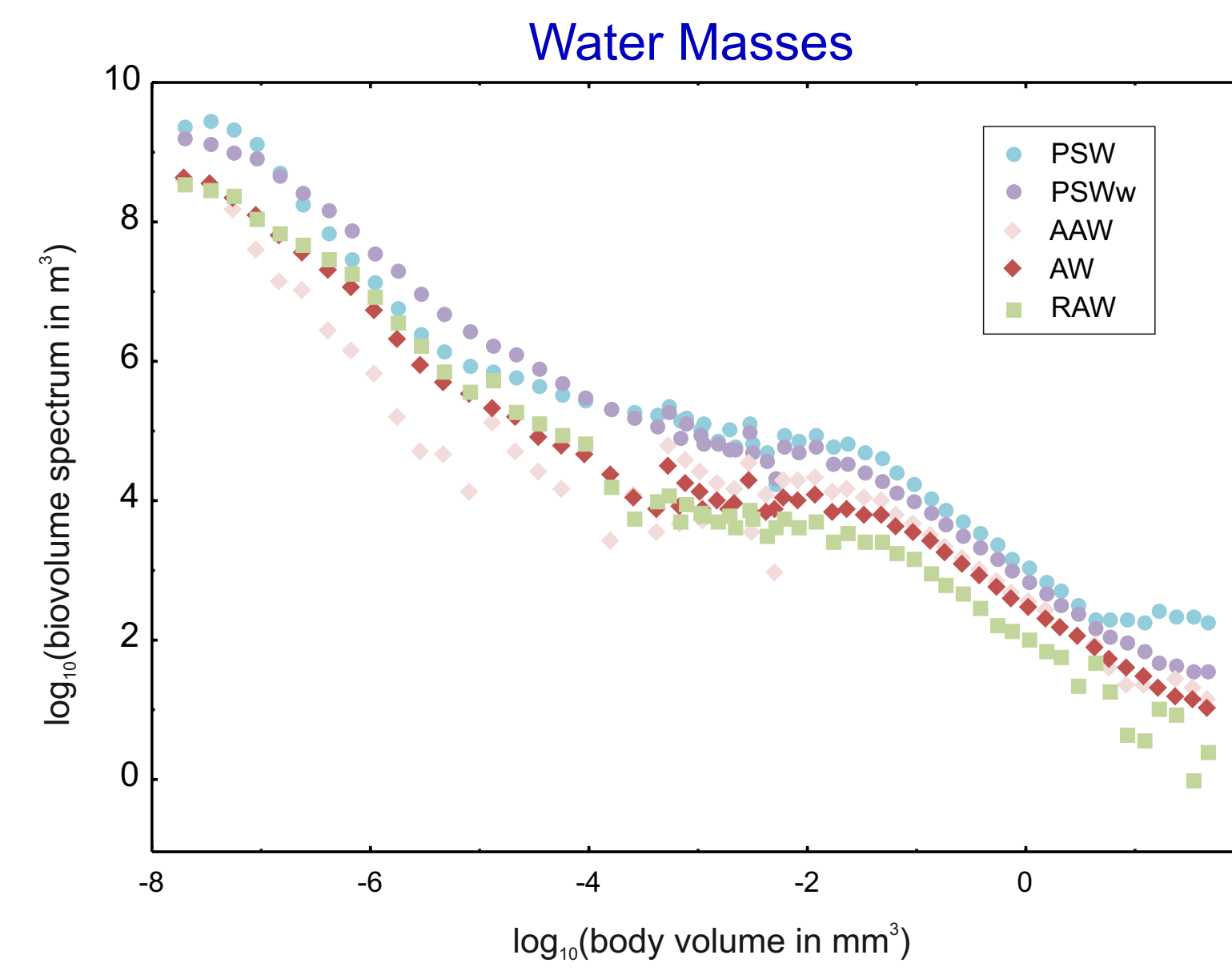
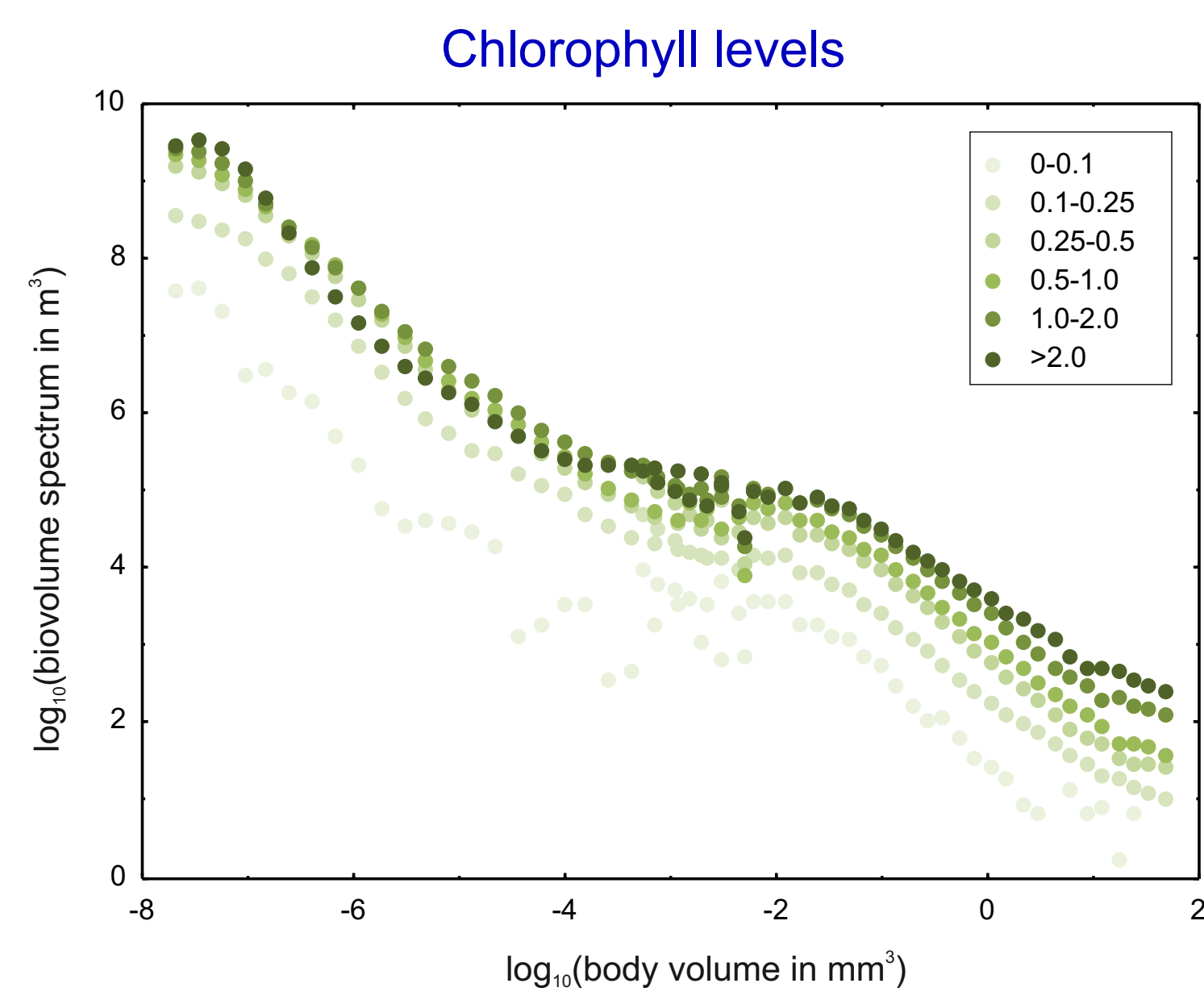


Water Masses



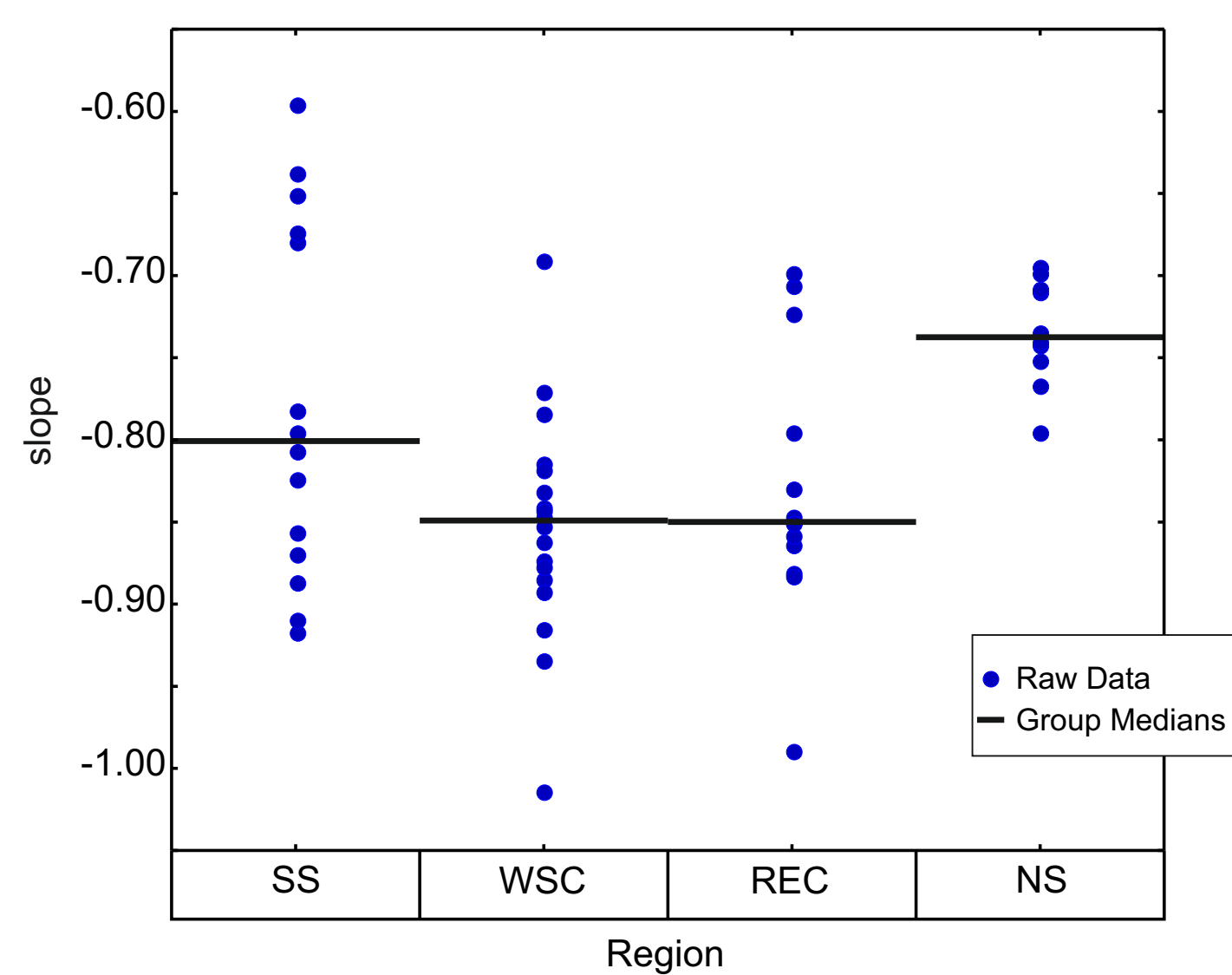
NBSS (Normalised Biovolume Size Spectrum)

Chlorophyll fluorescence	slope	Intercept	R ²
