JERICO/GROOM - EGO Glider Workshop

22–23 May 2012, Mallorca

IOPAS physical oceanography activities

and glider using plans

Waldemar Walczowski

Strategic Direction of IO PAN Research

I. Role of the oceans in climate change and its effects for the European Seas

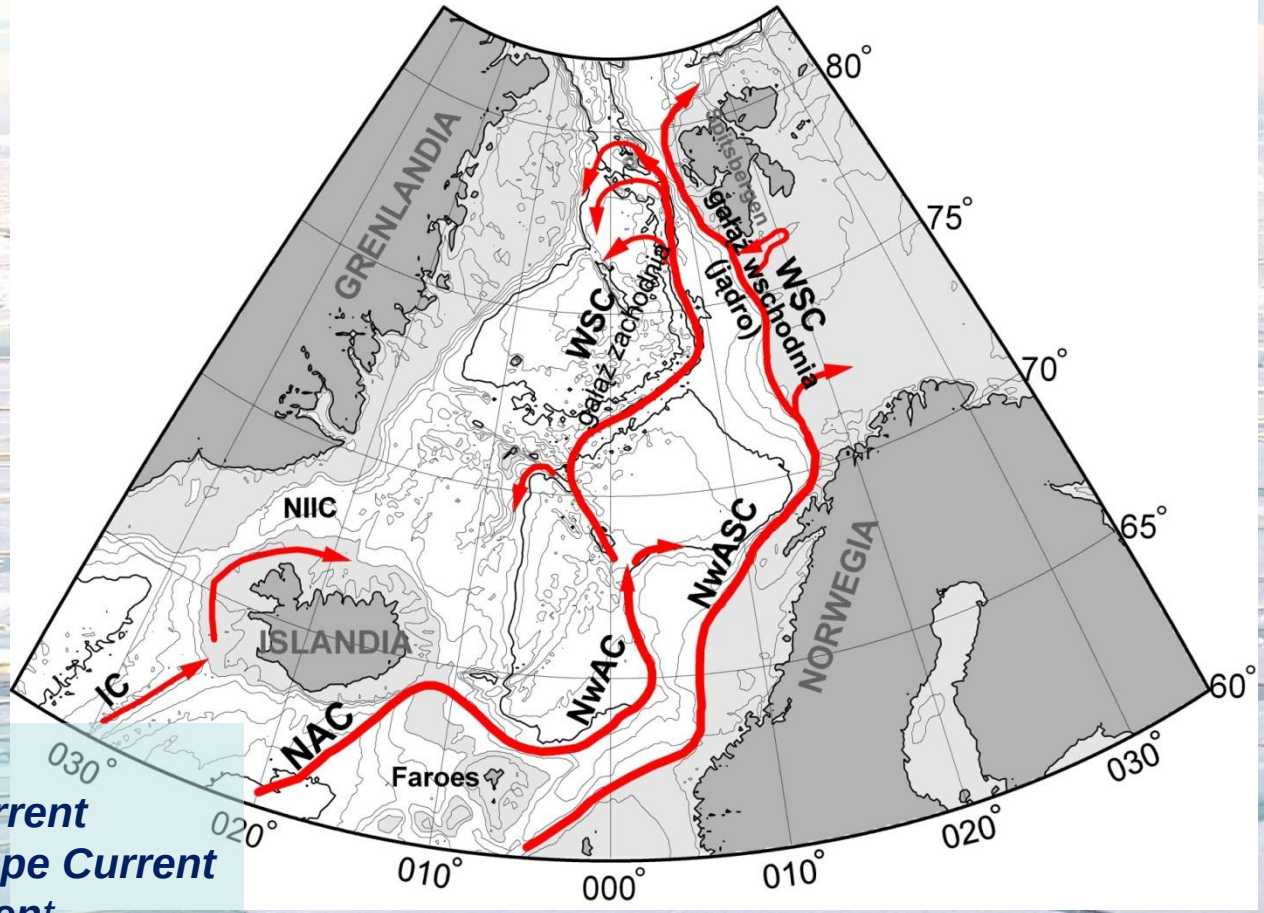
I.4. Investigation of the Thermohaline Circulation Processes

AWAKE **Arctic Climate and Environment of the Nordic Seas and the Svalbard - Greenland Area**

INSTITUTE OF OCEANOLOGY
POLISH ACADEMY OF SCIENCES

Physical oceanographers from the IOPAS investigate the Atlantic Water pathways and transports in the north-eastern part of the Nordic Seas.

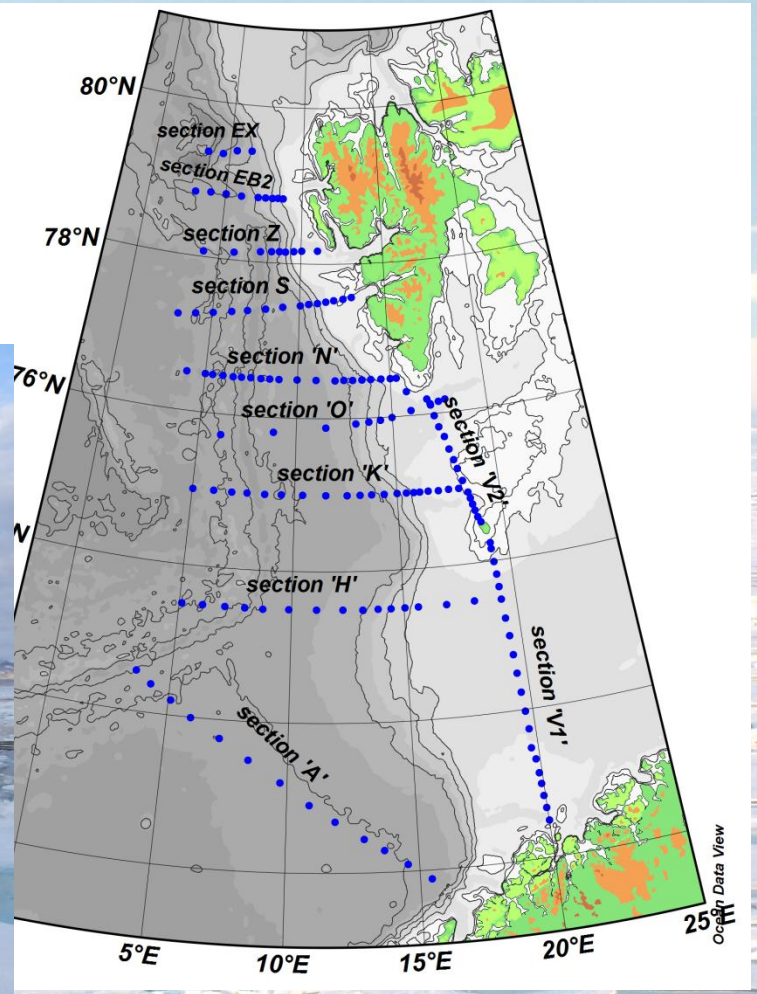
AW circulation and modification in this region are the important processes maintaining the global climate component – the Thermohaline Circulation



