REPORT
FROM THE RESEARCH CRUISE
AREX 2017

R/V OCEANIA
14.06. 2017 - 30.08.2017

Coordination

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IO PAS
SOPOT

The IO PAN long-term monitoring program AREX

The Arctic region is one of the most visible indicators of our changing climate. The impacts of climate change observed in the Arctic precede those observed at the lower latitudes. The effects of global warming in the Arctic include a steady temperature increase, observed both in the atmosphere and in the ocean. These changes influence both the thickness and extent of the sea ice in the sub-Arctic seas and Arctic Ocean. In the last two decades, the summer sea ice extent has shrunk dramatically together with a strong decline of its thickness and volume.

Large oceanic exchanges between the North Atlantic and the Arctic Ocean result in the strong conversion of water masses when warm and salty Atlantic water (AW), transported through the Nordic Seas into the Arctic Ocean mixes with surrounding local waters and undergoes cooling, freezing and melting. As a result a part of AW is transformed into freshened surface waters over the shallow shelves, sea ice and dense (and highly saline) deep waters. Southward transport of the Arctic origin waters is one of main mechanisms of the global thermohaline circulation (THC). Better understanding of the variability of volume and heat transports between the North Atlantic and Arctic Ocean as well as processes of water mass conversion is necessary for improved qualitative and quantitative estimation of the large-scale meridional overturning circulation and its role in shaping the climate change in the northern hemisphere on inter-annual to decadal time scales.

The long-term AREX program and IO PAN annual cruises, carried by the research vessel Oceania for the last 30 years in the Nordic Seas and the European Arctic, are focused on multidisciplinary observations in areas such as physical oceanography, air—ocean interactions, ocean biogeochemistry and ecology to study the changes of abiotic and biotic Arctic environment. All these studies are carried out under the strategic research initiative addressing the role of the ocean in changing climate, its effects on the European seas and contemporary changes of the coastal ecosystems in the shelf seas. The data collected under the observational program AREX every year, in the same way, provide time series of key ocean variables which allow monitoring changes of the Arctic environment.

Oceanographic measurements and collection of water samples during the AREX 2017 cruise contributed to several IO PAN statutory research areas (I.3, I.4. I.5, I.7, II.2, III.1, III.5) and external research projects (national and international): ARGO-Poland, INTAROS, Carbon Bridge, SCOF-Arctic, CASUMA, NAtMAP, Svalbard Intertide, SeaPopll, HYDRA and PhD grants.

Scientific goals and research tasks of the AREX2017 cruise

The AREX cruise of the Institute of Oceanology Polish Academy of Sciences (IO PAS) research vessel Oceania, repeated every summer over the same time period, in 2017 took place from June 14 to August 30. The AREX 2017 cruise lasted 78 days and consisted of five legs, devoted to collection of oceanographic, meteorological, aerosol and ocean ecosystem observations in the open ocean regions, including the eastern Norwegian and Greenland seas, Fram Strait and the southern Nansen Basin of the Arctic Ocean and in the West Spitsbergen fjords.

The main legs of the AREX 2017 expedition included:

LEG	PERIOD	TRACK	COORDINATION
I	14.06-21.06	Gdańsk - Tromsø	Mgr Iwona Wróbel
II	22.06-09.07	Tromsø - Longyearbyen	Dr Agnieszka Beszczyńska-Möller
III	10.07-26.07	Longyearbyen - Longyearbyen	Dr Agnieszka Beszczyńska-Möller
IVa	27.07-04.08	Longyearbyen – Longyearbyen	Dr Sławomir Kwaśniewski
IVb	05.08-14.08	Longyearbyen – Longyearbyen	Dr Joanna Legeżyńska
V	15.08-30.08	Longyearbyen – Gdańsk	Dr hab. Marek Zajączkowski

During atmospheric measurements collected on the leg I of the research expedition AREX2017 the following scientific tasks and questions were addressed:

- Estimation of the droplet flux from the sea surface and their impact on ocean-atmosphere mass and energy exchanges;
- Estimation of the vertical CO_2 fluxes in the atmospheric boundary layer;
- Description of marine aerosols in the Arctic region;
- Description of aerosol optical thickness and ozone concentration in atmosphere.

The standard meteorological observations were carried out according to the SHIP standard. The measurements included instantaneous values of wind components (GILL), humidity and CO2 concentrations (LI-COR) and aerosol optical properties (MICROTOPS II, CEILOMETR Nimbus).

During the legs II and III of the research expedition AREX2017 measurements were collected to address the following scientific tasks:

- Structure and dynamics of the Norwegian-Atlantic and West Spitsbergen Currents;
- Variability of temperature, salinity and sea currents over the shelf and continental slope in the west and north of Svalbard;
- Estimation of the volume and heat transport by the West Spitsbergen Current;
- Overflow of dense brine waters in the Storfjordrenna;
- Variability of intermediate and deep water masses in the eastern part of the Norwegian Sea, Greenland Sea and the entrance to the Barents Sea;

- Estimation of the droplet flux from the sea surface and their impact on ocean-atmosphere mass and energy exchanges;
- Estimation of the vertical CO_2 fluxes in the atmospheric boundary layer;
- Estimation of latent and sensible heat fluxes between ocean and atmosphere;
- Description of marine aerosols in the Arctic region
- Description of marine aerosols in the Arctic region, aerosol optical thickness and ozone concentration in atmosphere;
- Determining the black carbon concentration in atmosphere;
- Description of the spatial distributions and quantitative-qualitative composition of zooplankton communities in the epi- and mesopelagic zones in the Norwegian-Atlantic and West Spitsbergen Current;
- Genetic diversity in zooplankton population of Calanus species in the Norwegian-Atlantic and West Spitsbergen Current;
- Description of Cnidaria and Ctenophora communities in the West Spitsbergen Current;
- Estimation of particulate matter concentration to validate the WRF-Chem model.

