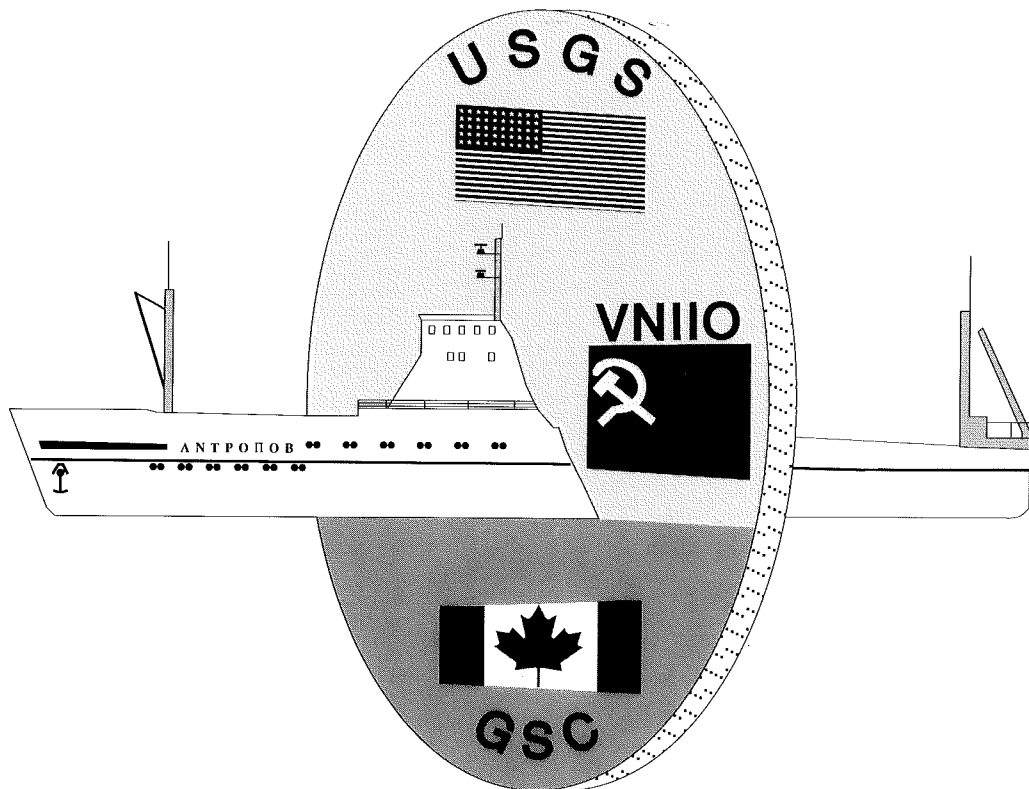


GEOCHEMICAL AND SEDIMENTOLOGICAL RESULTS FROM SEDIMENT CORES COLLECTED IN THE OKHOTSK / JAPAN SEAS

R.E. Cranston and P.D. Standing
Atlantic Geoscience Centre,
Bedford Institute of Oceanography,
Dartmouth, Nova Scotia B2Y 4A2



OPEN FILE REPORT (1992)
2520

Geological Survey
of Canada



Commission géologique
du Canada

GEOCHEMICAL AND SEDIMENTOLOGICAL RESULTS FROM SEDIMENT CORES COLLECTED IN THE OKHOTSK /JAPAN SEAS

OPEN FILE - DATA REPORT NO. 2520, (June,1992)

R.E. Cranston and P.D. Standing

Atlantic Geoscience Centre

Geological Survey of Canada

Box 1006

Dartmouth, Nova Scotia

CANADA B2Y 4A2

SUMMARY

Soviet, American and Canadian scientists carried out a successful gas hydrate investigation in the Okhotsk and Japan Seas, off the east coast of the USSR in October, 1991 onboard a Soviet research vessel. Four study areas were examined for the occurrence of methane gas vents and methane gas hydrate deposits. Seventy four sediment core stations, 50 bottom water stations and 14 heat flow sites were studied. This report contains geochemical and sedimentological results carried out on the sediment samples at GSC labs in Dartmouth.

INTRODUCTION

An expedition to study the occurrence of gas hydrates deposits was carried out in the Okhotsk and Japan Seas September 27 to October 28, 1991 onboard the *R. V. ANTROPOV*, which was operated by Dalmorgeologia in Nakhodka, Far-East Region of the USSR, now known as the Commonwealth of Independent States, as of December, 1991. Gas hydrates had been recovered at a methane venting site in the Okhotsk Sea in 1986 (Zonenshayn *et al*, 1987) and the goal was to revisit the site to further evaluate hydrate occurrences.

A summary of the cruise operation and shipboard data is available in Cranston (1991). This report contains geochemical and sedimentological results for the sediment cores as a result of analyses at the GSC labs in Dartmouth.

ANALYTICAL METHODS

GRAIN SIZE ANALYSIS

1) One hundred and thirty two (132) samples from the Soviet ship *R. V. ANTROPOV* were analyzed for grain size distributions on a Coulter Counter model TA II multichannel particle counter. The samples were first sieved through a 63 μm brass sieve. The material which passed through the sieve was then used for the Coulter size determination.

2) The same samples were freeze dried for 78 hours and disaggregated with an agate mortar and pestle into a fine powder. One (1) gram of sample was weighed to ± 0.1 mg with a Mettler ET electronic balance. The dried samples were then wet sieved through a stainless steel 63 μm sieve. Material left on the sieve was washed into a drying plate with distilled water. The samples were dried for twelve (12) hours at 35°C in a drying oven. The dried samples were weighed and the percent sand was calculated.

TOTAL METAL CONCENTRATION DETERMINATION

Sediment samples were freeze-dried for 78 hours in a Virtis™ freeze-dry unit. The dried samples were pulverized with an agate mortar and pestle.

The sediment samples underwent the Buckley and Cranston (1971) HF-aqua regia decomposition to prepare them for atomic absorption analysis for a variety of elements: Cu , Ni , Zn , Li , Pb , Cr, Fe , K , Si , Al , Ca , Mg , and Mn.

(a) TRACE METAL ANALYSIS (Cu, Ni, Zn, Li, Pb, Cr)

One half gram (0.5 g) of each sample was mixed with 1 ml aqua regia (66% concentrated HCl/33% concentrated HNO₃), which was used as a wetting agent, and 6 ml concentrated HF (hydrofluoric acid) in 20 ml Lorrant™ Teflon reaction bombs. The bombs were sealed and heated for 12 hours at 80°C.

When the bombs were cool, the contents were transferred to 150 ml polypropylene sample vials containing 5.6 g of boric acid. Each sample was diluted to 100 ml total volume with deionized water. Each sample underwent analysis using a Varian 975 Flame Atomic Absorption Spectrophotometer with automatic sampler. Sets of fifty samples were run at a time. Instrument accuracy and precision were determined by the analysis of known internationally accepted standards; BCSS-1, MAG-1, MESS-1, and PACS1. All trace metals with the exception of Pb were determined to within $\pm 10\%$ of the amount present, while Pb was determined to within $\pm 25\%$ of the amount present, as the concentrations were low and the analytical method appeared to be somewhat unstable.

(b) MAJOR METAL ANALYSIS (Al, Si, Ca, Fe, Mn, Mg, K)

Approximately one gram (1 g) of each sample was placed in a 100 ml centrifuge tube and was washed with deionized water. The samples were centrifuged at 3000 rpm for five minutes and the wash water was discarded. The washed samples were oven dried for 12 hours at 55°C. The dried samples were pulverized with an agate mortar and pestle.

One tenth of a gram (0.1 g) of each washed sample was weighed and prepared for A.A. analysis for the major inorganic metals, Fe , K , Si , Al , Ca , Mg , and Mn following the trace metal procedure described above. Precision and

accuracy estimates were $\pm 10\%$ for all metals except Mn ($\pm 25\%$), which was very unstable due to instrument and cathode lamp problems.

CARBON DETERMINATION

Organic carbon was determined by digesting 250 mg freeze dried samples with 10% HCl to remove inorganic carbon. Samples were air dried in a fume hood and washed with distilled water to remove any excess acid. The samples were then allowed to dry for three to four days. Organic carbon determinations were obtained with a LECO WR-112™ carbon determinator. The samples were placed in an oxygen fuelled furnace which converted the carbon into CO₂. The CO₂ was trapped and the quantity measured. The instrument has a precision and accuracy of $\pm 5\%$ of the amount present. Data is presented in percentage, i.e. g C per 100 grams of dry sample.

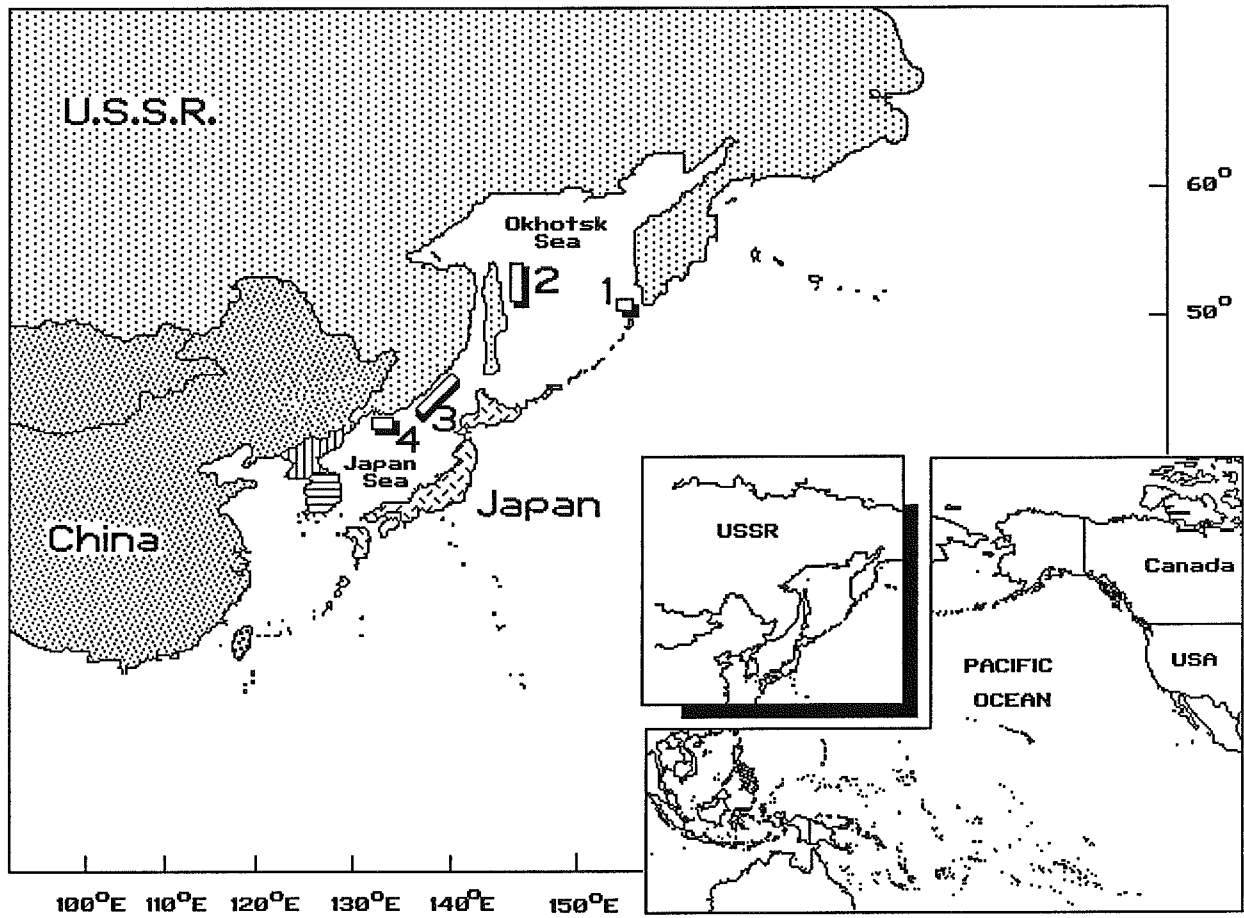
RESULTS

Station locations and onboard pore water results are presented in Appendix 1. Metal, carbon and particle size data are included in Appendix 2. Relative size frequency plots for the mud sized sediment and cumulative data for sand, silt and clay percentages are presented in Appendix 3.

REFERENCES

- Buckley, D.E. and Cranston, R.E. 1971. Atomic absorption analyses of 18 elements from a single decomposition of aluminosilicates. *Chemical Geology*:7,273-284.
- Cranston, R.E. 1991 Gas hydrate investigations in the Okhotsk/Japan Seas. Geological Survey of Canada Open File Report 2446, 105 pp.
- Zonenshayn, L.P., Murdmaa, I.O., Baranov, B.V., Koznetsov, A.P., Kurin, V.S., Barash, M.S. Valyashirv, G.M., Demiral, L. 1987. An underwater gas source in the Sea of Okhotsk west of Paramushir Island. *Oceanology*:27, 598-602.

FIGURE 1 Area Location Map



APPENDIX 1 - Station Locations and Onboard Pore Water Results

Notes:

1. Station identification consists of a 3 component number, e.g. 91 02 56, representing the year, the study area (1 through 4), and the station number.
2. Dates are tabulated in year-month-day format to allow them to be used as a single number in numerical operations in the spreadsheet. Times are reported in GMT (hours.minutes) to enable one number to represent time.
3. The pore water table contains a column labelled "stored - days", which is an approximation of the number of days that lapsed between core collection and pore water extraction. This allows for statistical testing of the effect of sample storage on analytical results.

LOCATIONS AREA 1

STATION	WATER DEPTH m	LATITUDE		LONGITUDE		DATE	TIME
						yrmoda	GMT
910101	800	50	30.912	155	18.241	911002	8.20
910102	796	50	30.975	155	18.310	911002	12.34
910103	800	50	30.830	155	18.272	911002	14.06
910104	794	50	30.911	155	18.317	911002	15.55
910105	798	50	30.905	155	18.286	911003	6.26
910106	798	50	30.868	155	18.298	911003	7.55
910107	802	50	30.909	155	18.171	911003	9.10
910108	802	50	30.841	155	18.249	911003	10.31
910109	802	50	30.996	155	18.129	911003	12.10
910110	800	50	30.893	155	18.217	911003	14.16
910111	795	50	31.208	155	18.788	911003	15.23
910112	814	50	30.711	155	17.710	911003	17.50
910113	800	50	30.822	155	18.331	911003	20.33
910115	795	50	30.883	155	18.691	911004	2.49
910116	798	50	30.859	155	18.317	911004	4.02
910117	800	50	30.838	155	18.773	911004	4.52
910118	804	50	31.005	155	18.165	911004	5.47
910119	800	50	30.929	155	18.210	911004	6.46
910120	800	50	30.898	155	18.244	911004	7.42
910121	800	50	30.927	155	18.222	911004	8.37
910122	800	50	30.918	155	18.253	911004	10.46
910123	800	50	30.884	155	18.237	911004	11.47
910124	790	50	31.019	155	18.602	911004	13.55
910125	790	50	30.945	155	18.631	911004	16.15
910126	798	50	30.899	155	18.245	911004	18.42
910127	816	50	30.737	155	17.939	911004	21.50
910128	800	50	30.877	155	18.235	911004	23.36
910129	802	50	30.854	155	18.242	911005	.56
910130	795	50	30.900	155	18.323	911005	2.47
910131	802	50	30.854	155	18.228	911005	3.39
910132	796	50	30.926	155	18.325	911005	7.52
910133	798	50	31.025	155	18.337	911005	8.51

LOCATIONS AREA 2

STATION	WATER DEPTH m	LATITUDE		LONGITUDE		DATE	TIME
						yrmoda	GMT
910234	732	54	26.695	144	5.765	911007	15.11
910235	728	54	26.435	144	5.616	911007	16.53
910236	721	54	26.698	144	5.234	911007	18.20
910237	709	54	26.781	144	4.892	911007	19.53
910238	700	54	26.671	144	4.496	911007	21.31
910239	719	54	26.856	144	5.002	911007	22.28
910240	708	54	26.738	144	4.911	911007	23.35
910241	708	54	26.777	144	4.859	911008	.42
910242	710	54	26.773	144	5.013	911008	2.23
910243	725	54	26.628	144	5.384	911008	3.20
910244	708	54	26.790	144	4.916	911008	4.47
910245	701	54	26.752	144	4.563	911008	6.41
910246	718	54	26.773	144	5.170	911008	7.56
910247	708	54	26.769	144	4.845	911008	10.14
910248	708	54	26.771	144	4.933	911008	11.31
910249	612	53	23.152	144	24.254	911010	21.27
910250	635	53	22.601	144	25.234	911010	22.44
910251	643	53	22.720	144	25.548	911011	.03
910252	642	53	22.728	144	25.497	911011	1.22
910253	646	53	22.701	144	25.352	911011	4.13
910254	645	53	22.765	144	25.480	911011	5.27
910255	642	53	22.740	144	25.509	911011	6.42
910256	645	53	22.764	144	25.442	911011	7.39
910257	628	53	22.387	144	25.176	911011	8.20
910258	627	53	22.425	144	24.825	911011	9.33
910259	620	53	21.936	144	24.692	911011	10.43
910260	664	53	22.257	144	26.635	911011	11.50
910261	658	53	22.859	144	26.281	911011	13.27
910262	657	53	22.862	144	26.259	911011	14.59
910263	642	53	22.714	144	25.452	911011	16.22
910264	728	53	22.322	144	25.029	911011	17.38
910265	611	53	21.950	144	24.449	911011	18.54
910266	641	53	22.680	144	25.505	911011	19.43
910267	601	53	10.341	144	25.847	911012	1.00
910268	817	52	48.776	144	44.584	911012	5.31
910269	822	52	48.782	144	44.990	911012	7.04
910270	833	52	38.018	144	52.941	911012	9.35

LOCATIONS AREA 3

STATION	WATER DEPTH m	LATITUDE	LONGITUDE		DATE	TIME
					yrmoda	GMT
910371	599	44 13.497	136 25.859	911016	7.44	
910372	590	44 13.481	136 25.824	911016	8.52	
910373	600	44 13.600	136 25.907	911016	12.10	
910374	610	44 13.671	136 26.034	911016	13.40	
910375	595	44 13.841	136 25.869	911016	14.58	
910376	650	44 12.981	136 25.527	911016	16.13	
910377	685	44 12.736	136 26.301	911016	17.23	
910378	885	44 9.647	136 32.584	911016	19.11	
910379	888	44 9.463	136 32.750	911016	20.29	
910380	960	44 8.245	136 34.746	911016	21.25	
910381	948	44 8.559	136 34.117	911016	21.56	
910382	708	44 12.322	136 26.433	911016	23.47	
910383	900	44 9.303	136 33.189	911017	.55	
910384	700	44 12.191	136 26.902	911017	2.46	
910385	962	44 8.228	136 34.907	911017	4.37	
910386	1190	44 8.208	136 45.462	911018	.27	
910387	1565	44 3.520	136 53.810	911018	2.22	
910388	1500	44 4.152	136 53.987	911018	3.48	
910389	1815	44 1.511	136 57.749	911018	5.20	
910390	1825	44 1.298	136 58.570	911018	6.35	
910391	1878	44 .933	136 58.244	911018	7.45	
910392	1840	44 1.166	136 58.516	911018	9.45	
910393	1735	44 .548	136 59.455	911018	21.22	
910394	1800	44 .749	136 58.838	911018	22.14	
910395	1853	44 1.231	136 57.618	911019	.24	
910396	1845	44 .009	137 .135	911019	1.40	
910397	2380	43 56.212	137 6.039	911019	3.16	
910398	2420	43 55.905	137 6.303	911019	4.51	

LOCATIONS AREA 4

STATION	WATER DEPTH m	LATITUDE	LONGITUDE	DATE		TIME
				yr	moda	GMT
910499	652	42 30.272	132 43.080	91	1020	1.11
9104100	787	42 30.263	132 43.243	91	1020	2.24
9104101	868	42 29.825	132 43.363	91	1020	3.22
9104102	780	42 30.262	132 43.234	91	1020	5.17
9104103	723	42 29.966	132 43.433	91	1020	6.04
9104104	768	42 26.832	131 48.088	91	1020	14.00
9104105	215	42 27.034	131 49.688	91	1020	15.57
9104106	380	42 26.966	131 46.151	91	1020	16.50
9104107	736	42 27.275	131 47.763	91	1021	.16
9104108	860	42 26.121	131 47.766	91	1021	1.31
9104109	1015	42 25.576	131 47.115	91	1021	3.02
9104110	900	42 25.602	131 47.767	91	1021	3.52
9104111	1150	42 25.214	131 47.625	91	1021	5.07
9104112	1230	42 20.023	131 19.503	91	1021	8.17
9104113	863	42 20.958	131 19.920	91	1021	9.04
9104114	210	42 22.357	131 17.054	91	1021	12.29
9104115	648	42 22.645	131 18.038	91	1021	13.29
9104116	330	42 22.529	131 19.268	91	1021	14.51
9104117	722	42 21.929	131 18.557	91	1022	.57
9104118	592	42 23.128	131 17.885	91	1022	1.52
9104119	397	42 24.341	131 17.687	91	1023	2.35

PORE WATER RESULTS AREA 1

STATION	ID NUM	TOP INT cm	BOT INT cm	Eh mv	pH	Si mM	SO ₄ mM	NH ₄ mM	Cl g/L	STORED days
910101	105201	10	25	195	7.10	.87	28	.23	19.0	2
910101	105202	80	95	175	7.40	.68	28	.26	19.0	2
910101	105203	140	155	156	7.82	.68	28	.51	18.5	2
910106	105209	10	20	160	8.46	.87	28	.47	19.0	1
910106	105210	40	50	160	8.20	.70	28	.43	18.2	1
910106	105211	100	110	150	8.40	.75	28	.43	19.0	1
910107	105212	30	80	-340	8.05	.72	18	.85	15.6	1
910110	105213	15	40	172	7.60	.72	28	.60	19.2	2
910110	105214	65	85	138	8.39	.63	28	.96	18.5	2
910110	105215	85	115	130	8.78	.60	28	1.00	19.0	2
910117	105216	20	30	165	7.75	.80	28	.50	18.8	4
910117	105217	90	100	175	8.16	.80	28	1.10	19.0	4
910117	105218	140	150	180	8.06	.74	28	1.20	19.0	4
910118	105219	50	60	200	7.30	.82	28	.50	19.0	4
910118	105220	110	120	164	7.75	.80	21	.85	18.8	4
910118	105221	180	205	164	7.84	.68	12	1.40	18.6	4
910119	105222	110	120	100	8.62	.80	15	1.10	19.0	1
910119	105223	140	150	100	8.62	.71	9	.87	17.3	1
910119	105224	230	240	120	8.58	.77	3	1.30	19.0	1
910123	105228	30	80	-50	8.75	.74	12	.36	15.6	1
910128	105225	50	60	143	8.60	.81	28	.59	19.3	3
910128	105226	100	110	124	8.44	.73	28	.74	18.1	3
910128	105227	180	190	118	8.58	.63	16	.78	17.9	3
910133	105229	50	60	158	8.10	.72	23	.75	18.6	1
910133	105230	140	150	142	8.40	.61	1	1.40	17.3	1
910133	105231	170	180	150	8.36	.76	0	1.60	18.3	1

PORE WATER RESULTS AREA 2

STATION	ID NUM	TOP INT cm	BOT INT cm	Eh mv	pH	Si mM	SO ₄ mM	NH ₄ mM	Cl g/L	STORED days
910239	105232	0	10	160	7.25	.38	28	.49	17.9	2
910239	105233	10	20	140	8.15	.43	28	.54	18.6	2
910240	105235	20	45	-350	8.15	1.00	0	.29	18.6	1
910240	105236	80	90	-340	8.09	1.10	0	.35	19.0	1
910240	105237	95	195	-387	8.00	.73	0	.55	12.6	1
910241	105238	20	30	80	7.92	.64	26	.14	19.0	0
910241	105239	110	120	130	8.55	.84	0	.44	18.6	0
910241	105240	120	140	-280	8.06	.47	0	.61	7.0	0
910242	105247	100	120	-330	8.32	.44	4	.24	11.2	0
910243	105241	50	60	-120	7.88	.90	23	1.10	18.1	1
910243	105242	170	180	-50	7.97	.86	0	2.80	18.3	1
910243	105243	230	240	80	7.93	.90	0	3.40	18.0	1
910244	105244	20	30	-348	8.25	.94	0	.46	17.8	0
910244	105245	60	70	-340	8.22	.90	0	.46	18.1	0
910244	105246	70	160	-290	8.20	1.00	0	2.00	15.9	2
910251	105248	110	125	70	8.28	.73	12	.70	19.7	0
910251	105249	170	190	75	7.85	.69	0	1.10	20.0	0
910251	105250	240	250	110	7.85	.60	0	1.50	22.5	0
910252	105251	110	120	50	8.10	.55	28	.56	19.7	1
910252	105252	150	160	140	7.84	.43	18	1.10	20.0	1
910252	105253	250	260	136	7.63	.49	0	1.60	19.9	1
910253	105254	50	60	130	7.10	.51	28	.26	19.0	1
910253	105255	110	120	134	7.52	.62	28	.61	18.9	1
910253	105256	180	200	140	7.40	.72	0	1.90	18.2	1
910254	105259	50	60	196	7.75	.59	26	.22	19.0	2
910254	105258	170	180	145	7.67	.80	19	1.10	19.2	2
910254	105257	210	220	156	7.75	.64	11	1.20	19.0	2
910254	105260	310	320	156	7.25	.70	0	1.40	19.0	2
910256	105261	50	60	146	7.68	.54	28	.26	18.8	2
910256	105262	110	120	156	7.50	.52	28	.41	19.0	2
910256	105263	250	265	143	7.62	.55	24	.91	20.3	2
910257	105264	60	70	175	7.64	.49	0	.63	19.0	2
910257	105265	160	170	146	7.68	.52	0	1.00	19.3	2
910257	105266	205	215	125	7.68	.43	0	1.30	21.2	2
910267	105267	20	30	176	7.43	.70	28	.42	19.3	2
910267	105268	140	150	154	7.46	.81	17	1.20	19.9	2
910267	105269	240	250	144	7.64	.87	7	1.40	19.5	2
910267	105270	290	300	156	7.70	.90	0	1.80	20.6	2
910269	105271	10	20	136	7.38	.87	28	.42	20.7	2
910269	105272	90	100	136	7.50	.86	28	1.20	19.9	2
910269	105273	200	210	152	7.40	.98	19	2.00	20.7	2
910270	105274	20	30	180	7.38	.87	28	.78	20.0	2
910270	105275	120	130	171	7.44	.87	28	1.30	19.6	2
910270	105276	220	235	152	7.56	.90	18	1.80	20.0	2

