INSTITUT FÜR OSTSEEFORSCHUNG WARNEMÜNDE
an der Universität Rostock BALTIC SEA RESEARCH INSTITUTE

# Leibniz Institute for Baltic Sea Research Warnemünde

## C r u i s e R e p o r t

r/v "Professor Albrecht Penck"

Cruise- No. 07PE0809

This report is based on preliminary data

Institut für Ostseeforschung Warnemünde
an der Universität Rostock
Seestraße 15
D-18119 Rostock- Warnemünde
GERMANY
☎ +49-381-5197-0
🗐 +49-381-5197 440

1. **Cruise No.:** 07PE0809

2. **Dates of the cruise:** from March 5 to March 17 2009

3. **Particulars of the research vessel:**
   Name: Professor Albrecht Penck
   Nationality: Germany
   Operating Authority: Baltic Sea Research Institute (BSRI) Warnemünde

4. **Geographical area in which ship has operated:**
   Baltic Sea, more specifically the regions off Klaipeda and the Pomeranian Bay

5. **Dates and names of ports of call**
   Saßnitz, Germany

6. **Purpose of the cruise**
   Sampling of fresh water plumes that come out of the Curonian Lagoon from the Nemunas River and from the Oder Lagoon from the Oder River

7. **Crew:**
   Name of master: Uwe Scholz
   Number of crew: 10

8. **Research staff:**
   Chief scientist: Maren Voß

   Scientists: 5

   Engineers: 1

   Technicians:

9. **Co-operating institutions:**
   Partner Institutes in the EU funded Amber project:
   Coastal Research and Planning Institute, University of Kleipeda (CORPI), Lithuania;
   Prof. Dr. Jan-Marcin Weslawski, Institute of Oceanography Polish Academy of Science (IOPAS), Sopot, Poland.

10. **Scientific equipment**
    CTD with oxygen and light sensor and water bottles
    box corer
    multi corer

11. **General remarks and preliminary result** (ca. 2 pages)
    First station was in the Arkona Sea (ABBoje) for coring and IP (isotope pairing method for the determination of denitrification rates) method. Then we steamed to the investigation area in Lithuanian waters and after finishing our work there continued to the one in Polish waters (Figure 1).
    On March 6 after sampling in the Arkona Sea we proceeded to Lithuanian waters to study the outflow from the Curonian Lagoon. Due to strong westerly winds of 9-10m $s^{-1}$ it took us until the evening of March 7 2009 to arrive there. First, we made a profile with the ships thermosalinograph from west to east for an overview of the outflow situation. The

next day we sampled along this profile with a CTD system and water bottles in 1 NM intervals and sampled 6 stations (Figure 2). We found a salinity gradient from 7.21 down to 2.92 at the station closest to Klaipeda harbour entrance which confirmed our assumption that the lagoon's outflow was strongest close to the outflow (Figure 3). Nutrients, oxygen and samples for dissolved organic nitrogen and carbon were taken. The next day (March 8) the transect was repeated for water samples. We found highest $NO_3^-$ concentrations at the third station from the Lagoon entrance with over 40µmol, while $PO_4^{3-}$ stayed more or less uniform (Figure 4). The nutrient data from the one transect is representative for the other ones too. Furthermore we selected one station for coring (0013). But the sediment was very coarse and sandy and we had major problems to collect as much sediment as needed for IP method denitrification measurements. Finally, we decided to make a reduced programme and quit sediment samples. The southerly transect off Klaipeda was investigated with the thermosalinograph and then sampled the same way as the northerly transect. In 1 NM distances we selected again six stations for water column work. The transect work was repeated on March 9. Around noon we finished our work and took course to the south.