NAC North Atlantic Current
NwAC Norwegian-Atlantic Current
NwASC Norwegian Atlantic Slope Current
WSC West Spitsbergen Current
IC Irminger Current

Arex Cruises

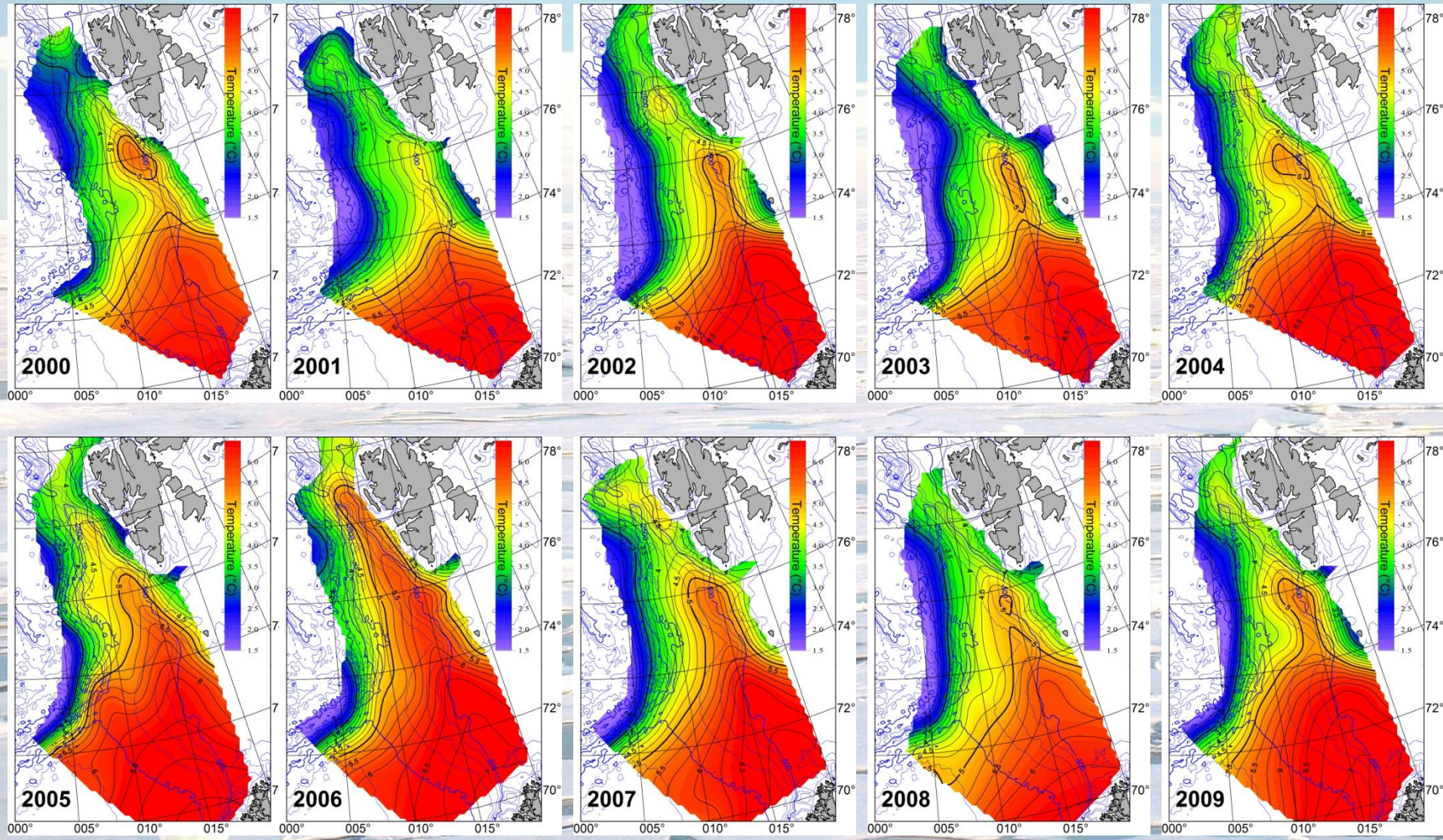
- 10-11 sections
- ~200 CTD profiles
- ~200 LADCP profiles
- Towed CTD – high resolution section
- West Spitsbergen fiords investigations