PORE WATER RESULTS AREA 3

STATION	ID NUM	TOP INT cm	BOT INT cm	Eh mv	pH	Si mM	SO ₄ mM	NH ₄ mM	Cl g/L	STORED days
910373	105277	50	60	258	8.02	.58	28	.13	19.2	2
910373	105278	150	160	254	7.94	.43	28	.19	19.0	2
910373	105279	260	270	252	8.33	.34	28	1.50	18.2	2
910383	105283	20	30	263	8.05	.36	28	.35	19.0	1
910383	105280	120	130	272	7.98	.47	28	.47	19.5	1
910383	105281	220	230	272	7.96	.45	28	.49	19.2	1
910383	105282	310	320	266	7.95	.49	21	.67	19.3	1
910384	105284	20	30	266	7.79	.47	28	.01	19.0	1
910384	105285	180	190	264	7.88	.48	24	.43	18.5	1
910384	105286	270	280	256	7.87	.47	21	.51	18.0	1
910385	105287	20	30	264	7.71	.40	28	.24	19.2	1
910385	105288	160	170	254	7.93	.50	26	.43	19.0	1
910385	105289	250	260	254	8.06	.60	22	.72	19.0	1
910386	105290	20	30	156	7.52	.53	28	.35	18.2	1
910386	105291	140	150	144	8.09	.62	28	.54	18.8	1
910386	105292	200	210	145	8.16	.47	28	.86	18.2	2
910386	105293	220	300	167	8.21	.40	22	1.00	19.3	2
910388	105294	20	30	262	7.72	.68	28	.21	19.6	1
910388	105295	60	70	262	7.95	.51	28	.36	19.6	1
910388	105296	130	140	135	8.18	.42	28	.45	18.2	1
910389	105297	30	40	260	7.90	.37	28	.26	19.5	1
910389	105298	150	160	260	8.07	.37	28	.36	18.8	1
910389	105299	240	250	150	7.86	.34	28	.67	19.3	1
910390	105300	0	10	170	7.75	.51	28	.48	18.8	2
910390	105301	30	40	173	7.56	.27	28	.26	19.0	3
910390	105302	50	60	184	7.40	.38	28	.93	18.5	3
910393	105303	0	10	165	7.50	.41	28	.82	18.6	3
910393	105304	40	50	200	7.75	.29	28	.51	18.5	3
910393	105305	150	160	194	7.70	.25	25	.52	18.2	3
910393	105306	300	310	177	7.78	.34	15	.71	17.9	3
910394	105307	10	20	216	7.28	.46	28	.52	19.2	5
910394	105308	70	80	203	7.37	.33	21	.56	19.3	5
910394	105309	210	220	198	7.58	.57	14	.56	19.5	5
910394	105310	310	320	194	7.44	.55	14	.88	18.8	5
910395	105311	50	60	175	7.90	.33	28	.48	18.6	3
910395	105312	150	160	162	8.00	.39	28	.38	19.2	3
910395	105313	250	260	155	7.68	.23	28	.67	19.5	3
910396	105314	20	30	165	7.64	.56	28	.37	18.5	2
910396	105315	150	160	180	7.80	.31	28	.38	18.8	2
910396	105316	250	260	174	7.46	.31	28	.28	18.6	2

PORE WATER RESULTS AREA 4

STATION	ID NUM	TOP INT cm	BOT INT cm	Eh mv	pH	Si mM	SO ₄ mM	NH ₄ mM	Cl g/L	STORED days
9104100	105317	0	10							
9104101	105318	0	10	200	7.81	.62	28	.24	19.2	1
9104101	105319	50	60	200	7.70	.68	28	.46	18.8	1
9104101	105320	100	110	200	7.75	.54	28	.79	19.2	1
9104102	105321	10	20	170	7.73	.63	28	.51	19.5	0
9104102	105322	90	100	166	7.65	.58	28	.62	18.5	0
9104102	105323	160	170	191	7.72	.49	28	.85	19.3	0
9104103	105324	50	60			.66	28	.89		3
9104103	105325	90	100			.58	28	1.20		3
9104107	105326	0	10							
9104108	105327	10	25							
9104109	105328	10	20			.71	28	.75		2
9104109	105329	70	80			.62	28	1.00		2
9104110	105330	10	20	190	7.50	.69	28	.45	16.4	2
9104110	105331	40	50	195	7.68	.57	28	.63	16.0	2
9104110	105332	70	85	195	7.75	.36	28	.66	18.3	2
9104111	105333	20	30	182	7.58	.55	28	.53	18.3	2
9104111	105334	80	90	183	7.85	.54	28	1.00	17.9	2
9104111	105335	130	140	190	7.85	.54	28	1.10	17.5	2
9104113	105336	20	25	198	7.26	.63	28	.44	18.5	2
9104113	105337	50	60	163	7.82	.53	28	.74	18.2	2
9104118	105338	10	20	218	7.68	.82	28	.45	17.3	1
9104118	105339	50	60	203	7.55	.61	28	.54	18.5	1
9104118	105340	100	110	195	7.50	.60	28	.89	19.4	1

APPENDIX 2

Metal, Carbon and Particle Size Analyses of Sediment Core Samples

Notes:

1. Station numbers, subsample depths and sample identification (I.D.) numbers are the same as the ones used in Appendix 1.
2. All metal results are total (τ) concentrations.
3. Sand, silt and clay results total 100 %. Silt/clay refers to the ratio of silt to clay.

METAL, ORGANIC CARBON and PARTICLE SIZE CONCENTRATIONS AREA 1

Station	depth	Si _T	Al _T	Ca _T	Fe _T	Mg _T	K _T	Mn _T	Zn _T	Li _T	Cu _T	Cr _T	Ni _T	Pb _T	C _{ORG}	Sand	Silt	Clay	Silt/Clay	I.D.
	cm	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	fraction	per	100 g		
																%	%	%	%	
910101	10	27.60	8.12	4.79	3.85	1.46	1.10	601	103	43	35	19	25	7	0.89	30	45	25	1.8	105201
910101	80	28.07	8.38	4.79	3.89	1.40	1.04	518	110	38	20	21	26	3	0.59	50	34	16	2.1	105202
910101	140	29.01	8.24	4.91	3.94	1.36	1.10	553	107	33	28	17	15	3	0.64	40	43	17	2.4	105203
910106	10	27.43	8.56	4.94	3.89	1.40	1.31	567	128	45	42	22	26	5	0.70	30	49	21	2.4	105209
910106	40	27.00	8.61	5.35	4.00	1.60	1.06	718	123	40	36	22	24	3	0.77	40	41	19	2.2	105210
910106	100	27.27	8.66	6.34	3.84	1.32	1.22	564	89	34	27	24	10	0	0.66	25	49	26	1.8	105211
910107	30	27.26	8.27	6.71	4.06	1.37	1.07	624	85	44	35	24	20	0	0.68	80	16	4	3.7	105212
910110	15	29.63	8.78	5.14	3.90	1.39	1.12	379	134	42	30	24	9	0	0.88	20	61	19	3.1	105213
910110	65	29.03	7.87	4.93	4.11	1.26	1.00	361	95	38	26	23	5	0	0.73	60	24	14	1.8	105214
910110	85	27.81	8.75	5.11	4.08	1.41	1.22	599	87	37	32	25	13	0	0.59	50	41	9	4.8	105215
910117	20	28.63	7.77	4.62	3.83	1.32	0.99	336	94	44	26	22	8	0	0.97	40	37	23	1.6	105216
910117	90	28.16	7.94	5.33	4.15	1.39	1.10	683	100	34	34	21	7	0	0.64	75	19	6	2.9	105217
910117	140	27.93	8.79	5.68	4.15	1.37	1.26	823	109	37	32	23	10	0	0.53	60	33	7	4.5	105218
910118	50	26.51	7.30	4.72	3.78	1.19	1.10	421	93	35	24	21	4	0	0.62	40	45	15	3.0	105219
910118	110	28.27	8.32	4.78	4.40	1.37	1.05	566	87	31	41	21	6	0	0.52	70	23	7	3.1	105220
910118	180	27.06	7.98	5.28	4.38	1.53	0.99	591	110	37	36	20	9	0	0.61	30	55	15	3.6	105221
910119	110	26.83	7.51	4.60	4.34	1.36	0.94	718	99	39	35	20	1	0	0.76	60	27	13	2.1	105222
910119	140	26.74	6.47	4.43	3.71	1.06	0.90	434	103	30	31	20	14	0	0.69	25	54	21	2.6	105223
910119	230	27.76	7.93	4.57	4.02	1.32	1.15	351	88	33	32	22	1	0	0.53	40	43	17	2.5	105224
910128	50	27.19	7.60	4.14	3.75	1.18	1.00	81	105	37	30	23	3	0	0.92	20	45	35	1.3	105225
910128	100	26.56	9.16	4.97	4.10	1.36	1.31	564	87	31	33	22	13	0	0.55	80	17	3	4.9	105226
910128	180	27.19	8.12	5.30	3.97	1.18	1.00	561	103	28	29	22	10	0	0.59	30	51	19	2.7	105227
910123	180	26.37	8.72	5.54	4.50	1.36	1.05	617	90	44	38	23	9	0	0.65	70	21	9	2.3	105228
910133	50	27.31	8.03	4.88	3.85	1.30	1.03	531	109	34	39	19	5	0	0.74					105229
910133	140	26.32	8.42	4.88	4.04	1.29	1.16	809	106	35	39	17	3	0	0.32	60	35	5	7.8	105230
910133	170	26.64	8.03	5.74	3.95	1.36	1.08	468	102	36	31	18	12	0	0.64	20	51	29	1.7	105231

METAL, ORGANIC CARBON and PARTICLE SIZE CONCENTRATIONS AREA 2

Station	depth cm	Si _T	Al _T	Ca _T	Fe _T	Mg _T	K _T	Mn _T	Zn _T	Li _T	Cu _T	Cr _T	Ni _T	Pb _T	C _{ORG}	Sand	Silt	Clay	Silt/Clay	I.D.
		%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	fraction %	per %	100 g %		
910239	0	32.22	5.08	0.85	1.91	0.35	1.43	0	87	21	33	29	13	0	1.70	5	52	43	1.2	105232
910239	10	23.77	3.17	9.70	1.92	0.11	0.87	0	118	19	33	27	9	0	1.93	5	52	43	1.2	105233
910240	20	31.89	4.63	0.66	2.01	0.21	1.25	7	69	33	12	21	0	1	1.41	5	49	46	1.1	105235
910240	80	31.15	5.18	0.60	2.02	0.21	1.41	0	103	19	25	28	14	0	1.27	5	50	44	1.1	105236
910240	95	31.51	5.26	0.55	2.04	0.25	1.46	0	85	18	35	26	6	0	1.32	5	53	42	1.3	105237
910241	20	32.21	5.24	1.10	2.22	0.35	1.50	109	110	21	16	32	10	3	1.30	5	51	44	1.2	105238
910241	110	34.04	5.19	1.72	2.15	0.27	1.39	60	90	25	44	37	15	3	1.31	5	49	46	1.1	105239
910241	120	33.03	4.95	0.78	2.11	0.27	1.41	57	85	21	36	30	17	0	1.30	2	51	47	1.1	105240
910243	50	32.86	4.84	0.97	2.08	0.43	1.28	116	102	23	44	34	12	4	1.64	2	55	43	1.3	105241
910243	170	33.41	4.38	0.79	1.99	0.35	1.45	57	119	21	22	28	13	0	1.37	2	57	41	1.4	105242
910243	230	31.97	4.49	1.13	2.10	0.36	1.32	43	96	21	44	31	15	0	1.45	2	55	43	1.3	105243
910244	20	33.04	5.35	0.74	2.13	0.32	1.62	41	103	23	43	28	15	3	1.26	2	52	46	1.1	105244
910244	60	32.53	5.15	0.79	2.17	0.29	1.50	39	120	25	22	34	12	2	1.26	3	53	44	1.2	105245
910244	70	31.78	5.32	0.78	2.12	0.29	1.55	64	77	15	29	22	6	0	1.18	2	54	44	1.2	105246
910251	110	32.73	6.49	1.22	2.29	0.49	2.02	0	104	39	8	32	19	0	1.03	5	55	40	1.4	105248
910251	170	31.84	6.82	1.45	2.39	0.64	2.07	0	90	16	26	32	9	0	1.13	5	46	50	0.9	105249
910251	240	31.31	7.27	1.18	3.10	0.84	2.05	0	89	21	12	39	14	0	1.42	5	60	35	1.7	105250
910252	110	31.24	7.01	1.00	2.94	0.67	2.00	0	89	17	21	38	19	0	1.17	5	59	36	1.6	105251
910252	150	29.40	7.82	1.36	3.20	0.85	2.36	0	93	19	29	37	16	0	1.39	5	61	34	1.8	105252
910252	250	28.70	8.43	0.79	3.12	1.06	2.69	0	114	25	13	47	15	0	1.65	5	61	34	1.8	105253
910253	50	32.68	5.79	0.97	2.38	0.39	1.71	0	116	21	34	57	12	0	1.28	10	53	37	1.4	105254
910253	110	31.13	6.81	1.08	2.52	0.49	1.94	0	98	18	48	31	11	0	1.03	7	71	22	3.3	105255
910253	180	30.71	7.06	1.07	2.89	0.80	1.82	0	98	20	21	36	12	0	1.35	5	60	35	1.7	105256
910254	210	33.23	5.22	0.79	2.16	0.71	1.73	126	91	17	57	36	24	0	1.28	5	57	38	1.5	105257
910254	170	31.15	5.47	1.15	2.82	0.72	1.87	0	74	12	48	24	34	0	1.13	5	59	36	1.6	105258
910254	50	28.96	5.70	0.92	2.78	0.74	2.05	0	48	15	27	28	21	0	1.17	7	60	33	1.8	105259
910254	310	29.20	4.87	0.74	2.85	0.81	1.77	46	69	30	40	39	20	0	1.32	7	53	40	1.3	105260
910256	50	30.91	5.00	1.04	1.66	0.69	1.87	0	80	9	22	39	33	0	1.38	10	52	38	1.4	105261
910256	110	32.21	6.83	1.43	2.97	0.86	2.62	0	81	15	39	35	19	0	1.09	10	55	35	1.6	105262
910256	250	28.93	7.22	1.44	3.55	0.92	2.02	373	80	20	26	32	1	0	1.29	5	56	39	1.4	105263
910257	60	28.14	8.57	1.60	4.34	1.07	2.12	239	55	16	36	41	0	0	1.37	8	56	36	1.5	105264
910257	160	26.22	8.73	0.96	3.76	1.34	2.66	274	77	16	55	45	5	0	1.57	5	59	36	1.7	105265
910257	205	25.95	9.23	1.15	4.51	1.31	2.52	195	75	24	48	58	0	17	1.57	5	61	34	1.8	105266
910267	20	28.85	6.02	1.38	2.88	0.60	1.76	363	91	29	53	62	3	0	1.15	10	53	37	1.4	105267
910267	140	30.85	6.68	1.30	4.01	0.93	1.77	299	33	3	34	29	14	0	1.41	5	54	41	1.3	105268
910267	240	32.33	7.45	1.25	3.29	1.04	2.08	345	71	8	52	41	17	0	1.41	3	54	43	1.3	105269
910267	290	32.06	7.56	1.40	3.37	1.08	2.20	214	47	26	42	33	7	0	1.35	2	59	39	1.5	105270
910269	10	31.39	4.12	0.66	1.99	0.59	1.20	248	72	16	61	43	5	36	1.55	4	48	48	1.0	105271
910269	90	31.39	4.17	0.77	1.98	0.59	1.16	320	69	24	53	29	11	49	1.71	4	50	46	1.1	105272
910269	200	31.04	4.59	0.77	2.17	0.68	1.18	16	76	22	77	28	20	23	1.87	2	55	43	1.3	105273
910270	20	29.60	4.49	0.97	2.12	0.57	1.13	99	52	13	69	24	17	0	1.74	3	51	46	1.1	105274
910270	120	29.05	4.33	1.03	2.08	0.45	1.14	12	78	31	78	24	30	25	1.58	1	52	47	1.1	105275
910270	220	27.62	4.82	0.98	2.48	0.66	1.22	53	57	13	61	25	28	22	1.55	3	52	45	1.2	105276

METAL, ORGANIC CARBON and PARTICLE SIZE CONCENTRATIONS AREA 3

Station	depth	Si _T	Al _T	Ca _T	Fe _T	Mg _T	K _T	Mn _T	Zn _T	Li _T	Cu _T	Cr _T	Ni _T	Pb _T	C _{ORG}	Sand	Silt	Clay	Silt/Clay	I.D.
	cm	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	fraction	per	100 g		
																%	%	%		
910373	50	26.55	10.55	1.48	3.35	0.81	2.89	62	73	21	66	25	19	0	0.77	10	72	18	4.0	105277
910373	150	26.79	11.27	1.75	3.71	0.83	2.69	21	71	23	74	41	8	31	0.78	5	65	30	2.2	105278
910373	260	27.39	10.23	1.50	3.04	0.65	2.71	0	78	16	92	46	17	12	0.35	60	32	8	4.0	105279
910383	120	28.23	12.25	1.20	4.79	1.46	2.84	0	87	0	53	41	36	16	1.07	3	44	53	0.8	105280
910383	220	27.73	11.52	1.16	4.57	1.40	2.90	0	104	2	60	68	27	0	1.09	3	42	55	0.8	105281
910383	310	26.54	10.25	1.62	4.27	1.26	2.74	0	119	21	51	73	30	0	1.39	1	46	53	0.9	105282
910383	20	26.37	12.51	0.88	4.68	1.58	3.39	0	93	10	74	65	28	20	0.87	1	51	48	1.0	105283
910384	20	28.52	9.49	1.28	3.82	0.90	2.70	0	120	11	74	72	23	0	0.76	10	77	13	6.1	105284
910384	180	25.78	9.97	1.20	4.18	1.13	2.66	0	88	9	65	55	9	0	0.92	1	66	33	2.0	105285
910384	270	24.74	8.88	1.37	4.27	1.10	2.74	0	116	12	70	69	19	21	1.27	2	53	45	1.2	105286
910385	20	23.42	11.42	0.88	4.38	1.41	2.94	0	95	5	61	61	43	0	1.10	2	46	52	0.9	105287
910385	160	24.69	11.52	0.95	4.62	1.49	2.91	0	108	3	79	67	33	0	1.17	2	45	53	0.9	105288
910385	250	27.59	11.14	1.00	4.59	1.43	2.74	0	108	19	61	68	37	0	1.13	4	45	51	0.9	105289
910386	20	29.02	7.74	0.70	4.29	1.17	2.02	0	98	0	90	64	35	0	1.81	1	47	52	0.9	105290
910386	140	27.06	7.20	0.84	3.94	1.17	1.97	0	99	6	53	45	30	0	1.74	1	41	58	0.7	105291
910386	200	26.57	11.56	1.08	3.78	1.40	3.02	0	104	0	95	51	44	0	0.96	5	55	41	1.3	105292
910386	220	25.45	16.29	0.86	5.02	1.76	3.33	0	98	1	48	60	31	0	0.81	1	41	58	0.7	105293
910388	20	27.80	8.11	0.70	3.68	1.31	2.35	0	110	0	79	63	36	0	1.42	2	38	60	0.6	105294
910388	60	24.73	10.16	0.89	5.02	1.74	3.06	0	87	0	68	45	36	0	0.86	1	39	60	0.6	105295
910388	130	23.21	7.05	2.28	4.65	1.16	2.52	0	109	2	79	63	39	0	1.04	5	46	49	0.9	105296
910389	30	25.40	9.03	0.88	4.67	1.41	2.71	0	84	4	79	55	35	0	0.44	4	42	54	0.8	105297
910389	150	20.42	6.62	0.97	7.88	1.24	2.18	19253	74	32	42	53	0	22	2.05	5	33	62	0.5	105298
910389	240	25.26	11.65	0.92	4.73	1.50	2.75	522	118	54	77	60	40	18	0.51	4	41	55	0.8	105299
910390	0	29.36	8.57	0.79	4.33	1.11	2.36	0	117	39	91	90	18	8	0.96	4	36	60	0.6	105300
910390	30	28.62	5.13	0.71	4.88	0.98	2.23	0	96	22	59	49	12	3	0.34	80	8	12	0.7	105301
910390	50	28.92	5.04	0.48	3.47	0.84	1.77	0	56	15	81	44	0	0	1.66	1	35	64	0.5	105302
910393	0	29.56	7.89	0.96	4.44	1.07	2.47	2689	66	50	86	49	23	10	0.68	10	38	52	0.7	105303
910393	40	26.91	12.64	0.95	4.99	1.43	2.92	0	72	25	53	41	17	35	0.31	10	42	48	0.9	105304
910393	150	26.52	4.08	0.20	4.78	1.35	3.05	0	105	45	79	61	28	12	1.02	5	30	65	0.5	105305
910393	300	26.19	5.96	0.31	3.39	0.98	2.72	0	129	41	78	105	31	22	1.06	3	33	64	0.5	105306
910394	10	28.79	8.39	0.70	3.87	0.74	2.94	68	93	27	38	90	23	0	0.31	10	39	51	0.8	105307
910394	70	27.62	6.66	0.82	7.39	0.99	3.23	117	100	6	65	55	14	0	0.16	30	32	38	0.8	105308
910394	210	28.39	6.47	0.49	2.77	0.42	2.28	109	62	8	36	37	3	0	1.14	2	34	64	0.5	105309
910394	310	28.90	6.12	0.48	2.69	0.34	2.14	125	102	20	68	73	31	0	1.20	1	29	70	0.4	105310
910395	50	25.20	7.92	1.55	4.80	1.55	2.80	255	89	31	60	69	30	0	1.66	5	43	52	0.8	105311
910395	150	23.97	7.99	0.41	7.57	1.39	2.71	173	139	44	107	70	37	0	2.55	4	34	62	0.5	105312
910395	250	27.23	9.05	0.54	4.96	1.87	3.04	0	113	37	62	89	17	1	0.65	1	35	64	0.5	105313
910396	20	29.27	7.28	0.58	3.10	1.28	2.43	3	109	40	84	54	23	0	1.46	3	38	59	0.6	105314
910396	150	26.55	8.98	0.48	4.60	1.39	3.15	0	112	29	107	75	30	0	1.35	10	39	51	0.8	105315
910396	250	26.05	8.70	0.50	4.17	1.60	2.99	0	112	35	93	88	13	0	1.11	1	30	69	0.4	105316

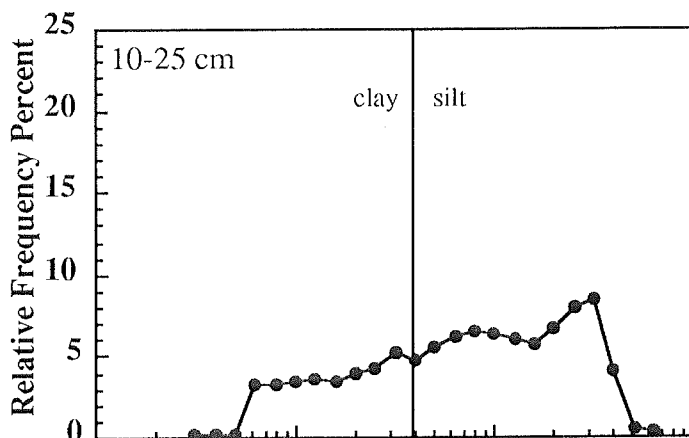
METAL, ORGANIC CARBON and PARTICLE SIZE CONCENTRATIONS AREA 4

