

The Sedimentation along the Rømø-dam

by

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The dam from Jutland to the isle of Rømø was built in the years 1936–47. In 1943 several sedimentation basins were constructed along the southern side by building long brushwood-fences out vertically from the dam with the purpose to accelerate the sedimentation and growing up of a marsh-foreland (dutch = Kvelder, Schor). In the years gone by, this has succeeded and the fences had to be heightened several times.

In the summer 1955 a vegetation mostly of *Salicornia* with *Spartina* and *Puccinellia* covered the surface in the basins at a distance of 1700 m from the coast and 40 m. from the dam. Farther out the vegetation was more scattered. (Fig. 1).

In order to follow the sedimentation in these basins, samples were taken several times and in the summer of 1955 a core sampling was made in a place 1600 m. from the coast and 35 m. to the south of the dam.

The core was taken with a celluloid-tube 1.5 m. long and 3 cm. in diameter. In the tube there was a tight fitting rubber cork. By pressing the tube down into the mud and at the same time drawing out the cork a slight vacuum was established above the mud surface in the tube, and it therefore worked in a similar way as the KULLENBERG core sampler.

When taken up, the tube contained a 70 cm. core. By drilling in other ways around the place where the core was taken it was found that the surface of the sandy wad was situated 95 cm. below the surface, the mud in the tube was therefore compressed to about half the original thickness.

When the tube was brought to the Skalling Laboratory it was cut into pieces 10 cm. long, the core was pressed out and half of it without previous drying stirred in distilled water by rubbing with a stiff brushand. After that it was analysed by the pipette method by KRUMBEIN (1938). The other half was dried by 110° C and the content of water determined.

When fresh the samples are bluish-black sapropelitic but do not smell of sulphur-hydrogene. By stirring the suspension, the black color does not disappear or turns into brown. When dried the samples from the upper 40 cm. are light grey and very hard. They contain some scattered thin layers of sand especially in the lower part. The fractions $> 62 \mu$ contains several foraminiferae and flakes of mica.

Below 40 cm. from the surface the samples too are light grey when dry but more loose and evidently sandy. The fraktions 250–150 μ contain

innumerable shells of foraminiferae and other plankton organisms together with small flakes of mica.

Between 40–50 cm. a shell of cardium was found and between 50–60 cm. a small cavity contained several shells of *Hydrobia*.

The content of water decreases gradually downward as shown in the following table.

Table I

Depth in cm.	Water.	p. c.
0—3	62	Mud
3—10	56	
10—20	55	
20—25	54	
25—30	45	
30—40	36	
40—45	28	Sand
45—50	24	
50—30v	22	

The results of the granulometric analyses are shown in table II and fig. 2.

Table II

Analysis No.	Depth cm.	Sand > 62 μ p. c.	Silt 62–4 μ p. c.	Clay < 4 μ p. c.	Md μ	Q ₃ μ	Q ₁ μ	QD ϕ
678	0–10	0.6	62.6	36.8	6	13	3.9	0.8
679	10–20	6.5	64.2	29.3	7.6	20	2.9	1.4
680	20–30	11.8	63.9	24.3	16.0	35	4.1	1.3
681	30–40	5.2	72.8	22.0	17.5	29	5.5	1.2
682	40–50	61.3	30.7	8.0	70.0	92	38.0	0.6
683	50–60	60.5	26.5	13.0	70.0	97	23.0	1.0
684	60–70	79.9	16.2	8.9	90.0	110	62.0	0.4

The analyses 682, 683 and 684 are typical Wadden sand with less than 39% of grains < 62 μ . The analysis 684 is the purest one with a median grain size of 90 μ and QD ϕ =0.4 (KAJ HANSEN). Decomposed into the sand and mud components the analyses give the following figures, from the sand fraction:

