

4.7.3 Shore face profiles in the area of Cape Mamontov Klyk: echo sounding, seawater and sea bottom deposits sampling

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4.7.3.1. Introduction

One of the tasks of the expedition "Lena-Anabar 2003" was a determination of shore face features in the area of Cape Mamontov Klyk at the adjacent near-shore shelf. In this region, a bathymetric survey, seawater and bottom sediment sampling were carried out in August 2003. The main reason of seabed research is a purpose to conduct a relatively deep drilling on the shallow shelf from the sea ice in the nearest future. Previous shore face investigations in this sector of the Laptev Sea (near Terpay-Tumsa Cape) have been carried out in 2000 (Are et al., 2001).

4.7.3.2. Methods

Bathymetric studies were conducted with help the echo-sounding device and rubber boat with "Honda" engine. The field of bathymetric survey has occupied an area about 60 km² (4 x 15 km), between isobath 1 and 10 meters (Figure 4.7-10). The length of all bathymetric profiles exceeds 150 km. For bottom sediment and seawater sampling a standard sampling dredger and bathometer were used.

4.7.3.3. Preliminary results

As a result of bathymetric survey the bathymetric scheme of studied seabed was created. The mean shore face inclination at that part of the shelf is extremely slightly, about 0.0007. At least two quite evident sub-sea terraces (or terrace-like surfaces) were discovered at the shore face. The first vast sub-sea terrace is over the range of depth about 5-6 meters and another terrace begins from 9.5 meters depth (see Fig. 4.7-10).

It is very interesting that a few years ago approximately the same sub-sea terraces were found near the Cape Terpay-Tumsa in 60 km east of the Cape Mamontov Klyk (Are et al., 2001). Probably, these forms are results of several stages of coastal erosion activity. Taking into account that an average coastal retreat rate for the whole studied coast is about 4.0 m/year, the shallow sub-sea terrace, placed from 4.5 km to 11.5 km from the shoreline, was formed during a period of about 2900-1000 years BP. It is very difficult to evaluate the age of formation of the deeper terrace, beginning in a distance of about 14.5 km from the coast. It is possible that this terrace was formed during first stage of sea level stabilization in Holocene (about 5000-3600 years BP).