Station	depth	Si _T	Al _T	Ca _T	Fe _T	Mg _T	K _T	Mn _T	Zn _T	Li _T	Cu _T	Cr _T	Ni _T	Pb _T	C _{ORG}	Sand	Silt	Clay	Silt/Clay	I.D.
	cm	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	fraction	per	100 g	%	
9104100	0	25.47	8.45	0.49	4.20	1.74	2.82	0	59	13	51	27	0	0	0.94	50	31	19	1.6	105317
9104101	0	31.37	6.48	0.76	2.53	0.21	2.97	0	68	3	65	39	0	0	0.65	20	59	21	2.7	105318
9104101	50	30.91	6.23	0.73	2.15	0.19	2.85	0	72	1	65	41	0	0	0.60	30	49	21	2.4	105319
9104101	100	28.30	6.58	0.73	2.30	0.34	2.84	0	85	15	83	46	0	0	0.95	15	65	20	3.2	105320
9104102	10	31.30	6.01	0.92	2.00	0.00	2.43	0	64	0	84	32	3	0	1.10	20	56	24	2.4	105321
9104102	90	31.50	6.91	1.10	2.01	0.08	2.91	0	76	4	63	51	0	0	0.87	20	56	24	2.4	105322
9104102	160	31.19	5.88	0.71	1.51	0.00	2.61	0	45	5	50	32	14	0	0.53	80	13	7	2.0	105323
9104103	50	30.30	7.55	1.33	2.74	0.36	3.04	0	89	5	90	54	6	0	0.74	15	59	26	2.3	105324
9104103	90	29.04	7.00	1.28	2.64	0.48	2.56	0	82	7	83	42	24	0	0.96	5	63	32	2.0	105325
9104107	0	29.57	7.62	0.50	2.22	0.11	2.23	0	71	11	72	53	5	0	0.57	25	58	17	3.4	105326
9104108	10	32.14	5.84	1.01	1.93	0.00	2.61	0	70	7	81	32	4	0	1.32	20	47	33	1.4	105327
9104109	10	29.61	7.24	0.77	2.25	0.11	3.00	0	55	0	66	40	1	0	0.56	10	55	35	1.6	105328
9104109	70	32.75	6.96	0.94	1.70	0.00	2.96	0	60	8	65	36	15	0	0.61	15	54	31	1.8	105329
9104110	10	33.39	6.18	0.79	1.73	0.00	2.65	0	59	6	47	25	0	0	0.77	10	58	32	1.8	105330
9104110	40	32.58	6.78	0.97	2.12	0.13	2.50	0	54	11	47	26	11	0	0.78	20	52	28	1.9	105331
9104110	70	33.74	5.92	0.72	1.29	0.00	2.96	0	46	10	36	23	0	0	0.63	30	45	25	1.8	105332
9104111	20	32.17	6.05	0.71	1.75	0.00	2.64	0	42	7	56	22	0	0	0.72	20	49	31	1.6	105333
9104111	80	34.89	6.27	1.02	0.80	0.00	2.55	32	47	8	27	20	0	5	0.43	15	50	35	1.4	105334
9104111	130	32.06	6.05	0.71	1.50	0.00	2.55	0	40	5	51	22	0	0	0.61	20	44	36	1.2	105335
9104113	50	28.68	7.87	0.92	2.44	0.36	3.20	0	112	6	57	53	30	0	0.58	10	73	17	4.2	105337
9104118	10	32.37	6.02	0.58	1.68	0.00	2.59	0	32	8	44	22	0	0	0.70	25	44	31	1.4	105338
9104118	50	28.36	7.86	0.97	2.38	0.11	3.20	0	82	10	92	46	12	0	1.32	10	53	37	1.5	105339
9104118	100	27.83	7.73	0.89	2.70	0.21	2.72	0	63	8	80	40	0	2	1.07	10	60	30	2.0	105340

APPENDIX 3

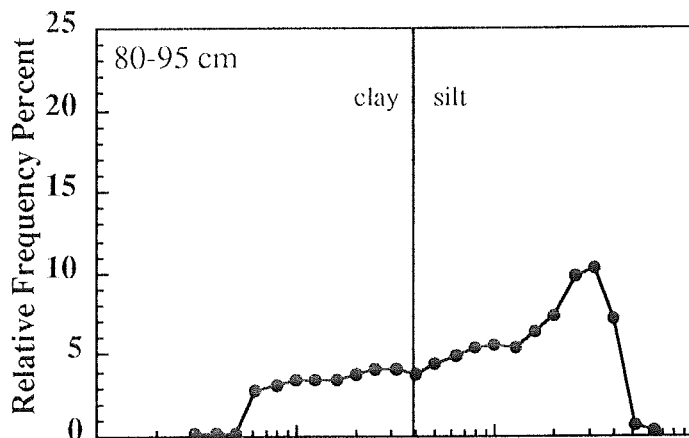
Relative Frequency Diagrams for Sediment Particle Size Results

Station 910101



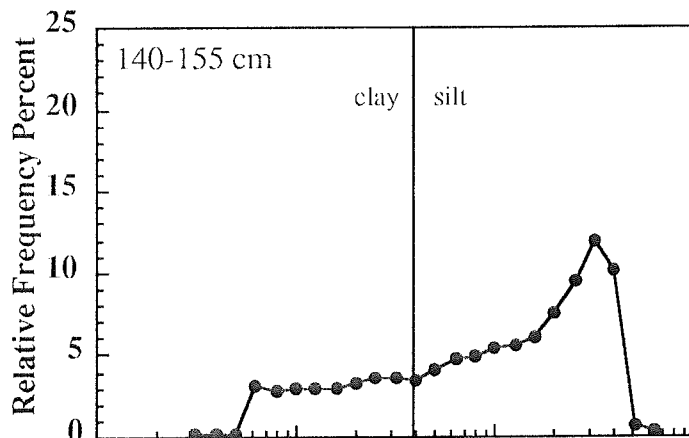
**I.D.
105201**

sand= 30%
silt= 45%
clay= 25%
silt/clay=1.8
org. car.=0.89%



**I.D.
105202**

sand= 50%
silt= 34%
clay= 16%
silt/clay=2.1
org. car.=0.59%

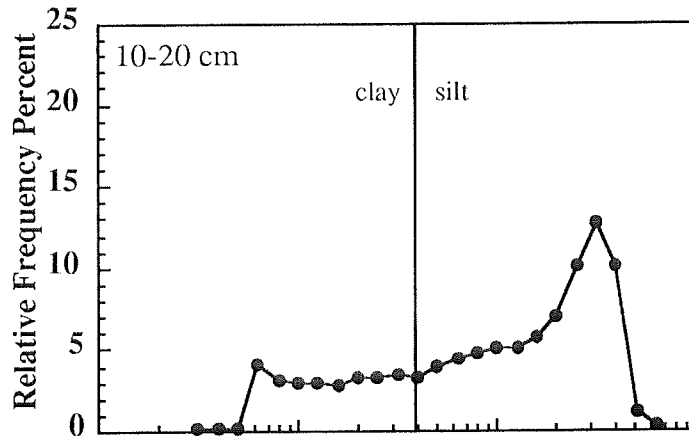


**I.D.
105203**

sand= 40%
silt= 43%
clay= 17%
silt/clay=2.4
org. car.=0.64%

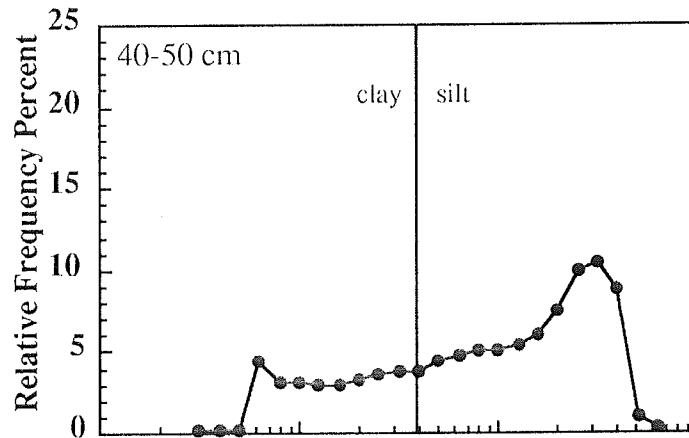
.1 1 10 100
Size (μm)

Station 910106



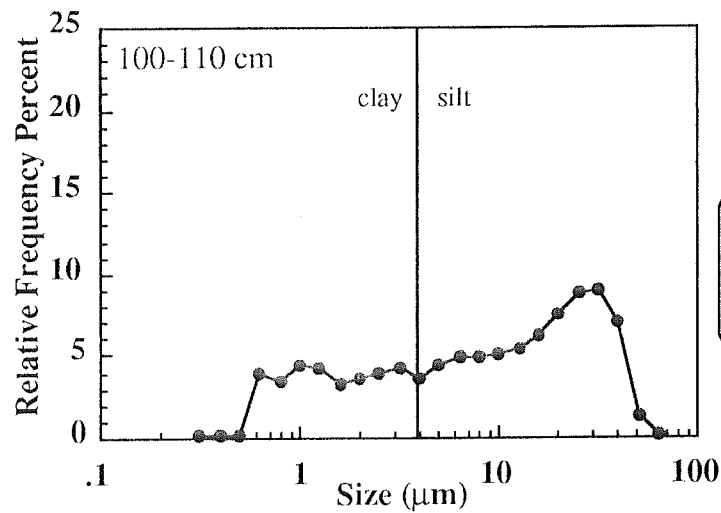
I.D.
105209

sand= 30%
silt= 49%
clay= 21%
silt/clay=2.4
org. car.=0.70%



I.D.
105210

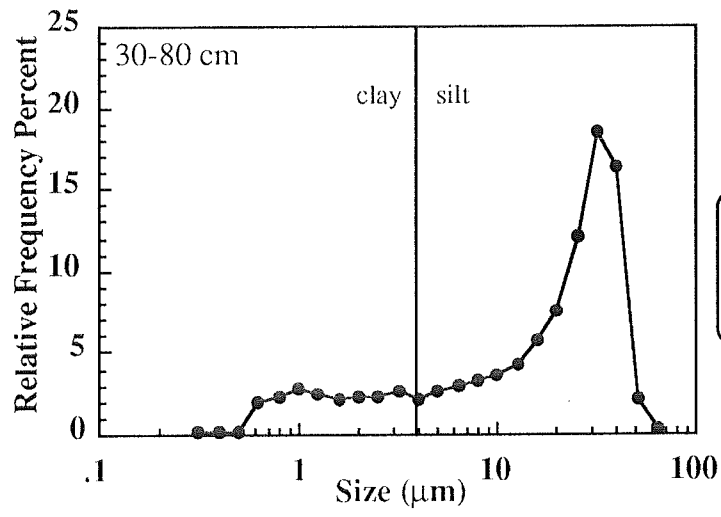
sand= 40%
silt= 41%
clay= 19%
silt/clay=2.2
org. car.=0.77%



I.D.
105211

sand= 25%
silt= 49%
clay= 26%
silt/clay=1.8
org. car.=0.66%

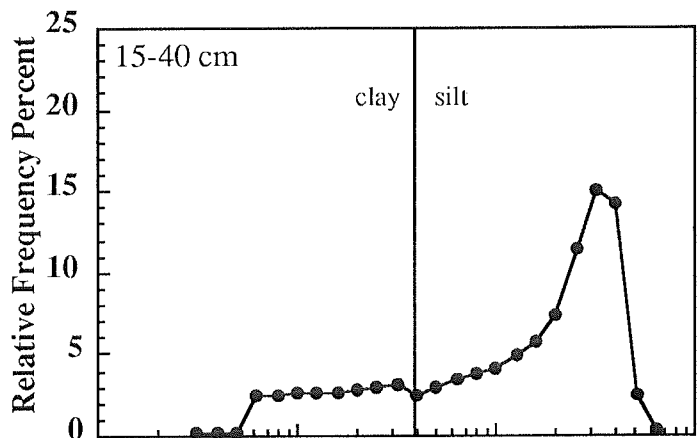
Station 910107



I.D.
105212

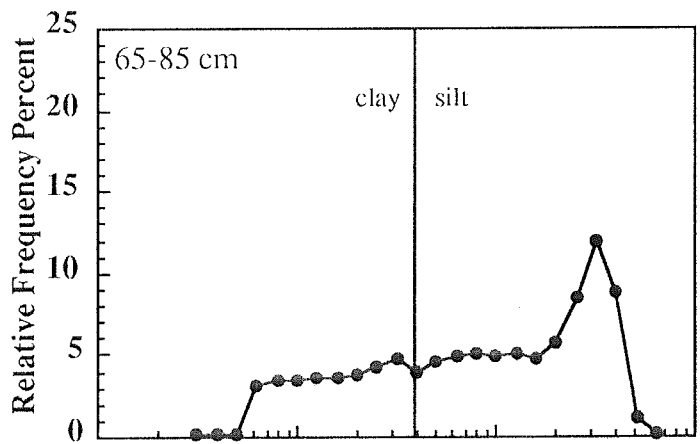
sand= 80%
silt= 16%
clay= 4%
silt/clay=4.0
org. car.=0.68%

Station 910110



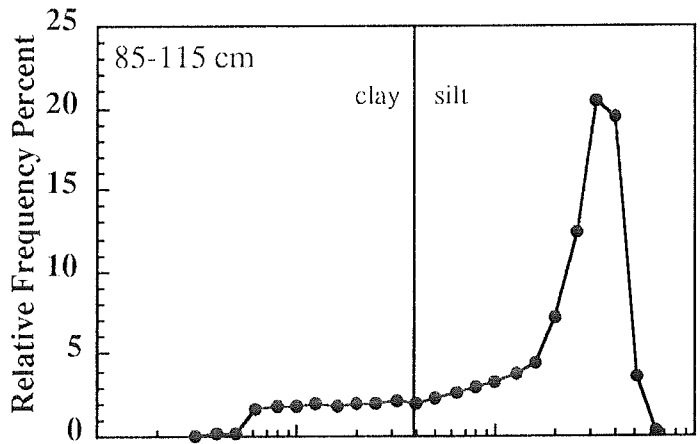
I.D.
105213

sand= 20%
silt= 61%
clay= 19%
silt/clay=3.1
org. car.=0.88%



I.D.
105214

sand= 60%
silt= 24%
clay= 14%
silt/clay=1.8
org. car.=0.73%

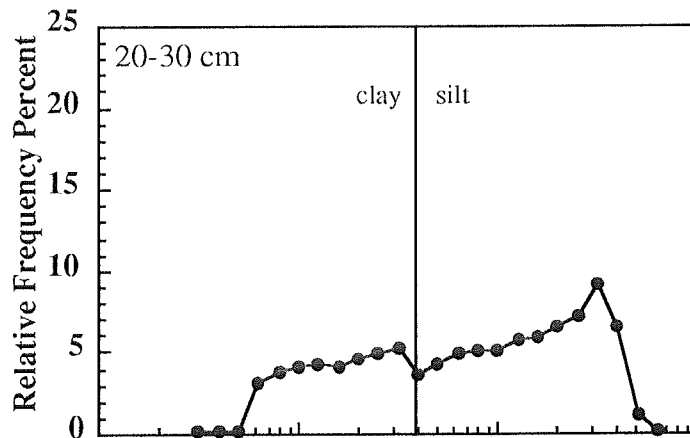


I.D.
105215

sand= 50%
silt= 41%
clay= 9%
silt/clay=4.8
org. car.=0.59%

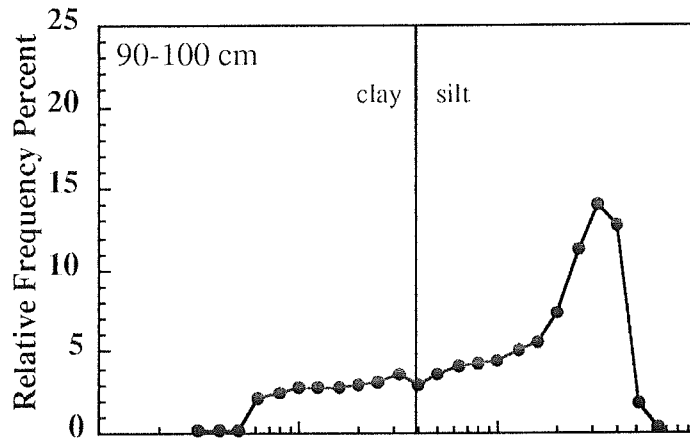
.1 1 10 100
Size (µm)

Station 910117



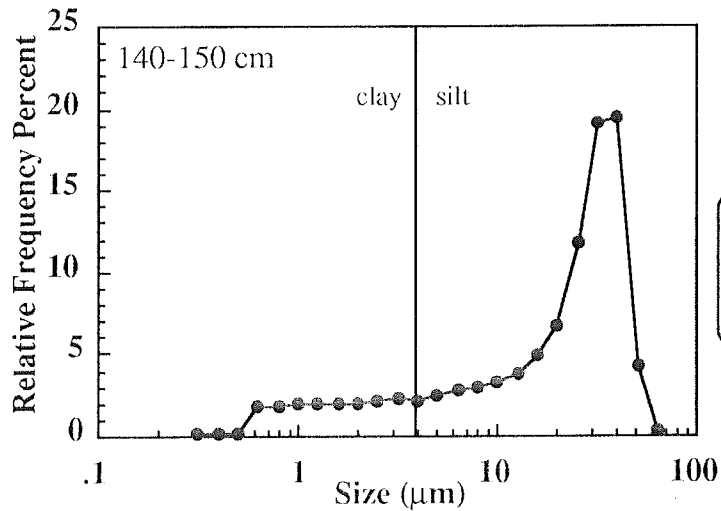
I.D.
105216

sand= 40%
silt= 37%
clay= 23%
silt/clay=1.6
org. car.=0.97%



I.D.
105217

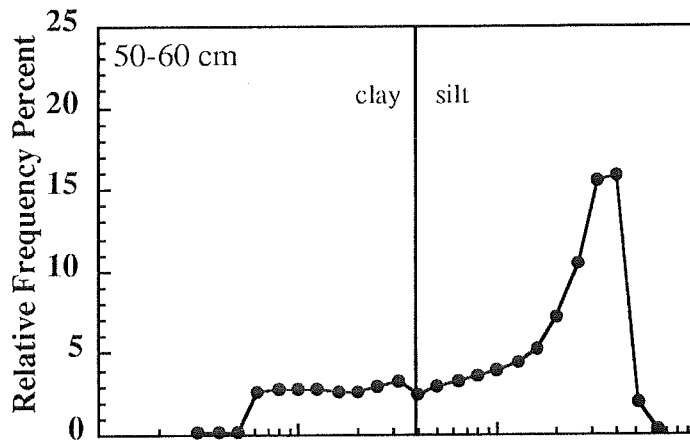
sand= 75%
silt= 19%
clay= 6%
silt/clay=2.9
org. car.=0.64%



I.D.
105218

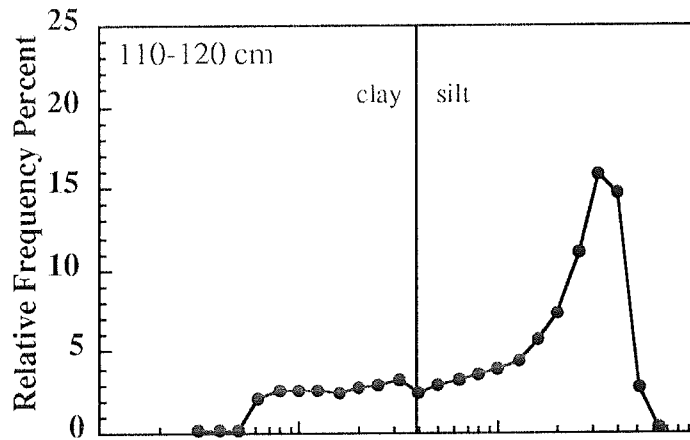
sand= 60%
silt= 33%
clay= 7%
silt/clay=4.5
org. car.=0.53%

Station 910118



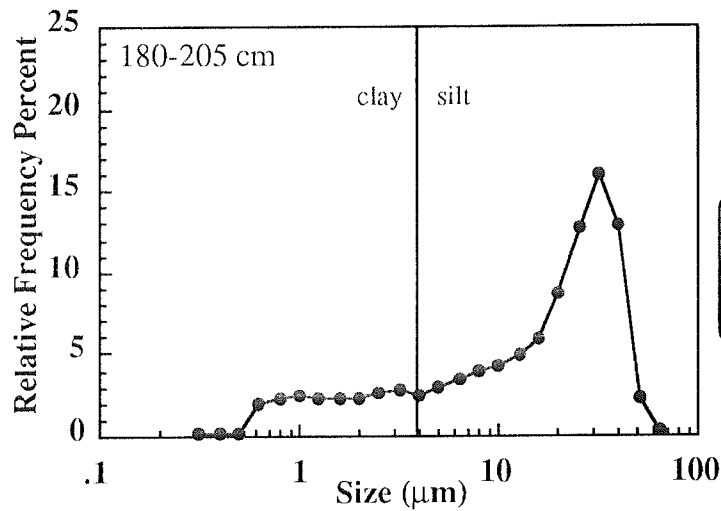
**I.D.
105219**

sand=40%
silt= 45%
clay= 15%
silt/clay=3.0
org. car.=0.62%



**I.D.
105220**

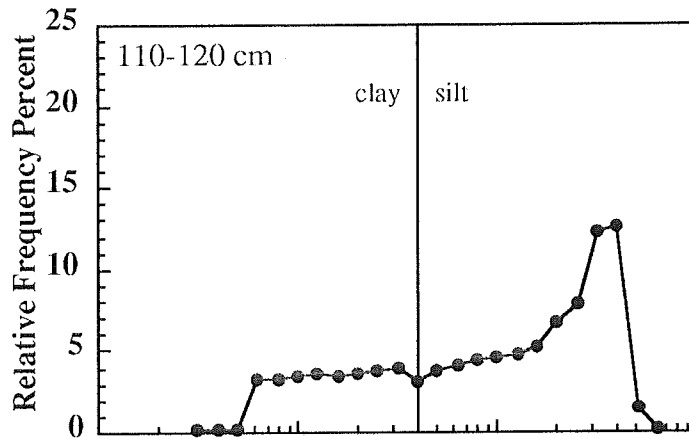
sand= 70%
silt= 23%
clay= 7%
silt/clay=3.1
org. car.=0.52%



**I.D.
105221**

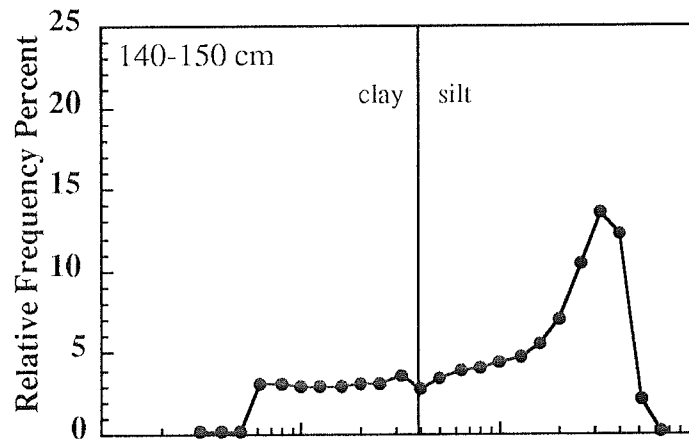
sand= 30%
silt= 55%
clay= 15%
silt/clay=3.6
org. car.=0.61%

Station 910119



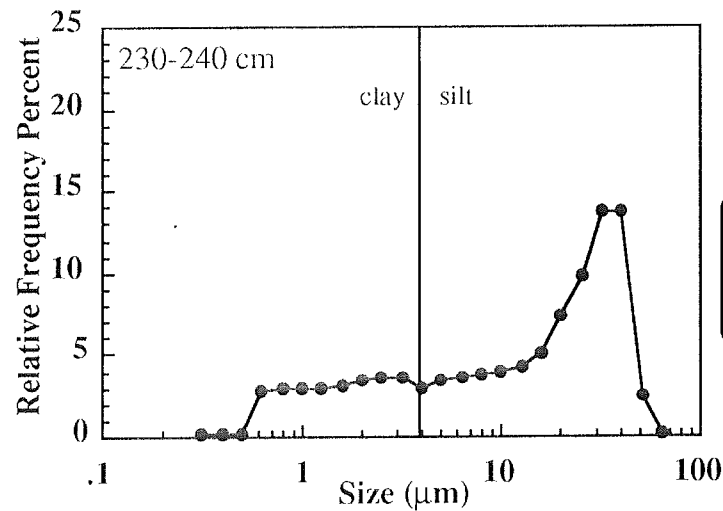
I.D.
105222

sand= 60%
silt= 27%
clay= 13%
silt/clay=2.1
org. car.=0.76%



I.D.
105223

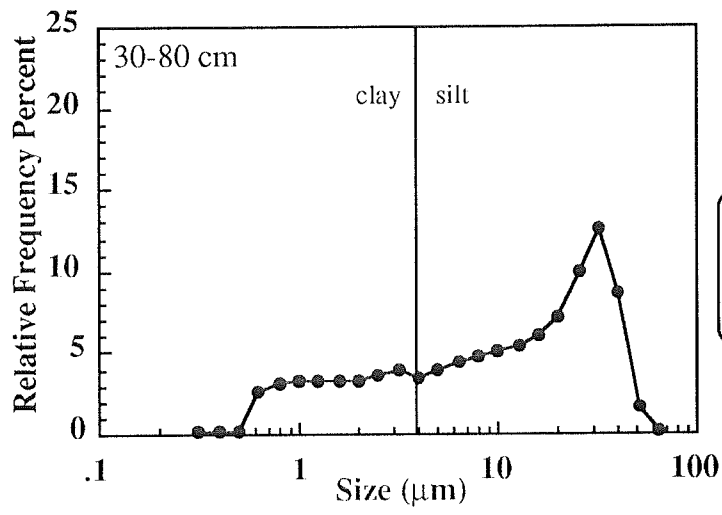
sand= 25%
silt= 54%
clay= 21%
silt/clay=2.6
org. car.=0.69%



