

FINNISH INSTITUTE OF MARINE RESEARCH

## CRUISE REPORT



*R/V Aranda*

Cruise 5 / 2001

*23 - 27 April 2001*

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

Finnish Institute of Marine Research  
Lyypekinkuja 3  
P.O. Box 33  
FIN-00931 HELSINKI  
FINLAND

PHONE: +358 9 613 941  
FAX: +358 9 61394 494  
<http://www.fimr.fi>

# HYMNE1

**Cruise:** 5/2001, HYMNE1 (23. - 27. April 2001)  
**Chief scientist:** Pekka Alenius  
**Master:** Pertti Lahti

## INTRODUCTION

The fifth cruise of R/V Aranda in 2001 was the first one of two planned joint cruises of two projects funded by the European Commission. The projects are HYMNE (Hydrographic monitoring of the Neva Bight) and FinGulf.

The EU partners of HYMNE are GKSS Research Center in Geesthacht, Germany, Brockmann Consult in Geesthacht, Germany, University of Dundee in United Kingdom and Finnish Institute of Marine Research (FIMR) in Helsinki, Finland. The Russian partners of HYMNE are the Electrotechnical University of St.Petersburg, Arctic and Antarctic Research Institute in St.Petersburg, Russian State Hydrometeorological University in St.Petersburg and Independent Consulting and Investigation Center (ICIC) in Moscow.

The EU partners of FinGulf are Nansen Environmental and Remote Sensing Center in Bergen, Norway and Finnish Institute of Marine Research in Helsinki, Finland. The Russian partners of the FinGulf project are Nansen International Environmental and Remote Sensing Center in St.Petersburg, Northern Water Problems Institute in Petrozavodsk and Zoological Institute of the Russian Academy of Sciences in St.Petersburg.

The project HYMNE aims at developing cost effective well validated system for monitoring and predicting the most relevant parameters describing the environmental conditions of the Neva bight. The role of the cruise in that project was to get ground truth data for validating remote sensing methods and to get data for analysis of the external effects of the Neva outflow to the whole Gulf of Finland. The project FinGulf aims at describing the environmental state of the eastern Gulf of Finland and to develop strategic means to monitor the environmental state and to develop tools for environmental decision makers.

The cruise began by taking samples just outside of Helsinki. Then the cruise continued towards the eastern Gulf of Finland where a section across the gulf was measured on Finnish and Estonian waters.

R/V Aranda entered the Russian territorial waters on Tuesday 24<sup>th</sup> of April 2001 and sailed directly to St.Petersburg pilot point outside Kotlin island. The research work began right after a military observer from Russia entered the ship on Wednesday afternoon 25<sup>th</sup> April 2001. Because of time constraints of R/V Aranda, research was conducted only until midnight on Thursday 26 of April. On the morning of Friday 27 of April 2001 R/V Aranda returned to St.Petersburg pilot point to leave the observer.

