CRUISE REPORT

R/V Aranda

Cruise 12/2015

Combine 3, leg 2/2015

17th – 19th August 2015

Photo: Maiju Lehtiniemi

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

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Monitoring cruise COMBINE 3/2014, 17 – 19 August 2015, second leg.

Table 1. Scientific crew on Combine 3 cruise, 2. leg.

	Scientific Crew	**Time onboard**	**Organization**
Chief scientist:	Maiju Lehtiniemi	17.-19.8.2015	SYKE MRC
Participants:	Janne Bruun	17.-19.8.2015	SYKE MRC
	Pia Varmanen	17.-19.8.2015	SYKE MRC
	Kirsi Järvenmäki	17.-19.8.2015	SYKE MRC
	Ilkka Lastumäki	17.-19.8.2015	SYKE MRC
	Outi Setälä	17.-19.8.2015	SYKE MRC
	Sirpa Lehtinen	17.-19.8.2015	SYKE MRC
	Heidi Hällfors	17.-19.8.2015	SYKE MRC
	Tero Purokoski	17.-19.8.2015	FMI
	Timo Laaksonen	17.-19.8.2015	SYKE
	Jere Riikonen	17.-19.8.2015	SYKE MRC
	Pekka Kosloff	17.-19.8.2015	FMI
	Juha Flinkman	17.-19.8.2015	SYKE MRC
	Eetu Savilahti	17.-19.8.2015	FMI
	Andrey Sharov	17.-19.8.2015	RAS, Russia
	Anna Grzyb	17.-19.8.2015	UG, Poland
	Richard Horaeb	17.-19.8.2015	NatMIRC, Namibia

SYKE MRC: Finnish Environment Institute, Marine Research Centre, FMI: Finnish Meteorological Institute

Description of the cruise

Combine 3 cruise concentrates on monitoring the physical, chemical and biological parameters of the water column, with emphasis on phyto- and zooplankton according to HELCOM COMBINE Program. In addition, phycotoxins and marine litter was monitored. The cruise (leg 2) covered the Gulf of Finland (Fig. 1).
Intercalibration samples for phyto- and zooplankton were collected for Russian scientists. There were also visiting researchers from Poland and Namibia to take part to the experiments conducted with zooplankton and microplastics. In addition towed zooplankton samplers were tested for further use in zooplankton monitoring. These vehicles were CPR (continuous zooplankton recoreder), Gulf-V sampler and Multinet.