I.D.
105224

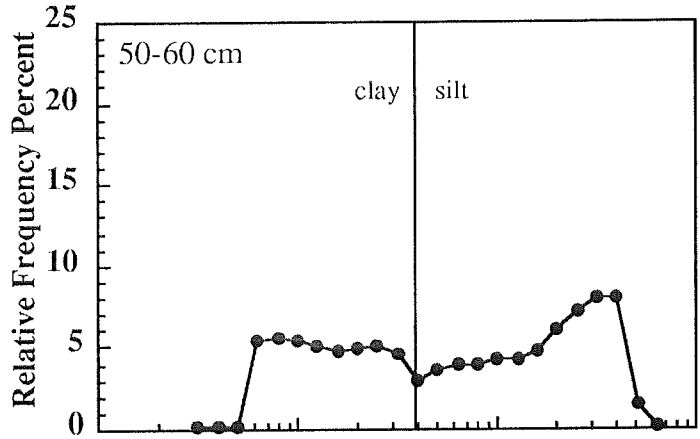
sand= 40%
silt= 43%
clay= 17%
silt/clay=2.5
org. car.=0.53%

Station 910123



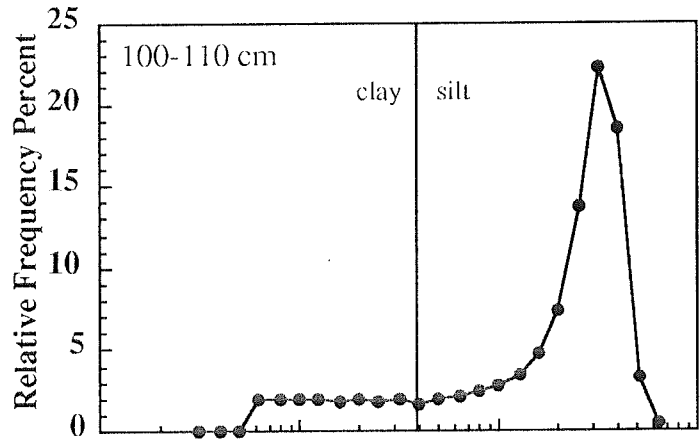
I.D.
105228

Station 910128



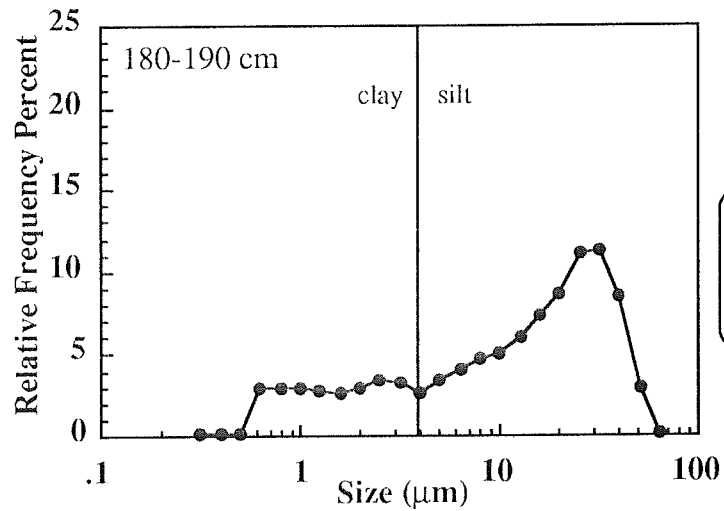
I.D.
105225

sand= 20%
silt= 45%
clay= 35%
silt/clay=1.3
org. car.=0.92%



I.D.
105226

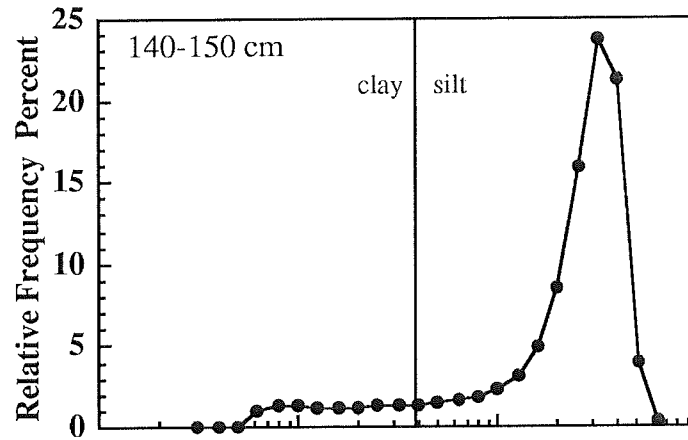
sand= 80%
silt= 17%
clay= 3%
silt/clay=4.9
org. car.=0.55%



I.D.
105227

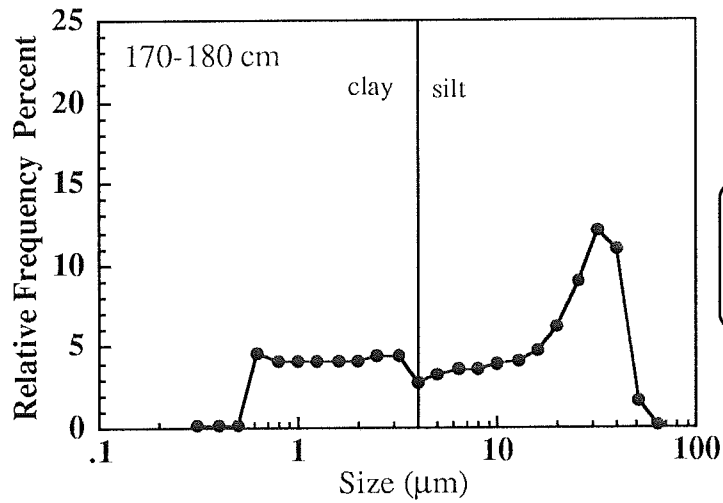
sand= 30%
silt= 51%
clay= 19%
silt/clay=2.7
org. car.=0.59%

Station 910133



I.D.
105230

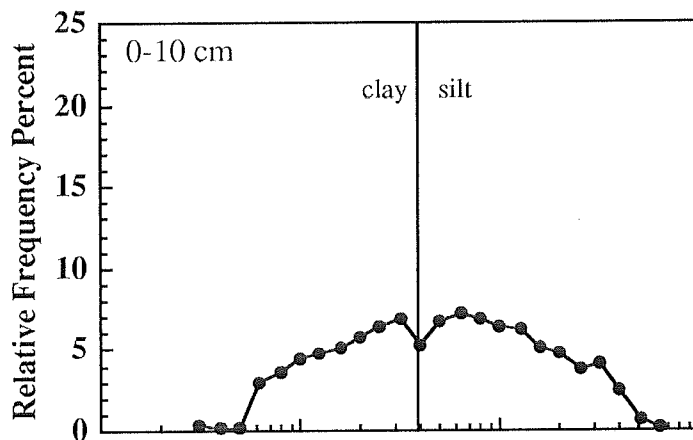
sand=60%
silt= 35%
clay= 5%
silt/clay= 7.0
org. car.= 0.32%



I.D.
105231

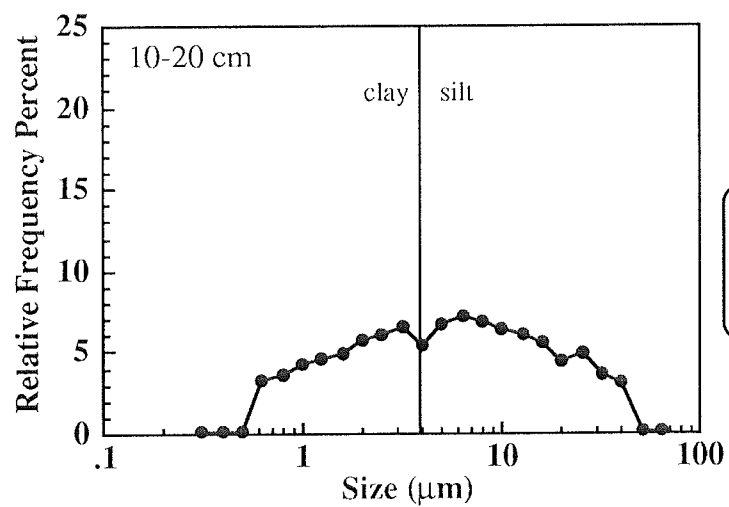
sand=20%
silt= 51%
clay= 29%
silt/clay=1.8
org. car.=0.64%

Station 910239



I.D.
105232

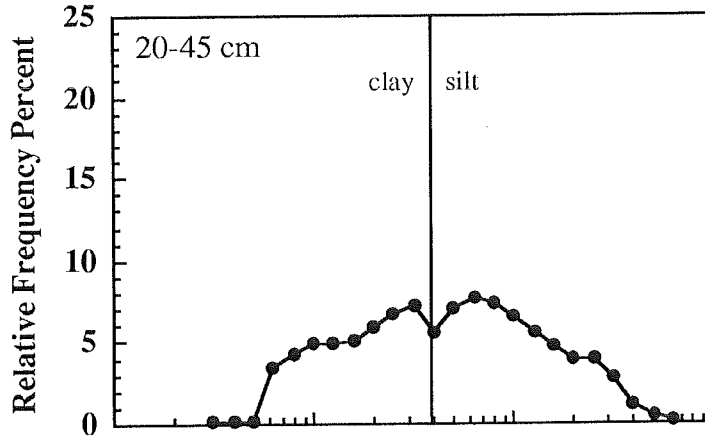
sand=5%
silt= 52%
clay= 43%
silt/clay=1.2
org. car.=1.70%



I.D.
105233

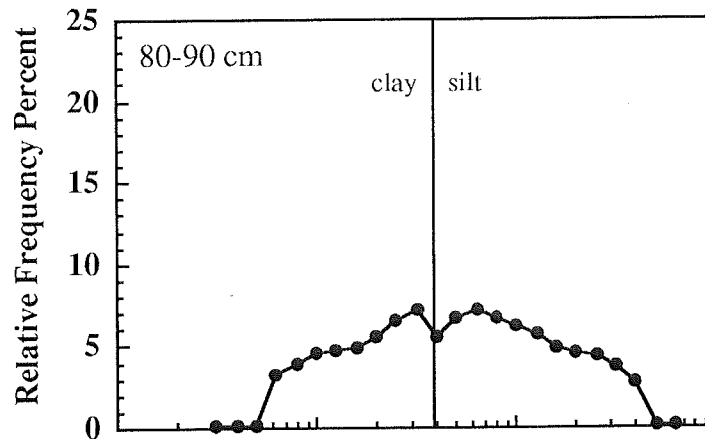
sand= 5%
silt= 52%
clay= 43%
silt/clay=1.2
org. car.=1.93%

Station 910240



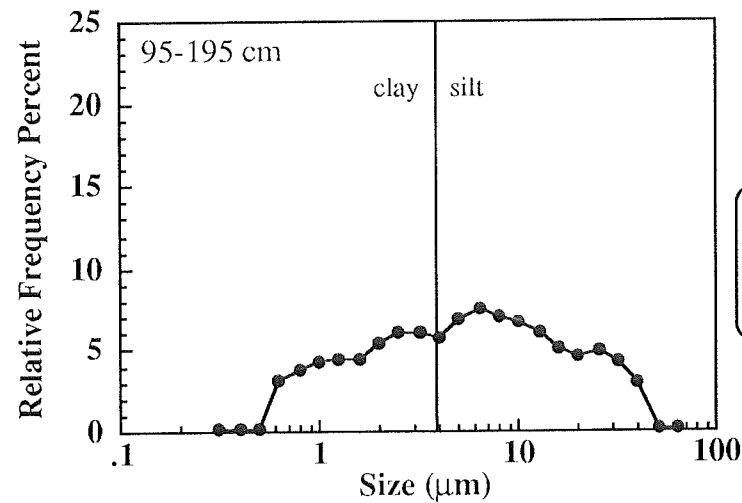
I.D.
105235

sand= 5%
silt= 49%
clay= 46%
silt/clay=1.1
org. car.=1.41%



I.D.
105236

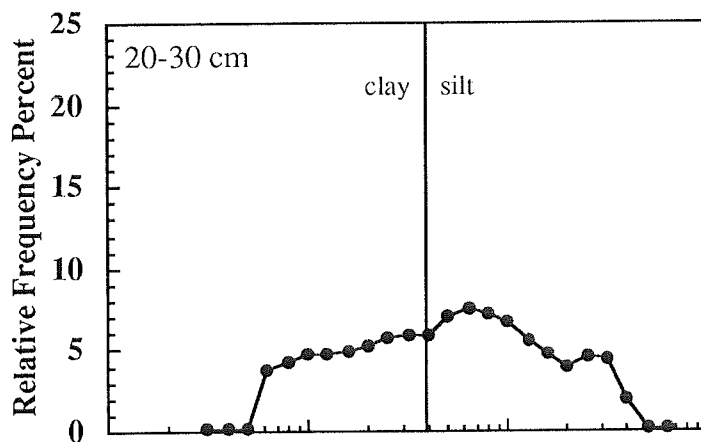
sand= 5%
silt= 50%
clay= 44%
silt/clay=1.1
org. car.=1.27%



I.D.
105237

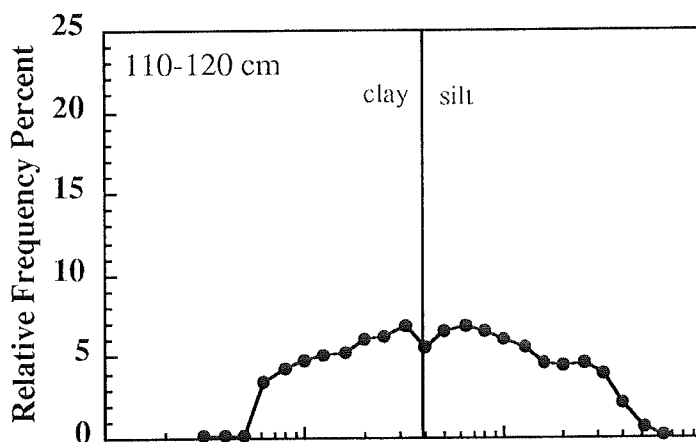
sand= 5%
silt= 53%
clay= 42%
silt/clay=1.3
org. car.=1.32%

Station 910241



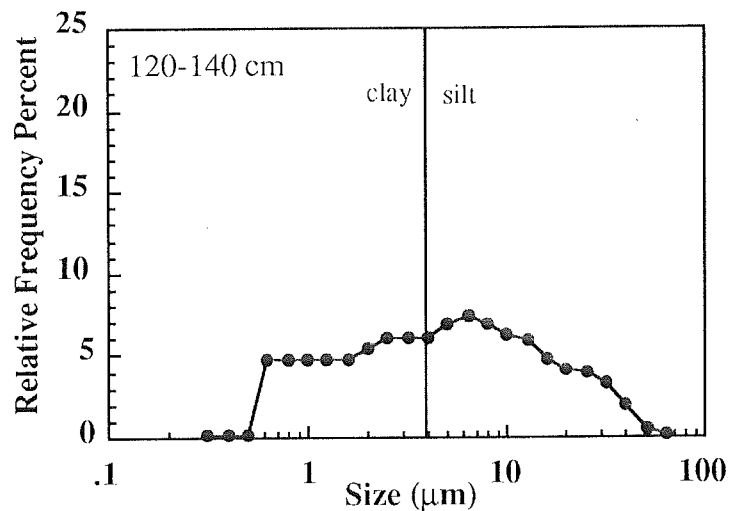
**I.D.
105238**

sand= 5%
silt= 51%
clay= 44%
silt/clay=1.2
org. car.=1.30%



**I.D.
105239**

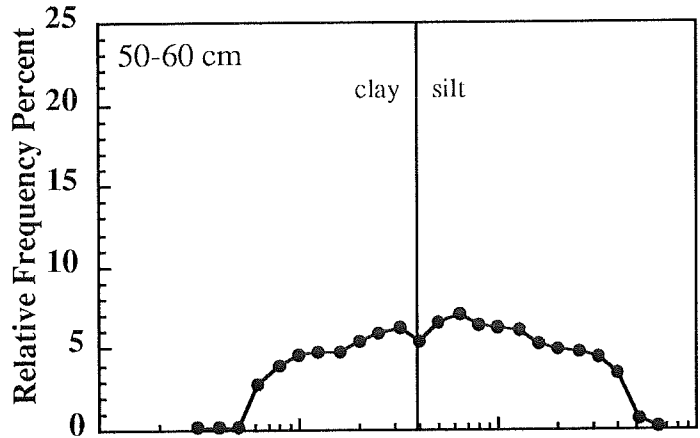
sand= 5%
silt= 49%
clay= 46%
silt/clay=1.1
org. car.=1.31%



**I.D.
105240**

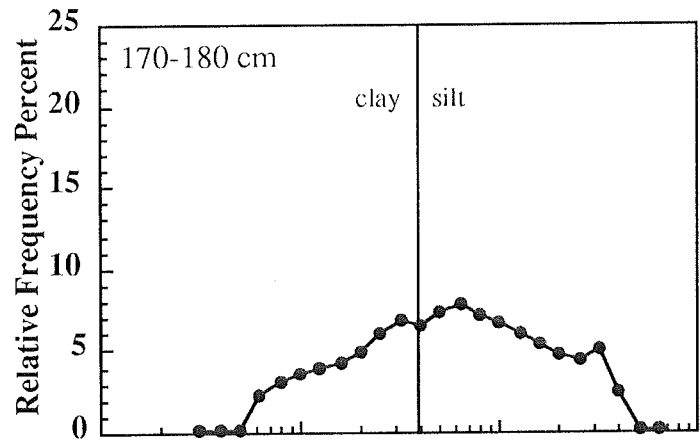
sand= 2%
silt= 51%
clay= 47%
silt/clay=1.1
org. car.=1.30%

Station 910243



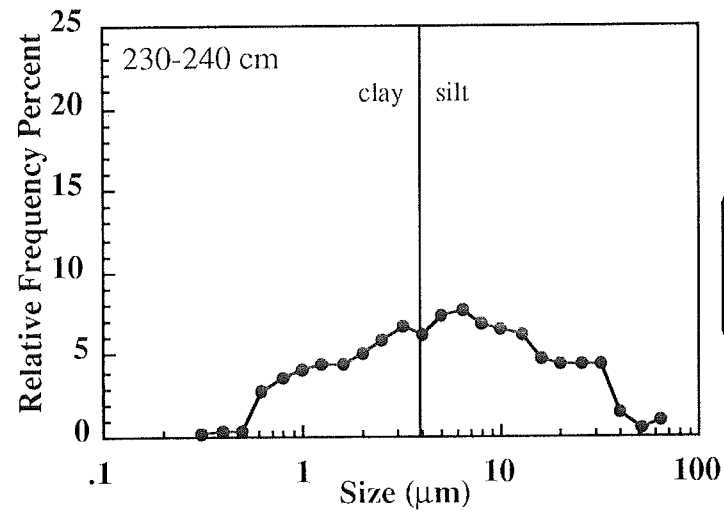
**I.D.
105241**

sand= 2%
silt= 55%
clay= 43%
silt/clay=1.3
org. car.=1.64%



**I.D.
105242**

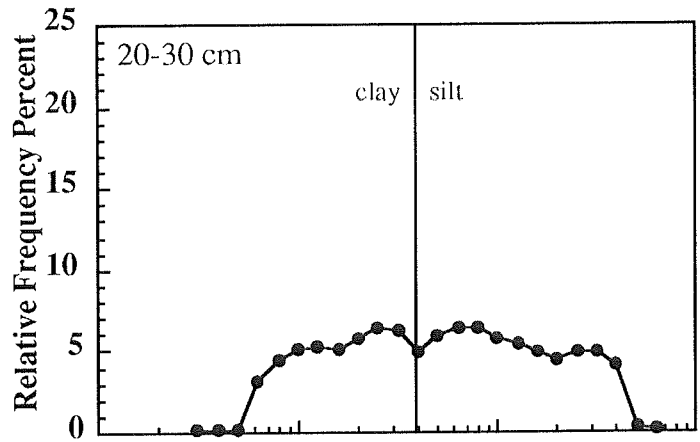
sand= 2%
silt= 57%
clay= 41%
silt/clay=1.4
org. car.=1.37%



**I.D.
105243**

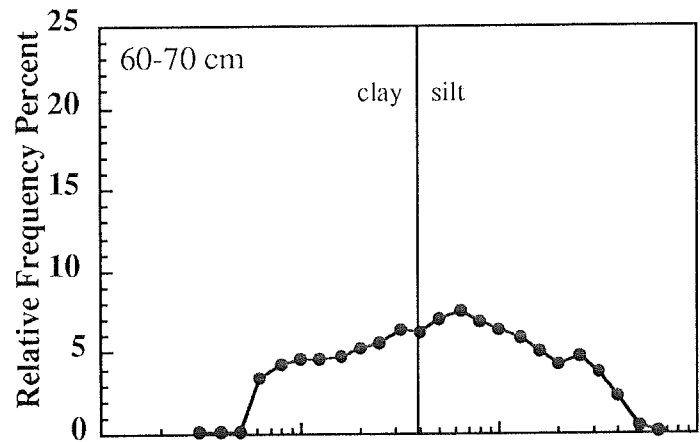
sand= 2%
silt= 55%
clay= 43%
silt/clay=1.3
org. car.=1.45%

Station 910244



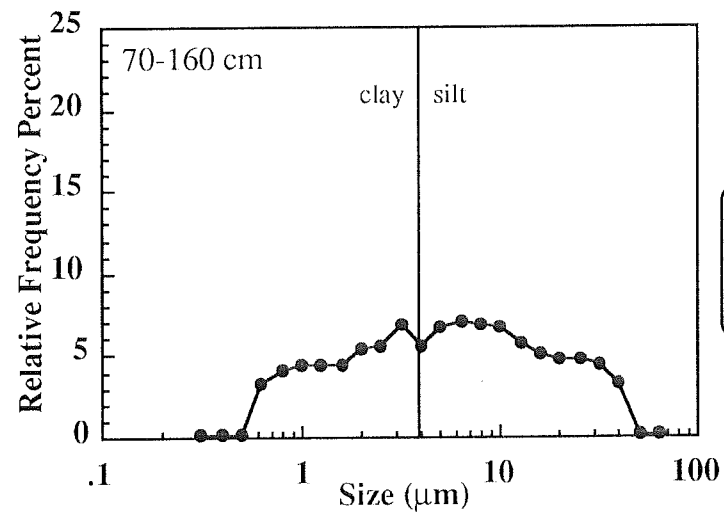
I.D.
105244

sand= 2%
silt= 52%
clay= 46%
silt/clay=1.1
org. car.=1.26%



I.D.
105245

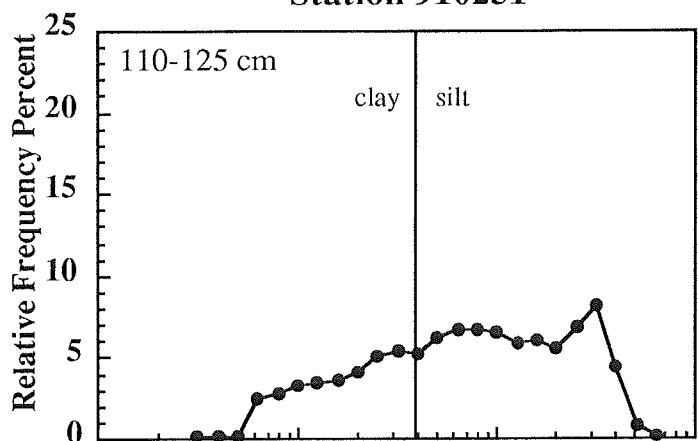
sand= 3%
silt= 53%
clay= 44%
silt/clay=1.2
org. car.=1.26%



I.D.
105246

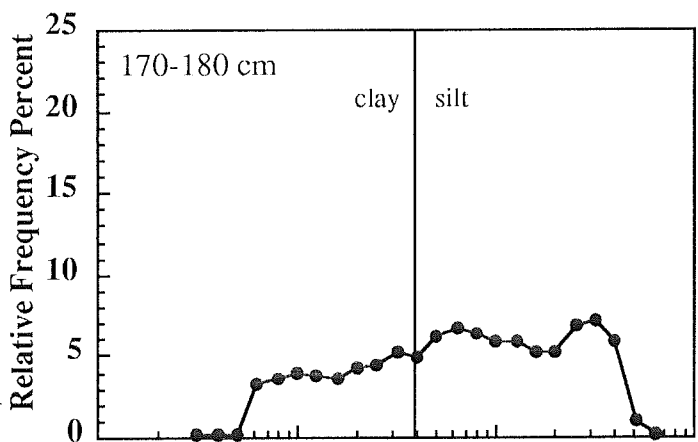
sand= 2%
silt= 54%
clay= 44%
silt/clay=1.2
org. car.=1.18%

