

Cruise report Merian cruise M12-4a Bremerhaven – Stockholm 25.8.2009 – 9.9.2009

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On Merian cruise M12-4a project partners from 4 different BONUS projects participated: *INFLOW*, *BALTIC-C*, *AMBER*, and *BALTIC GAS*. The cruise was organized by the Baltic Sea Research Institute with Dr. Falk Pollehne as chief scientist. A total of 37 stations were visited. The work programme was a mixture of spacial surveys of geological and pelagic variables. Stations for *BALTIC GAS* activities were restricted to the Gotland Deep, Aland Sea, Bothnian Bay and Bothnian Bight, as there have been no published data on the distribution, depth, and abundance of methane in sediments from the oligotrophic, low-salinity northern Baltic Sea. In sediments from all stations, gas bubbles formed shortly after core retrieval on deck indicating the presence of abundant methane in the sediment. Sediment acoustic echosounder data are not available from this cruise because no permit for sediment acoustic work could be obtained from the Swedish authorities. Sampling activities focused on water column and sediment profiling to determine methane concentrations, and the extraction of porewater from multicores and gravity cores to determine the concentration of methane, sulfate, sulfide, DIC, ammonium, and dissolved iron and manganese. In addition, ^{35}S -sulfate reduction rate experiments were conducted on intact surface sediment cores from nine stations. ^{14}C -methanogenesis experiments were conducted on gravity cores from two stations. The analyses of the samples is ongoing. An extensive set of multicores and gravity cores were also archived for later analyses of physical properties and for bulk geochemical analysis at IOW (Rudi Endler and Thomas Leipe).

The participation of four BONUS projects on this cruise opened the opportunity for direct collaboration between the different project partners. For the project *INFLOW* multicores and gravity cores were taken in the Kattegat/Skagerrak and the western Baltic to study the historic development of saline deep water inflow into the Baltic by geological analysis of proxies of North Sea origin. An extensive water column filtration/sediment trap sampling program was conducted to study the composition, size spectrum, sinking rates, and decomposition of particles (*AMBER*). Within the project *AMBER* the effects of changing input of dissolved organic carbon to the Baltic Sea, on the background of a changing climate, were investigated by filtering large volumes of surface water to determine $\delta^{13}\text{C}_{\text{DOC}}$ and $\delta^{34}\text{S}_{\text{DOS}}$. *BALTIC-C*

activities focused on continuous measurements of surface waters as well as discrete CTD/Rosette samples and pump-CTD samples for alkalinity, pCO₂, and N₂ determination.

Table 1. Sampling summary for BALTIC GAS project

Station Name	Station Nr	Proposal Station	Geology Station Alias	CTD bottle file	Latitude/Longitude
12-4_031	Stn 0026	W2	--	0022F04	GPS: 57 18.0218N 020 02.2342E
12-4_032		Inflow 10	372740		GPS: 57 23.1200N 020 15.4800E
12-4_034	Stn 0030	S9	372770	0025F02	GPS: 60 12.8628N 019 01.7975E
12-4_035	Stn 0031	S10	372780	0026F02	GPS: 60 59.0654N 019 34.8896E
12-4_036	Stn 0032	Stn 11	372790	0027F03	GPS: 62 39.9892N 020 01.0263E
12-4_037	Stn 0033	Stn 12	372800	0028F02	GPS: 64 17.0703N 022 27.8896E
X_0034	Stn 0034	Stn 15s	--	0029F02	GPS: 65 41.6852N 023 04.9725E
12-4_041	Stn 0035	Stn 15	372810	0030F02	GPS: 65 41.0246N 023 10.0360E
12-4_048	Stn 0037	S13a	372820	0032F02	GPS: 65 10.7043N 023 05.7283E
12-4_045	Stn 0044	S18		0036F02	GPS: 61 46.0195N 019 17.0920E
12-4_046	Stn 0043	S19		0035F02	GPS: 62 25.1680N 019 05.4637E
12-4_049	Stn 0045	S10		0037F02	GPS: 61 04.9941N 019 35.0099E

Station Name	³⁵ S-SRR	Porewater GC	Porewater MUC	WC Methane	MUC Methane	GC Methane	¹⁴ C-Methanogenesis
12-4_031				x			
12-4_032	x	x	x		x	x	x
12-4_034	x		x		x		
12-4_035	x	x	x	x	x	x	
12-4_036	x		x		x		
12-4_037	x	x	x	x	x	x	x
X_0034				x			
12-4_041	x		x		x		
12-4_048	x	x	x	x	x	x	
12-4_045				x			
12-4_046				x			
12-4_049				x			

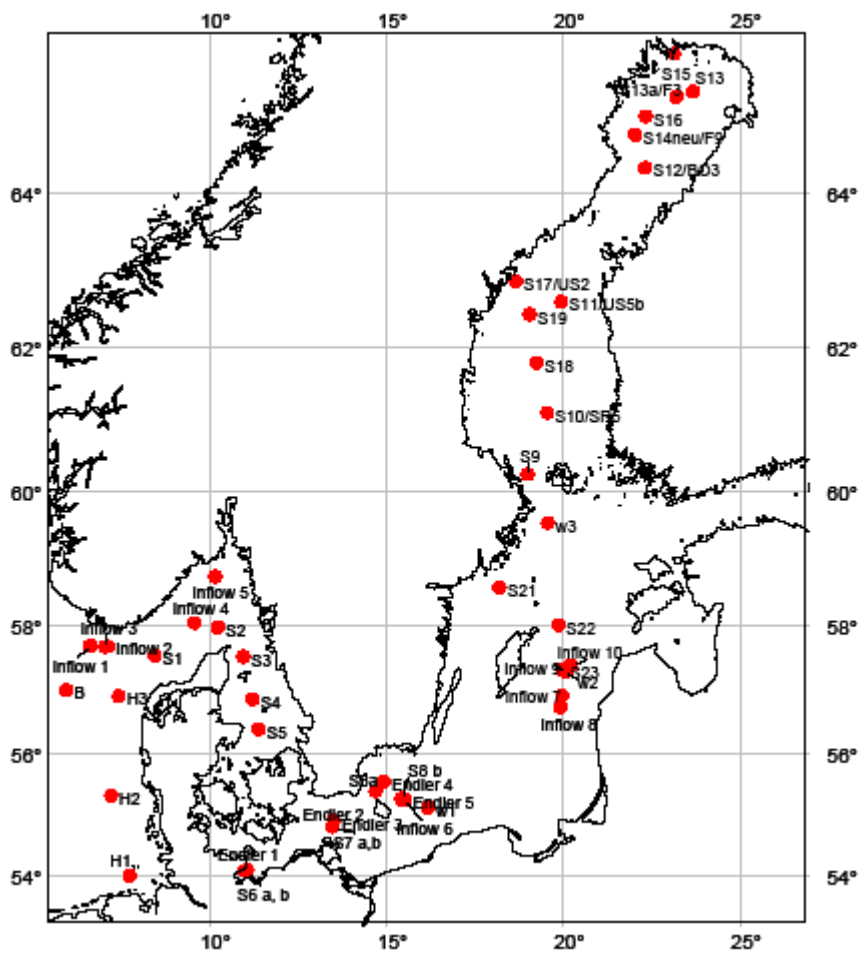


Figure 1. Station map. Cruise M12-4a.

Figure 2. Multicorer from Station 372820 Bothnian Bight



Figure 3. 8.50 m-long gravity core from Station 372740 (Gotland Deep) with pronounced laminations. Top of core upper right.

