

## 6.1 Sediment sampling program

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In this expedition of “Akademik Boris Petrov 2001” main objectives were studying and sampling the northern part of the Kara Sea and the Ob Estuary and Ob River in the south (Fig. 6.1). Compared to the former expeditions of the “Akademik Boris Petrov” in the years 1999 and 2000 the working area and the working time were larger (Stein and Stepanets 2000, Stein and Stepanets 2001). The working area reached ca. from 72° E until 90°E and from 78°N down to 68°N. The working time was 29 days in the working area. Due to participating of members of a Russian/Norwegian-Project it was possible to get water and sediment samples also in the Yenisei River. In the southern region of the working area the samples were taken along the salinity gradient from the outer estuaries of Ob and Yenisei down to the fresh water endmember. The water column and the sediments were generally sampled at the same stations in order to study the relationship between modern processes in the surface waters and their reflection in the surface sediments.

Based on the sediment echograph profiling the geological stations were selected. After arriving and anchoring at the station in the shallower water (water depth <70 m) the water sampling started. When this was finished the geological sampling started usually with the Okean Grab, the Giant Box Corer and the Multicorer in order to take samples from the surface and near-surface sediments. For long sediment cores the Gravity Corer was used in lengths of 3, 5 and 8 m. At the stations with deeper water depths (water depths >70 m) anchoring was not possible. Changes in the position due to drifting were documented in the stationlist.

### Okean Grab

The Okean Grab is of light weight, and therefore, needs less time to get a small amount of surface sediment.

### Giant Box Corer

The Giant Box Corer (weight of ca. 500 kg; volume of sample 50\*50\*60 cm; manufactured by Fa. Wuttke, Henstedt-Ulzburg, Germany) was successfully used 96 times on 49 stations. Three times the box was destroyed due to hard sediment surface, only two box corers were disturbed, and four box corer were overfilled due to overpenetration. The recovery generally varied between 20 and 68 cm. The box cores were sampled for the following investigations:

- surface sediments
- stable isotope analysis of benthic calcareous organisms (Geomar)

- 10\*10 from the upper 1 cm (100 cm<sup>3</sup>) fixed with bengal-rose-methanol-solution
- 10\*10 from the upper 5 mm (50 cm<sup>3</sup>)
- benthic foraminifera and stable isotopes (Shirshov-Institute)
  - 1-3 times 10\*10 from the upper 1 cm (100 cm<sup>3</sup>) fixed with bengal-rose-methanol-solution
- studies on benthic macrofauna (AWI-Biology)
- organic geochemistry (Vernadsky-Institute)
- radionuclides analysis (Norway)
- radionuclides analysis (Taifun, Moscow)
  
- profiles (tubes 120 mm in diameter)
  
- sedimentology, grain-size and clay mineralogy (AWI-Geology)
- organic geochemical bulk parameters (TOC, CaCO<sub>3</sub>, C/N-ratio, Rock Eval pyrolysis) and biomarkers as well as  $\delta^{13}\text{C}$  of specific biomarkers (AWI-Geology)
- organic geochemistry, radio-nuclides (Vernadsky-Institute)
- benthic foraminifera (Shirshov-Institute)
- radionuclides analysis (Norway)
- radionuclides analysis (Taifun, Moscow)

### Multicorer

The standard 12-tubes-version multicorer (weight of 495 kg; manufactured by Fa. Wutke, Henstedt-Ulzburg, Germany) with an inner tube diameter of 6 cm was used. The penetration weight was always 250 kg. The multicorer was successfully used 49 times on 32 stations, and usually recovered undisturbed surface sediments and overlying bottom water. Three multicorer were empty due to technical problems.