No.	Md	Q ₃	Q ₁	QD ϕ
682	87 μ	105 μ	74 μ	0.3
683	90 -	110 -	75 -	0.3

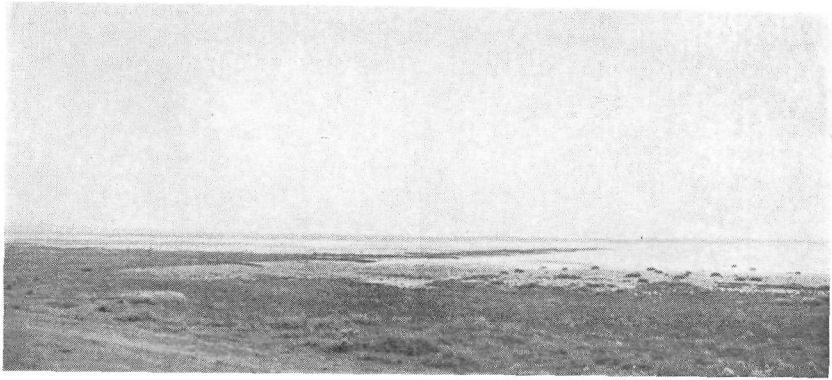


Fig. 1. Sedimentation basins along the southern side of the Rømo dam. 1600 m. from the shore. Sept. 1955.

which indicates that the samples Nos. 682 and 683, too, are Wadden Sand with some mud, bivalves and snails. The tube must therefore have been 30 cm down below the Wadden surface from 1943.

The cores from 0–40 cm. are obviously quite another type of sediments. The median grain size ranges from 1–17.5 μ and the sorting is much poorer with $Q_{D_{50}}$ ranging from 0.8–1.4. These samples are slick deposits with silt as the predominant component and with up to 36 p.c. clay ($< 4 \mu$). The table II and the fig. 2 both show, that there is no continual transition from the underlying sand to the slick, and they also show, that the slick gradually becomes more fine grained upward, especially the clay content is increasing whereas the sand is practically totally absent in the uppermost 10 cm.

It seems evident, that the upper 40 cm. of the core represent the whole 95 cm. thick slick deposited after the brush-wood fences and the sedimentation basins were built, while the lower 30 cm. is the wadden sediment from before 1943. This assumption may be further confirmed by the analyses of the samples taken in the years 1949, 1950 and 1953.

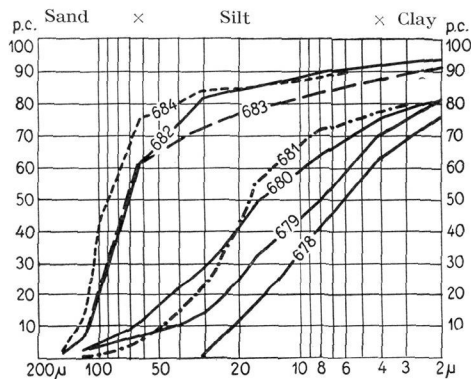


Fig. 2. Cumulation diagram of the core samples.

Table III

Analysis No.	Sand > 62 μ	Silt 62-4 μ	Clay < 4 μ	Md μ	Q ₃ μ	Q ₁ μ	QD _p
162	1.5	66.4	32.1	8.2	14	1.8	1.2
163	3.7	71.5	24.8	9.2	18	3.9	1.0
164	2.9	67.8	29.3	9.0	15	2.9	1.2
166	3.1	68.8	28.1	9.2	15.5	4.0	1.1

Table III and fig. 3 show the granulometric analyses of 4 samples taken in 1949 in a basin nearer to the coast of Jutland than the core from 1955. A comparison with the core analyses seems to place these older samples

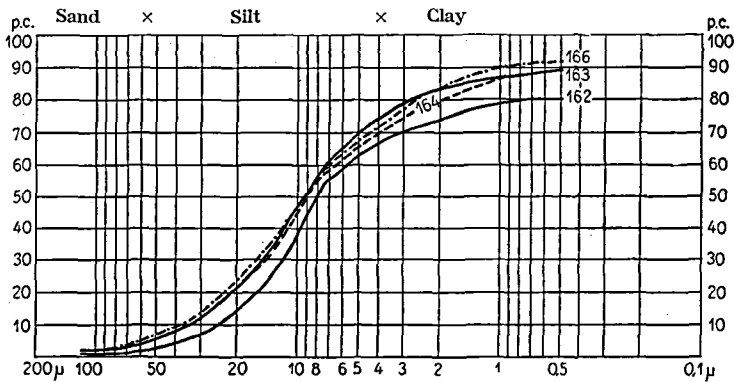


Fig. 3. Cumulation diagram of surface samples taken 1949.

at a depth of about 20–25 cm. below the surface. The median grain size and the clay content are nearly the same but the sand content is less than in the core.