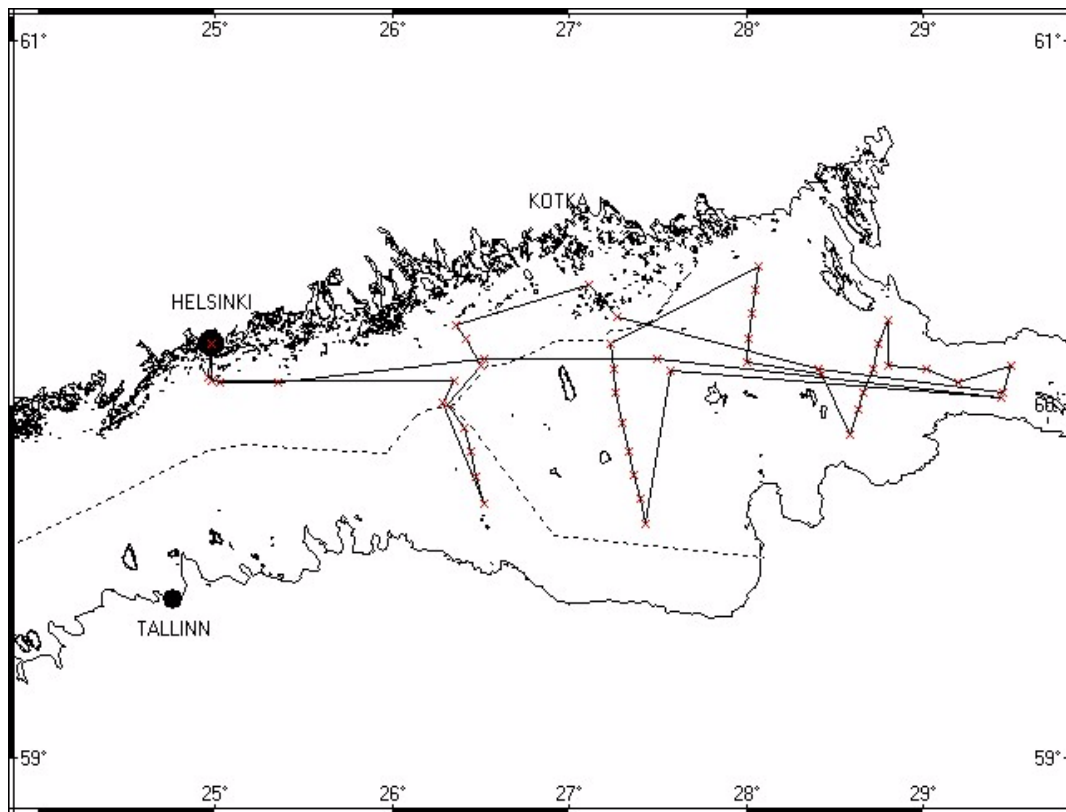


Figure 1. Cruise route and observation stations during R/V Aranda cruise HYMNE1 23.-27.4.2001.

### ***Weather conditions***

The weather was a most nice calm spring weather during the whole cruise. Average air temperature was 10.7°C varying between 3 and 20°C. The largest numbers reflect direct sun light at the temperature sensor area, but occasionally the weather was like in mid-summer. Sea surface temperature was on the average 4.5°C varying between 0.2 and 8.7°C. At some areas there was still ice on the sea, but on other areas the direct solar radiation has already warmed up the surface layer considerably. Air pressure was high, between 1004 and 1016 hPa and was rising during the cruise. Average wind speed was only 4.8 m/s varying between 0.2 and 11 m/s. The wind direction was mostly from east-south-east. The sea surface was very calm. There was rather much fog formation occasionally during the cruise.

The weather can be considered ideal for studies of influence of river inflow to the sea, because the wind effects were practically absent.