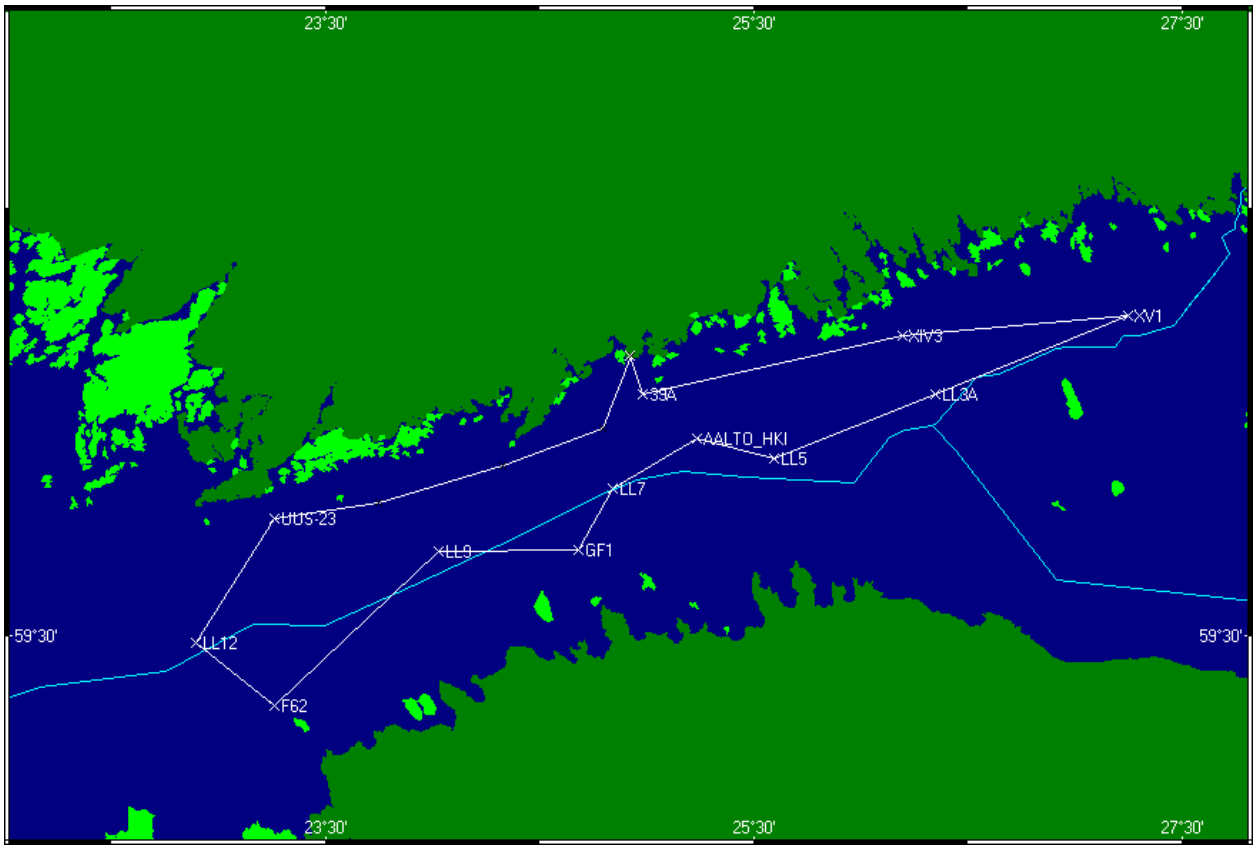

Figure 1. Route and sampling stations during COMBINE 3 leg 2 2015 cruise (17- 19 August 2015).

Combine 3, leg 2 sailed from Helsinki on Monday 17th August 2015 at 12 o'clock. During the cruise the HELCOM Combine pelagic monitoring stations were sampled (Fig. 1, Table 2).

Observations

Deep water oxygen conditions were much better compared to year 2014 (Fig. 2). In the middle of the Gulf of Finland the better oxygen conditions can be seen close to the bottom (Fig. 3). This is mainly due to the weather conditions during summer 2015, which prevented the anoxic deep water inflow from the Baltic Proper to the Gulf of Finland. However still the western parts of the Gulf of Finland suffered from oxygen depletion and even from hypoxia (Fig. 2).

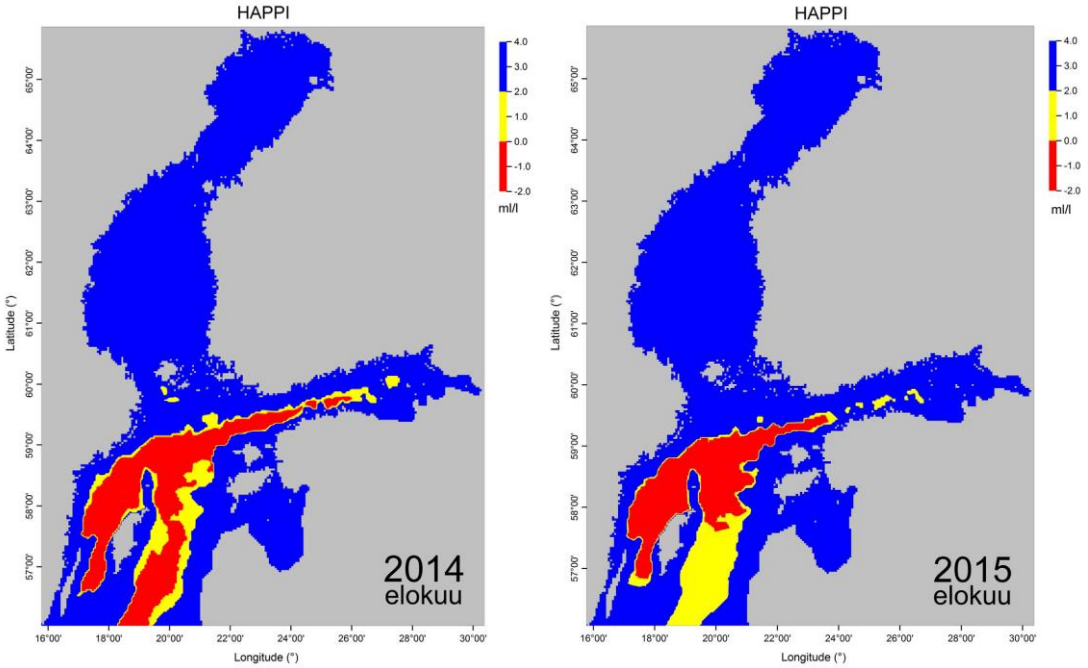

Figure 2. Oxygen conditions on the bottom in August 2014 and 2015.