Table IV

Analysis No.	Sand > 62 μ	Silt 62-4 μ	Clay < 4 μ	Md μ	Q ₃ μ	Q ₁ μ	QD _p
345	11.9	49.5	38.6	7.5	30	2.7	1.9
478	8.2	57.1	34.7	8.0	29	4.0	1.4

The sample 345 is taken in the sedimentation basins in 1950 and the sample 478 is taken in 1953. They are more sandy than the samples from 1949 but the clay content is larger and the median grain size finer. Compared with the core samples these seem to be equivalent with the samples from the uppermost 10 cm.

Altogether the slick deposits along the Rømø-dam have a granulometric

composition very much alike the klei in the older salt-marches on the western side of the Ho-bugt and on Skallingen (KAJ HANSEN, 1951) and differ from them only by a lower content of sand.

A comparison with other silt and klei deposits from the coast of the Northsea is given in the following examples.

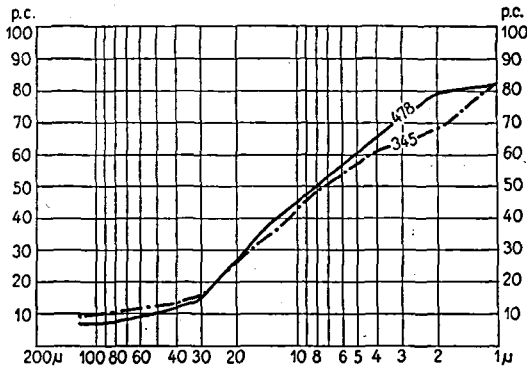


Fig. 4. Cumulation diagram of surface samples taken 1950 and 1953.

WOHLENBERG (1954) gives the following composition of klei and silt from the salt-marsh in Slesvig.

	< 20 μ	20-100 μ	> 100 μ
	p.c.	p.c.	p.c.
Olversum.....	28	72	
Hindenburg dam.....	74	26	
Hindenburg dam.....	10	48	42
Finkhaushallig Kog.....	24	76	
Viding Herred.....	44	51	5
Neufeld.....	65	35	

By the Rømø-dam the corresponding figures are:

Analysis 681.....	57	42	1
- 680.....	57	39	4
- 679.....	75	23	2
- 678.....	88	12	

LÜNEBURG (1954) gives the following composition of the silt for a typical siltkwart:

< 10 μ	10-50 μ	50-100 μ	> 100 μ
p.c.	p.c.	p.c.	p.c.
29	13	50	8

The figures from the Rømø dam are:

Analysis 681	33	57	9	1
- 680	41	42	12	5
- 679	56	35	6	5
- 678	67	33	0	0

From these examples it can be seen, that the silt by the Rømø-dam is rather more fine grained than the silt farther to the south.

DANSK RESUME

Allerede medens Rømø-dæmningen var under bygning anlagde man langs dens sydside i 1943 en række slikgårde for at forstærke slikafsætningen og opbygningen af et marskforland. For nærmere at undersøge sedimentationen toges der prøver fra overfladen i 1949, 1950 og 1953, og i 1955 foretoges en boring, der analyseredes for kornstørrelsesfordelingen.

Det viste sig, at der var aflejret ca. 95 cm slik, og at borekærnen fra 1955 var blevet presset sammen til ca. den halve tykkelse. De nederste 30 cm af denne er vadesand, fra før 1943, resten slik.

Kornstørrelsesanalyserne er givet i fig. 2—4 og i tabellerne I—III.

De i tabellerne angivne parametre har følgende betydning. Md. = middeldkornstørrelsen. Q_3 og Q_1 er kvartilerne, d.v.s. kornstørrelsen 25 % på begge sider af middeldkornstørrelsen. QD_ϕ er et mål for sorteringen udtrykt i en særlig skala. QD_ϕ mindre end 0,4 viser at sedimentet er velsorteret, større værdier tyder på stedse ringere sortering.

Ved sammenligning med slikaflejringer fra vadehavet langs Slesvig og Holstens kyster og ved Wesermundingen ses, at slikken i slikgårdene er mere finkornet end disse.

LITERATURE

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