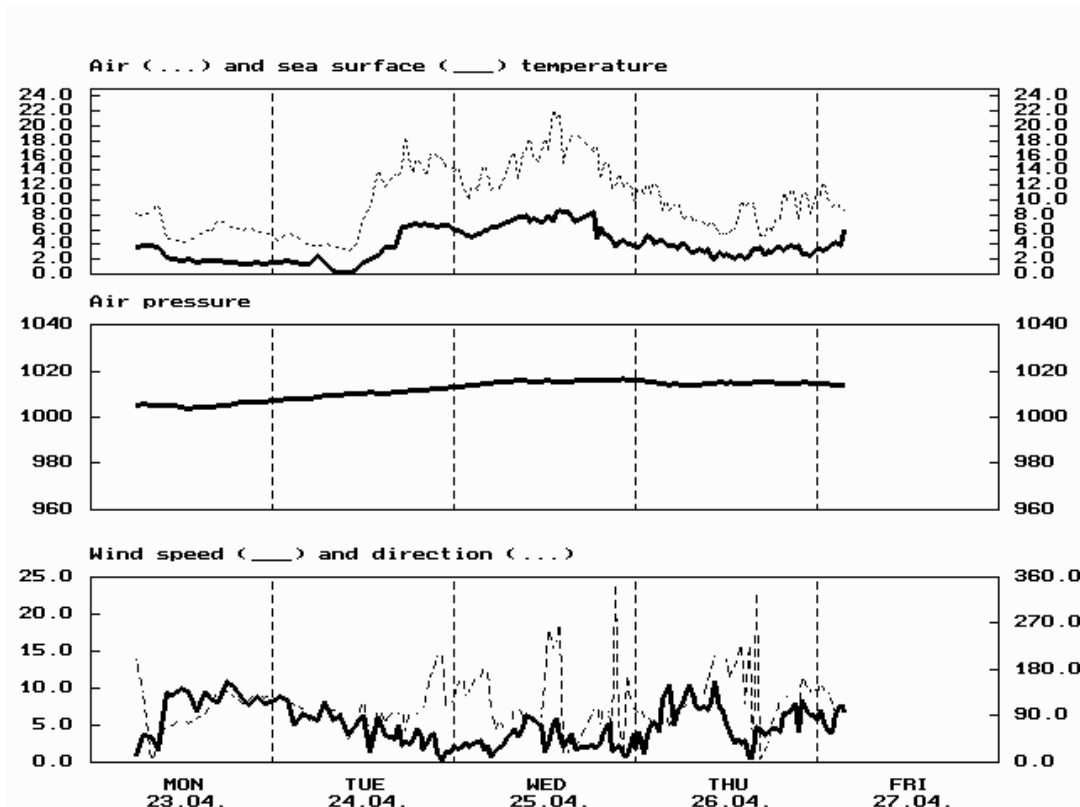


Figure 2. Weather conditions during the R/V Aranda cruise HYMNE1, 23.-27.4.2001 from Helsinki to St. Petersburg.

## HYDROGRAPHIC CONDITIONS

### *Temperature*

The sea surface temperature structure showed typical late spring situation where the latest melting ice fields are found in the north-eastern most parts of the Gulf of Finland. On the same time the intensive solar radiation is warming the surface layer of the sea. At the shallow stations in the east the sea surface temperature rose during the sunny day to well over 6°C having a gradient of roughly 1°C/m at the uppermost 5 m layer. Vertical convection has stopped almost at every station except the one that still had ice on the surface. The seasonal thermocline has begun to form up. The minimum temperature layer was between 5 and 15 m depth depending on the location.

### *Salinity*

The surface salinity near the Kotlin island was below 1, but almost 5 at 15 m depth. The vertical salinity gradient was rather strong (1/3 m) at all of the stations most near to the Neva bight.

The salinity values were higher towards south indicating the river flow along the northern coast of the gulf.

There was clear halocline even at depths of 20-25 m.

## Oxygen

Oxygen concentrations were naturally high at the surface (over 9.5 ml/l). However, the near bottom values were much smaller, even below 4 ml/l. The oxygen concentration profiles were mirror images to the density profiles. There was a jump in the oxygen at the halocline. This may indicate poor oxygen conditions in the deeper areas during the coming summer.