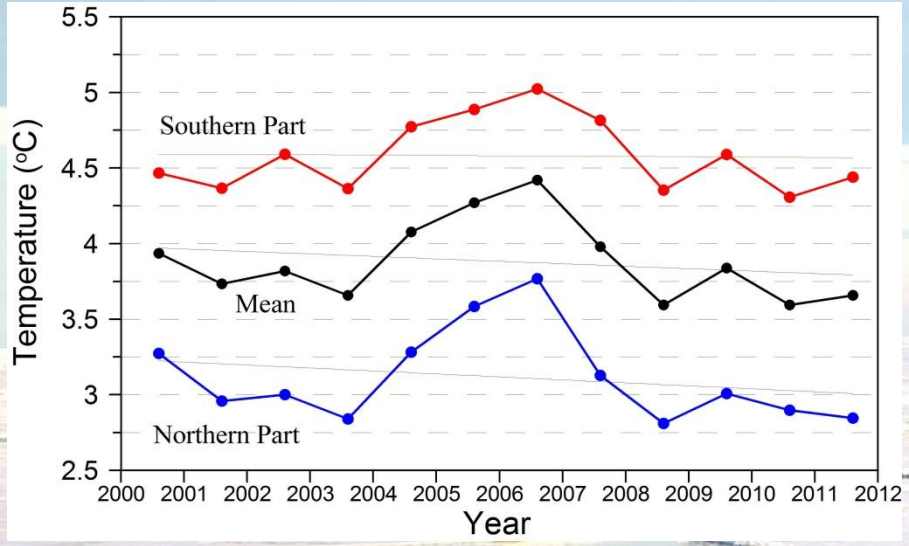
S/Y Oceania after modernisation

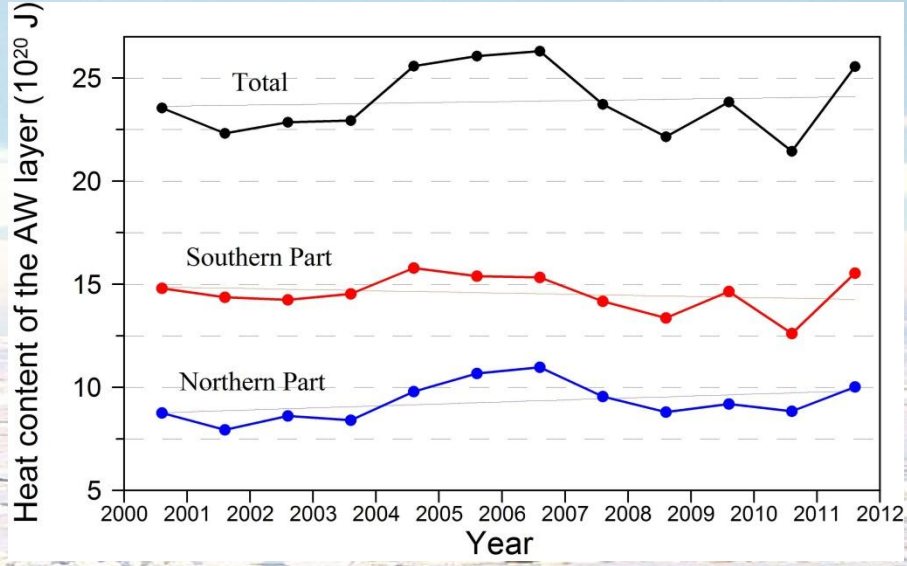
- *Eingine Diesel, 600 kW MTU*
- *Sails 280 m^2*
- *Maximal speed 12 kn*
- *12 persons crew*
- *14 scientists*
-

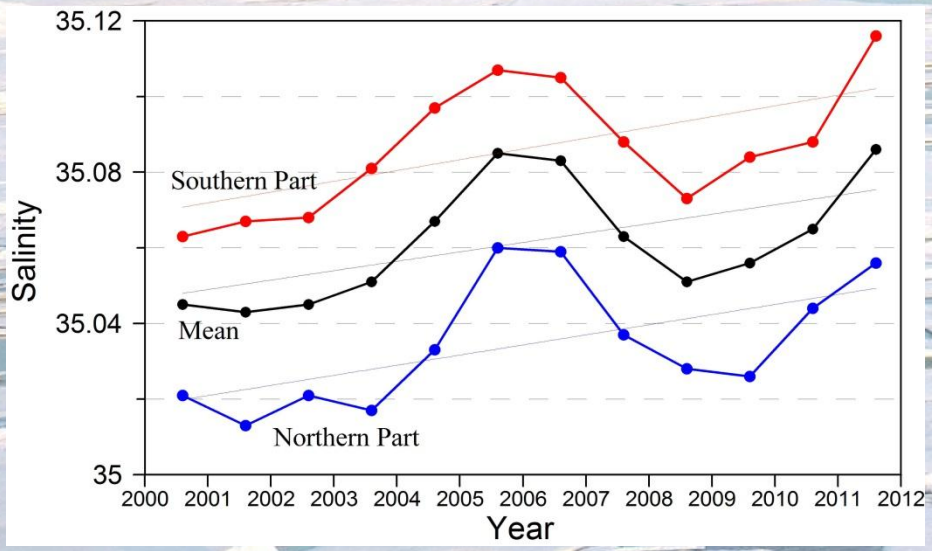
Hydrography of the West Spitsbergen Current
Temperature distribution at 100 dbar
Summers 2000-2009

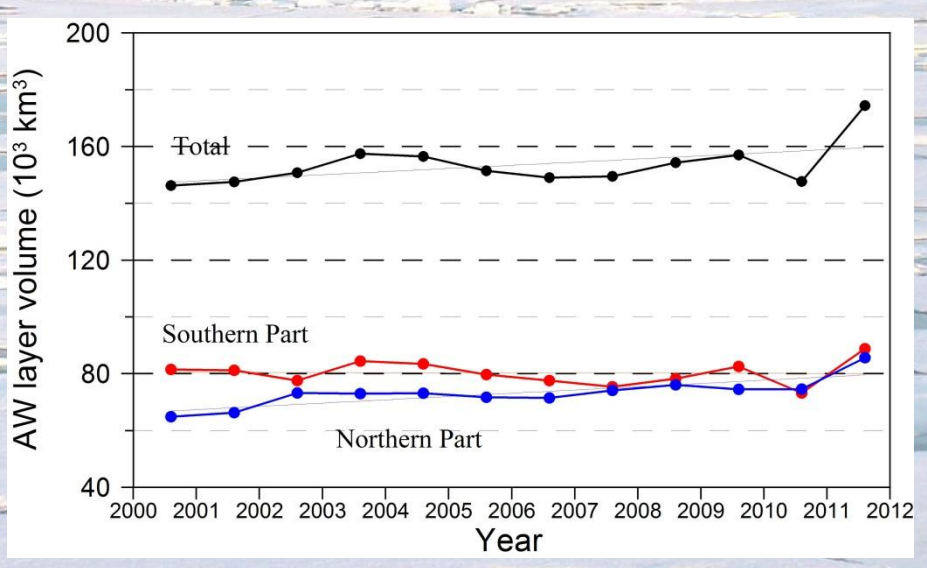


Properties of Atlantic Water (T>0 °C, S>34.92)
Mean (black), northern part (blue), southern part (red)