March 10 in the evening we arrived in German waters to take cores again for denitrification measurements with the IP method at station NS11 (table 1).
On March 11 we started with our work in the Oder Bight with thermosalinograph recordings along the notified transects. Based on that picture we designed a station grid (Table 1, Figure 5) which was visited three times. We sampled the grid at 18 selected stations on three consecutive days, March 12, 13, 14. We could not visit all stations at all the days due to heavy fishing activity and had to avoid most of the coastal near stations. We found varying salinities in surface waters although winds were low during these days (Figure 6). Nevertheless our data will provide an overview of surface water nutrient concentrations and dissolved and particulate material. Highest concentrations of nitrate were up to 70µmol close to the Swina Canal and decreased rapidly towards the north and east.
Since the sediments in the Pomeranian Bay were too coarse for sediment sampling we instead took cores from the German waters around the island of Rügen. A total of seven sediment stations were sampled in the AMBER cruise in 5-17.3.2009 with R/V Professor A. Penck. Six sampling stations were located in the Arkona area and one in Curonian Lagoon. (Table 2).
The purpose of the sampling was to measure denitrification/anammox rates and nitrification rates. Additionally sediment porewater nutrient profiles, sediment characteristics and nutrient fluxes were measured. The denitrification/ anammox rates were measured by using revised isotope pairing techniques (r-IPT). Nitrification was measured by using the $^{15}NH_4^+$ oxidation method. The nutrient fluxes and the sediment characteristics were analyzed by using standardized methods.
The denitrification/anammox rates will help to estimate the nitrogen removal capacity of the sediments in these areas. As nitrification is providing the substrate for denitrification/anammox, the nitrification rate measurements will give insight to the parameters controlling nitrogen removal. Overall these measurements will help to understand the nitrogen dynamics of the Baltic Sea.
Due to strong winds a visit at the Arkona platform was cancelled and we returned a day earlier than originally planned. We arrived in Rostock harbour March 17 2009. We are very grateful for the uncomplicated communication and the generous support by the coastal authorities of Klaipeda and Swinoujscie.

**Appendix:**

Table 1 Stationlist and Positions in the Pomeranian Bay and off Klaipeda:

| Name | lat (dec) | long (dec) |
|---|---|---|
| OBT1Sued | 53,9385833 | 14,28895 |
| OBT1Mitte | 53,9754667 | 14,28265 |
| OBT1Nord | 53,9997667 | 14,27605 |
| OBT1NordA | 54,0327667 | 14,2660833 |
| OBT3Nord | 54,01615 | 14,3280833 |
| OBT3Mitte | 53,9904333 | 14,32695 |
| OBT3Sued | 53,9438333 | 14,3151333 |
| OBT7Sued | 53,9414 | 14,3932833 |
| OBT8Sued | 53,9461333 | 14,4239333 |
| OBT8Mitt | 54,0014 | 14,4664 |
| OBT8Nord | 54,0304167 | 14,3310667 |
| OBT7Nord | 54,0324333 | 14,4292167 |
| OBT7Mitt | 53,96965 | 14,4050167 |
| OBT5Mitte | 53,9639167 | 14,3634 |
| OBT5Nord | 55,3566667 | 14,3806333 |
| KL_T1_O | 54,00040 | 14,27490 |
| X_0004 | 55,73542 | 21,02447 |
| X_0005 | 55,73717 | 20,99520 |
| X_0006 | 55,73817 | 20,96693 |
| X_0007 | 55,73838 | 20,93813 |
| KL_T1_W | 55,73868 | 20,90928 |
| KL_T2_O | 55,73513 | 21,05630 |
| X_0011 | 55,73573 | 21,02463 |
| X_0012 | 55,73727 | 20,99535 |
| X_0013 | 55,73725 | 20,96838 |
| X_0014 | 55,73842 | 20,93777 |
| KL_T2_W | 55,73840 | 20,91037 |

Table 2: Station information for sediment cores.