During the AREX2017 expedition (legs II and III) all oceanographic measurements were conducted on the station grid consisting of standard sections repeated annually since 2000, and along new sections located north of Svalbard. Location of oceanographic sections is shown on Fig. 1. During both legs of the cruise 238 full-depth CTD stations were measured (126 stations during the leg II and 112 stations during the leg III), providing profiles of temperature, salinity, dissolved oxygen and fluorescence. In addition to CTD casts, the ocean currents were measured with a Lowered Acoustic Doppler Current Profiler (LADCP) at each station and the upper ocean currents were continuously recorded during the whole survey with a Vessel-Mounted Acoustic Doppler Current Profiler (VM-ADCP). The CTD and LADCP system was mounted on the SeaBird bathymetric rosette equipped with large Nansen bottles. On 47 stations water samples were collected for post-cruise calibration of conductivity and dissolved oxygen sensors. The detailed list and schedule of CTD casts is given in the station list (Att. 1).

During the AREX2017 leg III the measurements of inherent and apparent optical properties of different water masses in situ were complemented with collection of water samples for analyses of apparent optical properties in the lab. On the stations measurements were performed with the modified Integrated Optical-Hydrographic Probe, measuring CDOM and chlorophyll a fluorescence. Together with above measurements, volume concentration of suspended matter was measured with laser *in situ* counter. Inherent optical properties were measured with the C-OPS (Compact Optical Profiling System) and water samples were collected for lab analyses of chlorophyll a, DOC, and coefficient of light absorption.

The standard meteorological observations were carried out according to the SHIP standard and instantaneous values of wind components, air humidity and CO2 concentration were measured separately. Concentration and distribution of marine aerosols, as well as aerosol optical thickness, were measured at selected stations. On selected stations, plankton samples were collected with various sampling gear (WP2/180, WP2/60, WP2/20 nets, Multiple Plankton Sampler) and preserved for different biological analyses in the laboratory. Additionally, in cooperation with the Institute of Geophysics PAS, five Ocean Bottom Seismometer (OBS) were recovered and during the leg III one Autonomous Underwater Vehicle (glider) type Slocum G1 was launched in cooperation with LOCEAN (Laboratoire d'Océanographie et du Climat: Expérimentations et Approches Numériques) University Pierre et Marie Curie.

During legs IVa and IVb of the AREX2017 expedition multidisciplinary observations of marine plankton and benthos in the West Spitsbergen fjords were conducted in the main studied areas in Hornsund, Kongsfjorden, Smeerenburgfjorden, and Raudfjorden. Collection of samples and in situ hydrographic and biological measurements will contribute to long-term observations of plankton and benthos in the Arctic fjords. Observations and biological sampling will be also part of the projects SeaPopII and HYDRA. The measurements and samples collection included:

- Collection of plankton and benthos samples in the studied areas;
- Photographic documentation of the bottom habitat with a drop camera;
- Collection of bottom sediment samples and water samples for chemical analysis;
- Collection of water, bottom sediment and benthos samples and photographical documentation during scientific dives;
- Collection of bottom sediment samples for studying phytoplankton and primary production;
- Collection of water samples, benthic organisms and surface sediments to study organic contaminants in in the West Spitsbergen fjords;
- Collection of water samples for microplastic estimates;
- Determining the droplet emission, ocean-atmosphere fluxes of CO2, sensible and latent heat, characteristics of ocean aerosols, optical depth of atmosphere and ozone concentrations in the studied area;
- Measurements of inherent and apparent optical properties in the West Spitsbergen fjords;
- High-resolution hydrographic section with a towed CTD scanfish system in Hornsund, Kongsfjorden (Fig.2).

Paleoceanography measurements carried on under the last, V leg of the research expedition AREX2017 were aimed in studying:

- Northward advection of Atlantic water along the western and northern Svalbard shelf over the Holocene using benthic/pelagic foraminifera as a main indicator;
- Determining the droplet emission, ocean-atmosphere fluxes of CO2, sensible and latent heat, characteristics of ocean aerosols, optical depth of atmosphere and ozone concentrations in the studied area;
- Description of Atlantic water inflow to the Hinlopen Strait based on hydrographic measurements.