Station 910251



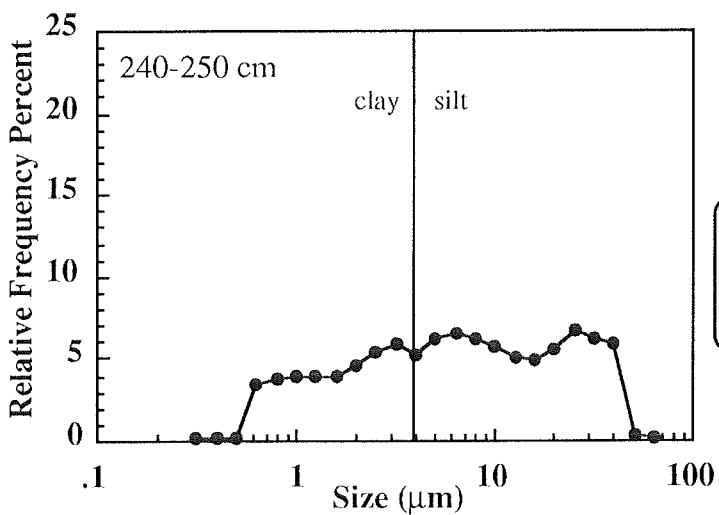
I.D.
105248

sand= 5%
silt= 55%
clay= 40%
silt/clay=1.4
org. car.=1.03%



I.D.
105249

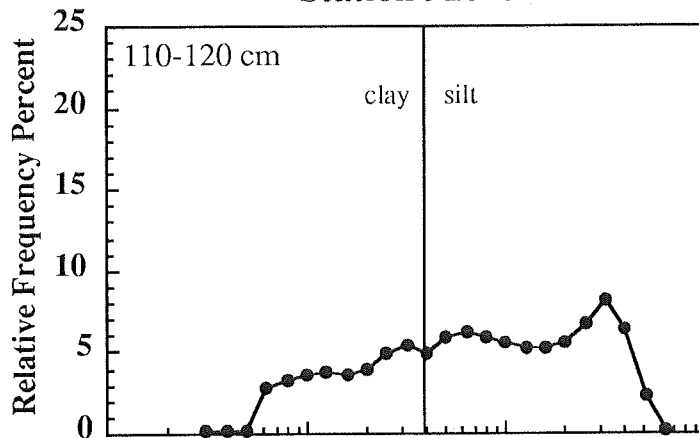
sand= 5%
silt= 46%
clay= 50%
silt/clay= 0.9
org. car.=1.13%



I.D.
105250

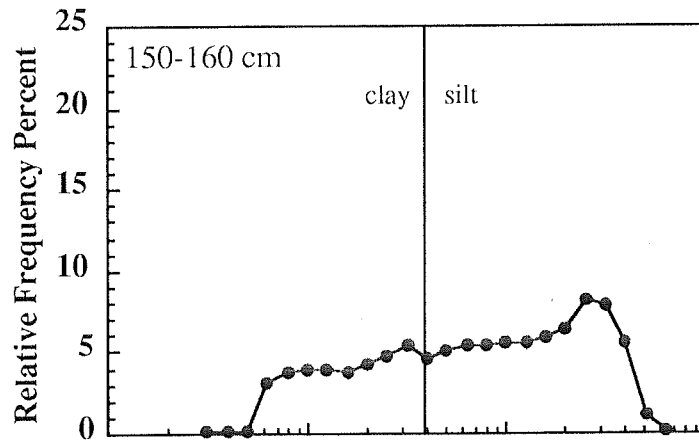
sand= 5%
silt= 60%
clay= 35%
silt/clay=1.7
org. car.=1.42%

Station 910252



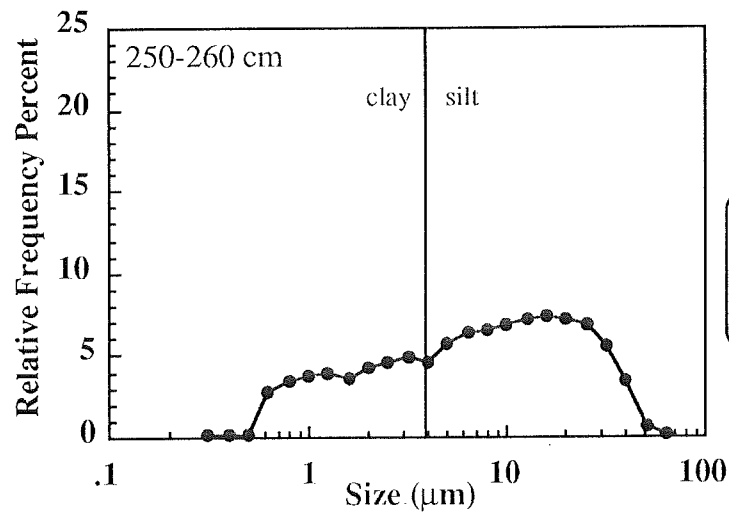
I.D.
105251

sand= 5%
silt= 59%
clay= 36%
silt/clay=1.6
org. car.=1.17%



I.D.
105252

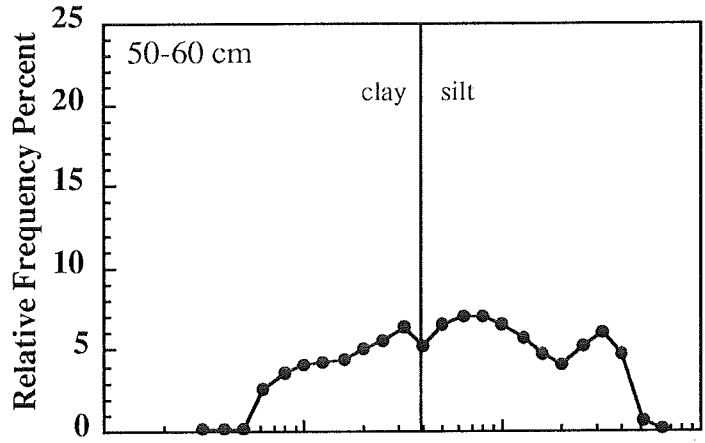
sand= 5%
silt= 61%
clay= 34%
silt/clay=1.8
org. car.=1.39%



I.D.
105253

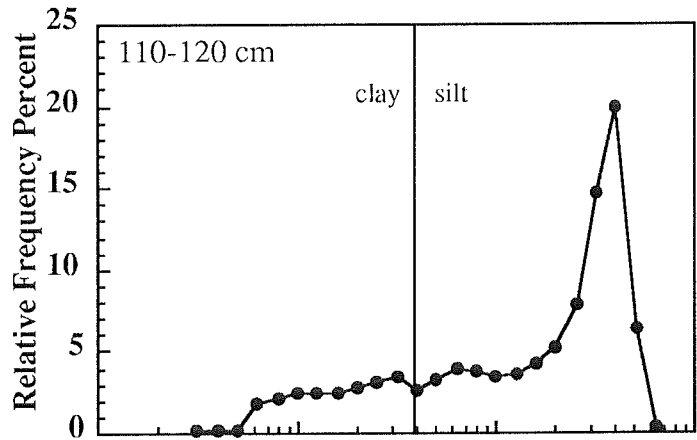
sand= 5%
silt= 61%
clay= 34%
silt/clay=1.8
org. car.=1.65%

Station 910253



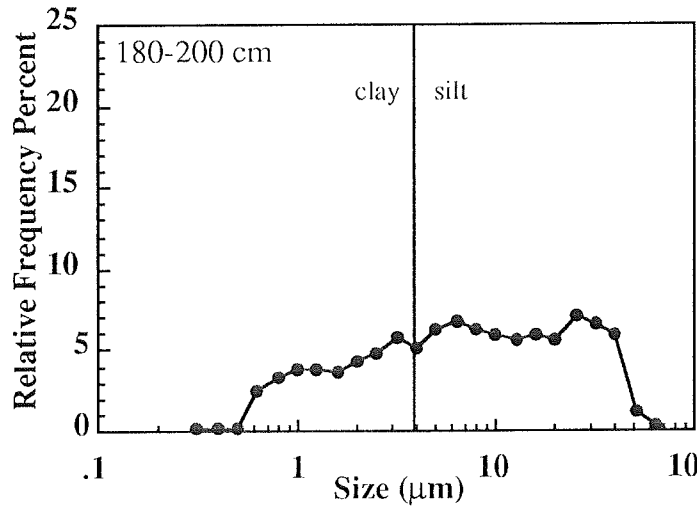
I.D.
105254

sand= 10%
silt= 53%
clay= 37%
silt/clay=1.4
org. car.=1.28%



I.D.
105255

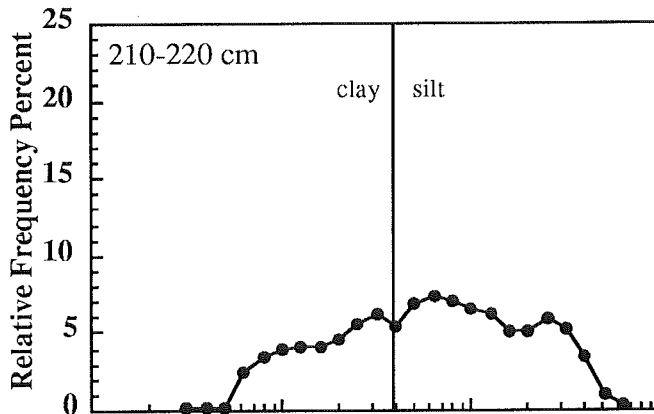
sand= 7%
silt= 71%
clay= 22%
silt/clay=3.3
org. car.=1.03%



I.D.
105256

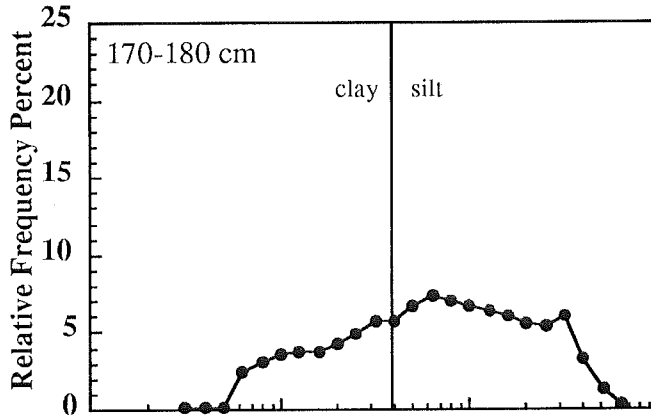
sand= 5%
silt= 60%
clay= 35%
silt/clay=1.7
org. car.=1.35%

Station 910254



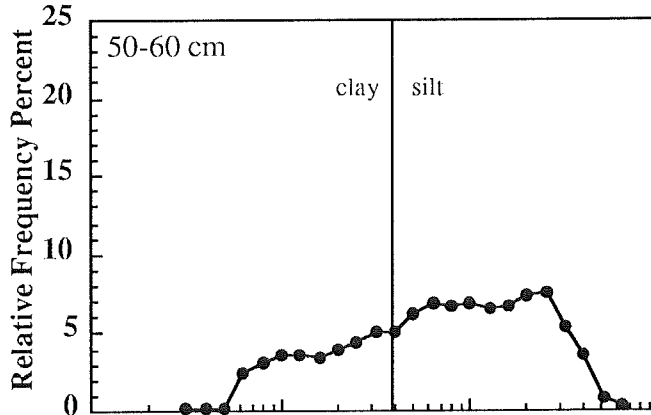
I.D.
105257

sand=5%
silt= 57%
clay= 38%
silt/clay=1.5
org. car.=1.28%



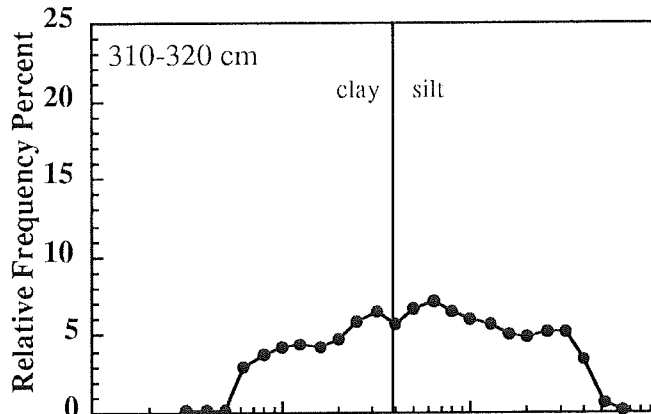
I.D.
105258

sand= 5%
silt= 59%
clay= 36%
silt/clay=1.6
org. car.=1.13%



I.D.
105259

sand= 7%
silt= 60%
clay= 33%
silt/clay=1.8
org. car.=1.17%

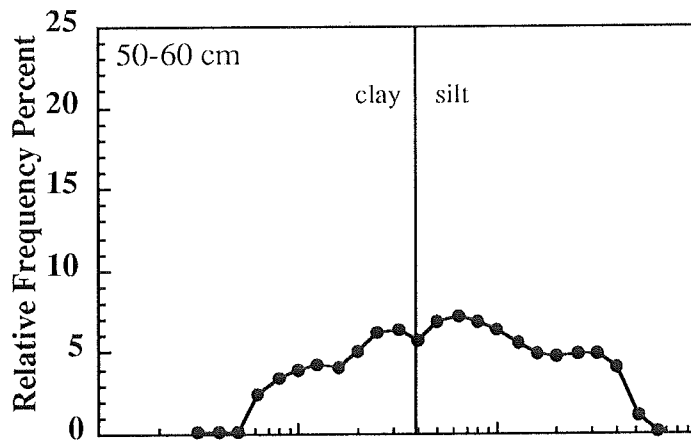


I.D.
105260

sand= 7%
silt= 53%
clay= 40%
silt/clay=1.3
org. car.=1.32%

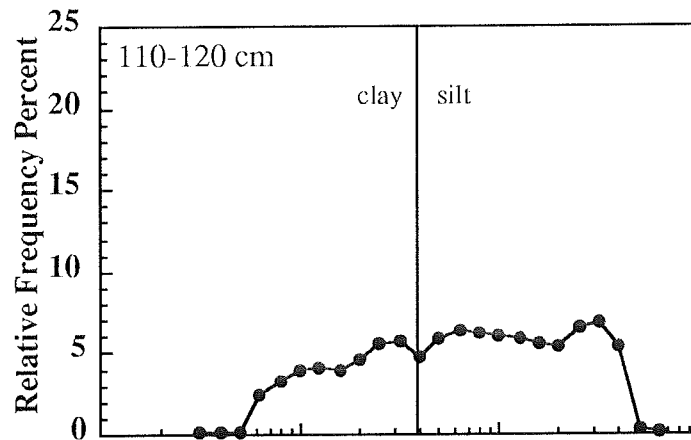
.1 1 10 100
Size (µm)

Station 910256



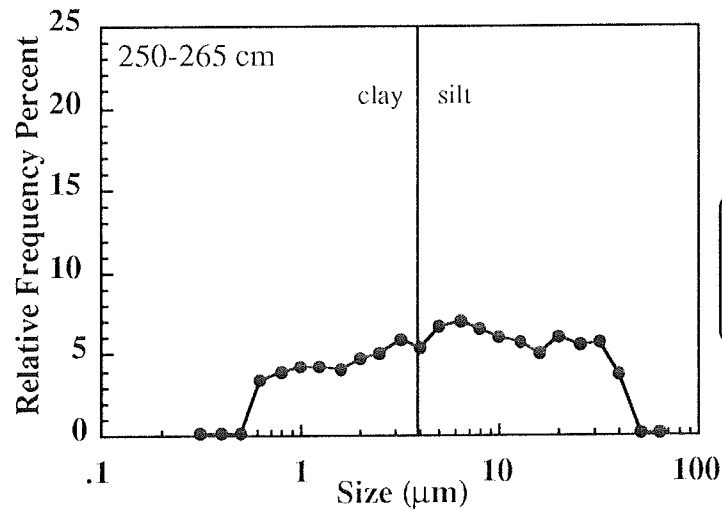
I.D.
105261

sand= 10%
silt= 52%
clay= 38%
silt/clay=1.4
org. car.=1.38%



I.D.
105262

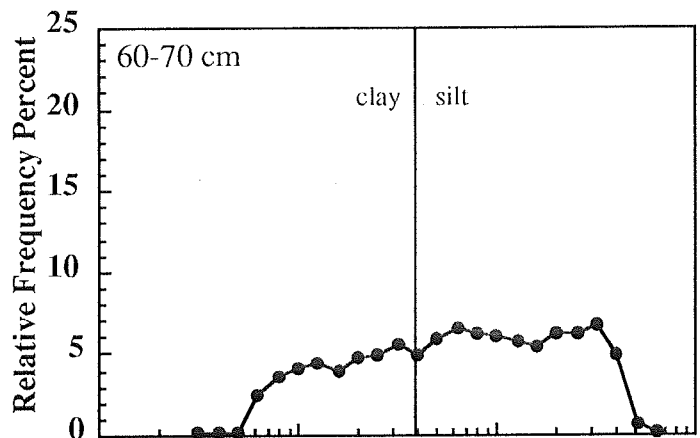
sand= 10%
silt= 55%
clay= 35%
silt/clay=1.6
org. car.=1.09%



I.D.
105263

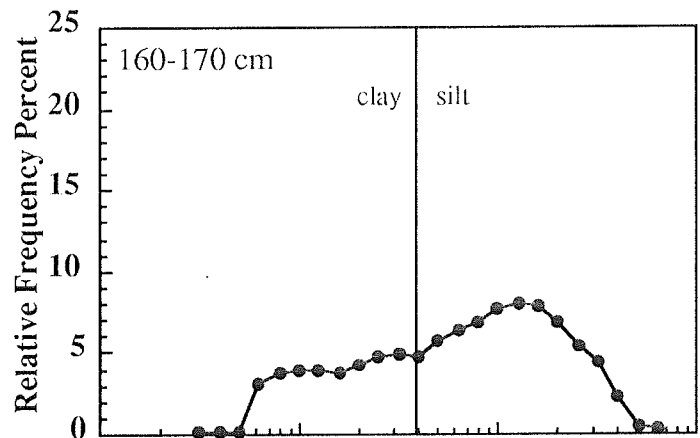
sand= 5%
silt= 56%
clay= 39%
silt/clay=1.4
org. car.=1.29%

Station 910257



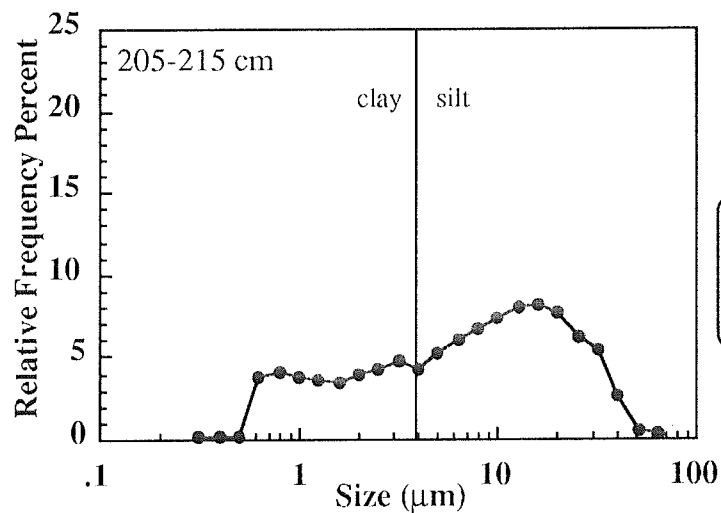
I.D.
105264

sand= 8%
silt= 56%
clay= 36%
silt/clay=1.5
org. car.=1.37%



I.D.
105265

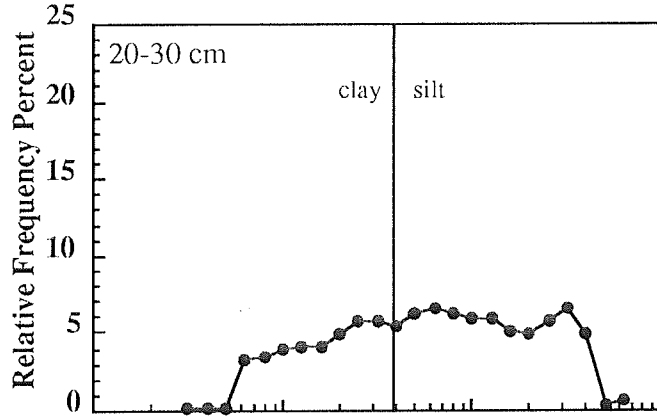
sand= 5%
silt= 59%
clay= 36%
silt/clay=1.7
org. car.=1.57%



I.D.
105266

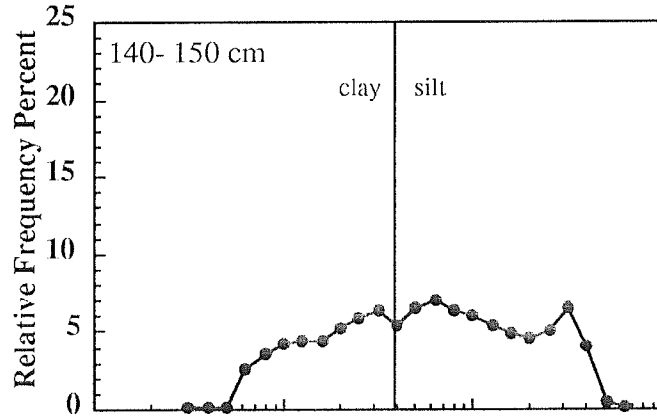
sand= 5%
silt= 61%
clay= 34%
silt/clay=1.8
org. car.=1.57%

Station 910267



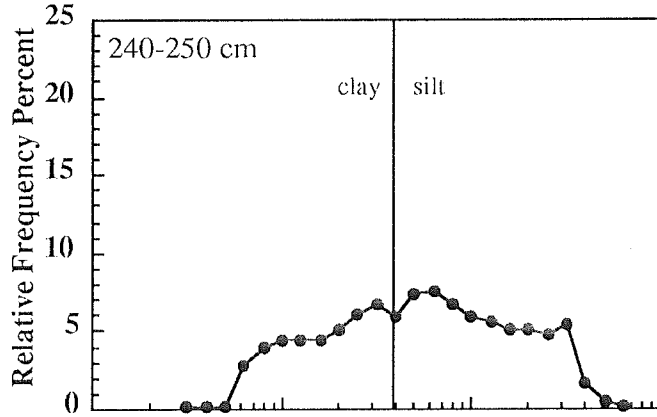
I.D.
105267

sand= 10%
silt= 53%
clay= 37%
silt/clay=1.4
org. car.=1.57%



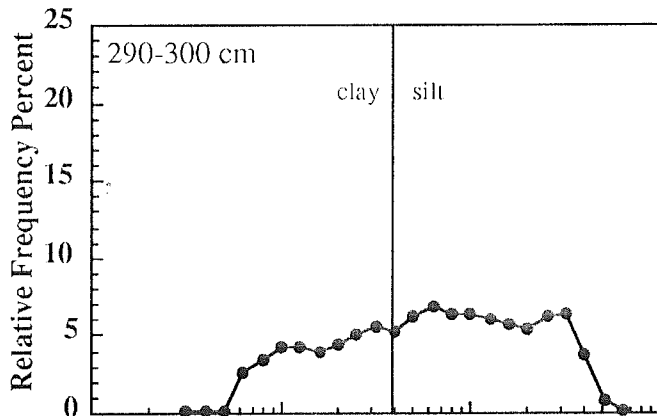
I.D.
105268

sand= 5%
silt= 54%
clay= 41%
silt/clay=1.3
org. car.=1.41%



I.D.
105269

sand= 3%
silt= 54%
clay= 43%
silt/clay=1.3
org. car.=1.41%

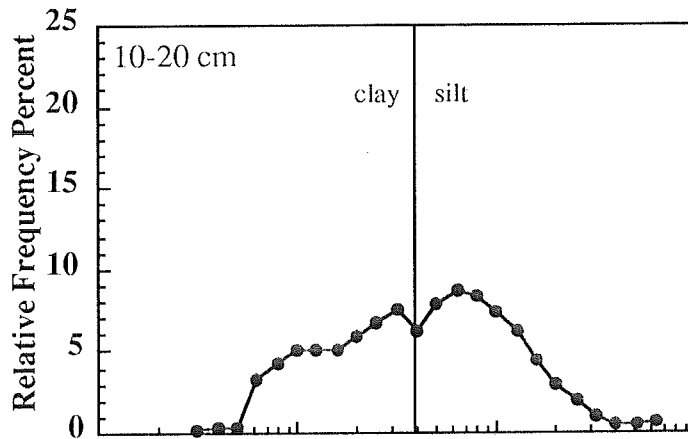


I.D.
105270

sand= 2%
silt= 59%
clay= 39%
silt/clay=1.5
org. car.=1.35%

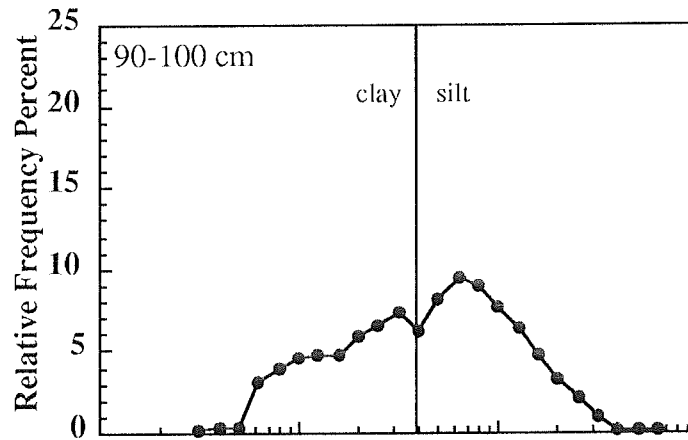
.1 1 10 100
Size (µm)