0-0.01	-0.68	1.5	0.90
0.01-0.25	-0.79	2.2	0.96
0.25-0.5	-0.81	2.6	0.95
0.5-1.0	-0.80	2.8	0.95
1.0-2.0	-0.75	3.2	0.95
>2.0	-0.69	3.3	0.92



Water Mass	Slope	Intercept	R ²
PSW	-0.72	3.1	0.95
PSW _w	-0.79	2.8	0.98
AAW	-0.63	2.4	0.86
AW	-0.73	2.3	0.95
RAW	-0.83	1.8	0.97

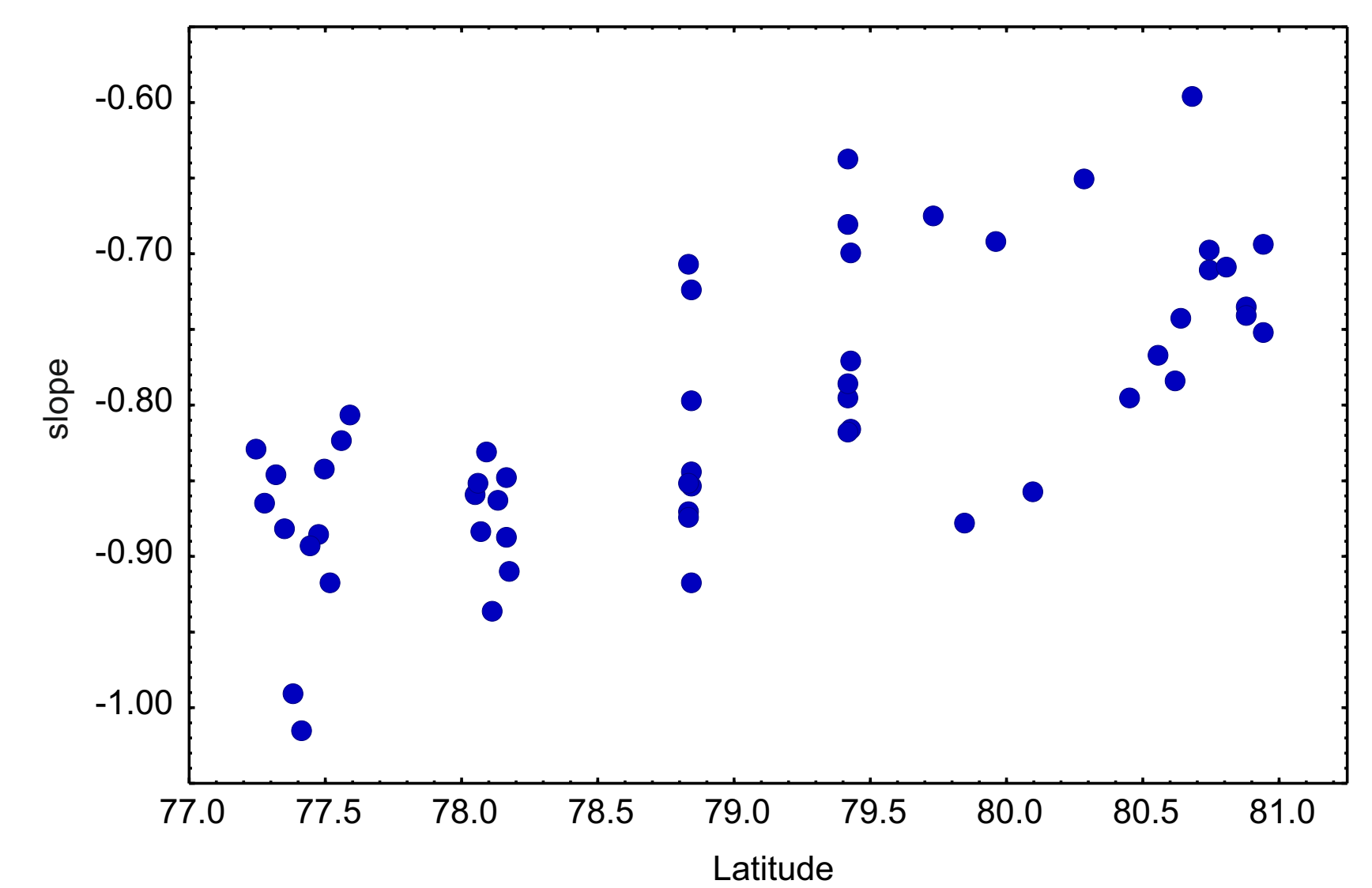
Regional variability



Conclusions

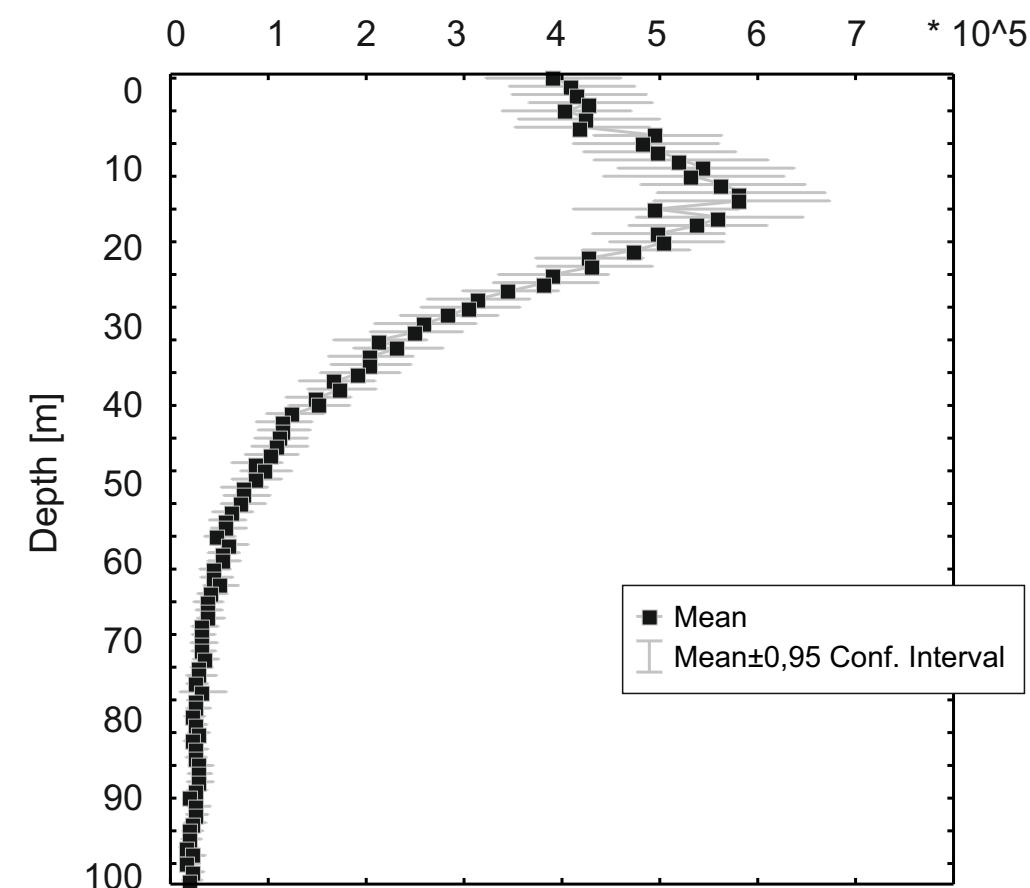
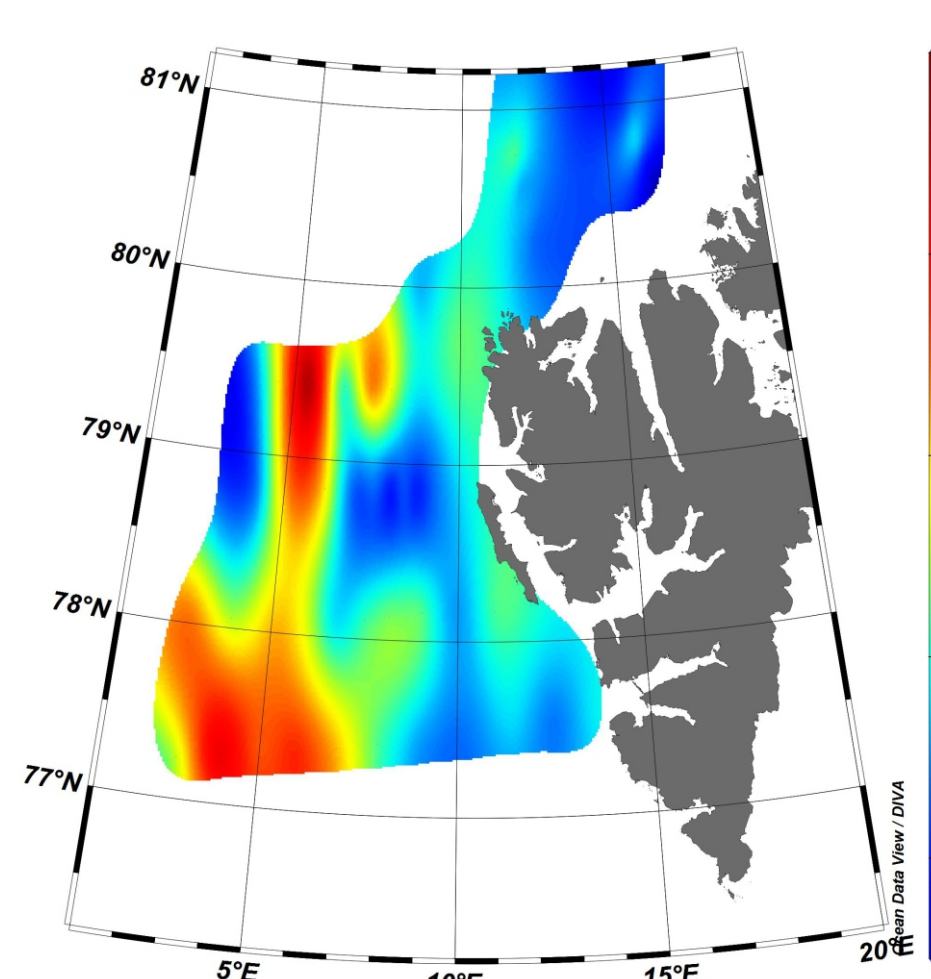
- By using two *in situ* bio-optical instruments, we