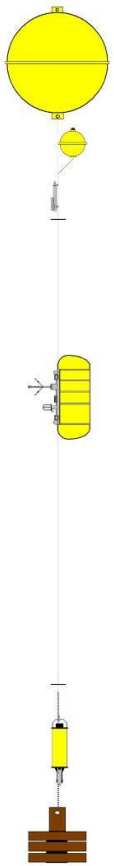








McLane Moored Profiler (MMP)



McLane steel sphere 48″

Chain 2 m

17″ Benthos XT-6000 Acoustic Transponder

SBE 37-SMP S/N 4689

Stopper

McLane Moored Profiler

S/N ML11984

¼″ Nilspin line 700 m

Stopper

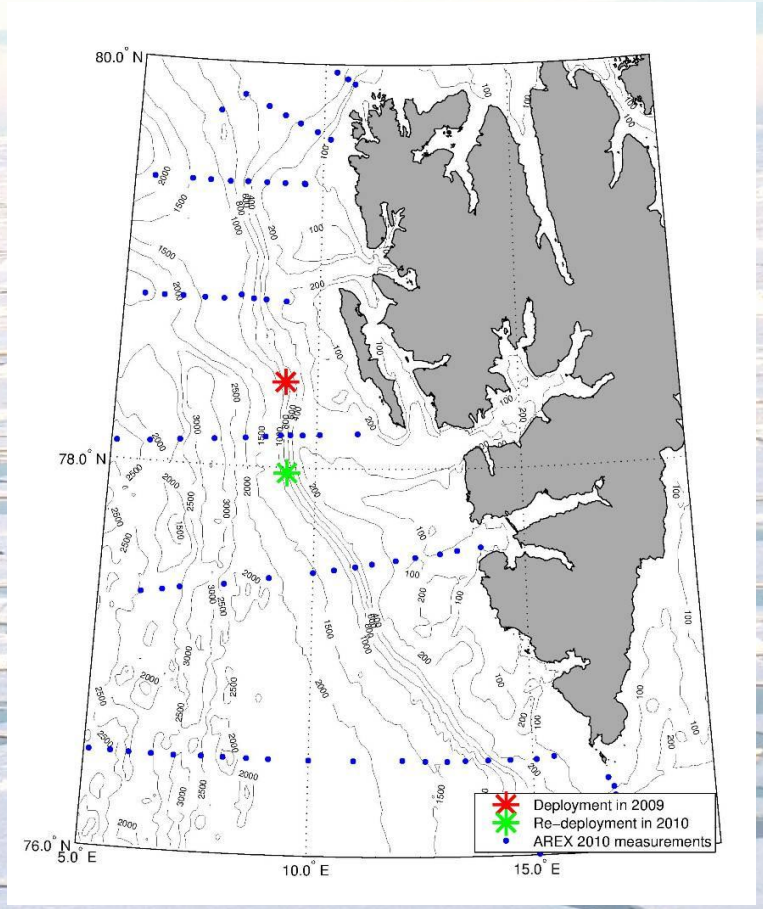
Chain 1.5 m

ORE 8242XS Acoustic Release Transponder S/N 31380

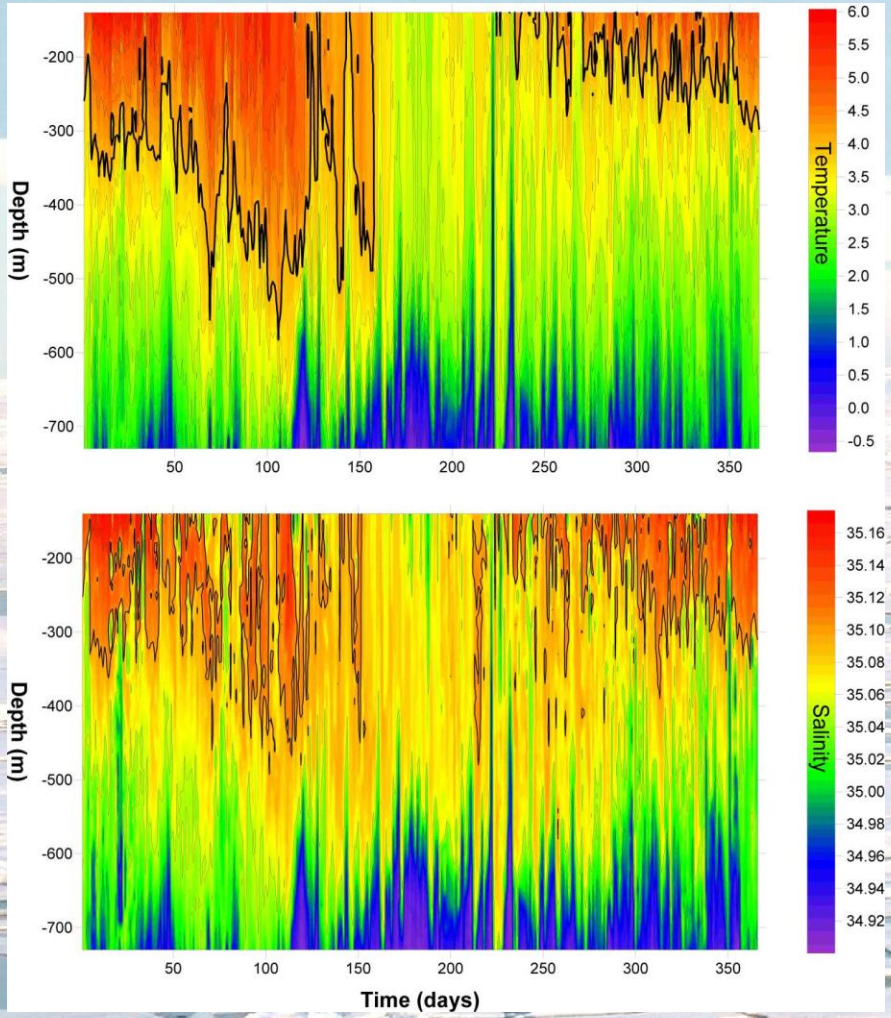
Chain 0.4 m

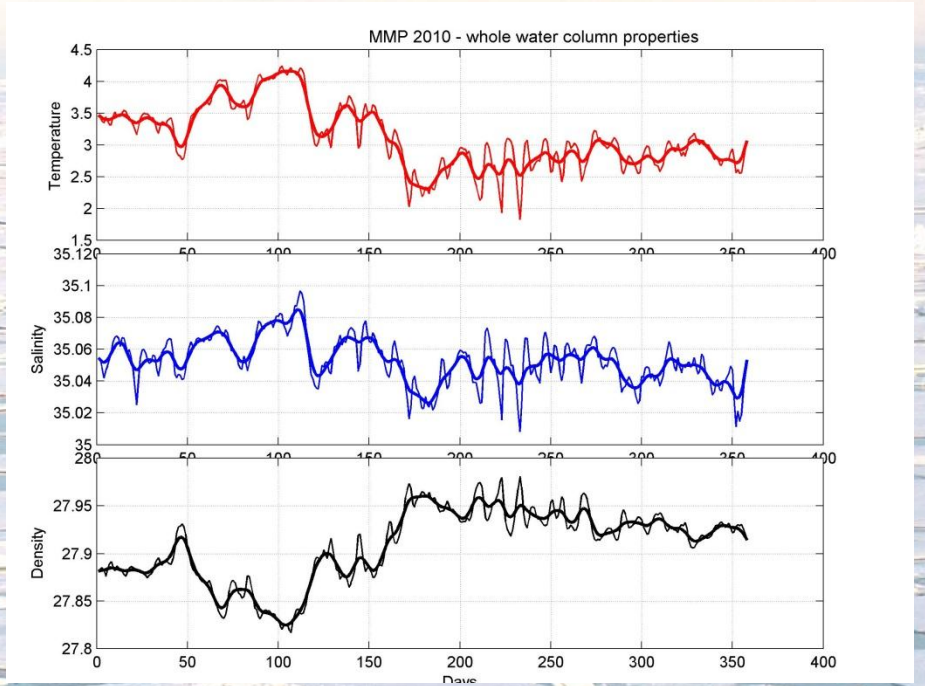
Anchor 1000kg

Positions of MMP in 2009 (red star), 2010 and 2011 (green star)