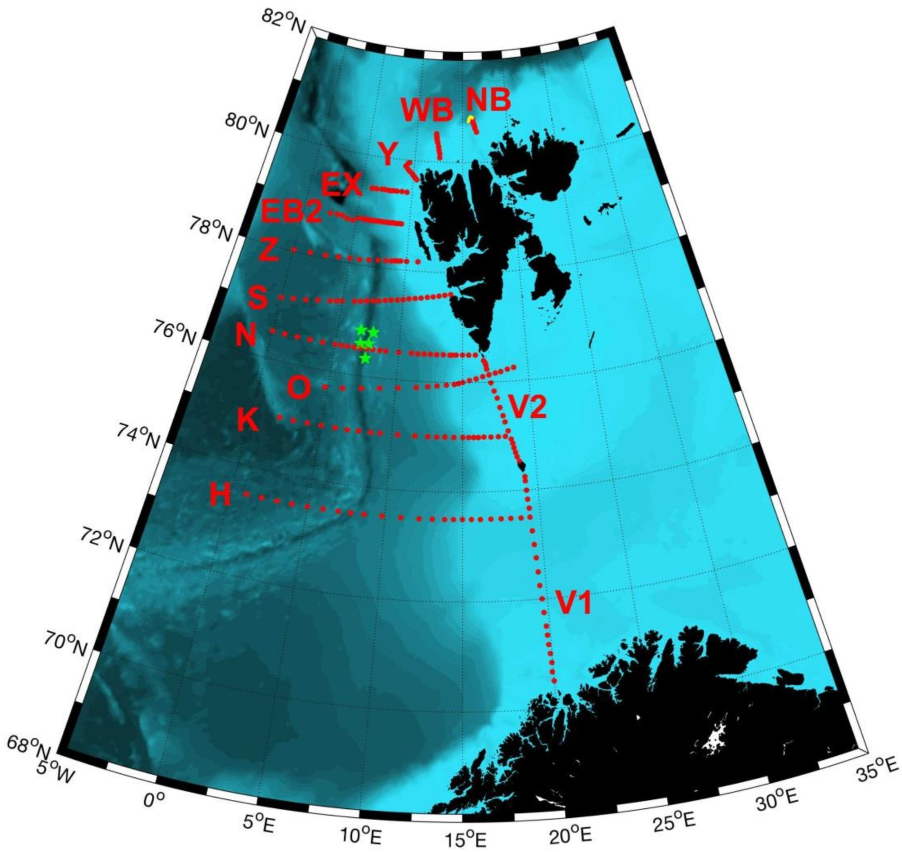

Figure 1 Distribution of CTD stations during the open ocean part (legs II and III) of the AREX 2017 cruise. Green stars show the Ocean Bottom Seismometer positions.

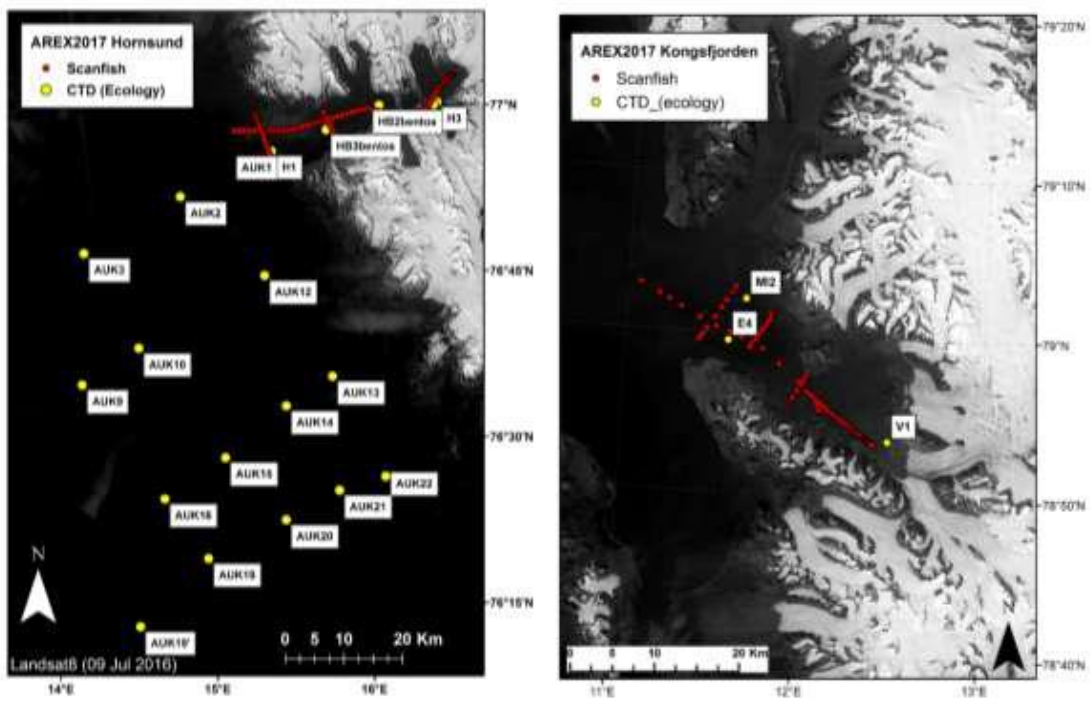

Figure 2 Distribution of CTD stations during the fjord part (legs II and III) of the AREX 2017 cruise.

Attachment 1 List of stations measured during the open ocean part of the AREX2017.