Station 910269



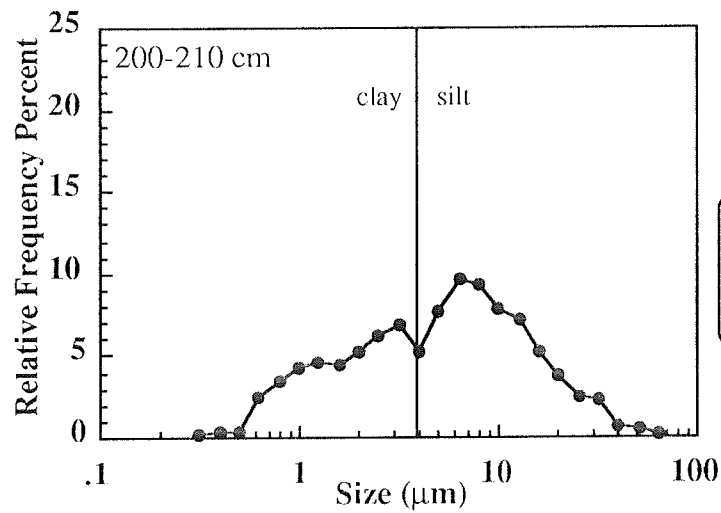
I.D.
105271

sand= 4%
silt= 48%
clay= 48%
silt/clay=1.0
org. car.=1.55%



I.D.
105272

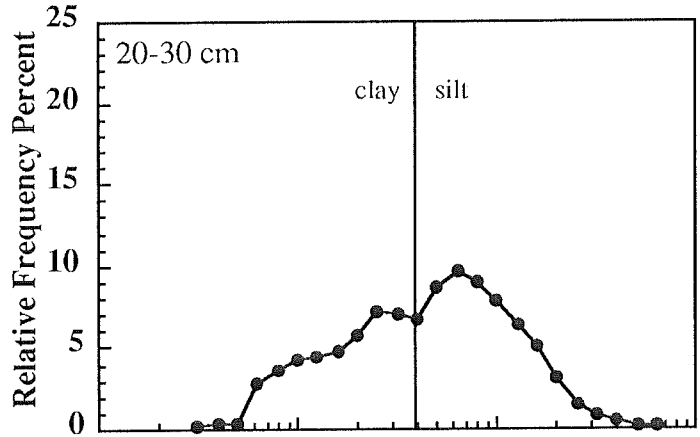
sand= 4%
silt= 50%
clay= 46%
silt/clay=1.1
org. car.=1.71%



I.D.
105273

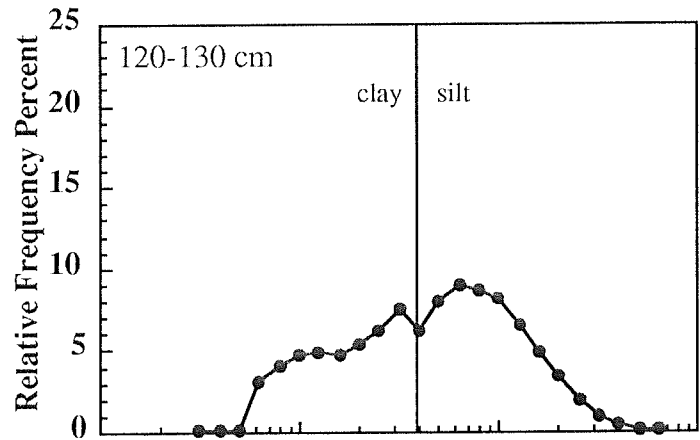
sand= 2%
silt= 55%
clay= 43%
silt/clay=1.3
org. car.=1.87%

Station 910270



I.D.
105274

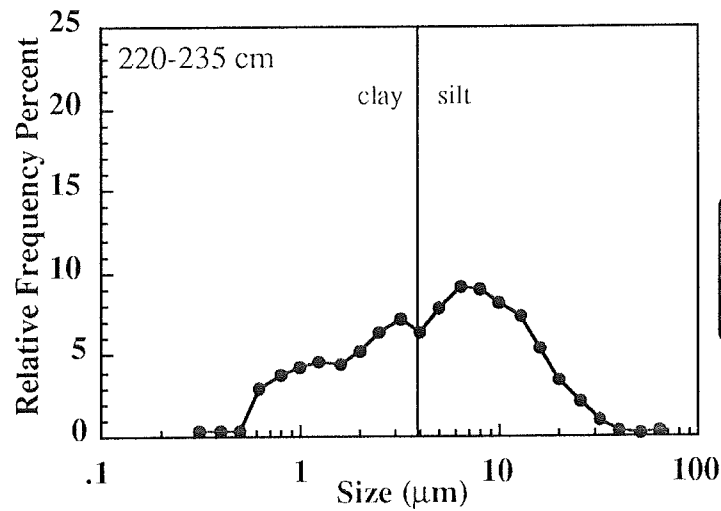
sand= 3%
silt= 51%
clay= 46%
silt/clay=1.1
org. car.=1.74%



I.D.
105275

sand= 1%
silt= 52%
clay= 47%
silt/clay=1.1
org. car.=1.58%

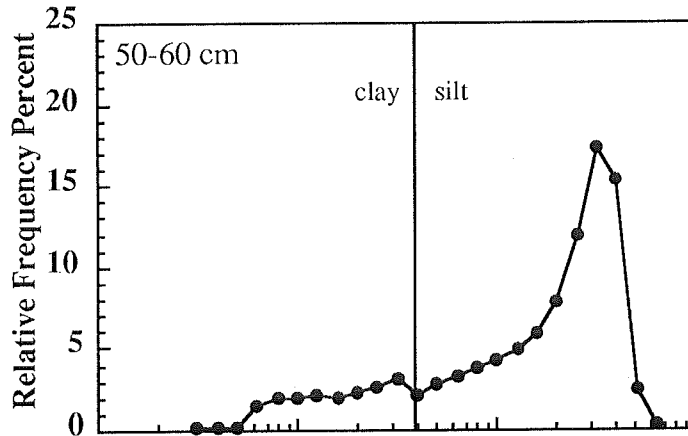
Size (μm)



I.D.
105276

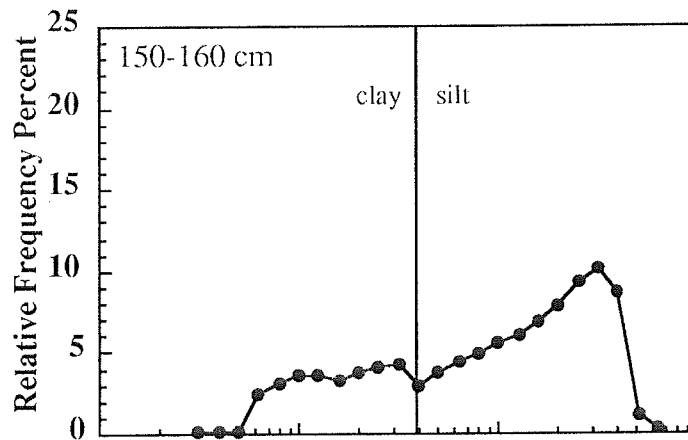
sand= 3%
silt= 52%
clay= 45%
silt/clay=1.2
org. car.=1.55%

Station 910373



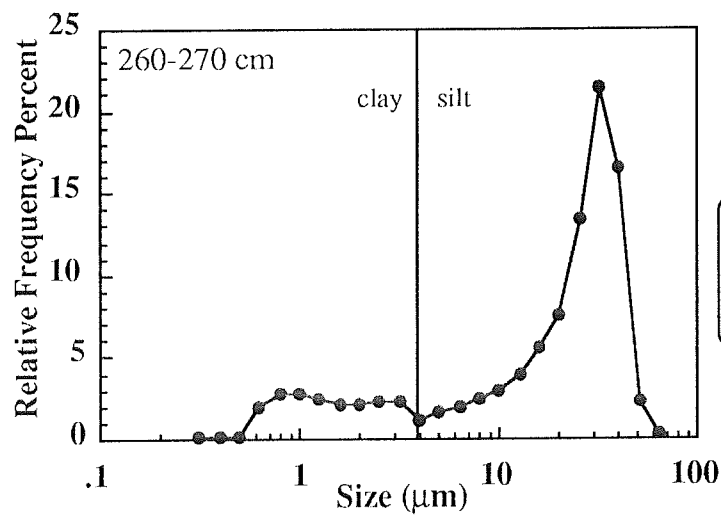
I.D.
105277

sand= 10%
silt= 72%
clay= 18%
silt/clay=4.0
org. car.=0.77%



I.D.
105278

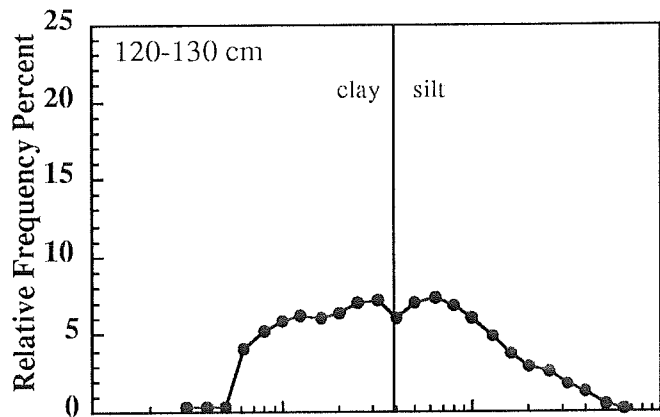
sand= 5%
silt= 65%
clay= 35%
silt/clay=2.2
org. car.=0.78%



I.D.
105279

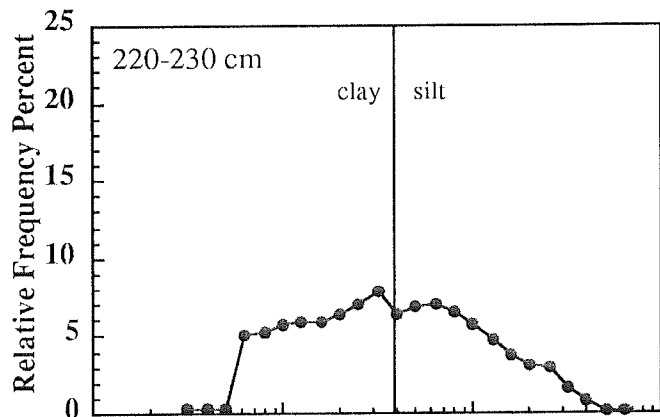
sand= 60%
silt= 32%
clay= 8%
silt/clay=4.0
org. car.=0.35%

Station 910383



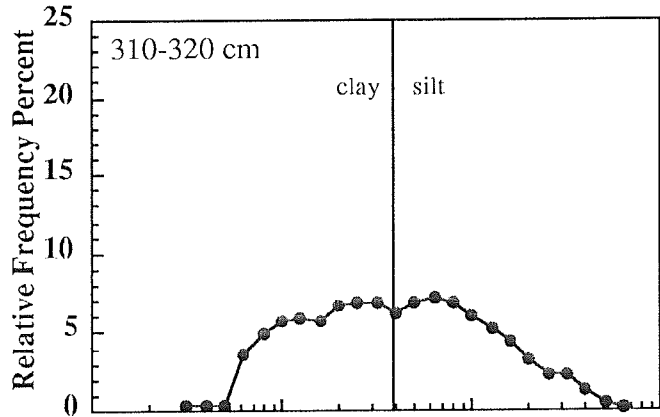
I.D.
105280

sand= 3%
silt= 44%
clay= 53%
silt/clay=0.8
org. car.=1.07%



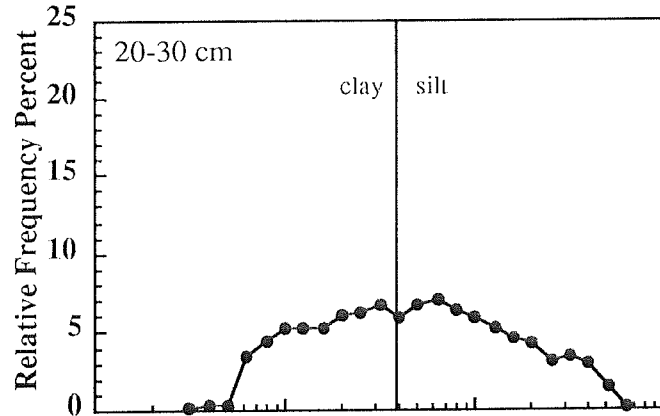
I.D.
105281

sand= 3%
silt= 42%
clay= 55%
silt/clay=0.8
org. car.=1.09%



I.D.
105282

sand= 1%
silt= 46%
clay= 53%
silt/clay=0.9
org. car.=1.39%

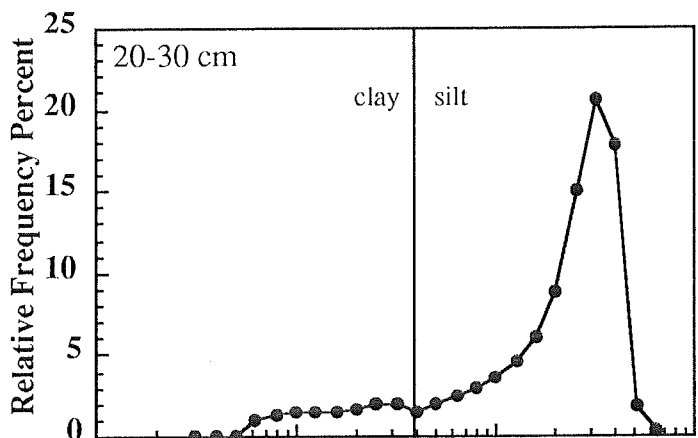


I.D.
105283

sand= 1%
silt= 51%
clay= 48%
silt/clay=1.1
org. car.=0.87%

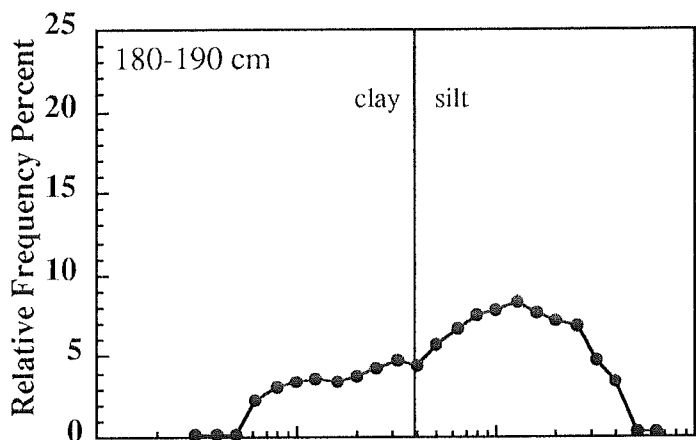
.1 1 10 100
Size (µm)

Station 910384



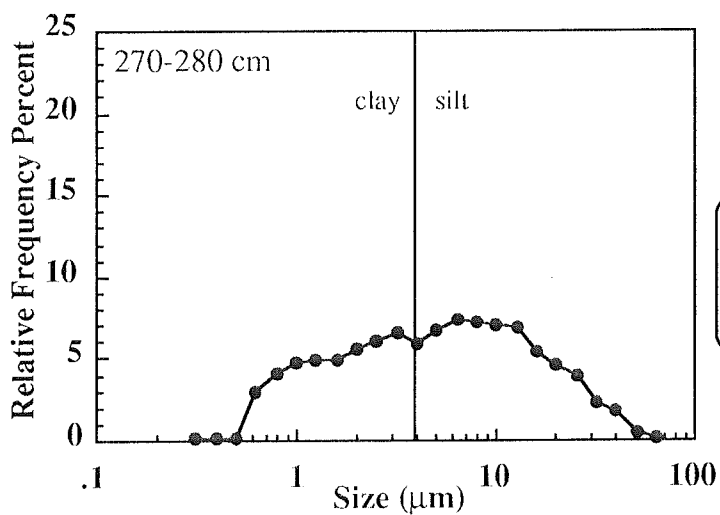
I.D.
105284

sand= 10%
silt= 77%
clay= 13%
silt/clay=6.1
org. car.=0.76%



I.D.
105285

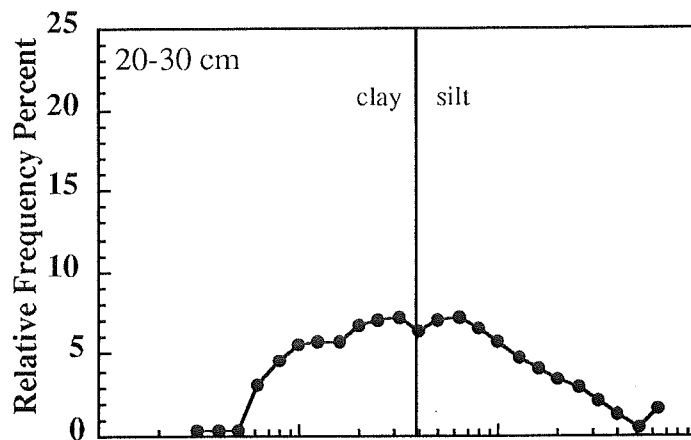
sand= 1%
silt= 66%
clay= 33%
silt/clay=2.0
org. car.=0.92%



I.D.
105286

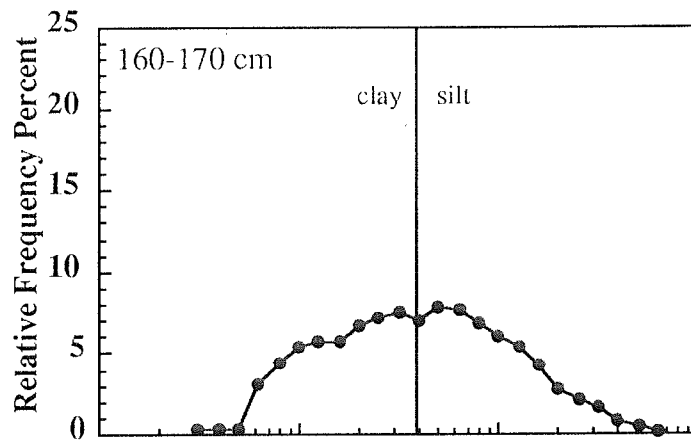
sand= 2%
silt= 53%
clay= 45%
silt/clay=1.2
org. car.=1.27%

Station 910385



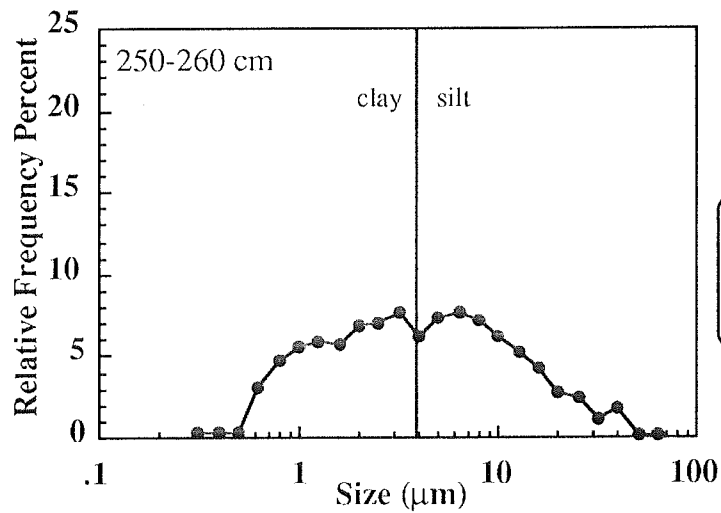
I.D.
105287

sand= 2%
silt= 46%
clay= 52%
silt/clay=0.9
org. car.=1.10%



I.D.
105288

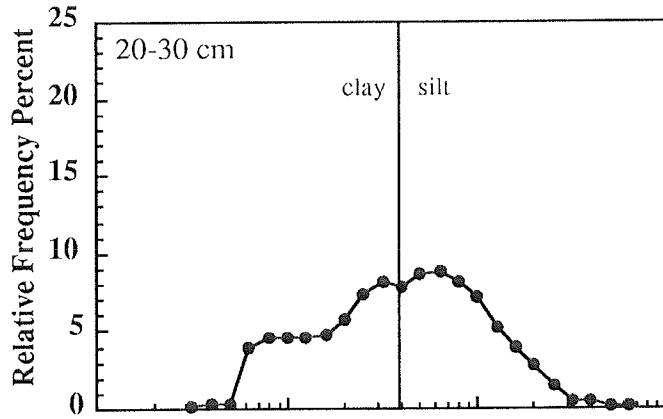
sand= 2%
silt= 45%
clay= 53%
silt/clay=0.9
org. car.=1.17%



I.D.
105289

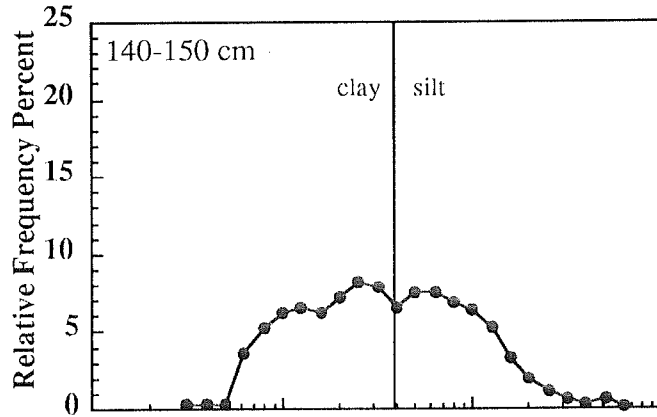
sand= 4%
silt= 45%
clay= 51%
silt/clay=0.9
org. car.=1.13%

Station 910386



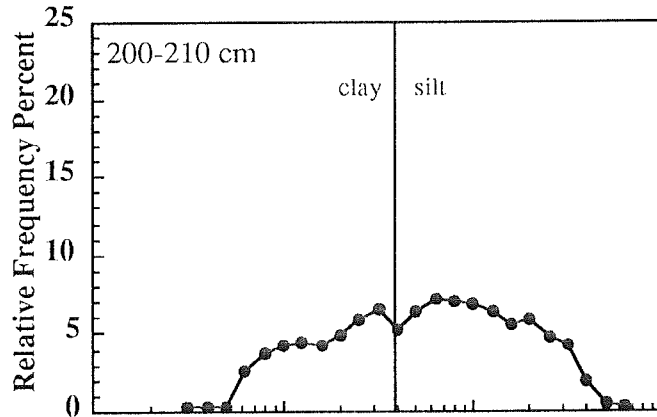
I.D.
105290

sand= 1%
silt= 47%
clay= 52%
silt/clay=0.9
org. car.=1.81%



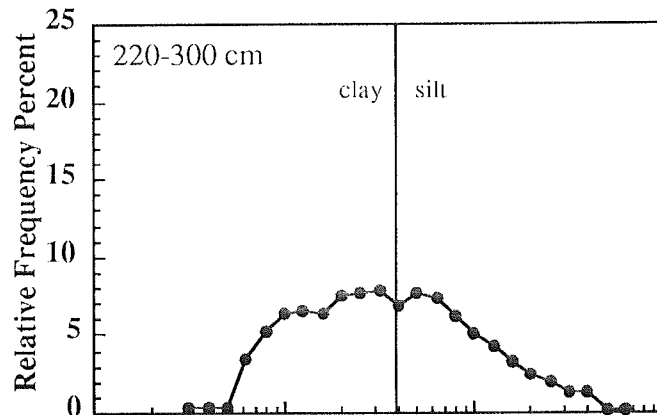
I.D.
105291

sand= 1%
silt= 41%
clay= 58%
silt/clay=0.7
org. car.=1.74%



I.D.
105292

sand= 5%
silt= 55%
clay= 41%
silt/clay=1.3
org. car.=0.96%

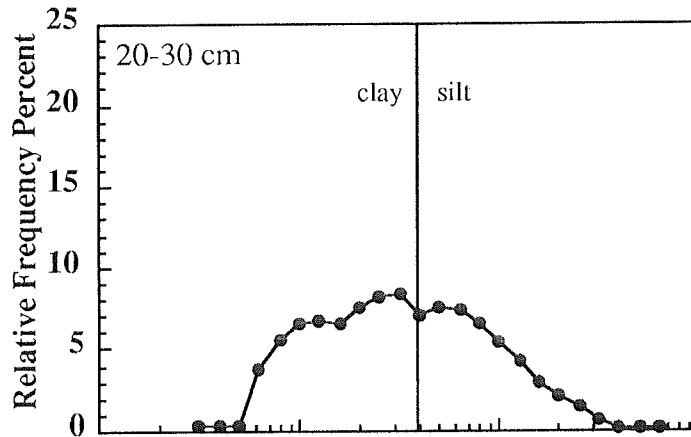


I.D.
105293

sand= 1%
silt= 41%
clay= 58%
silt/clay=0.7
org. car.=0.81%

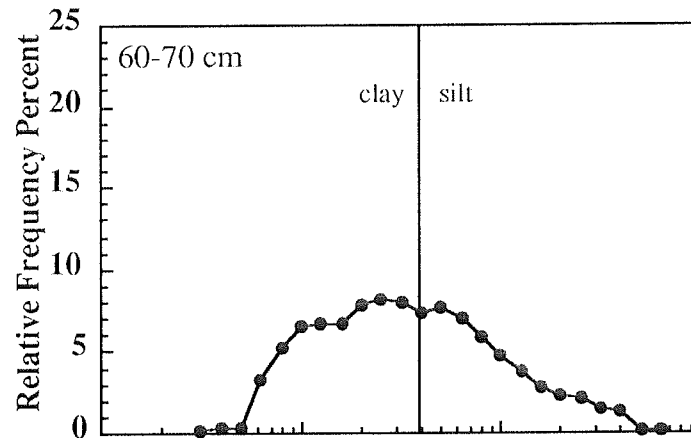
.1 1 10 100
Size (μm)