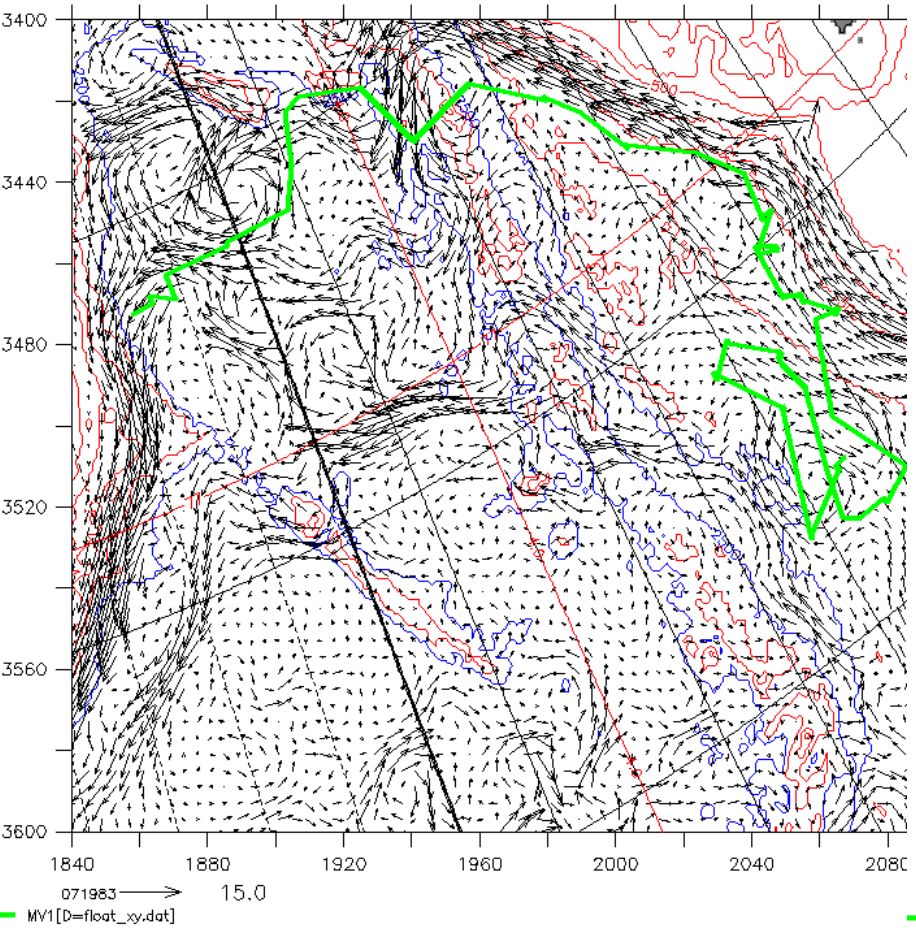


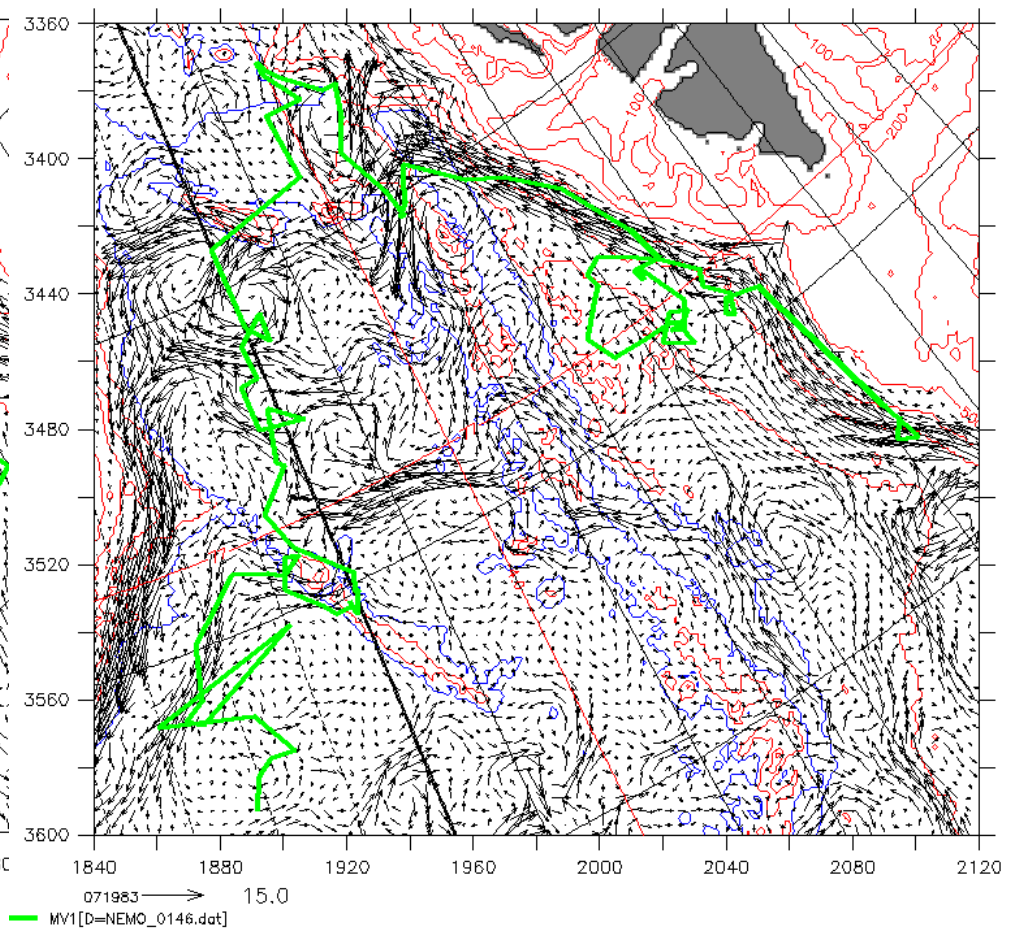
MMP results 2009-2010





Euro-Argo project, collaboration with OPTIMARE





The main goal of SIOS

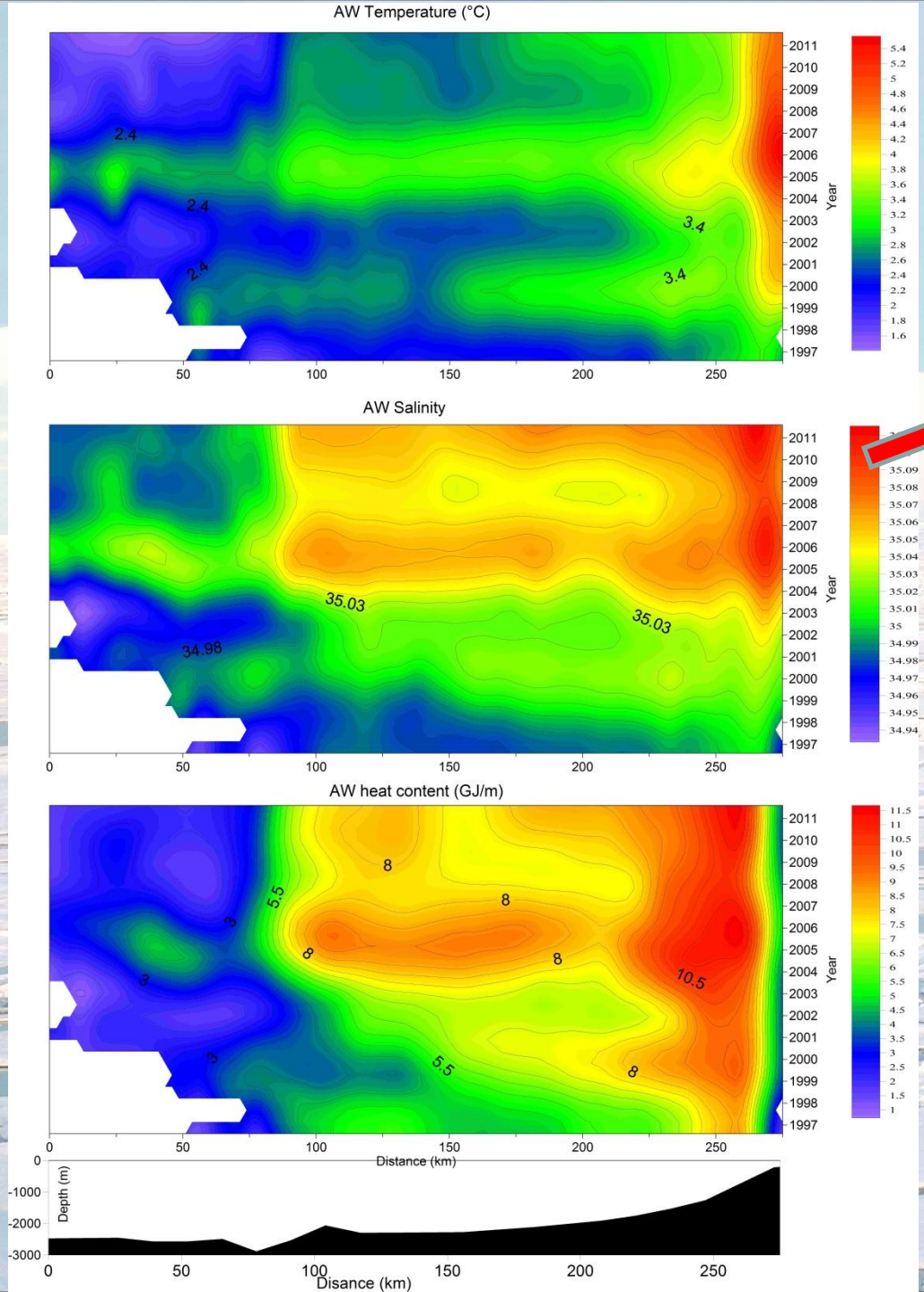
- Establish an (**Arctic) Earth System Observing Facility** in and around Svalbard that covers meteorological, geophysical, hydrological, cryospheric and biological processes from a set of platforms **to match Earth System Models**.
- Establish a first important node in the envisaged Sustained Arctic Observing Network (**SAON**).