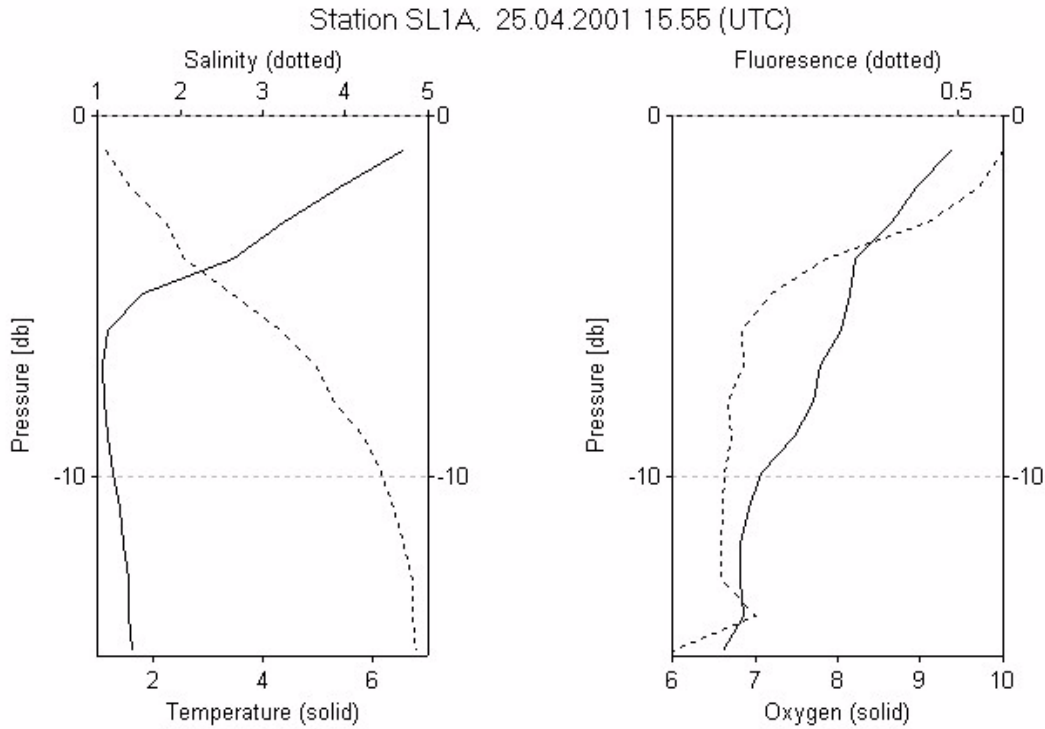


Figure 3. CTD-profiles from station SL1A (index 197) from the eastern Gulf of Finland.

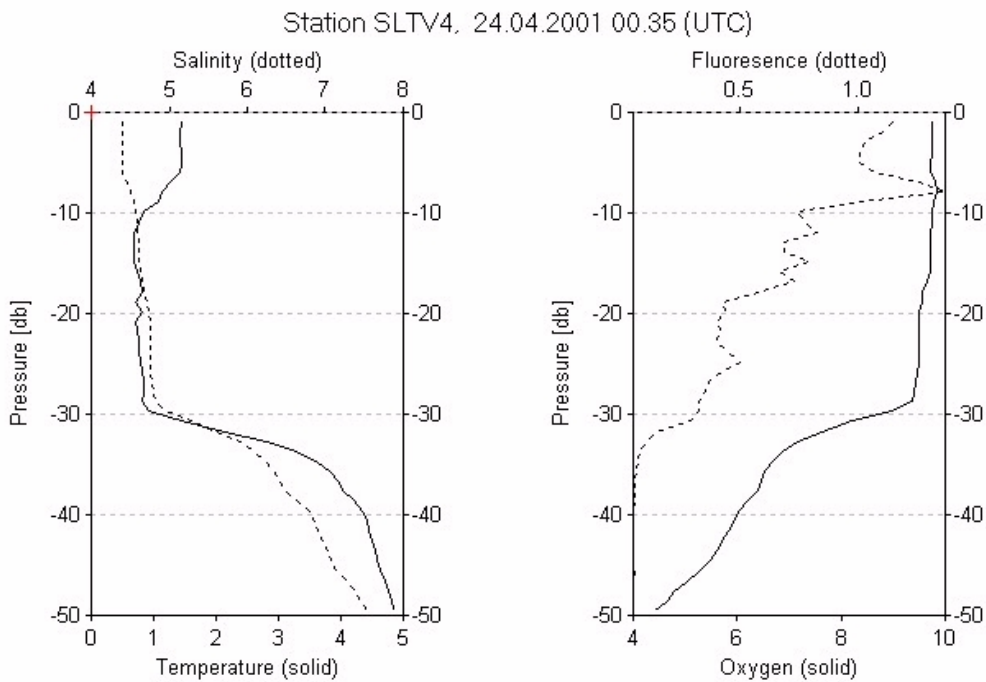


Figure 4. CTD-profiles from station SLTV4 (index 192) from the middle of the Gulf of Finland.