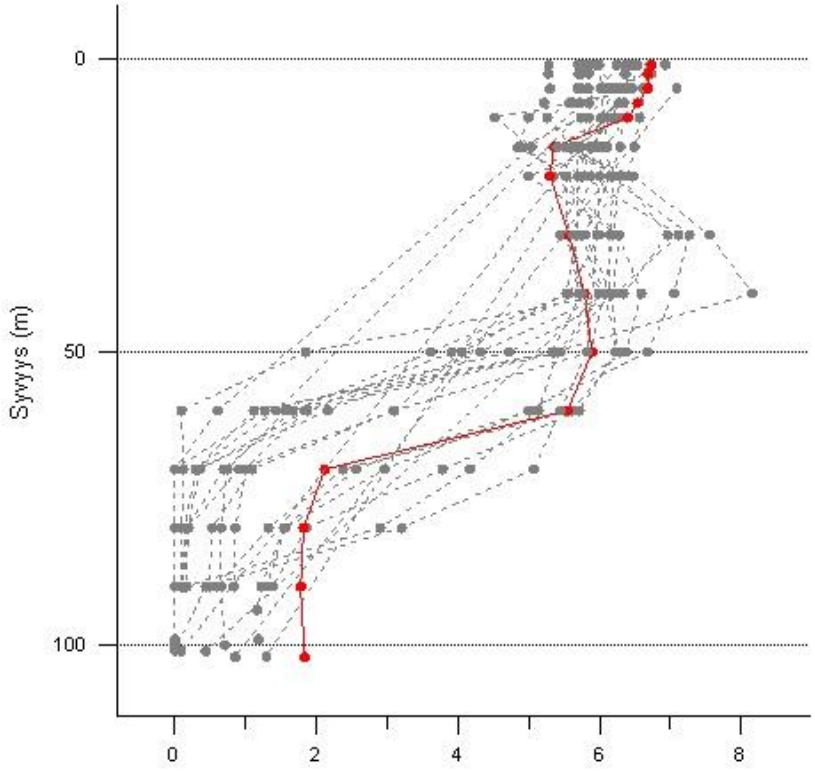

Figure 3. Oxygen profiles on the station LL7 in the middle of the Gulf of Finland 1997-2015. Profile of the present cruise is shown with red color. Depth (m) on y-axis, oxygen level (ml $^{-1}$l) on the x-axis.

The oxygen situation and nutrient levels in the deep water areas of the Gulf of Finland studied during the Aranda cruise are significantly influenced by the intermittent inflow of low-oxygen deep water from the Baltic Sea's main basin into the Gulf of Finland.

Phosphate and total phosphorus levels were (Fig. 4) on average levels compared over the last ten years over the whole Gulf of Finland.

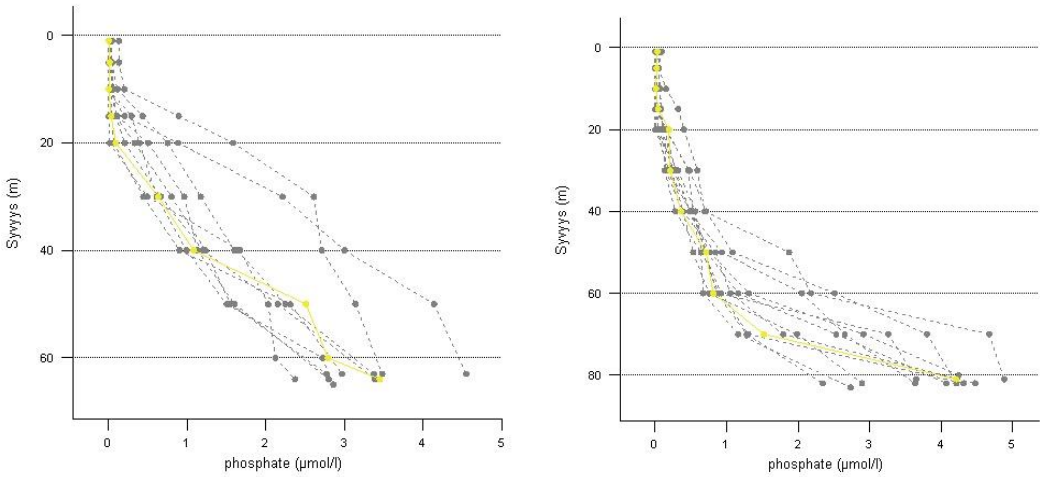

Figure 4. Phosphate levels in the easternmost station XV1 (left) and on the westernmost station LL12 (right) in the Gulf of Finland 1997-2015. Profile of the present cruise is shown with yellow color. Depth (m) on y-axis, phosphate level (µmol $^{-1}$l) on the x-axis.'