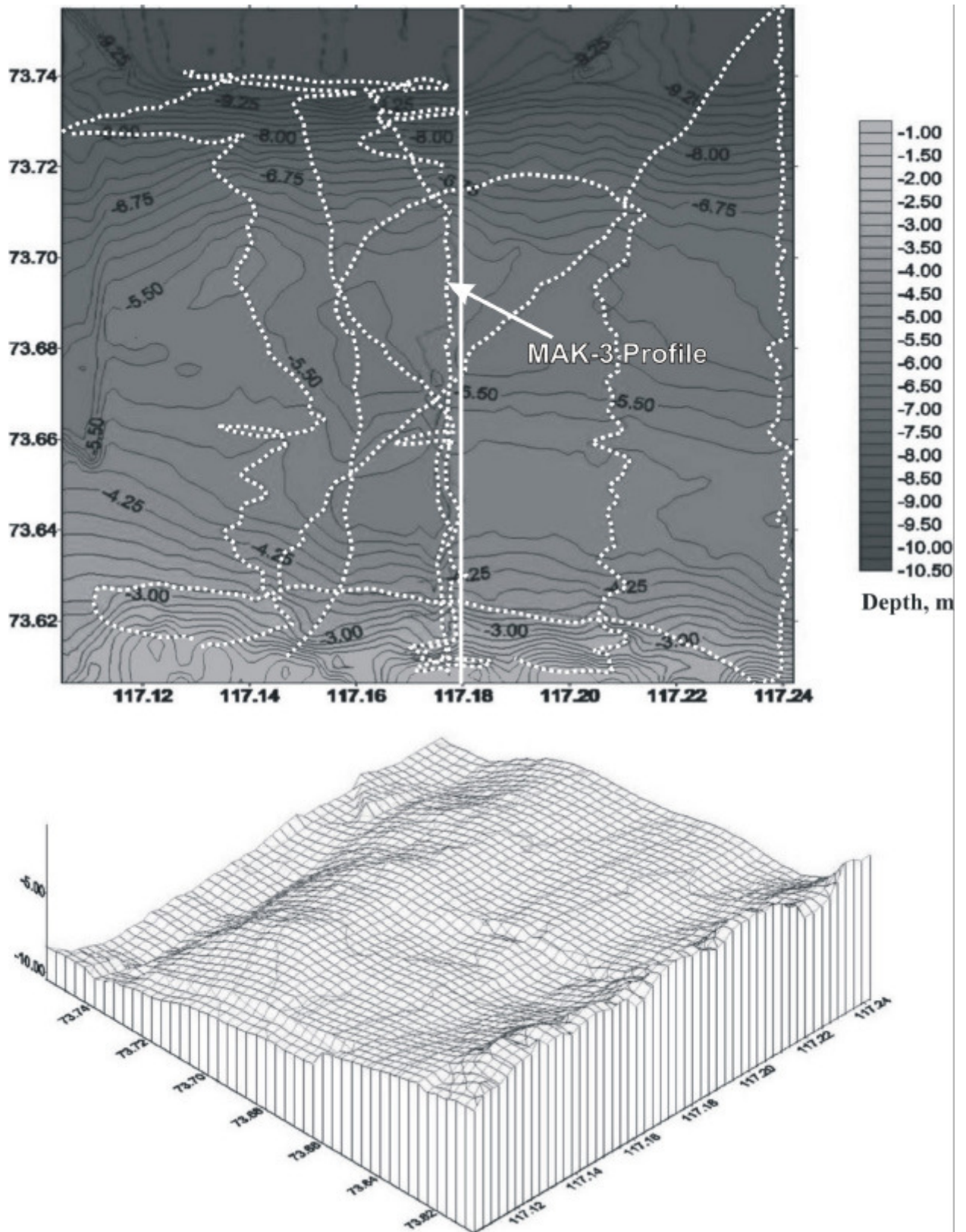


Figure 4.7-10. Bathymetric scheme and the shore face relief adjacent to the Mamontov Klyk Cape area (August 2003). Bathymetric profiles - white dotted line. Vertical white line is a location of proposed drilling profile.

During summer fieldwork 30 bottom sediments samples were collected from 0 to 10 meters depth as well as ice and frozen sediment samples from the coastal outcrops for different types of analysis, which were transported to Germany (Tabs. 4.7-2, 4.7-3). At present time all samples are processed in the laboratories.

Table 4.7-2: List of bottom sediment samples, Profile MAK-3 (August 2003)

No.	Name	Water depth (m)	Number of samples
1	S. MAK-3 (0 m)	0	3
2	S. MAK-3 (1 m)	1	3
3	S. MAK-3 (2 m)	2	3
4	S. MAK-3 (3 m)	3	3
5	S. MAK-3 (4 m)	4	3
6	S. MAK-3 (5 m)	5	3
7	S. MAK-3 (6 m)	6	3
8	S. MAK-3 (7 m)	7	3
9	S. MAK-3 (8 m)	8	3
10	S. MAK-3 (9 m)	9	3
11	S. MAK-3 (10 m)	10	3

Table 4.7-3: Frozen water and frozen sediment samples „Lena – Anabar 2003“

No.	Name	Depth (Water depth / Depth of sampling)	Description	Number of samples
1	MAK-3	0m; 2,5m; 5m; 7,5m; 10m	Frozen sea water samples	5
2	MAK-3	7/0m; 7/3,5m; 7/7m; 10/0m;10/5m;10/10m 0m;2,5/0m;5/0m;5/5m;	Frozen sea water sample (Unfiltered)	10
3	MAK-3	0/0m; 2,5/0m; 5/0m; 5/5m; 7/0m; 7/3,5m; 7/7m; 10/0m; 10/5m; 10/10m)	Frozen sea water sample (Filtered)	10

4.7.3.4. Further investigations

The study of shore face profile structure and dynamics in the area of Cape Mamontov Klyk will be continued in spring 2005. The new facts concerning development of the shore face could be very useful for study of sub-sea permafrost evolution and regional paleogeographical reconstructions on the whole.

4.8. References

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