File	Station	Latitude	Longi-tude	Water depth	Max Pres	Day	Month	Year	Hour	Minute
AREX2017 leg II (21.06-09.07.2017)										
AR17_001.awi	V1	70.500	19.989	136	134	22	6	2017	1	58
AR17_002.awi	V2	70.667	19.936	156	155	22	6	2017	3	46
AR17_003.awi	V3	70.835	19.941	182	181	22	6	2017	5	36
AR17_004.awi	V4	70.999	19.900	186	185	22	6	2017	7	13
AR17_005.awi	V5	71.166	19.867	207	208	22	6	2017	9	4
AR17_006.awi	V6	71.333	19.838	211	211	22	6	2017	11	15
AR17_007.awi	V7	71.498	19.805	235	235	22	6	2017	12	50
AR17_008.awi	V8	71.752	19.741	265	265	22	6	2017	15	5
AR17_009.awi	V9	72.001	19.685	306	307	22	6	2017	17	23
AR17_010.awi	V10	72.250	19.617	322	323	22	6	2017	19	33
AR17_011.awi	V11	72.500	19.569	381	377	22	6	2017	21	40
AR17_012.awi	V12	72.755	19.528	396	398	22	6	2017	23	56
AR17_013.awi	V13	73.002	19.472	417	419	23	6	2017	2	23
AR17_014.awi	V14	73.248	19.401	443	444	23	6	2017	6	1
AR17_015.awi	V15	73.499	19.335	476	479	23	6	2017	8	24
AR17_016.awi	V16	73.666	19.307	348	349	23	6	2017	12	33
AR17_017.awi	V17	73.831	19.267	235	236	23	6	2017	14	13
AR17_018.awi	V18	73.998	19.217	135	135	23	6	2017	16	33
AR17_019.awi	V19	74.166	19.186	69	68	23	6	2017	18	1
AR17_020.awi	V20	74.249	19.173	58	57	23	6	2017	18	49
AR17_021.awi	K-3	75.000	18.000	154	153	24	6	2017	5	52
AR17_022.awi	K-2	75.001	17.506	118	117	24	6	2017	6	56
AR17_023.awi	K-1	75.000	17.002	128	127	24	6	2017	8	0
AR17_024.awi	K0	75.001	16.505	245	245	24	6	2017	9	2
AR17_025.awi	K1	74.999	16.102	209	209	24	6	2017	10	41
AR17_026.awi	K2	74.999	15.789	361	363	24	6	2017	11	34
AR17_027.awi	K3	74.999	15.437	818	826	24	6	2017	12	40
AR17_028.awi	K4	74.999	15.003	1105	1117	24	6	2017	14	10
AR17_029.awi	K5	75.001	14.371	1527	1548	24	6	2017	16	19
AR17_030.awi	K6	74.999	13.745	1795	1819	24	6	2017	18	24
AR17_031.awi	K7	75.000	13.184	1982	2009	24	6	2017	20	41
AR17_032.awi	K8	75.000	12.550	2145	2175	24	6	2017	23	0
AR17_033.awi	K9	75.000	11.634	2353	2389	25	6	2017	2	2
AR17_034.awi	K10	74.999	10.420	2496	2534	25	6	2017	5	51
AR17_035.awi	K11	74.999	9.171	2610	2651	25	6	2017	9	37
AR17_036.awi	K12	74.999	8.519	2820	2867	25	6	2017	12	29
AR17_037.awi	K13	74.999	7.653	2217	2250	25	6	2017	16	18
AR17_038.awi	K14	74.997	6.837	2093	2121	25	6	2017	19	3
AR17_039.awi	K15	75.000	6.000	2821	2867	25	6	2017	22	4
AR17_040.awi	K16	74.998	4.991	3124	3177	26	6	2017	1	49
AR17_041.awi	K17	74.999	4.020	3038	3089	26	6	2017	5	41
AR17_042.awi	K18	75.001	2.998	2470	2507	26	6	2017	10	7
AR17_043.awi	K19	75.004	2.011	2753	2797	26	6	2017	14	21
AR17_044.awi	H22	73.501	1.001	3075	3127	27	6	2017	2	47
AR17_045.awi	H21	73.500	1.998	3364	3424	27	6	2017	7	14
AR17_046.awi	H20	73.500	2.998	2500	2539	27	6	2017	11	47

AR17_047.awi	H19	73.500	3.976	2859	2907	27	6	2017	15	53
AR17_048.awi	H18	73.500	4.999	2670	2713	27	6	2017	20	19
AR17_049.awi	H17	73.501	5.997	2026	2054	28	6	2017	0	19
AR17_050.awi	H16	73.500	6.988	2322	2357	28	6	2017	4	5
AR17_051.awi	H15	73.500	7.801	2942	2990	28	6	2017	8	4
AR17_052.awi	H14	73.502	8.664	2480	2517	28	6	2017	12	19
AR17_053.awi	H13	73.504	9.813	2290	2325	28	6	2017	16	23
AR17_054.awi	H12	73.501	11.030	2054	2084	28	6	2017	20	34
AR17_055.awi	H11	73.501	12.197	1801	1824	29	6	2017	0	25
AR17_056.awi	H10	73.503	13.058	1567	1586	29	6	2017	3	47
AR17_057.awi	H9	73.500	13.833	1285	1301	29	6	2017	6	41
AR17_058.awi	H8	73.500	14.415	1009	1019	29	6	2017	8	58
AR17_059.awi	H4	73.502	14.991	684	690	29	6	2017	11	5
AR17_060.awi	H7	73.504	15.566	479	483	29	6	2017	14	0
AR17_061.awi	H6	73.504	16.151	455	459	29	6	2017	15	51
AR17_062.awi	H5	73.502	16.807	443	446	29	6	2017	17	32
AR17_063.awi	H3	73.500	17.479	441	432	29	6	2017	19	38
AR17_064.awi	H2	73.500	18.091	406	408	29	6	2017	21	11
AR17_065.awi	H1	73.500	18.740	427	430	29	6	2017	22	49
AR17_066.awi	V21	74.533	18.873	78	28	30	6	2017	5	58
AR17_067.awi	V22	74.615	18.752	70	71	30	6	2017	6	49
AR17_068.awi	V23	74.700	18.666	97	96	30	6	2017	7	48
AR17_069.awi	V24	74.782	18.569	226	226	30	6	2017	8	41
AR17_070.awi	V25	74.866	18.502	204	204	30	6	2017	9	41
AR17_071.awi	V26	74.947	18.420	72	70	30	6	2017	10	39
AR17_072.awi	V27	75.100	18.218	67	65	30	6	2017	11	58
AR17_073.awi	V28	75.266	18.051	62	60	30	6	2017	13	13
AR17_074.awi	V29	75.380	17.918	101	100	30	6	2017	14	8
AR17_075.awi	V30	75.531	17.718	130	130	30	6	2017	15	45
AR17_076.awi	V31	75.701	17.547	210	210	30	6	2017	17	8
AR17_077.awi	V32	75.831	17.336	290	290	30	6	2017	19	9
AR17_078.awi	V33	75.983	17.134	319	319	30	6	2017	20	37
AR17_079.awi	V34	76.127	17.008	288	288	30	6	2017	21	57
AR17_080.awi	V35	76.240	16.847	218	220	30	6	2017	23	44
AR17_081.awi	V36	76.311	16.792	105	103	1	7	2017	0	38
AR17_082.awi	V37	76.350	16.743	53	50	1	7	2017	1	15
AR17_083.awi	V38	76.396	16.632	32	29	1	7	2017	1	49
AR17_084.awi	O8	76.250	18.916	261	260	1	7	2017	5	59
AR17_085.awi	O7	76.217	18.427	247	247	1	7	2017	7	37
AR17_086.awi	O6	76.183	17.918	274	274	1	7	2017	8	57
AR17_087.awi	O5	76.159	17.473	306	306	1	7	2017	10	7
AR17_088.awi	O4	76.134	17.012	281	281	1	7	2017	11	14
AR17_089.awi	O3	76.101	16.516	341	342	1	7	2017	12	29
AR17_090.awi	O2	76.067	16.008	384	385	1	7	2017	13	43
AR17_091.awi	O1	76.034	15.514	362	363	1	7	2017	15	3
AR17_092.awi	M4	76.004	15.012	337	338	1	7	2017	16	21
AR17_093.awi	O-1	75.981	14.697	323	324	1	7	2017	17	56
AR17_094.awi	O-2	75.967	14.361	344	344	1	7	2017	18	56
AR17_095.awi	O-4	75.950	13.782	908	916	1	7	2017	20	25
AR17_096.awi	O-6	75.932	13.086	1383	1399	1	7	2017	22	32
AR17_097.awi	Z1	78.170	11.012	260	260	2	7	2017	17	17
AR17_098.awi	Z2	78.167	10.012	266	266	2	7	2017	19	4
AR17_099.awi	Z3	78.164	9.501	265	265	2	7	2017	20	15