Station 910388



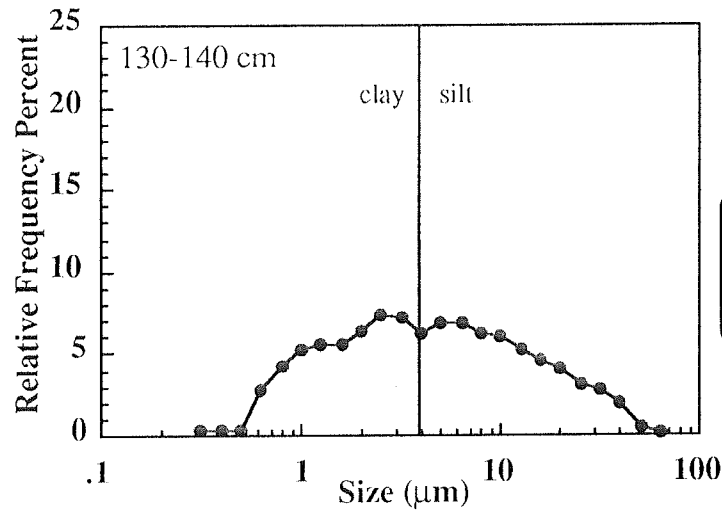
I.D.
105294

sand= 2%
silt= 38%
clay= 60%
silt/clay=0.6
org. car.=1.42%



I.D.
105295

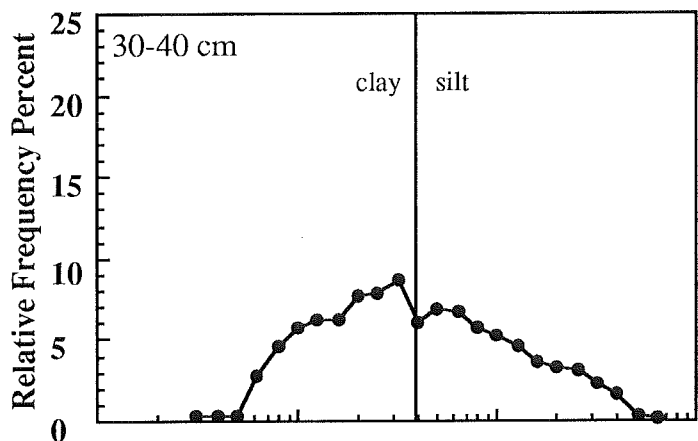
sand= 1%
silt= 39%
clay= 60%
silt/clay=0.6
org. car.=0.86%



I.D.
105296

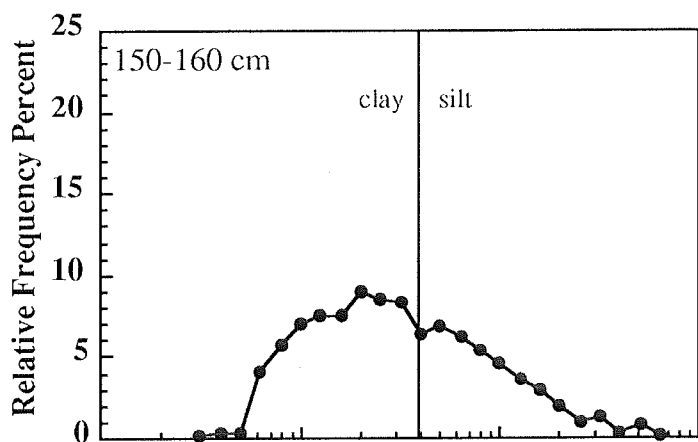
sand= 5%
silt= 46%
clay= 49%
silt/clay=0.9
org. car.=1.04%

Staion 910389



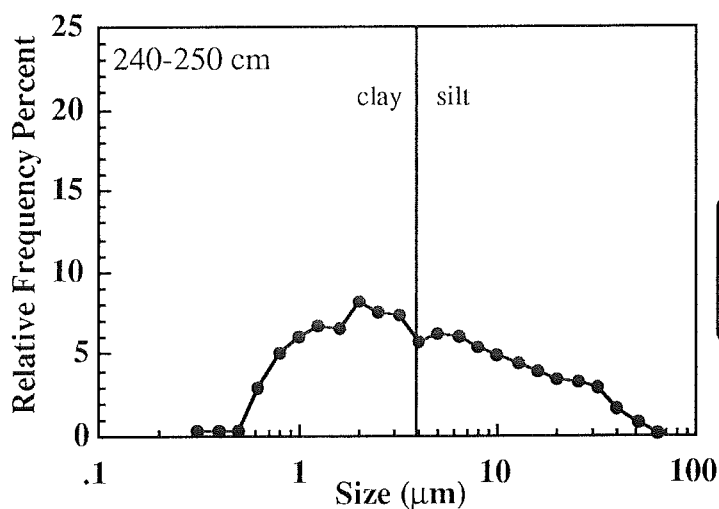
I.D.
105297

sand= 4%
silt= 42%
clay= 54%
silt/clay=0.8
org. car.=0.44%



I.D.
105298

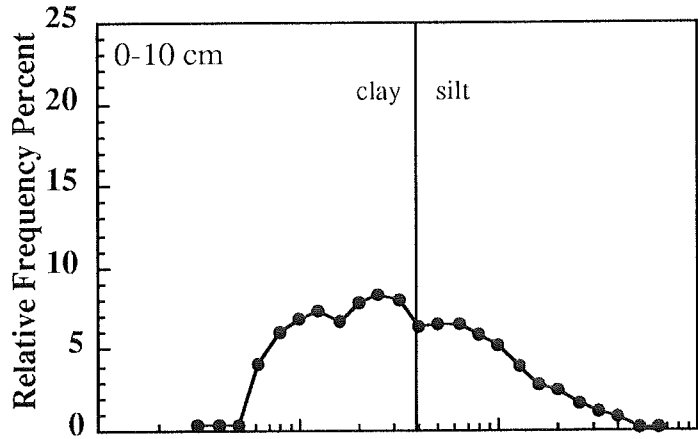
sand= 5%
silt= 33%
clay= 62%
silt/clay=0.5
org. car.=2.05%



I.D.
105299

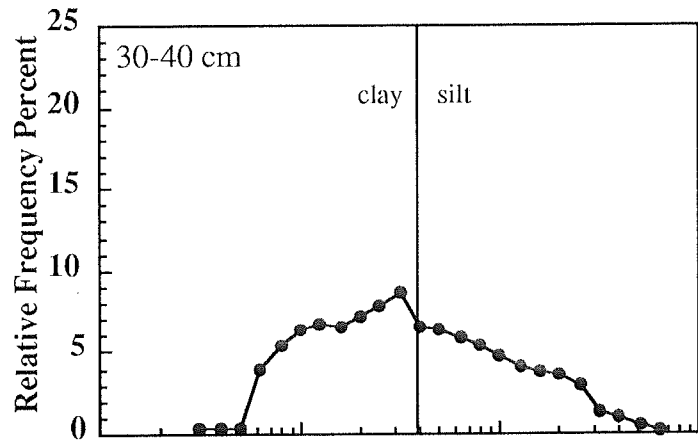
sand= 4%
silt= 41%
clay= 55%
silt/clay=0.8
org. car.=0.51%

Station 910390



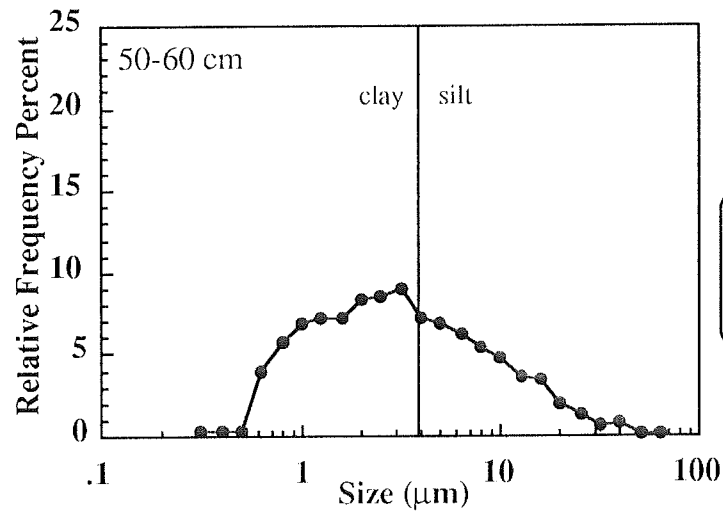
I.D.
105300

sand= 4%
silt= 36%
clay= 60%
silt/clay=0.6
org. car.=0.96%



I.D.
105301

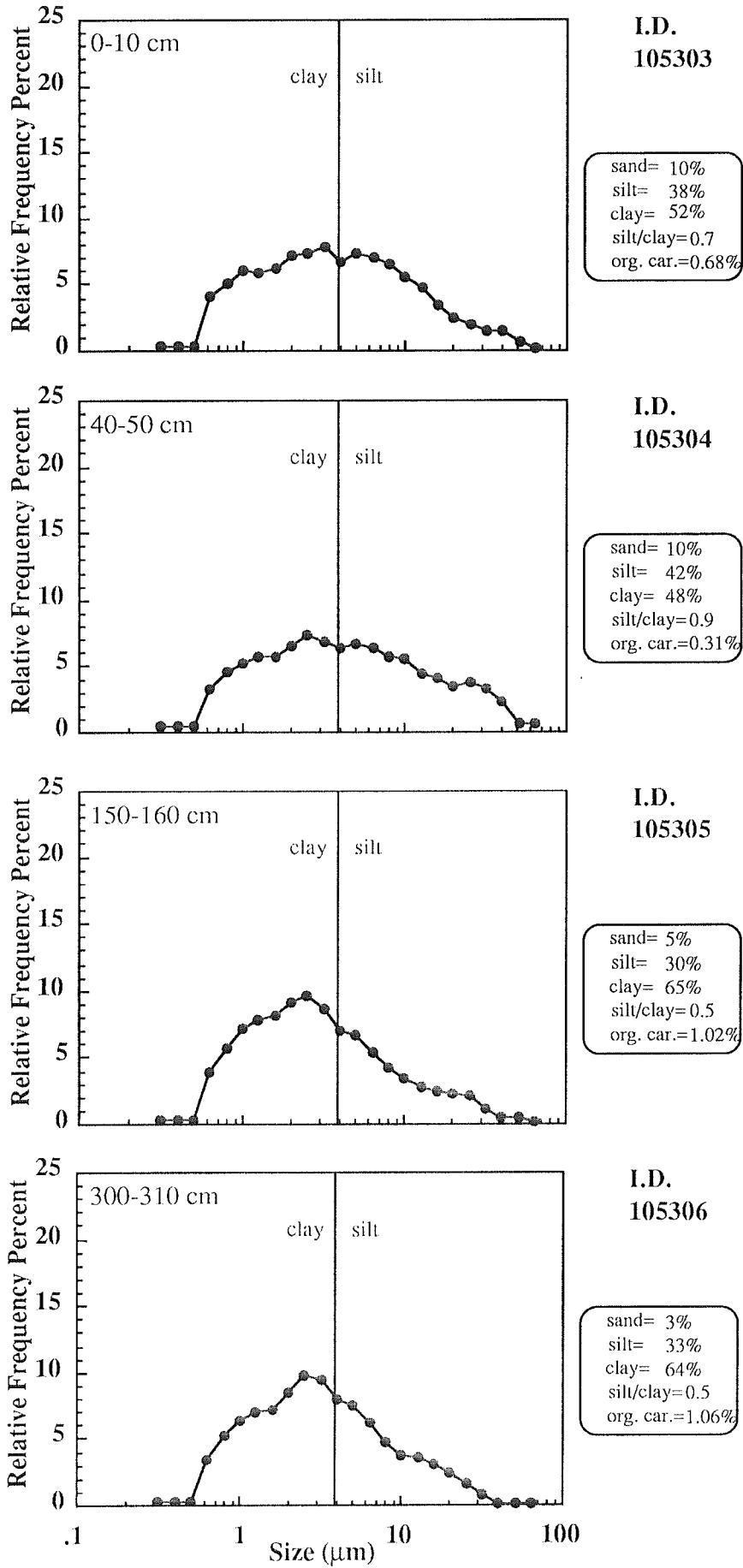
sand= 80%
silt= 8%
clay= 12%
silt/clay=0.7
org. car.=0.34%



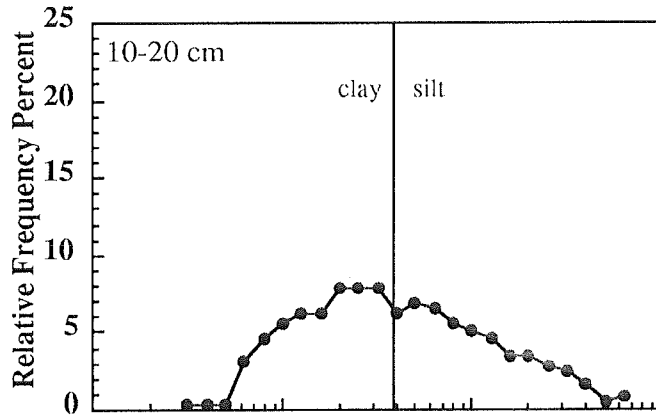
I.D.
105302

sand= 1%
silt= 35%
clay= 64%
silt/clay=0.5
org. car.=1.66%

Station 910393

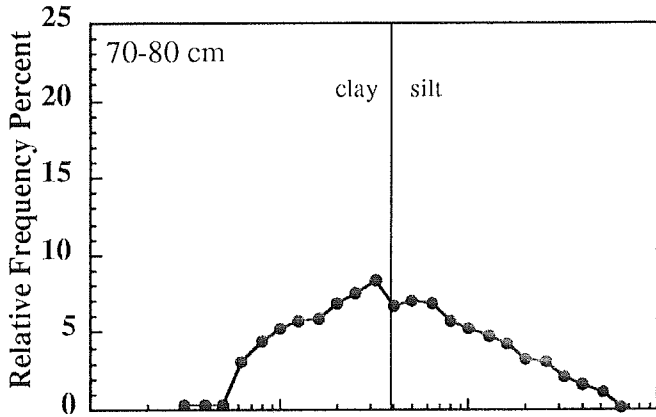


Station 910394



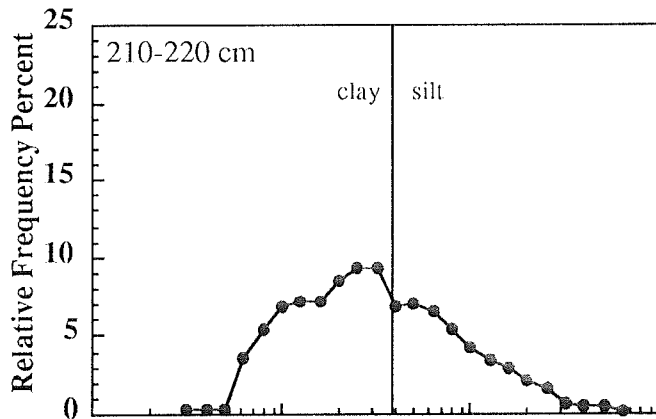
I.D.
105307

sand= 10%
silt= 39%
clay= 51%
silt/clay=0.8
org. car.=0.31%



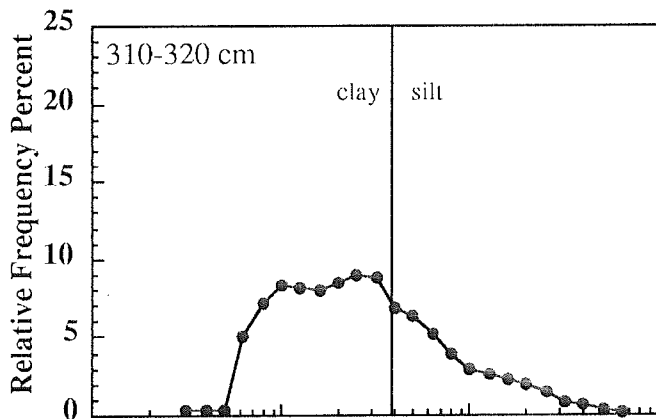
I.D.
105308

sand= 30%
silt= 32%
clay= 38%
silt/clay=0.8
org. car.=0.16%



I.D.
105309

sand= 2%
silt= 34%
clay= 64%
silt/clay=0.5
org. car.=1.14%

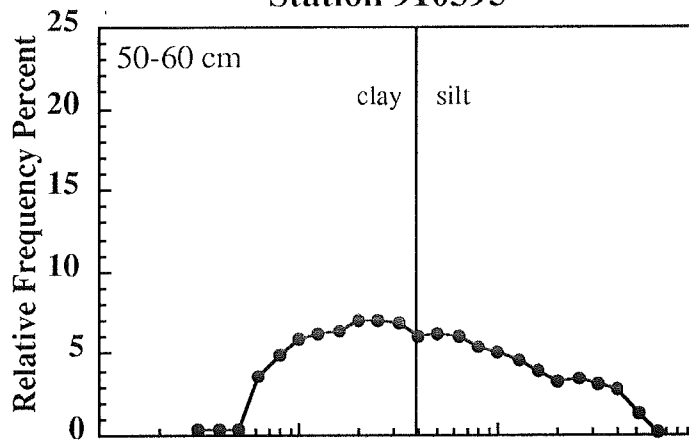


I.D.
105310

sand= 1%
silt= 29%
clay= 70%
silt/clay=0.4
org. car.=1.20%

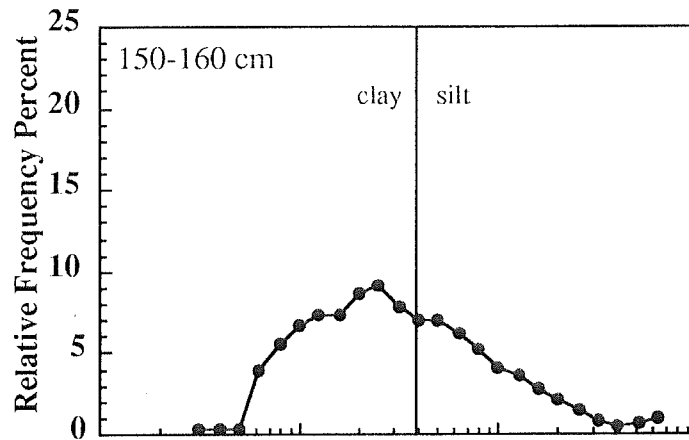
.1 1 10 100
Size (µm)

Station 910395



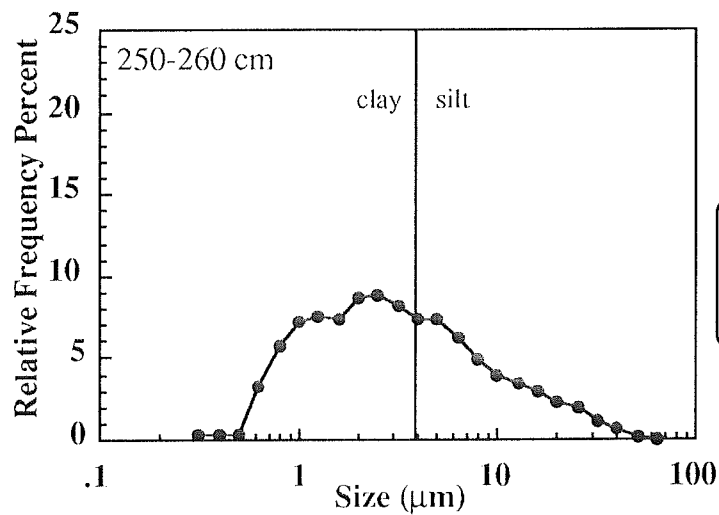
I.D.
105311

sand= 5%
silt= 43%
clay= 52%
silt/clay=0.8
org. car.=1.66%



I.D.
105312

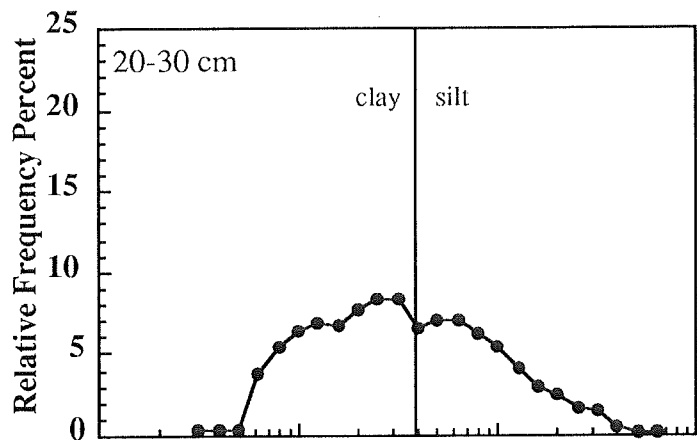
sand= 4%
silt= 34%
clay= 62%
silt/clay=0.5
org. car.=2.55%



I.D.
105313

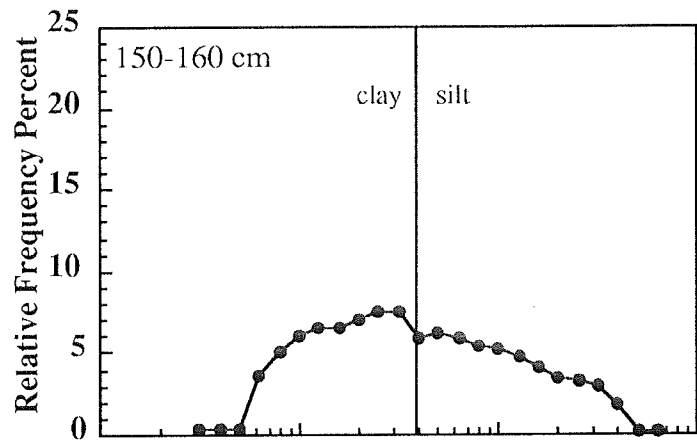
sand= 1%
silt= 35%
clay= 64%
silt/clay=0.5
org. car.=0.65%

Station 910396



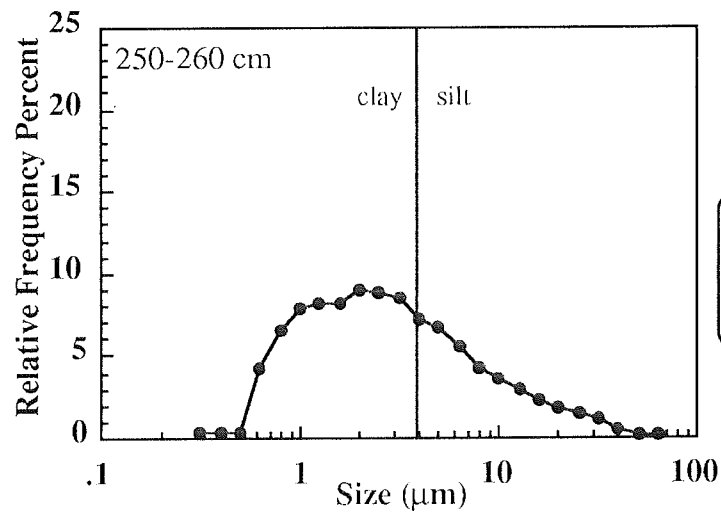
I.D.
105314

sand= 3%
silt= 38%
clay= 59%
silt/clay=0.6
org. car.=1.46%



I.D.
105315

sand= 10%
silt= 39%
clay= 51%
silt/clay=0.8
org. car.=1.35%

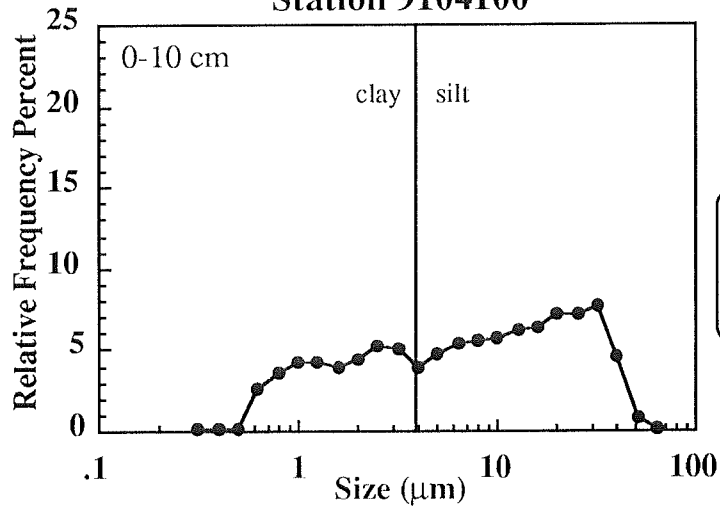


I.D.
105316

sand= 1%
silt= 30%
clay= 69%
silt/clay=0.4
org. car.=1.11%

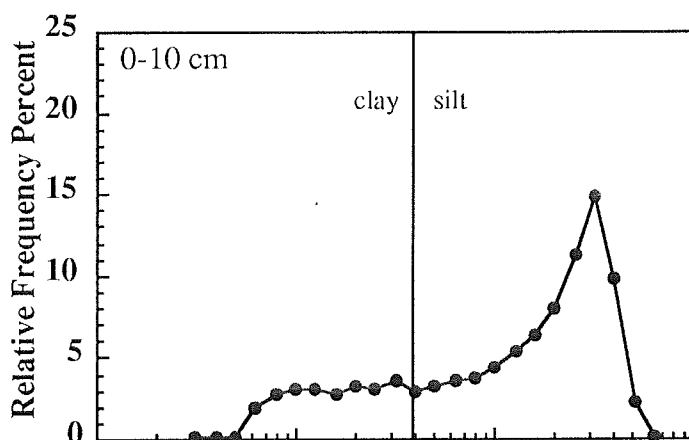
Station 9104100

I.D.
105317



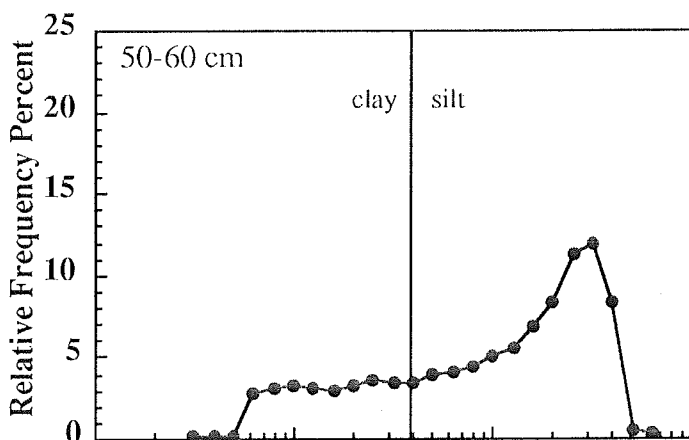
sand= 50%
silt= 31%
clay= 19%
silt/clay=1.6
org. car.=0.94%