surface sediments

- Benthic oxygen consumption measurements (AWI Biology)
  - 3-4 tubes
  - Copepodes (Juveniles) (AWI-Biology)
  - 3-4 tubes, 30 – 80 cm<sup>3</sup>
  - Phyto-zoo-plankton (AWI-Biology)
  - 2-3 tubes, 20 – 60 cm<sup>3</sup>
  - stable isotope analysis of benthic calcareous organisms (Geomar)
  - 1-3 tubes, 10 – 60 cm<sup>3</sup>, from the upper 1 cm fixed with bengal-rose-methanol-solution to stain living organisms
  - inorganic geochemistry (AWI-Geology)
  - 2 tubes, ca. 20 cm<sup>3</sup>
  - clay minerals (AWI-Geology)
  - 1 tube, 10 – 20 cm<sup>3</sup>
  - palynology (AWI-Geology)
  - 1 tube, 10 – 20 cm<sup>3</sup>
  - biomarkers and  $\delta^{13}\text{C}$  of specific biomarkers (AWI-Geology)
  - 1 tube, 10 – 20 cm<sup>3</sup>, stayed frozen at -20°C
  - organic geochemical bulk parameter (TOC, C/N, Rock Eval pyrolysis, CaCO<sub>3</sub>) (AWI-Geology); 1 tube, 10 – 20 cm<sup>3</sup>
- profiles

- organic geochemical analysis ( $C_{org}/N$ , carbonate, biogenic silica (Opal), carbohydrates, amino acids) (IfBM)

1 tube, samples ( $20\text{ cm}^3$ ) from the upper 3 cm, stored frozen at  $-20^\circ\text{C}$ , tube sampled at 5 cm intervals and additionally at lithological changes, stored at  $-20^\circ\text{C}$

- organic geochemistry (Vernadsky-Institute)

In addition, bottom water (100 ml), was sampled from the multicorer tubes for stable isotope measurements (Geomar).

#### Gravity Corer

The Gravity Corer has a penetration weight of 1.5 t and is used in 3, 5 and 8 m long core barrels. The diameter is 12 cm. The gravity corer was used on 55 stations for 62 times. Only two cores were empty due to stiff or hard sediment layers near to the surface. The other cores vary in the recovery of sediments from 0.10 up to 7.43 m (Fig. 6.2, Tab. 6.1). Most of the cores showed a brownish colored sediment at the top indicating that the near-surface sediments have been recovered. After recovery the cores were cut in segments of 100 cm length and stored in the cold. Double cores were taken at 9 stations (Tab. 6.1), 10 cores were opened, described and sampled for methane/pore water/heavy mineral investigations (Tab. 6.1). Core descriptions are presented in the annex.

Table 6.1: Penetration and recovery of gravity corer. (SL-3 (5 or 8): 3 (5 or 8) m core barrel (methane: methane and pore water sampling, CC: core catcher).

Core	Recovery	Penetration	Gear	Kodina-Core	Remarks
BP01-01/9	24	50	SL-5		
BP01-03/3	689	800	SL-8		
BP01-03/4	647	800	SL-8	x	
BP01-25/2	705	830	SL-8		Position BP99-04/7
BP01-26/3	526	650	SL-8	x	Position BP99-03/7; ikaite
BP01-28/7	488	600	SL-8		
BP01-29/2	174	300	SL-5		
BP01-30/6	0	30	SL-8		Basement ("Anstehendes")?
BP01-31/6	657	800	SL-8		
BP01-32/2	638	800	SL-8		
BP01-32/3	627	800	SL-8		
BP01-33/2	743	760	SL-8		
BP01-34/7	488	530	SL-5	x	Nannos, forams in ss
BP01-34/8	433	500	SL-8		
BP01-35/6	536	650	SL-8		
BP01-36/2	616	750	SL-8		
BP01-37/6	619	800	SL-8		
BP01-38/7	624	800	SL-8		
BP01-38/8	633	800	SL-8	x	
BP01-39/2	538	750	SL-8		
BP01-40/6	193	200	SL-8		stiff clay
BP01-41-7	457	500	SL-5		
BP01-42/2	572	800	SL-8		
BP01-43/7	344	400	SL-5		
BP01-43/8	329	400	SL-5	x	
BP01-44/2	309	350	SL-8		sandy?
BP01-45/6	490	750	SL-8		
BP01-46/2	234	250	SL-5		stiff clay (overconsolidated?)
BP01-47/3	259	350	SL-5	x	stiff clay (overconsolidated?)
BP01-47/4	405	500	SL-5		stiff clay (overconsolidated?)
BP01-48/7	469	700	SL-8		
BP01-49/2	384	450	SL-5		stiff clay (overconsolidated?)
BP01-50/2	211	250	SL-5		stiff clay (overconsolidated?); Stein (3cm) außen an CC
BP01-51/5	392	600	SL-8		
BP01-52/5	369	600	SL-8		
BP01-53/2	0	0	SL-5		end morain?
BP01-54/2	10	10	SL-5		extremely stiff clay
BP01-55/5	317	350	SL-5	x	H2S: ikaite
BP01-55/6	424	500	SL-5		no H2S!
BP01-56/5	245	400	SL-5		
BP01-57/2	274	300	SL-5		
BP01-58/5	589	800	SL-8		H2S
BP01-59/5	606	800	SL-8		
BP01-60/2	29	30	SL-5		end morain?
BP01-61/7	566	800	SL-8		
BP01-62/5	580	800	SL-8		
BP01-62/6	582	820	SL-8		
BP01-63/2	14	30	SL-3		end morain?
BP01-64/6	492	600	SL-5	x	surface missing
BP01-64/7	536	800	SL-8		
BP01-65/6	56	70	SL-5		
BP01-67/7	71	100	SL-5	x	