AR17_100.awi	Z4	78.160	9.254	695	700	2	7	2017	21	1
AR17_101.awi	Z5	78.156	9.000	1126	1138	2	7	2017	22	13
AR17_102.awi	Z6	78.145	8.685	1576	1596	2	7	2017	23	38
AR17_103.awi	Z7	78.138	8.188	2228	2261	3	7	2017	1	37
AR17_104.awi	Z8	78.129	7.508	3417	3477	3	7	2017	4	24
AR17_105.awi	Z9	78.116	6.671	2250	2281	3	7	2017	8	24
AR17_106.awi	Z10	78.097	5.848	2483	2522	3	7	2017	11	33
AR17_107.awi	Z11	78.092	5.002	2442	2480	3	7	2017	14	37
AR17_108.awi	Z12	78.080	4.024	2737	2747	3	7	2017	17	50
AR17_109.awi	Z13	78.067	2.843	3037	3089	3	7	2017	21	22
AR17_110.awi	Z14	78.050	1.501	3063	3115	4	7	2017	1	46
AR17_111.awi	Z15	78.028	0.008	3054	3106	4	7	2017	6	45
AR17_112.awi	O-13	75.706	4.786	2944	2993	5	7	2017	0	53
AR17_113.awi	O-12	75.733	6.093	2486	2523	5	7	2017	5	43
AR17_114.awi	O-11	75.777	7.464	2467	2505	5	7	2017	10	34
AR17_115.awi	O-10	75.819	8.803	2357	2392	5	7	2017	15	7
AR17_116.awi	O-9	75.851	10.189	2291	2326	5	7	2017	19	21
AR17_117.awi	O-8	75.886	11.549	2057	2086	5	7	2017	23	29
AR17_118.awi	O-7	75.907	12.389	1724	1747	6	7	2017	2	22
AR17_119.awi	S19	77.133	0.001	3184	3239	7	7	2017	20	2
AR17_120.awi	S18	77.166	0.990	3181	3237	7	7	2017	23	59
AR17_121.awi	S17	77.198	2.004	3190	3246	8	7	2017	3	59
AR17_122.awi	S16	77.233	3.006	2856	2903	8	7	2017	8	9
AR17_123.awi	S15	77.264	3.987	2523	2562	8	7	2017	11	57
AR17_124.awi	S14	77.285	4.489	2329	2364	8	7	2017	14	47
AR17_125.awi	S13	77.300	4.986	2461	2499	8	7	2017	17	27
AR17_126.awi	S12	77.333	5.990	2570	2610	8	7	2017	20	40
AREX2017 leg III (10-26.07.2017)										
AR17_127.awi	S-1	77.601	14.004	135	133	10	7	2017	22	15
AR17_128.awi	S0	77.583	13.501	144	142	11	7	2017	0	13
AR17_129.awi	S1	77.567	13.001	135	134	11	7	2017	1	13
AR17_130.awi	S2	77.546	12.526	98	96	11	7	2017	2	40
AR17_131.awi	S3	77.534	12.027	172	171	11	7	2017	3	36
AR17_132.awi	S4	77.516	11.504	273	273	11	7	2017	5	41
AR17_133.awi	S5	77.500	11.005	698	703	11	7	2017	6	47
AR17_134.awi	S6	77.484	10.493	1224	1238	11	7	2017	8	33
AR17_135.awi	S7	77.467	10.001	1577	1596	11	7	2017	10	52
AR17_136.awi	S7P	77.450	9.499	1913	1940	11	7	2017	13	9
AR17_137.awi	S8	77.436	9.000	2055	2084	11	7	2017	15	40
AR17_138.awi	S8P	77.416	8.499	1425	1443	11	7	2017	19	7
AR17_139.awi	S9	77.402	7.994	2266	2299	11	7	2017	21	8
AR17_140.awi	S9P	77.386	7.492	3432	3446	12	7	2017	0	19
AR17_141.awi	S10	77.369	7.000	2635	2677	12	7	2017	4	8
AR17_142.awi	S11	77.349	6.496	2079	2108	12	7	2017	7	26
AR17_143.awi	S12	77.333	5.997	2576	2617	12	7	2017	9	42
AR17_144.awi	N-15	76.500	0.004	3159	3214	12	7	2017	21	0
AR17_145.awi	N-14	76.501	1.001	3205	3262	13	7	2017	0	51
AR17_146.awi	N-13	76.499	1.983	3201	3256	13	7	2017	4	58
AR17_147.awi	N-12	76.499	3.008	2767	2813	13	7	2017	9	10
AR17_148.awi	N-11	76.500	3.999	2631	2673	13	7	2017	13	2
AR17_149.awi	N-10	76.502	5.003	2370	2405	13	7	2017	16	29
AR17_150.awi	N-9	76.502	5.492	2559	2599	13	7	2017	18	44
AR17_151.awi	N-8	76.501	5.989	2407	2425	13	7	2017	21	25