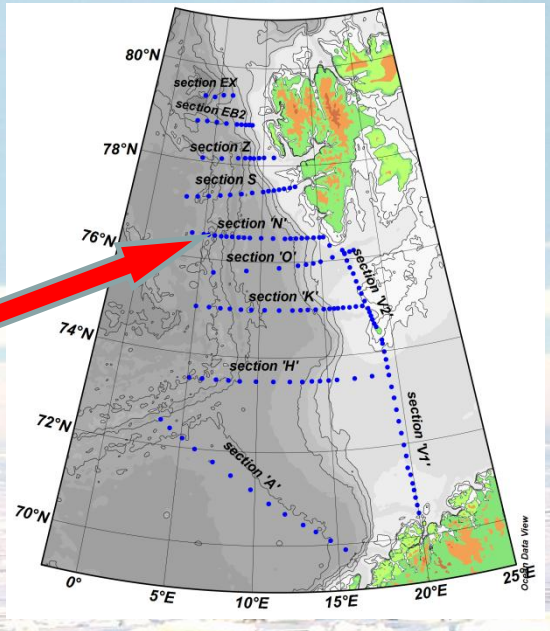
➔ Identify gaps in existing infra-structure, complement accordingly

➔ Organize the set of scientific and general infrastructure in t most practical and effective way

Location	Parameters	Platform	Respons. inst.	Country	Est. invest. [k€]	Est. op. costs/yr K€
Eastern Fram Strait (open water), optionally Hornsund	high resolution sections of temperature, salinity, oxygen, other biochemical properties	**2 gliders and gliderport in Hornsund**	IOPAS	Poland	280	8
Core of the West Spitsbergen Current	Sea current, temperature and salinity profiles	2 profiling moorings (MMP) with 2 Microcats each	IOPAS	Poland	30	40
Hornsund	currents, temperature, salinity	2 fiord moorings (each with RDCP 600 and 2 Microcats)	IOPAS	Poland	0	40
Western Svalbard slope	Current profile with CTD/ fluorescence	Mooring (with ADCP and 2 Microcats)	IOPAS	Poland	20	30


Arctic Ocean
Kvitøya
Nordaustlandet
Spitsbergen
Prins Karls Forland
Kong Karls Land
Barentsøya
Edgeøya
Greenland Sea
Norwegian Sea
Bjørnøya
Landstigningsplass
Landing site
© Norsk Polarinstitutt
Hansbreen
Sofiekammen
Burgerbukta
Hyrnefjellet
627
Hornbreen
Isbjørnhamna -
Polska Stacja Polarna
Gnål-
odden
Adria-
bukta
Treskelen
Brepollen
Samarinvågen
Hornsund
Gåshamna
487
Bautaen
1431
Hornsundtind
Hornsund-
neset
0
10 km
20





Hovmoeller plot of temperature, salinity and heat content at section 76º 30'N

Polish Polar Station Hornsund

77º 00'N, 15º 33'E

Themes:

- ionosphere
- meteorology/climate
- glaciology
- biology
- geology
- natural environment
- oceanography

Polish Polar Station, Polar Bear Bay (Isbjørnhamna), Hornsund fjord, West Spitsbergen.

- ***The northernmost Polish research facility operating continuously year-round;***
- ***The base is operated by the Institute of Geophysics, Polish Academy of Science (IGF PAN) in Warsaw;***

Advantages:

- ***Well equipped workshop;***
- ***Round year operation;***
- ***Easy access from deep ocean to the fjord.***

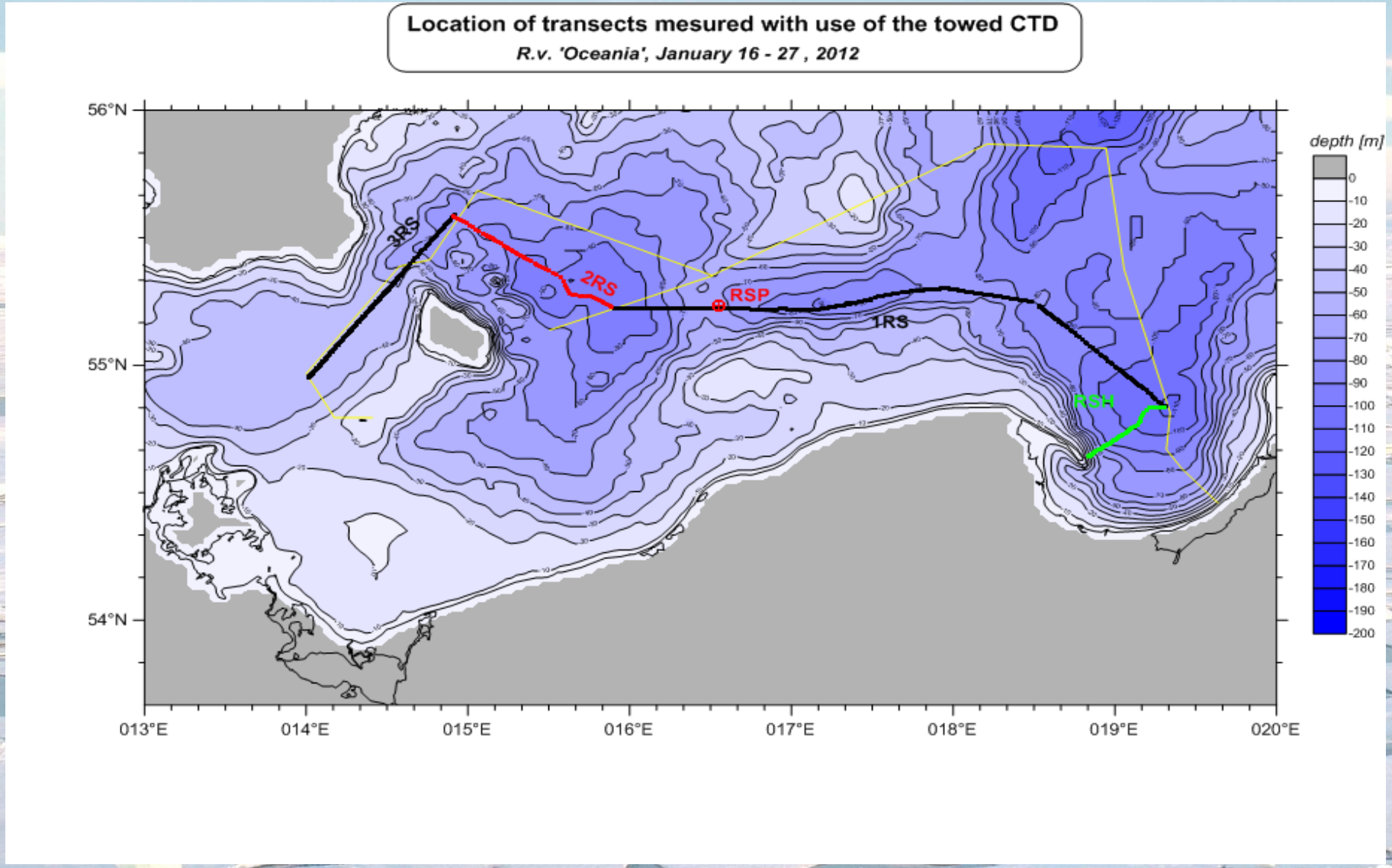
Disadvantages:

