



CRUISE REPORT



R/V Aranda

Cruise 8/2016

SL1 2016
9. – 12. May 2016

This report is based on preliminary data and is subject to changes.

SL1 2016

Cruise number 8 / 2016, date 9.-12.5.2016

Chief scientist Mika Raateoja

Description of the cruise

This cruise was part of HELCOM/COMBINE monitoring program, combined with enhanced environmental monitoring of Gulf of Finland. This leg of the Combine 2 cruise covers the Northern Baltic Proper, western and central Gulf of Finland, and Finnish territorial waters in the Gulf of Finland.

Monitoring parameters include:

- the hydrographic description of the water column (density, temperature, salinity)
- water transparency
- water chemistry (nutrients, pH, dissolved O₂)
- the parameters of biogenic origin (Chl *a*, *in vivo* fluorescence of Chl *a* as well as the taxonomic distribution and biomass of mesozooplankton and macrozoobenthos)
- marine litter

Also

- water and sediment samples were taken for STUK at two stations
- samples for alkalinity were taken at all stations

Observations

The past major Baltic inflow apparently did not have any effect on the deep-water salinity; it was quite average when reflected to the long-term variation.

The timing of the cruise was somewhat earlier than in the previous years; the vernal bloom was still present in the upper layers. In the westernmost part, Secchi-depth was 6 m while east of the line Helsinki - Tallinn it was 3.5 - 4.0 m. Part of the vernal bloomers (mainly dinoflagellates such as *Peridiniella catenata* and few diatoms such as *Thalassiosira baltica*) were condensed as a deep-water chlorophyll maximum at the depth of 35 to 40 m.

The western Gulf of Finland

Despite early timing the temperature-driven stratification was already developed in the Finnish coastal areas due to abnormally warm weathers during the past two weeks. Temperatures up to 8 - 9 °C was observed in the upper 5 - 10 m, followed by a sharp drop, and values of 3 - 4 °C took place beneath. The feature was not there in the southern areas; the vertical temperature pattern was quite typical.

Phosphate concentration ranged from 0.1 to 0.3 $\mu\text{mol/l}$ at the surface layer to 0.3 - 0.5 $\mu\text{mol/l}$ below the thermocline. Deep-water phosphate levels were at the higher end of long-term variation, but no exceptional. Nitrate was exhausted from the upper 30 m and started to increase drastically with depth up to 4 - 5 $\mu\text{mol/l}$.

Deep-water oxygen situation was quite typical. It was the worst at LL12, JML, and GF1 (like always), where there was hydrogen sulphide and no life was present in the zoobenthic samples. The areal variation in the deep oxygen condition was pronounced and related to bottom topography; the station LL11 and LL9 in between were oxic. It seems that the depth level for the occurrence of serious oxygen deprivation was 70 - 80 m. The stationwise variation in the oxygen situation reflected to the deep-water phosphate levels; at the stations where there were oxygen problems the level was typical (4 to 5 $\mu\text{mol/l}$) and at the stations where there was a good situation the level was 2 to 3 $\mu\text{mol/l}$.

The middle Gulf of Finland

The temperature-driven stratification was well-developed also in the middle part of the Gulf. The upper 10 m had temperatures of 8 - 9 °C, and at XV1 the value of 9 °C was clearly the highest measured since 1997 at this time of the year. Otherwise both temperature and salinity patterns were quite typical.

Phosphate was almost exhausted in the surface mixed layer, and varied in the range of 0.5 - 1.0 $\mu\text{mol/l}$ just beneath that. Nitrate was exhausted in the upper 20 - 30 m and beneath that its levels were at the lower end of the dataset since 1997.

The deep-water oxygen situation was the average one. Hypoxia was observed only at LL6A, and benthic animals were counted at all the stations.

Cruise personnel

Raateoja Mika	SYKE	9.-12.05.2016
Panu Hänninen	SYKE	9.-12.05.2016
Heini Jalli	IL	9.-12.05.2016
Susanna Hyvärinen	SYKE	9.-12.05.2016
Pia Varmanen	SYKE	9.-12.05.2016
Jere Riikonen	SYKE	9.-12.05.2016
Marko Jaale	SYKE	9.-12.05.2016
Jouko Rissanen	SYKE	9.-12.05.2016
Ulla Riihimäki	SYKE	9.-12.05.2016
Elina Bertell	SYKE	9.-12.05.2016
Outi Setälä	SYKE	9.-12.05.2016
Sirpa Lehtinen	SYKE	9.-12.05.2016
Tanja Kinnunen	SYKE	9.-12.05.2016
Ilkka Lastumäki	SYKE	9.-12.05.2016
Markku Jansson	IL	9.-12.05.2016
Pekka Kosloff	IL	9.-12.05.2016
Anders Mård	Aker Arctic	9.-12.05.2016

Station List

Index	Station	LAT	LON	Depth	Time / date
241	39A	60°04.01'	24°58.81'	41	10:00 09.05.2016
242	LL7S	59°51.01'	24°49.81'	78	11:56 09.05.2016
243	LÄNGDEN	59°46.36'	23°15.59'	60	19:51 09.05.2016
244	AMN	59°41.43'	23°15.43'	56	22:15 09.05.2016
245	LL12	59°29.01'	22°53.81'	82	01:20 10.05.2016
246	LL11	59°35.01'	23°17.81'	68	04:50 10.05.2016
247	JML	59°34.91'	23°37.61'	80	06:52 10.05.2016
248	LL9	59°42.01'	24°01.81'	69	09:23 10.05.2016
249	GF1	59°42.30'	24°40.93'	84	13:00 10.05.2016
250	LL6A	59°55.01'	25°01.81'	75	16:30 10.05.2016
251	LL5	59°55.01'	25°35.82'	70	19:17 10.05.2016
252	XIV3	60°12.19'	26°11.57'	77	23:41 10.05.2016
253	CAGE_KOTKA	60°24.06'	26°57.29'		03:00 11.05.2016
254	XV1	60°15.00'	27°14.82'	64	05:56 11.05.2016
255	LL3A	60°04.03'	26°20.80'	68	10:29 11.05.2016
256	LL4A	60°01.01'	26°04.81'	60	14:11 11.05.2016
257	GF2	59°50.31'	25°51.41'	84	16:40 11.05.2016

	CTD	Bottom sal + O2 / H2S	Secchi	O2 / H2S	pH	Nutrients	Chl a	Zooplankton	Zoobenthos	Litter	Alkalinity
39A	x	x	x	x	x	x					x
LL7S	x	x	x	x	x	x	x	x	x	x	x
LÄNGDEN	x	x		x	x	x	x	x		x	x
AMN	x	x		x	x	x			x		x
LL12	x	x		x	x	x	x	x	x	x	x
LL11	x	x	x	x	x	x			x		x
JML	x	x	x	x	x	x			x		x
LL9	x	x	x	x	x	x	x	x	x	x	x
GF1	x	x	x	x	x	x	x	x	x		x
LL6A	x	x	x	x	x	x			x		x
LL5	x	x		x	x	x			x		x
XIV3	x	x		x	x	x					x
CAGE_KOTKA	X										x
XV1	x	x	x	x	x	x	x	x	x	x	x
LL3A	x	x	x	x	x	x	x	x	x	x	x
LL4A	x	x	x	x	x	x			x		x
GF2	x	x		x	x	x			x		x