AR17_152.awi	N-7	76.501	6.500	2533	2572	13	7	2017	23	48
AR17_153.awi	N-6	76.501	6.987	2975	3025	14	7	2017	2	18
AR17_154.awi	N-5	76.502	7.501	2468	2506	14	7	2017	5	20
AR17_155.awi	N-4	76.502	7.991	1800	1825	14	7	2017	8	14
AR17_156.awi	N-3	76.500	8.501	2260	2291	14	7	2017	10	16
AR17_157.awi	N-2	76.500	9.000	2258	2290	14	7	2017	12	36
AR17_158.awi	N-1	76.500	9.996	2195	2228	14	7	2017	16	9
AR17_159.awi	N0	76.502	10.985	2081	2111	14	7	2017	19	29
AR17_160.awi	N0P	76.500	11.502	1998	2025	14	7	2017	22	27
AR17_161.awi	N1	76.502	11.996	1884	1909	15	7	2017	0	45
AR17_162.awi	N1P	76.502	12.484	1730	1753	15	7	2017	2	51
AR17_163.awi	N2	76.496	12.976	1528	1547	15	7	2017	5	0
AR17_164.awi	N2P	76.500	13.498	1259	1273	15	7	2017	10	59
AR17_165.awi	N3	76.498	13.996	746	752	15	7	2017	14	31
AR17_166.awi	N3PP	76.498	14.201	412	414	15	7	2017	15	46
AR17_167.awi	N3P	76.498	14.487	218	219	15	7	2017	16	40
AR17_168.awi	N4	76.499	14.998	173	174	15	7	2017	17	48
AR17_169.awi	N4P	76.499	15.485	139	138	15	7	2017	19	57
AR17_170.awi	N5	76.498	15.991	52	50	15	7	2017	21	8
AR17_171.awi	EB2-1	78.833	9.267	201	201	16	7	2017	13	34
AR17_172.awi	EB2-1P	78.837	9.035	208	210	16	7	2017	15	29
AR17_173.awi	EB2-2	78.836	8.785	209	211	16	7	2017	16	17
AR17_174.awi	EB2-2P	78.835	8.598	415	419	16	7	2017	17	26
AR17_175.awi	EB2-3	78.836	8.437	669	676	16	7	2017	18	17
AR17_176.awi	EB2-3P	78.834	8.270	837	845	16	7	2017	20	23
AR17_177.awi	EB2-4	78.832	8.100	956	966	16	7	2017	21	51
AR17_178.awi	EB2-4P	78.833	7.849	1053	1063	16	7	2017	23	20
AR17_179.awi	EB2-5	78.833	7.591	1100	1111	17	7	2017	0	39
AR17_180.awi	EB2-5P	78.838	7.356	1203	1216	17	7	2017	3	0
AR17_181.awi	EB2-6	78.835	7.101	1352	1367	17	7	2017	4	33
AR17_182.awi	EB2-6P	78.834	6.872	1553	1548	17	7	2017	5	59
AR17_183.awi	EB2-7	78.834	6.679	1744	1767	18	7	2017	19	27
AR17_184.awi	EB2-7P	78.833	6.410	2050	2080	18	7	2017	21	40
AR17_185.awi	EB2-8	78.833	6.164	2324	2359	18	7	2017	23	33
AR17_186.awi	EB2-8P	78.836	5.926	2452	2490	19	7	2017	1	43
AR17_187.awi	EB2-9	78.835	5.681	2517	2557	19	7	2017	3	58
AR17_188.awi	EB2-10	78.835	5.202	2583	2624	19	7	2017	7	11
AR17_189.awi	EB2-10P	78.785	4.668	1726	1719	19	7	2017	12	22
AR17_190.awi	EB2-11	78.798	4.154	2324	2359	19	7	2017	14	29
AR17_191.awi	EB2-11P	78.834	3.663	2255	2288	19	7	2017	17	6
AR17_192.awi	EB2-12	78.836	3.175	2369	2405	19	7	2017	19	37
AR17_193.awi	EB2-12P	78.834	2.506	2464	2502	19	7	2017	23	54
AR17_194.awi	EX7P	79.412	6.027	1747	1770	20	7	2017	15	6
AR17_195.awi	EX7P	79.414	6.020	66	63	20	7	2017	16	33
AR17_196.awi	EX7	79.417	6.495	1434	1451	20	7	2017	17	38
AR17_197.awi	EX6	79.418	7.003	1178	1191	20	7	2017	19	43
AR17_198.awi	EX5	79.418	7.309	998	1008	20	7	2017	21	30
AR17_199.awi	EX4P	79.417	7.662	751	758	20	7	2017	23	33
AR17_200.awi	EX4	79.417	7.914	492	494	21	7	2017	0	41
AR17_201.awi	EX3P	79.416	8.165	281	281	21	7	2017	1	46
AR17_202.awi	EX3	79.418	8.484	187	186	21	7	2017	2	29
AR17_203.awi	EX2	79.418	8.987	128	126	21	7	2017	3	47
AR17_204.awi	EX1	79.418	9.474	127	125	21	7	2017	4	36