| # | date | depth m | lat (deg) | lon (deg) | $O_2$ ml/l | Temp. C | salinity |
|---|---|---|---|---|---|---|---|
| 1 | 5.3.2009 | 45 | 54'52,5760N | 13'50,9010E | 8 | 2.5 | 12.5 |
| 2 | 8.3.2009 | 35 | 55'44,3040N | 20'54,6220E | 8.8 | 2.5 | 7.5 |
| 3 | 10.3.2009 | 22 | 54'26,4750N | 13'44,3210E | 8.7 | 2.3 | 9.9 |
| 4 | 14.3.2009 | 7 | 54'11,3340N | 13'44,6230E | 9.2 | 2.7 | 7.3 |
| 5 | 15.3.2009 | 40 | 54'48.0580N | 13'47.5720E | 8.2 | 2.6 | 11.8 |
| 6 | 15.3.2009 | 23 | 54'36.4520N | 13'38.0810E | 9.1 | 2.5 | 8.6 |
| 7 | 16.3.2009 | 41.5 | 54’50.0250N | 13'19.9690E | 7.74 | 2.7 | 11.2 |

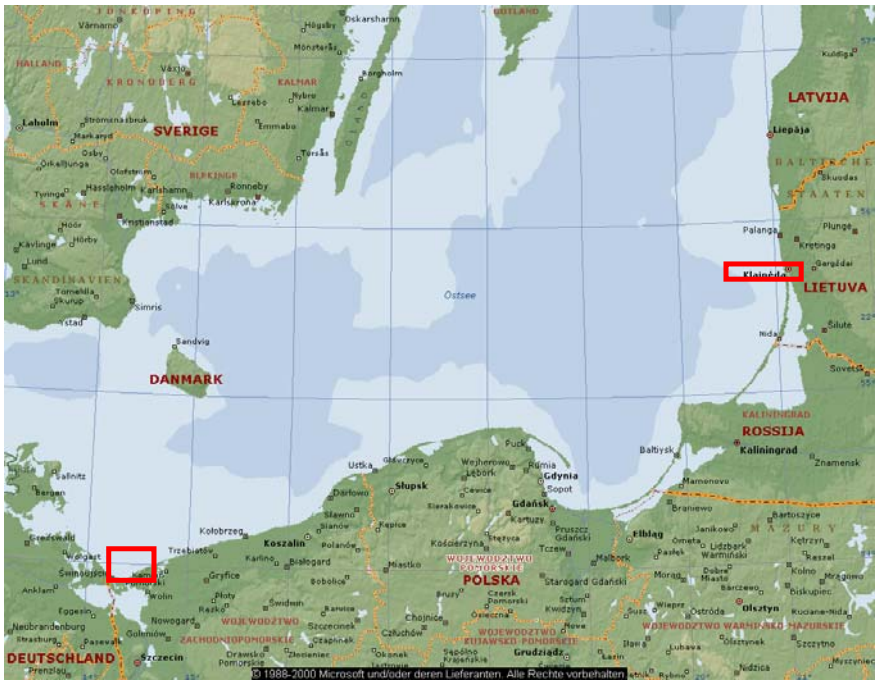


Figure 1 Overview of the Southern Baltic Sea with the rough location of the two investigation areas in Lithuanian and Polish waters marked with red squares.