The first effects of the salt water intrusion that came to the Baltic Sea in late autumn 2014 and has been flowing towards the north 8 months could be seen in the entrance to the Gulf of Finland as increased phosphate levels in the middle of the water column from 35 to 60 m depth (Fig. 5) as the deep water phosphate water has been pushed up and mixed to the upper water layers.

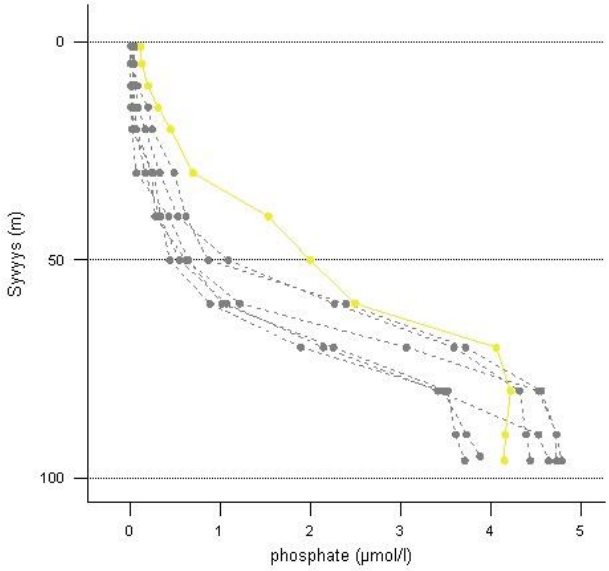

Figure 5. Phosphate levels at the southwestern station F62 in the entrance to the Gulf of Finland 2008-2015. Profile of the present cruise is shown with yellow color. Depth (m) on y-axis, phosphate level (µmol $^{-1}$l) on the x-axis.

The newer monitoring parameters include phycotoxins and surface microlitter. Phycotoxins are concentrated from water samples collected with a 30L water sampler (Fig. 6) from 10, 7.5, 5, 2.5 m and surface water. Phycotoxins were sampled from 3 stations in the Gulf of Finland (Table 2).

Microlitter monitoring was conducted with a Manta trawl (mesh size 330 µm) by horizontal tows of 10 minutes in the water surface on 6 sampling stations (Fig. 7, Table 2).

Figure 6. Launch of the water sampler used for monitoring phycotoxins from different water layers (between 0-10m). Photo: Maiju Lehtiniemi.

Figure 7. Launch of the Manta trawl used for monitoring microlitter particles in the surface water. Photo: Maiju Lehtiniemi.

Table 2. Summary of parameters collected at sampling stations during 17th-19th August 2015.

Index	*532*	*533*	*534*	*535*	*536*	*537*	*538*	*539*	*540*	*541*	*542*	*543*
Parametres/ Station	39A	XIV3	XV1	LL3A	LL5	AALTO_HKI	LL7	GF1	LL9	F62	LL12	LÄNGDEN/UUS23
Oil sample				X			X					
CTD-Salinity	x	x	x	x	x	x	x	x	x	x	x	x
CTD-Temperature	x	x	x	x	x	x	x	x	x	x	x	x
CTD-Oxygen	x	x	x	x	x	x	x	x	x	x	x	x
CTD-Fluorescence	x	x	x	x	x	x	x	x	x	x	x	x
Bottom salinity	x	x	x	x	x		x	x	x	x	x	x
Secchi depth	x	x			x		x	x			x	x
Bottom oxygen	x	x	x	x	x		x	x	x	x	x	x
H_2S										x	x	
pH	x	x	x	x	x		x	x	x	x	x	x
PO_4-P	x	x	x	x	x		x	x	x	x	x	x
NO_3-N	x	x	x	x	x		x	x	x	x	x	x
NO_2-N	x	x	x	x	x		x	x	x	x	x	x
SiO_4	x	x	x	x	x		x	x	x	x	x	x
TN	x	x	x	x	x		x	x	x	x	x	x
TP	x	x	x	x	x		x	x	x	x	x	x
a-Chlorophyll	x	x	x	x	x		x	x	x	x	x	x
Phytopl. Integr.			x	x			x			x	x	x
Phycotoxins			x	x			x					
Zoopl.- net		x	x	x			x	x	x	x	x	x
Microlitter		x	x	x			x		x			x

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