AR17_205.awi	WB1	80.079	12.580	254	191	21	7	2017	10	54
AR17_206.awi	WB2	80.155	12.559	175	174	21	7	2017	12	11
AR17_207.awi	WB3	80.219	12.482	195	194	21	7	2017	13	36
AR17_208.awi	WB4	80.286	12.404	183	182	21	7	2017	14	31
AR17_209.awi	WB5	80.350	12.305	168	167	21	7	2017	16	7
AR17_210.awi	WB6	80.381	12.265	180	179	21	7	2017	16	40
AR17_211.awi	WB7	80.415	12.230	232	232	21	7	2017	17	16
AR17_212.awi	WB8	80.433	12.209	372	373	21	7	2017	17	51
AR17_213.awi	WB9	80.449	12.220	466	468	21	7	2017	18	27
AR17_214.awi	WB10	80.466	12.184	573	577	21	7	2017	19	35
AR17_215.awi	WB11	80.483	12.171	649	654	21	7	2017	20	17
AR17_216.awi	WB12	80.517	12.142	807	815	21	7	2017	21	22
AR17_217.awi	NB1	80.552	16.521	56	54	22	7	2017	4	21
AR17_218.awi	NB2	80.615	16.366	144	143	22	7	2017	5	7
AR17_219.awi	NB3	80.644	16.312	165	161	22	7	2017	5	47
AR17_220.awi	NB4	80.679	16.268	176	172	22	7	2017	6	21
AR17_221.awi	NB5	80.698	16.215	348	348	22	7	2017	7	46
AR17_223.awi	NB6	80.710	16.187	606	608	22	7	2017	14	48
AR17_224.awi	NB7	80.726	16.151	703	707	22	7	2017	15	43
AR17_225.awi	NB8	80.742	16.121	915	922	22	7	2017	16	47
AR17_226.awi	NB9	80.755	16.099	987	994	22	7	2017	18	3
AR17_227.awi	NB10	80.775	16.063	1139	1149	22	7	2017	19	19
AR17_228.awi	NB11	80.795	16.127	1127	1138	22	7	2017	20	46
AR17_229.awi	Y1	79.660	10.357	41	39	24	7	2017	12	1
AR17_230.awi	Y2	79.682	10.236	87	84	24	7	2017	12	39
AR17_231.awi	Y3	79.709	10.089	137	137	24	7	2017	13	13
AR17_232.awi	Y4	79.731	9.969	314	312	24	7	2017	13	53
AR17_233.awi	Y5	79.754	9.860	373	372	24	7	2017	14	39
AR17_234.awi	Y6	79.797	9.616	427	426	24	7	2017	15	48
AR17_235.awi	Y7	79.837	9.376	455	455	24	7	2017	16	59
AR17_236.awi	Y8	79.885	9.105	461	461	24	7	2017	18	6
AR17_237.awi	Y9	79.943	9.324	474	475	24	7	2017	19	18
AR17_238.awi	Y10	79.959	9.486	474	474	24	7	2017	20	25

Preliminary results of oceanographic measurements

During the AREX2017 cruise hydrographic measurements were performed at the grid of stations, which included 13 standard CTD sections. Collected time series of water properties are used to study long-term changes in the ocean climate in Nordic Seas and Fram Strait. The standard section N, running westward off Sørkapp, represents the longest time series of IOPAN hydrographic observations and provides data for studying the long-term variability of the Atlantic water hydrographic properties.

Preliminary analysis showed that in 2017 AW was slightly colder (Fig. 3) and less saline (Fig.4) than in 2016. In 2016 isohalines 35.1 reached the latitude above 78°'N, when in 2017 was limited to 77°N (Fig. 4). Similar as in 2016, the meridional extent of water warmer than 5°C observed at the depth of 100 m slightly exceeded the latitude of 76°N (Fig. 3). Spatial distributions of temperature in 2017 revealed slightly warmer Atlantic water in the northern Fram Strait than in 2016.

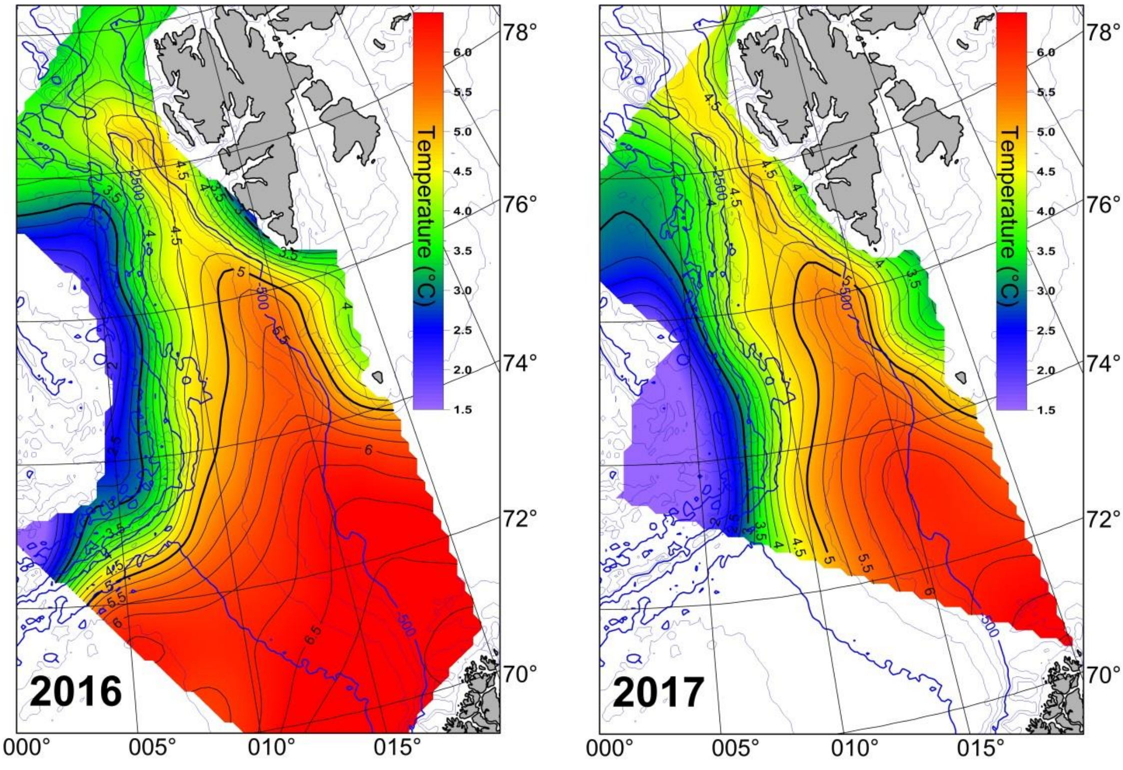

Figure 3 Spatial distribution of temperature measured in 2016 and 2017 at the depth of 100 m.