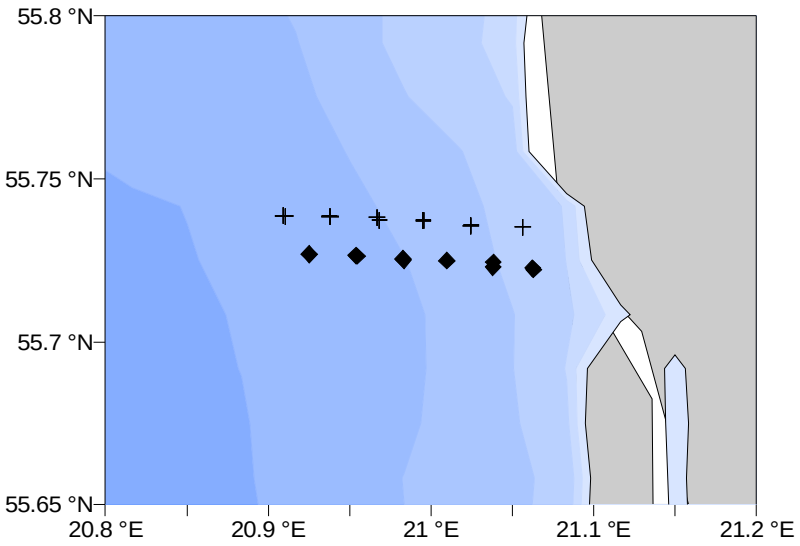


Figure 2 Station map of the Nemunas outflow. Crosses denote stations of transect 1 and diamonds denote stations of transect 2.

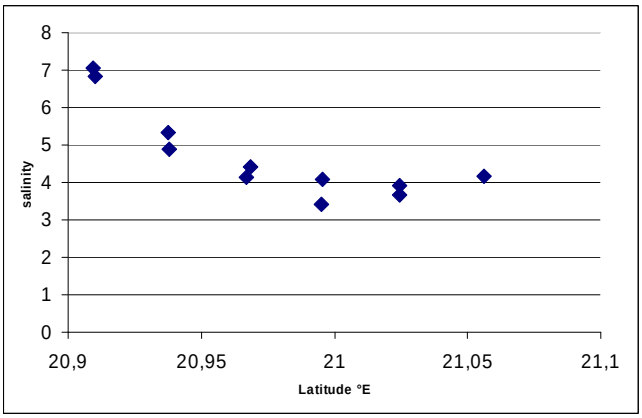


Figure 3 Salinity change along the transects off Klaipeda

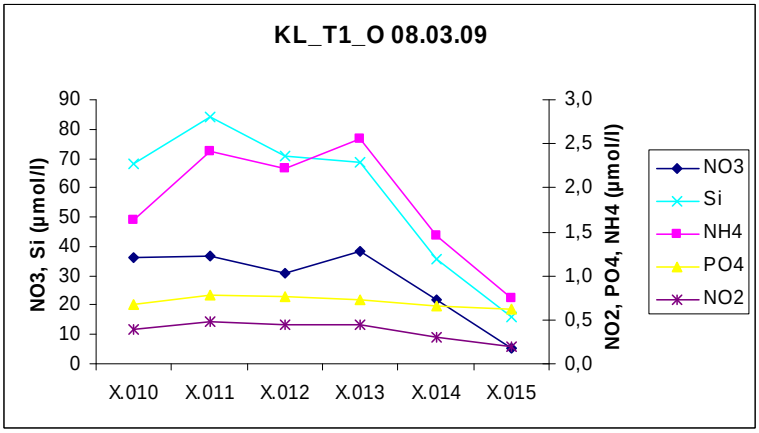


Figure 4 Nutrients along the first transect off Klaipeda at March 8. 2009. Left is the easternmost station right the westernmost station.