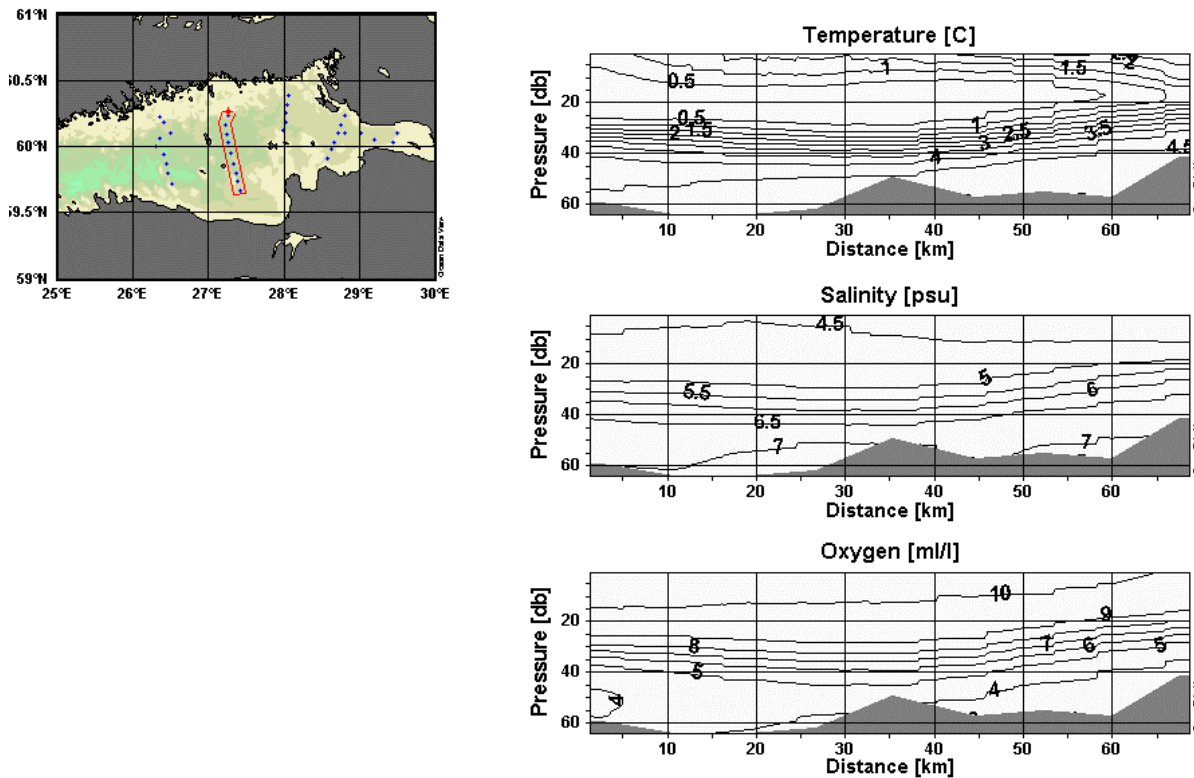


Figure 5. CTD-section across the eastern basin of the Gulf of Finland. Distance is counted from north (left hand side of the sections) to south.

## CHEMICAL OBSERVATIONS

One of the central items of the cruise was the determination of sea water alkalinity. Water samples for alkalinity determinations were taken at most of the stations at least from the surface and from near bottom water. At many stations water samples from intermediate depths were taken, too.

Concentrations of the dissolved nutrients (no totals) were measured during the cruise at many stations. The samples for surface water represent values from the first meter of the surface layer. The near bottom samples were taken approximately from 1 m above the bottom. Phosphate concentrations at the surface varied between 0.06 and 0.72  $\mu\text{mol/l}$  and near bottom phosphate varied between 0.58 and 2.84  $\mu\text{mol/l}$ . Silicate values at the surface were in the range of 5.50-15.40  $\mu\text{mol/l}$  and near bottom values in the range 12.5-36.5  $\mu\text{mol/l}$ . Nitrate values at the surface were in the range of 0.02-22.54  $\mu\text{mol/l}$  and near surface values in the range of 5.8-15.5  $\mu\text{mol/l}$ . Nitrite values were at the surface in the range of 0-0.49  $\mu\text{mol/l}$  and near the bottom in the range of 0.02-0.19  $\mu\text{mol/l}$ . Ammonia values at the surface were in the range of 0.15-2.08  $\mu\text{mol/l}$  and near the bottom in the range of 0.10-2.54  $\mu\text{mol/l}$ . The large ammonia value near the bottom was observed at one single station where the near bottom waters suffered from low oxygen concentration (less than 3 ml/l). The highest nutrient concentrations were found at the stations most near to the Neva bay.

## Participants

Chief scientist:	Pekka Alenius	Finnish Institute of Marine Research (FIMR)
Observer:	Oleg Churkin	(25.-27. May 2001)
Scientific team:	Matti Perttilä	Finnish Institute of Marine Research (FIMR)
	Oleg Andrejev	Finnish Institute of Marine Research (FIMR)
	Riikka Hietala	Finnish Institute of Marine Research (FIMR)
	Maija Hälvä	Finnish Institute of Marine Research (FIMR)
	Ilkka Lastumäki	Finnish Institute of Marine Research (FIMR)
	Pekka Punakivi	Finnish Institute of Marine Research (FIMR)
	Timo Ihatsu	Olari High School
	Katriina Matilainen	Olari High School
	Juan Prajogo	Olari High School

Departure from HELSINKI on Monday 23.04.2001.