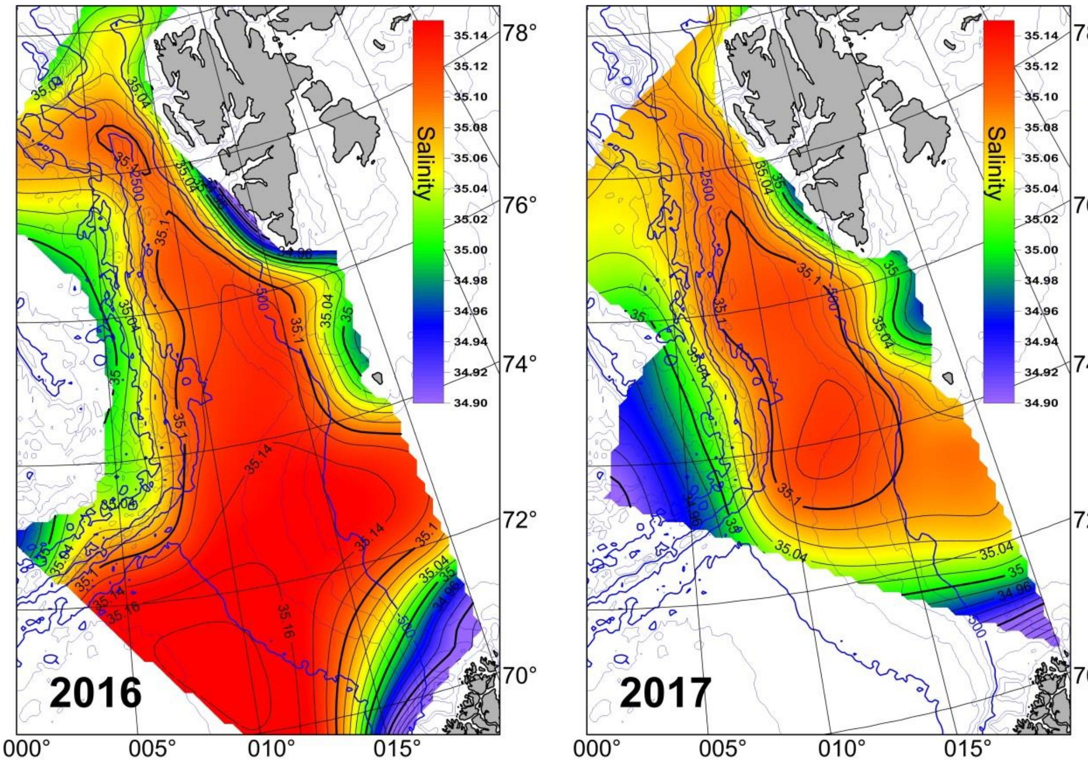

Figure 4 Spatial distribution of salinity measured in 2016 and 2017 at the depth of 100 m.

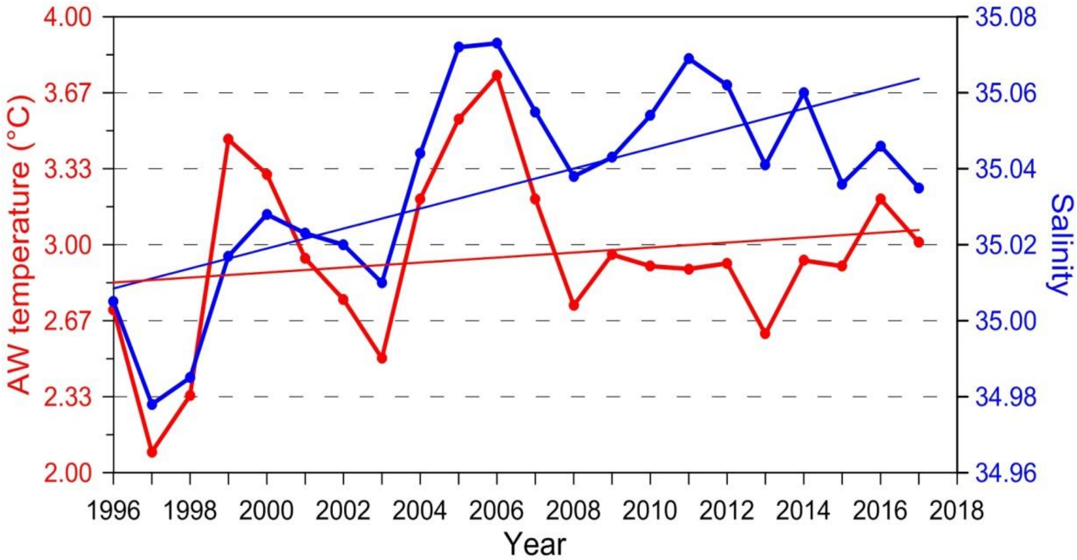

Figure 1 Time series of the vertically averaged temperature and salinity of the AW (T>0°C S>34.92) at the section N along 76°30'N between 6° and 15°E measured in summers of 1996-2017.