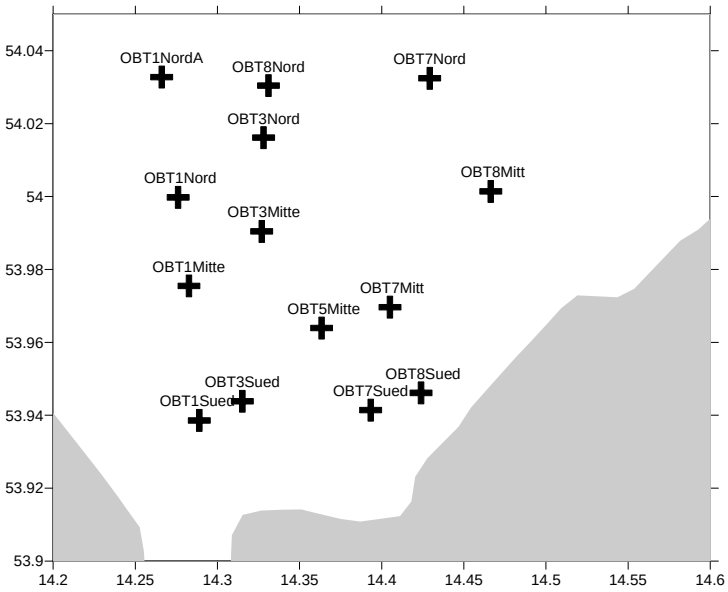


Figure 5 Station map and sampling location in the Pomeranian Bay

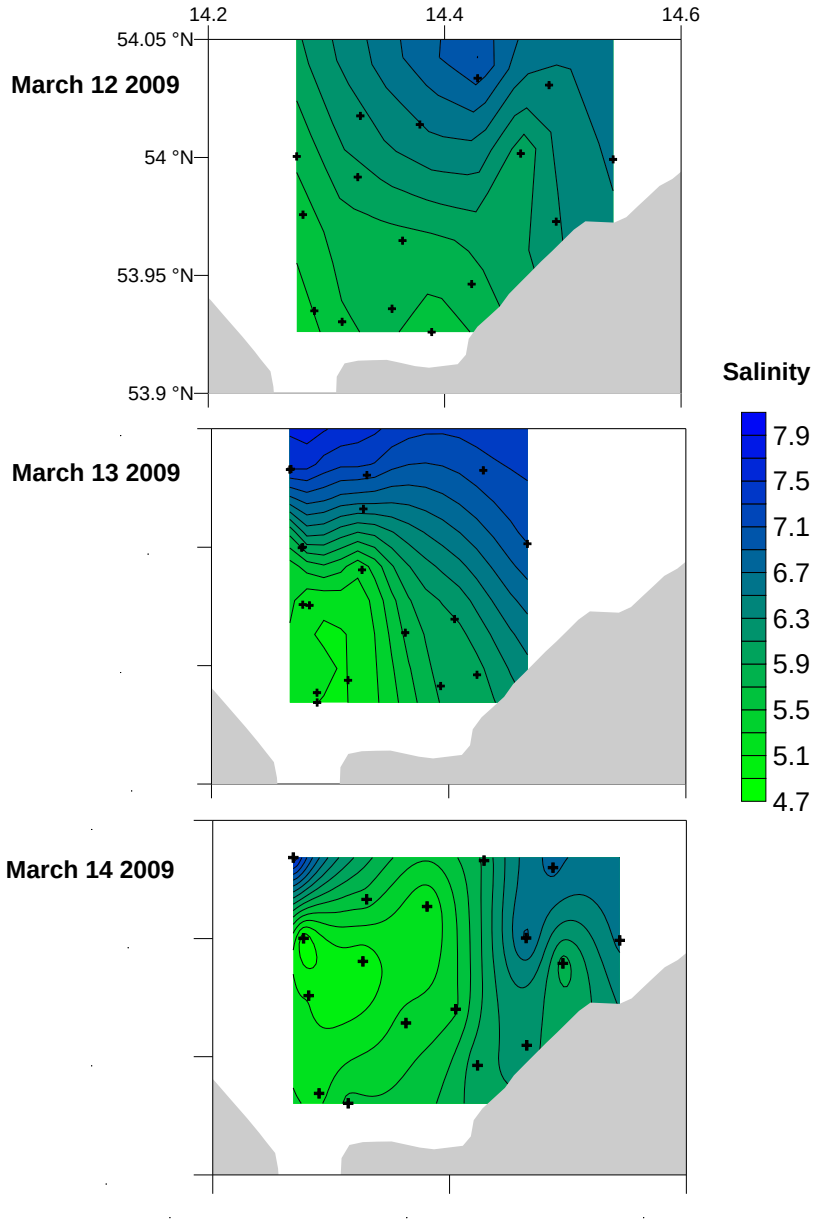


Figure 6 surface salinity isolines from the three rounds of sampling of three consecutive days. Although we had very calm weather the high dynamical motion of the outflowing plume can be seen.