Arrival to HELSINKI on Friday 27.04.2001.

**TABLE 1. List of stations (CTD includes oxygen profile, O2 is oxygen determined from water sample, Alk is alkalinity measurement, Nut means dissolved nutrients and Sec denotes to Secchi depth measurement):**

Index	Station	Latitude [aa.mmmm]	Longitude [aa.mmmm]	Depth	Date	EET- Time	Parameters
186	39A	60.0400	24.5900	41	23.04.2001	12:58	CTD,O2,Alk,Nut
187	LL3A	60.0400	26.2100	66	23.04.2001	18:00	CTD,O2,Alk,Nut
188	SLTV8	59.4331	26.3118	84	23.04.2001	22:15	CTD,O2,Alk,Nut
189	SLTV7	59.4782	26.2830	70	24.04.2001	00:43	CTD
190	SLTV6	59.5208	26.2687	64	24.04.2001	01:35	CTD
191	SLTV5	59.5612	26.2422	77	24.04.2001	02:35	CTD
192	SLTV4	60.0000	26.1900	64	24.04.2001	03:33	CTD
193	SLKO3	60.0649	26.3023	49	24.04.2001	04:55	CTD
194	SLKO2	60.1101	26.2487	42	24.04.2001	05:55	CTD
195	SLKO1	60.1326	26.2177	25	24.04.2001	06:40	CTD,O2,Alk,Nut
196	SLHA1	60.1444	27.1611	61	24.04.2001	10:20	CTD,O2,Alk,Nut
197	SL1A	60.0202	29.2683	20	25.04.2001	18:50	CTD,O2,Alk,Nut,Sec
198	F40E	60.0652	29.2983	22	25.04.2001	19:57	CTD,O2,Alk,Nut,Sec
199	SL2	60.0352	29.1182	29	25.04.2001	21:29	CTD,O2,Alk,Nut
200	F40A	60.0602	29.0132	33	25.04.2001	22:48	CTD,O2,Alk,Nut
201	F40	60.0643	28.4830	38	26.04.2001	00:06	CTD,O2,Alk,Nut
202	SLTJ1	60.1400	28.4800	32	26.04.2001	01:29	CTD,O2,Alk,Nut
203	SLTJ2	60.1000	28.4500	37	26.04.2001	02:23	CTD
204	SLTJ3	60.0600	28.4300	38	26.04.2001	03:23	CTD,O2,Alk,Nut
205	SLTJ4	60.0200	28.4000	33	26.04.2001	04:18	CTD,Alk
206	SLTJ5	59.5900	28.3800	27	26.04.2001	05:08	CTD,Alk
207	SLTJ6	59.5500	28.3500	27	26.04.2001	05:53	CTD,O2,Alk,Nut
208	SLVI5	60.0700	28.0000	43	26.04.2001	08:59	CTD,O2,Alk,Nut,Sec
209	SLVI4	60.1100	28.0100	46	26.04.2001	10:04	CTD,Alk
210	SLVI3	60.1500	28.0200	40	26.04.2001	11:09	CTD,Alk,Nut
211	SLVI2	60.1900	28.0300	41	26.04.2001	12:21	CTD,Alk
212	SLVI1	60.2300	28.0400	34	26.04.2001	13:11	CTD,O2,Alk,Nut,Sec
213	SLHA2	60.1000	27.1400	65	26.04.2001	16:34	CTD,O2,Alk,Nut
214	SLHA3	60.0600	27.1500	70	26.04.2001	17:37	CTD,Alk
215	SLHA4	60.0200	27.1600	63	26.04.2001	18:31	CTD,O2,Alk,Nut
216	SLHA5	59.5700	27.1800	50	26.04.2001	19:49	CTD,Alk,Sec
217	SLHA6	59.5200	27.2000	57	26.04.2001	20:40	CTD,Alk
218	SLHA7	59.4800	27.2200	57	26.04.2001	21:35	CTD,O2,Alk,Nut
219	SLHA8	59.4400	27.2400	58	26.04.2001	22:34	CTD,Alk
220	SLHA9	59.4000	27.2600	43	26.04.2001	23:21	CTD,O2,Alk,Nut