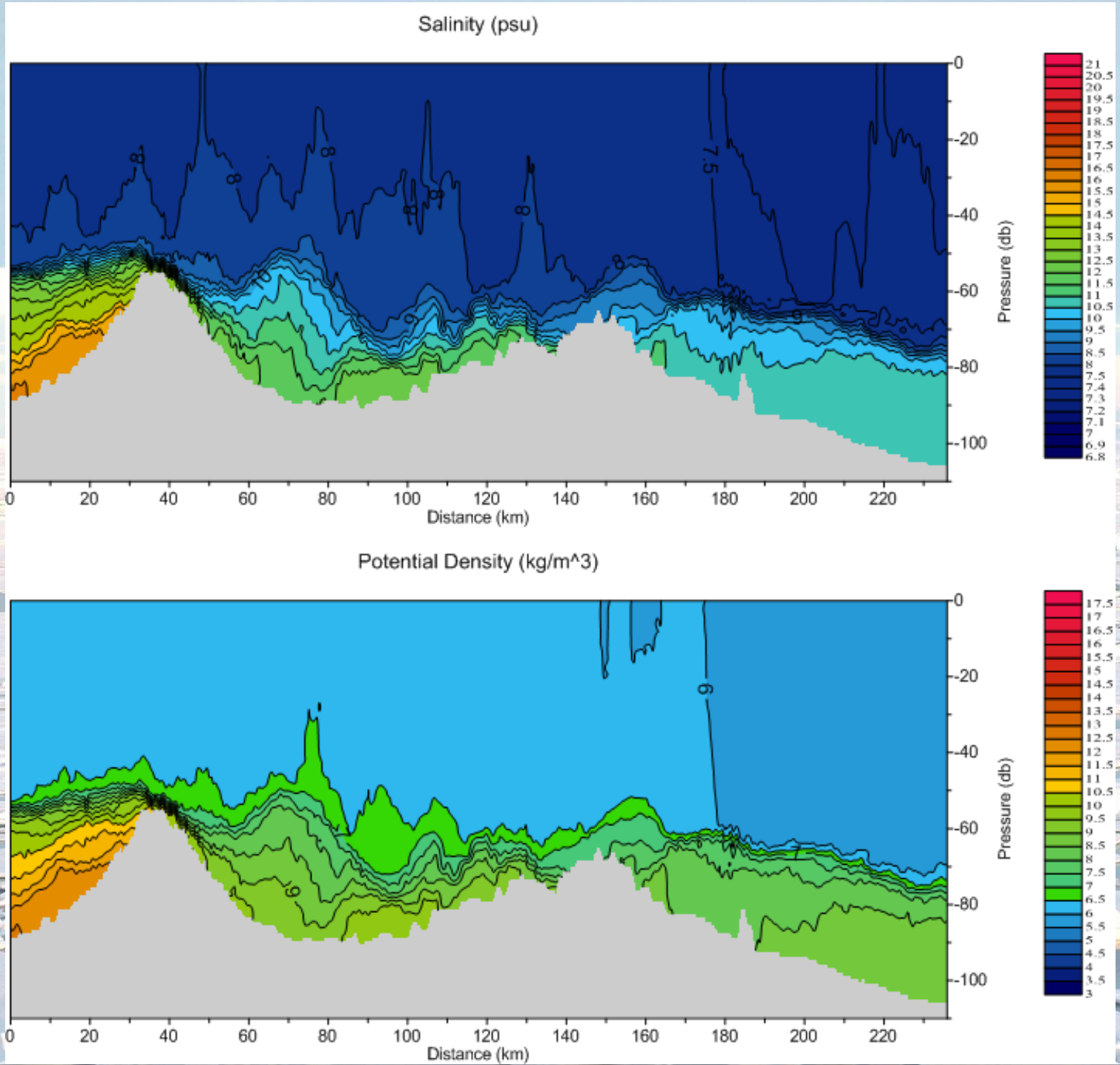
- ***Lack of the own vessel or cutter***
- ***Problems with connection to Longyearbyen (vessel, helicopter, skidoo)***
- ***Ice conditions.***

IDEA

- ***To establish the ‚gliderport' for recovery, maintenance and deploying gliders***
- ***Use gliders for investigation of the deep ocean (West Spitsbergen Current. East Greenland Current)***
- ***Use gliders for the fjords investigations (continuation of the Polish-Norway projects)***
- ***Collaboration with other partners.***

The Baltic Sea activity of IOPAS




Salinity (psu)
Pressure (db)
0
-20
-40
-60
-80
-100
8
7.5
21
20.5
20
19.5
19
18.5
18
17.5
17
16.5
16
15.5
15
14.5
14
13.5
13
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7.4
7.3
7.2
7.1
7
6.9
6.8
0
20
40
60
80
100
120
140
160
180
200
220
Distance (km)
Potential Density (kg/m^3)
Pressure (db)
6
9
17.5
17
16.5
16
15.5
15
14.5
14
13.5
13
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
Distance (km)

IDEAS

- ***Complex investigations of the coastal zone dynamics using vessel (Oceania), moorings, gliders, HF radars.***
- ***Collaboration with the Navy Academy and FORCOS (SME),***
- ***Development of the underwater navigation systems***