obtained high-resolution information on particles-plankton volume and size at significantly finer scales than it was possible using traditional methodologies
- By investigating a region of strong mesoscale variability we found contrasting situations in terms of particles-plankton distribution and their size structure - both in vertical and horizontal planes (regional & latitudinal variability)
- Our study confirmed a clear relationship between the high primary production level and the high NBSS intercepts. The flat NBSS slopes in extreme chlorophyll regimes (min./max.) indicate to lower energy transfer efficiency
- The Polar Waters were characterized by the higher overall biovolume of plankton-particles and by flatter size spectra slopes implying that more phytoplankton is used and retained by larger consumers compared to Atlantic Waters

Latitudinal variability

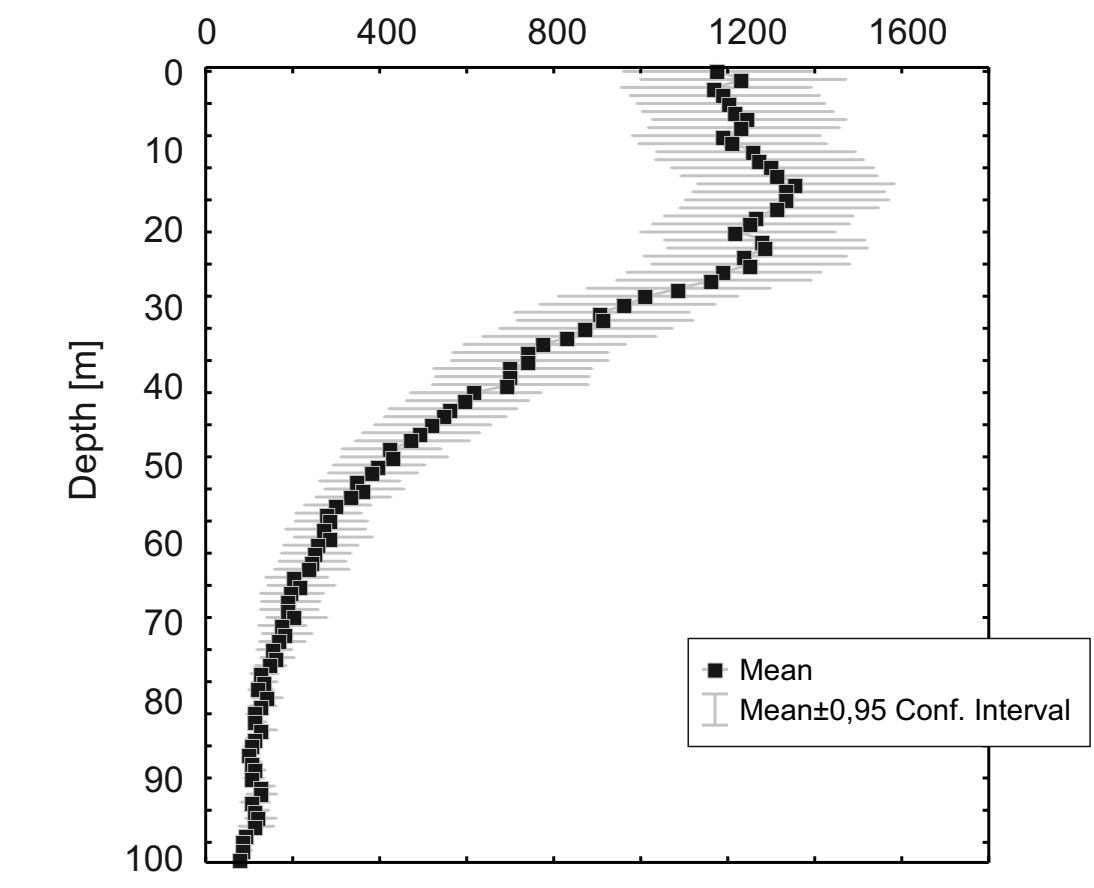
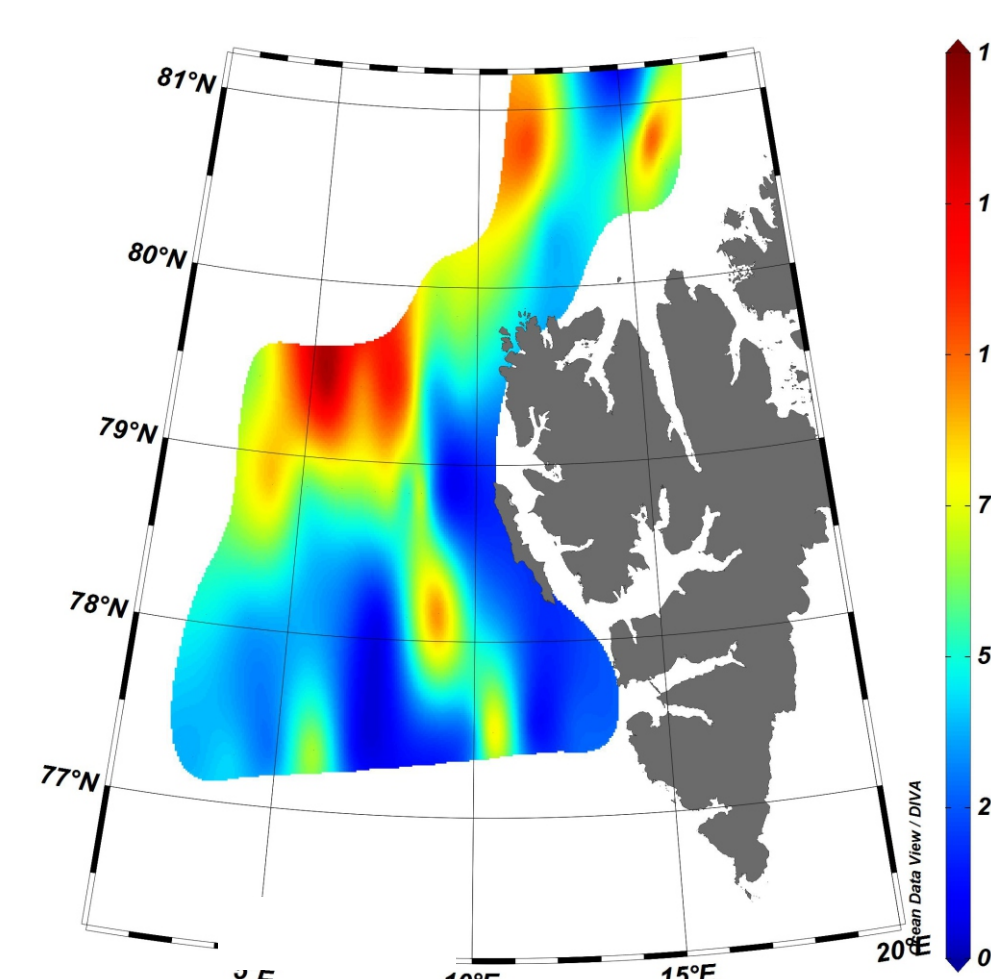