Core	Recovery	Penetration	Gear	Kodina-Core	Remarks
BP01-68/6	11	40	SL-5		
BP01-70/7	639	820	SL-8		
BP01-71/3	234	250	SL-5		
BP01-71/4	232	250	SL-5	x	
BP01-72a/2	467	510	SL-5		
BP01-73/5	222	250	SL-5		
BP01-80/6	150	200	SL-5		
BP01-82/7	229	300	SL-5		
BP01-82/8	213	300	SL-5	x	
BP01-83/2	730	780	SL-5		Position BP00-38/2
	24340				

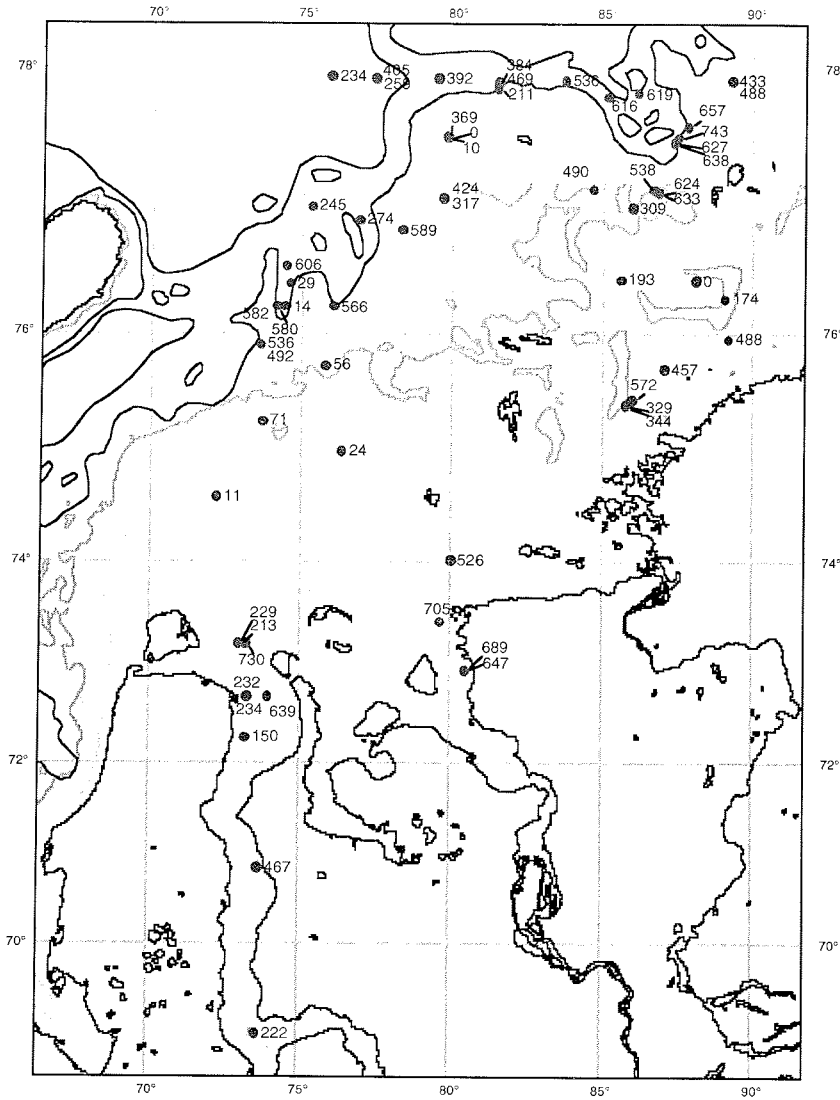


Fig. 6.1: Gravity Corer stations (SL) and recovery during „Akademik Boris Petrov“ Expedition 2001

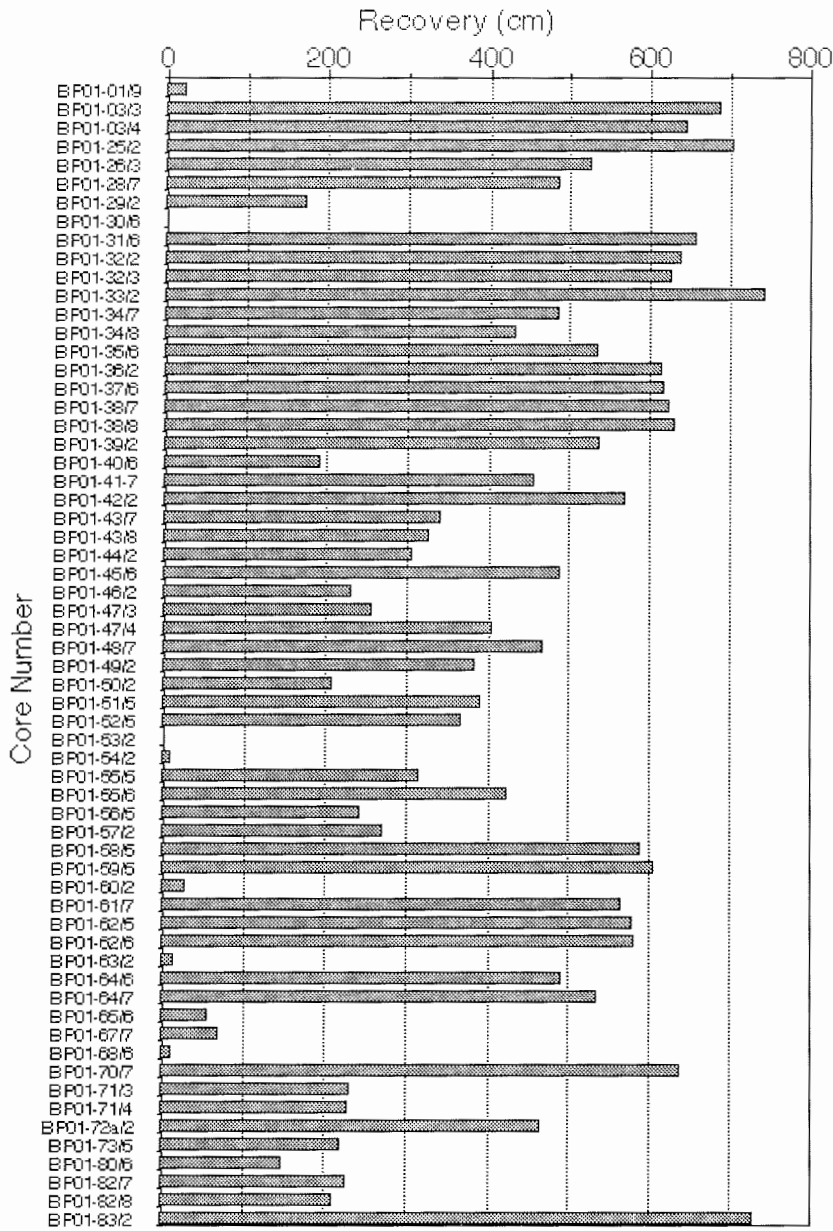


Fig. 6.2: Recovery of gravity cores during “Akademik Boris Petrov” Expedition 2001.