Horizontal & vertical distribution of size-fractionated biovolume (mm³ in m³)

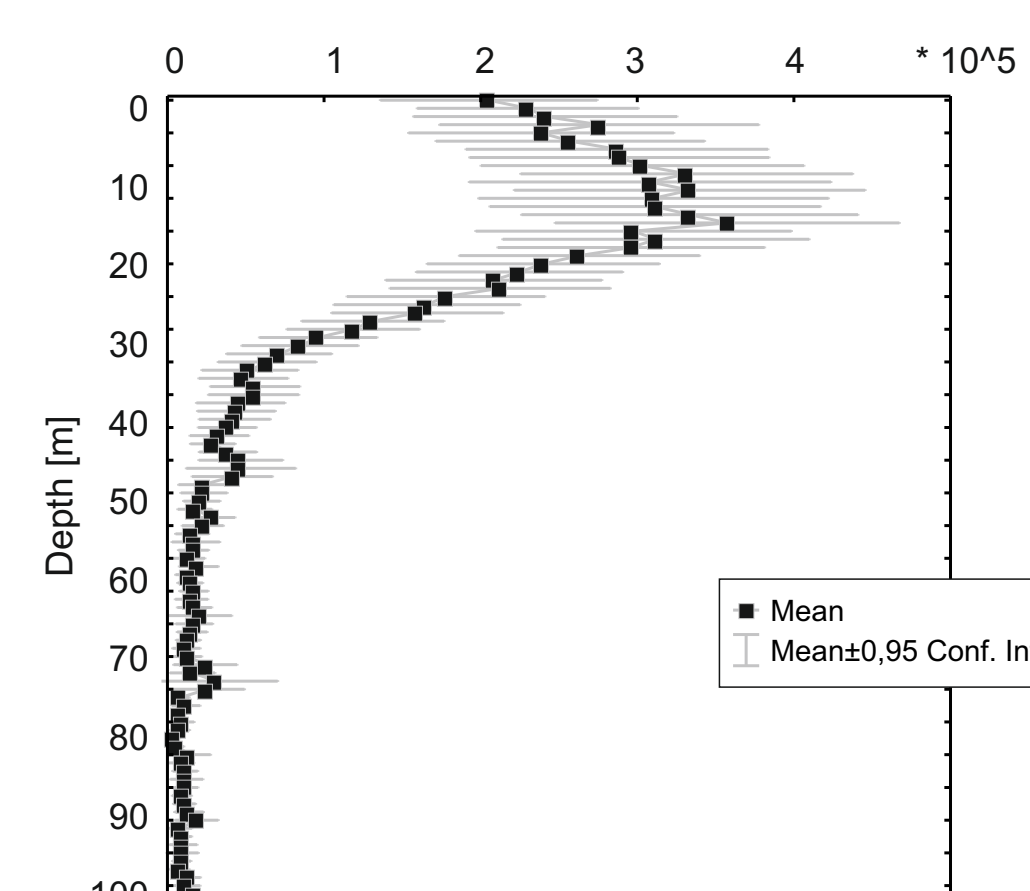
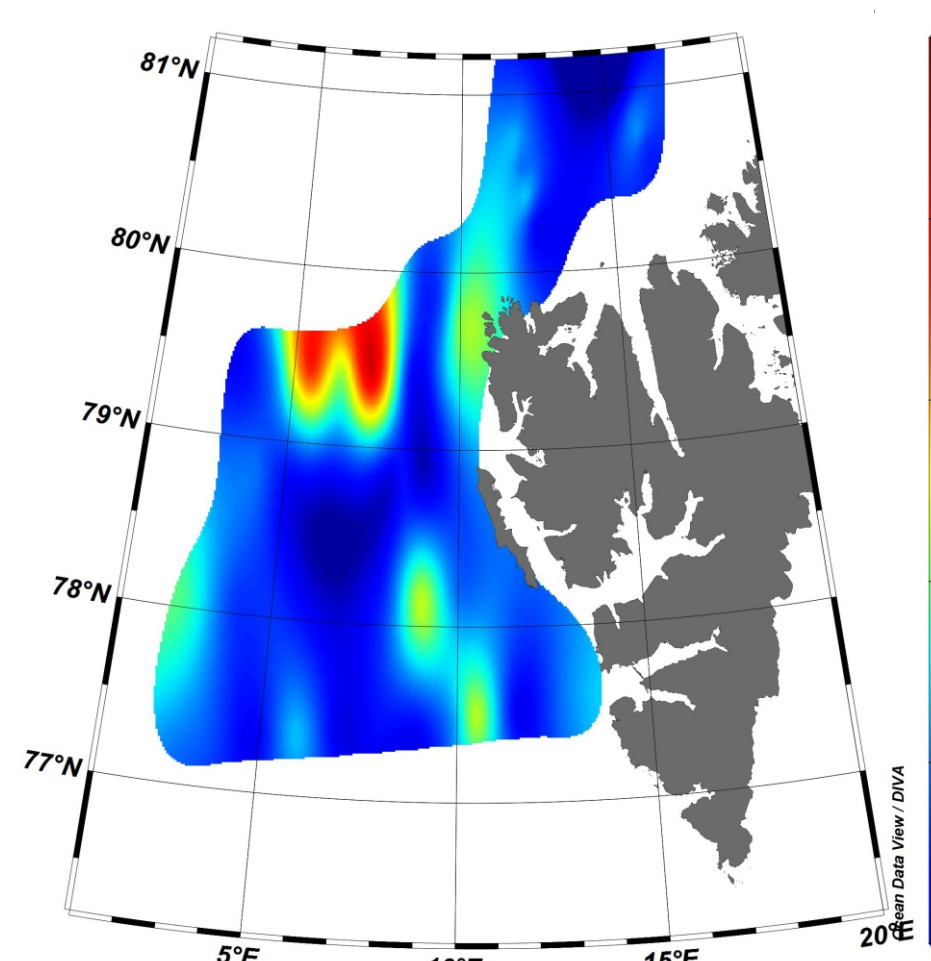
3 - 20 μm ESD



100 - 300 μm ESD



20 - 100 μm ESD



300 - 5 000 μm ESD