Station 9104101



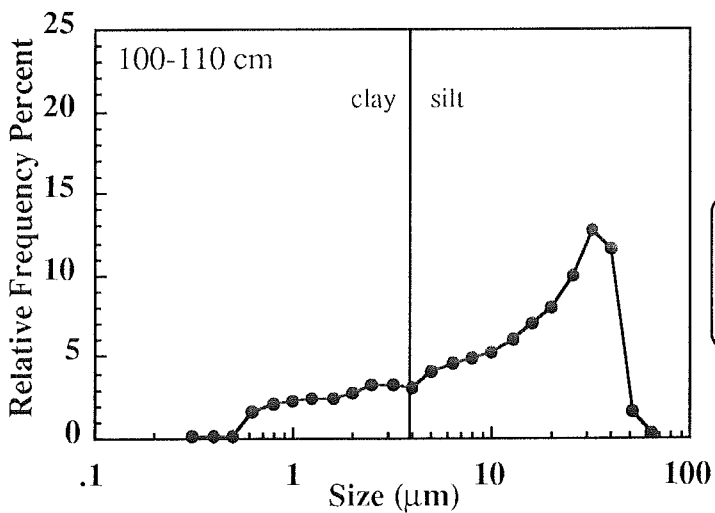
I.D.
105318

sand= 20%
silt= 59%
clay= 21%
silt/clay=2.7
org. car.=0.65%



I.D.
105319

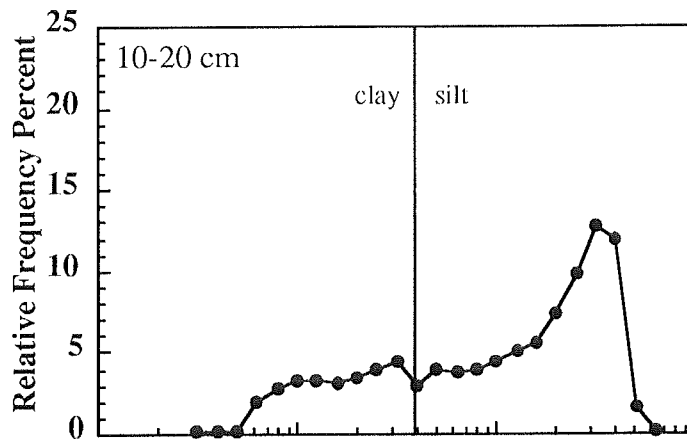
sand= 30%
silt= 49%
clay= 21%
silt/clay=2.4
org. car.=0.60%



I.D.
105320

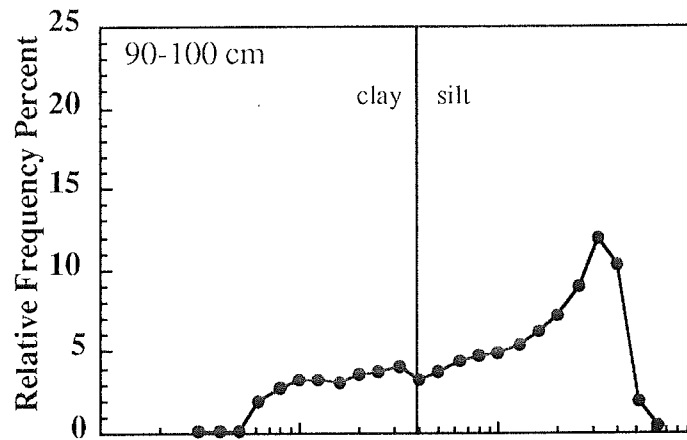
sand= 15%
silt= 65%
clay= 20%
silt/clay=3.2
org. car.=0.95%

Station 9104102



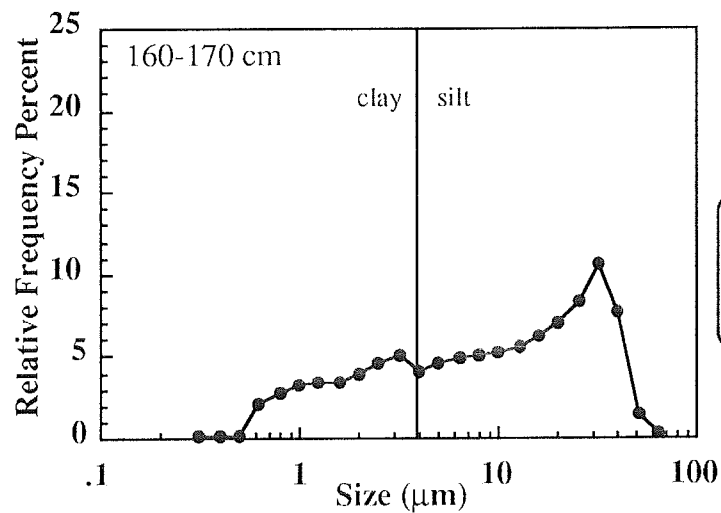
I.D.
105321

sand= 20%
silt= 56%
clay= 24%
silt/clay=2.4
org. car.=1.10%



I.D.
105322

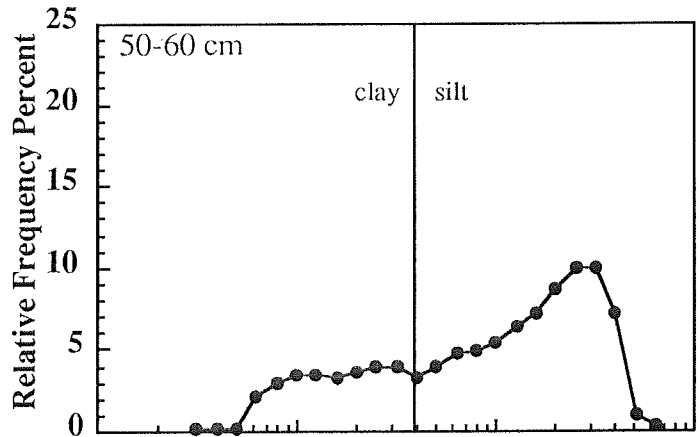
sand= 20%
silt= 56%
clay= 24%
silt/clay=2.4
org. car.=0.87%



I.D.
105323

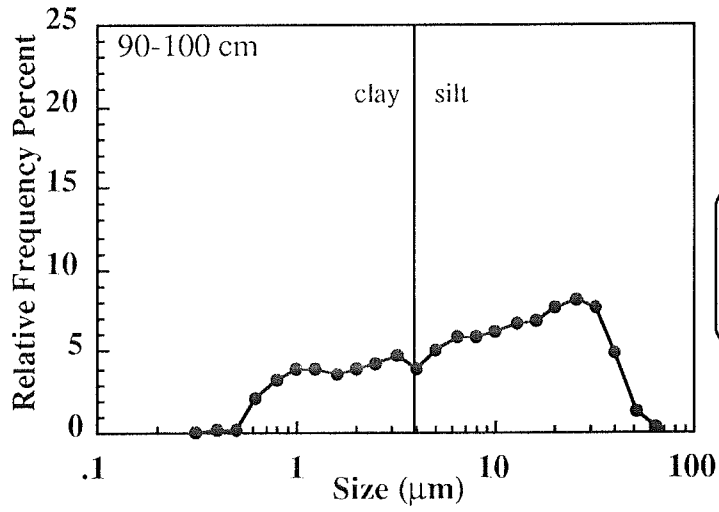
sand= 80%
silt= 13%
clay= 7%
silt/clay=2.0
org. car.=0.53%

Station 9104103



I.D.
105324

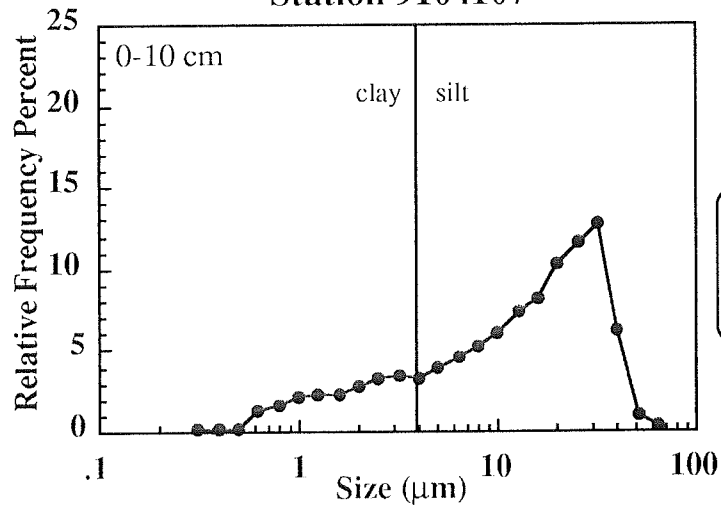
sand= 15%
silt= 59%
clay= 26%
silt/clay=2.3
org. car.=0.74%



I.D.
105325

sand= 5%
silt= 63%
clay= 32%
silt/clay=2.0
org. car.=0.96%

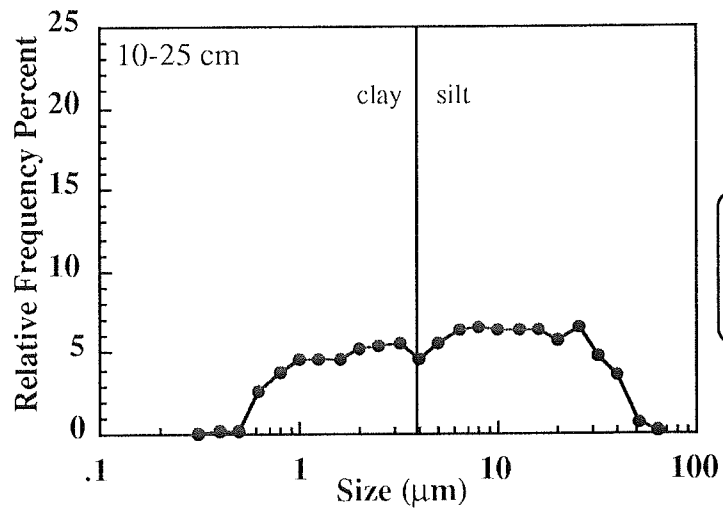
Station 9104107



I.D.
105326

sand= 25%
silt= 58%
clay= 17%
silt/clay=3.4
org. car.=0.57%

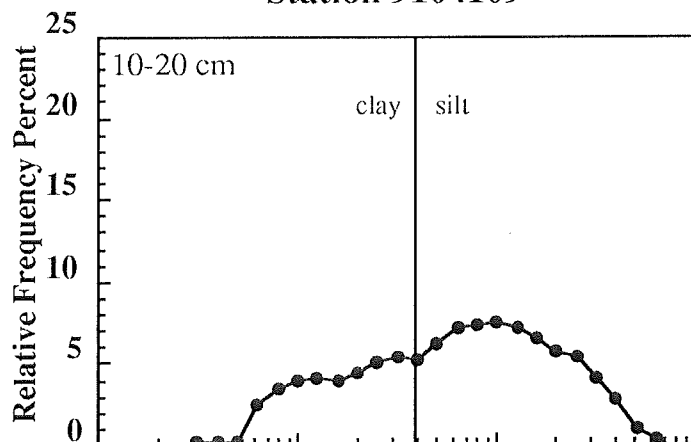
Station 9104108



I.D.
105327

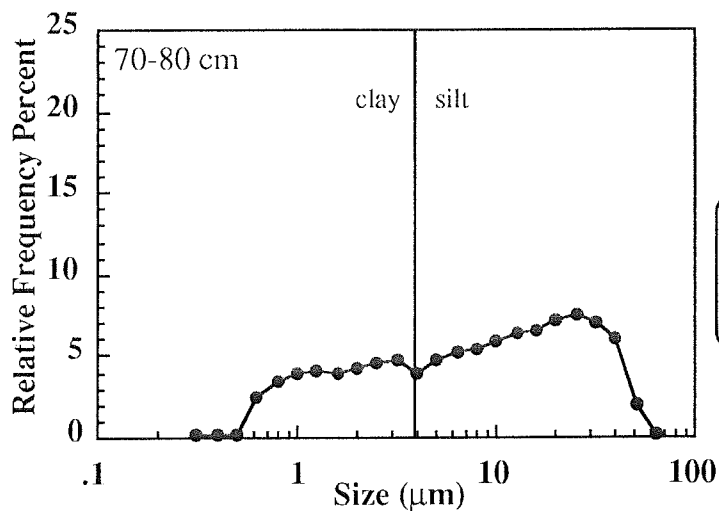
sand= 20%
silt= 47%
clay= 33%
silt/clay=1.4
org. car.=1.32%

Station 9104109



I.D.
105328

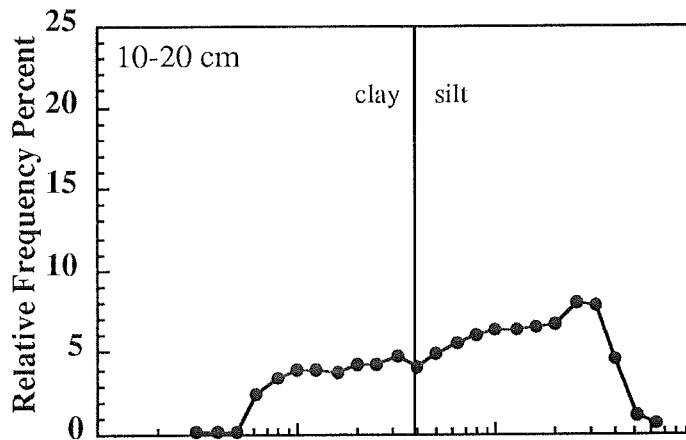
sand= 10%
silt= 55%
clay= 35%
silt/clay= 1.6
org. car.=0.56%



I.D.
105329

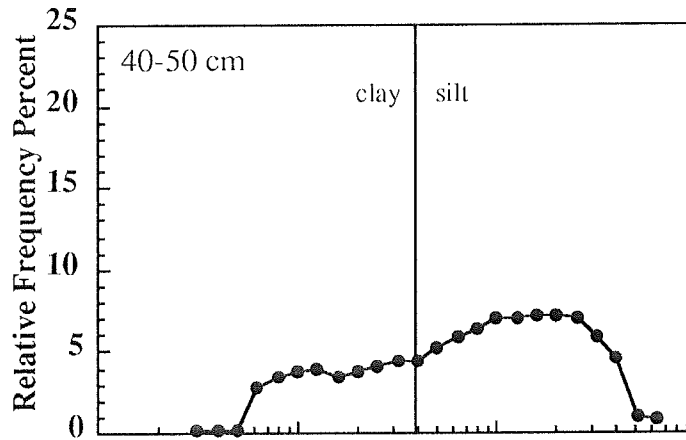
sand= 15%
silt= 54%
clay= 31%
silt/clay= 1.8
org. car.=0.61%

Station 4104110



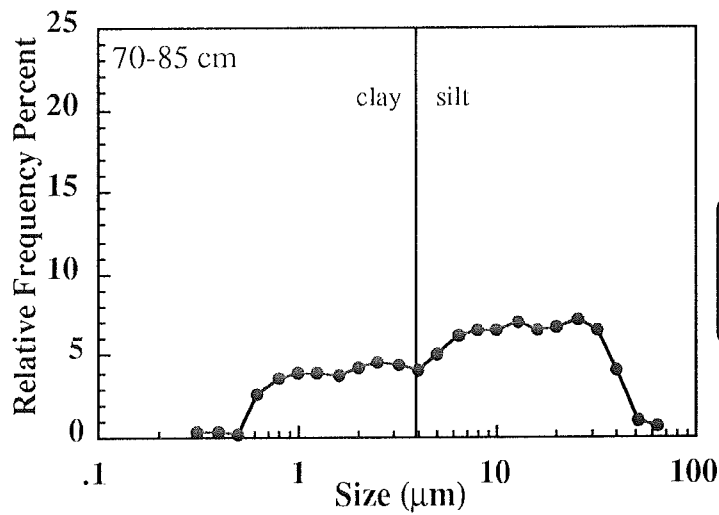
I.D.
105330

sand= 10%
silt= 58%
clay= 32%
silt/clay=1.8
org. car.=0.77%



I.D.
105331

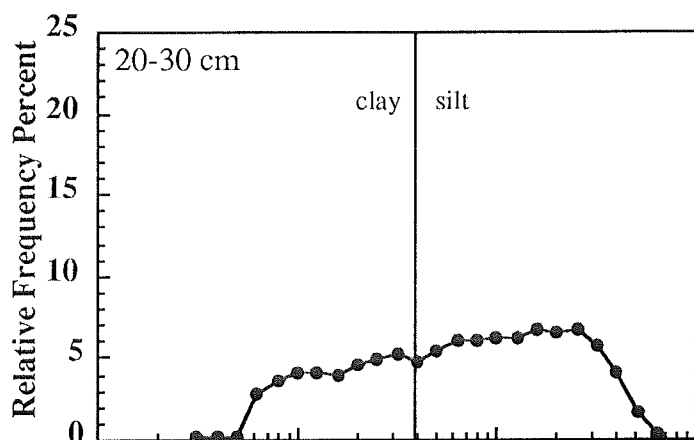
sand= 20%
silt= 52%
clay= 28%
silt/clay=1.9
org. car.=0.78%



I.D.
105332

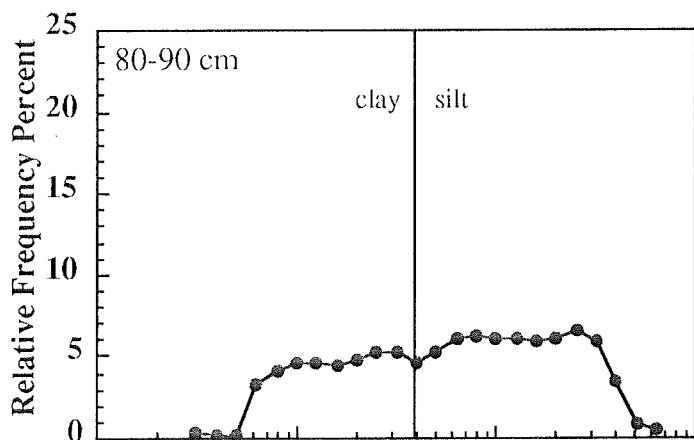
sand= 30%
silt= 45%
clay= 25%
silt/clay=1.8
org. car.=0.63%

Station 9104111



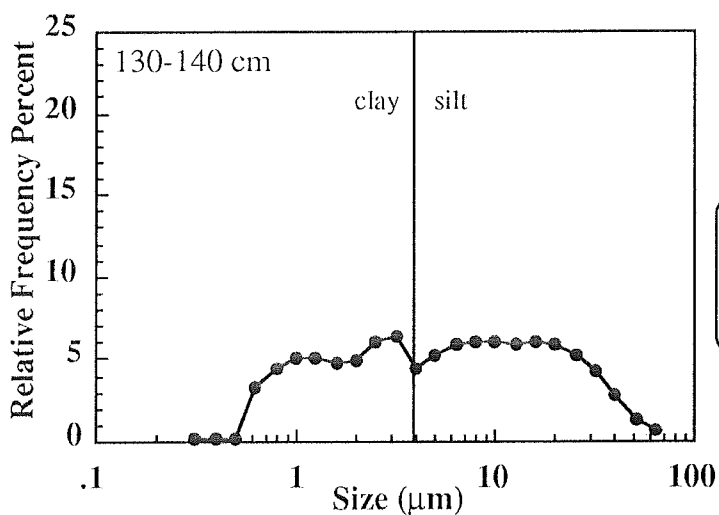
I.D.
105333

sand= 20%
silt= 49%
clay= 31%
silt/clay=1.6
org. car.=0.72%



I.D.
105334

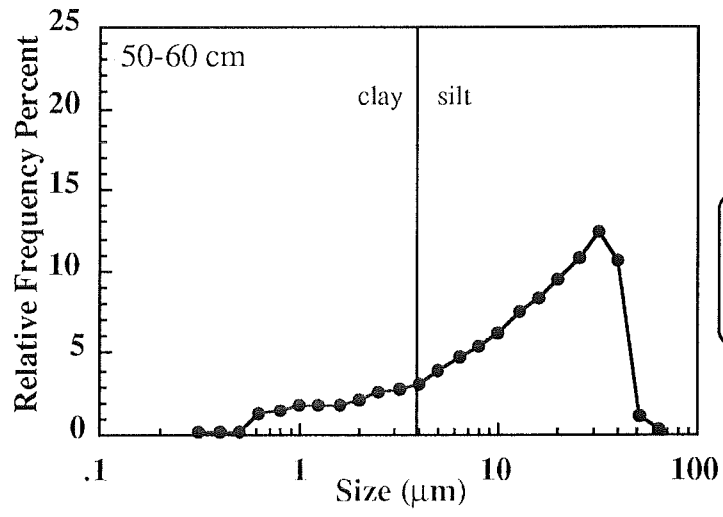
sand= 15%
silt= 50%
clay= 35%
silt/clay=1.4
org. car.=0.43%



I.D.
104335

sand= 20%
silt= 44%
clay= 36%
silt/clay=1.2
org. car.=0.61%

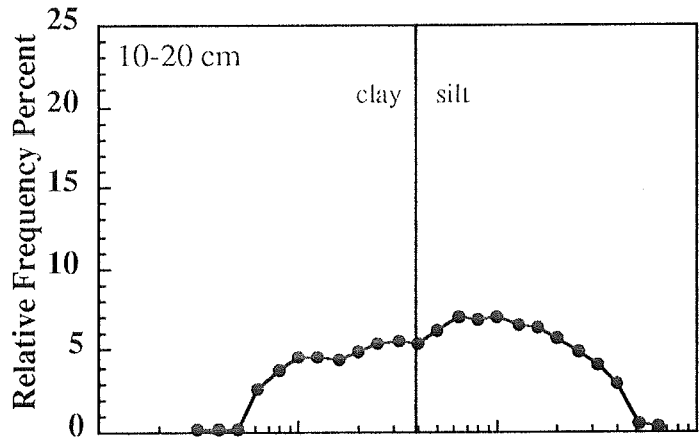
Station 9104113



I.D.
105337

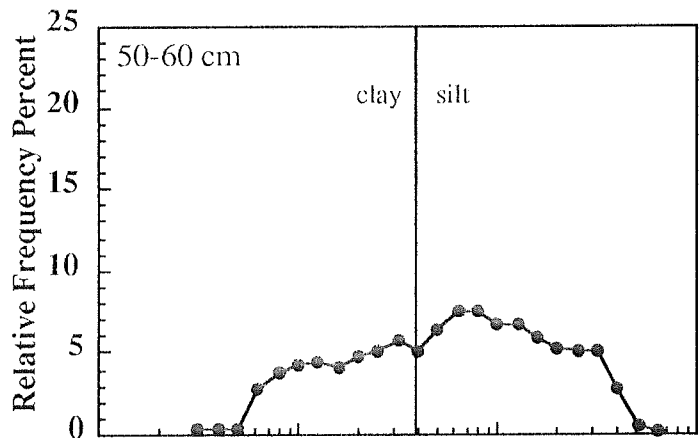
sand= 10%
silt= 73%
clay= 17%
silt/clay=4.2
org. car.=0.58%

Station 9104118



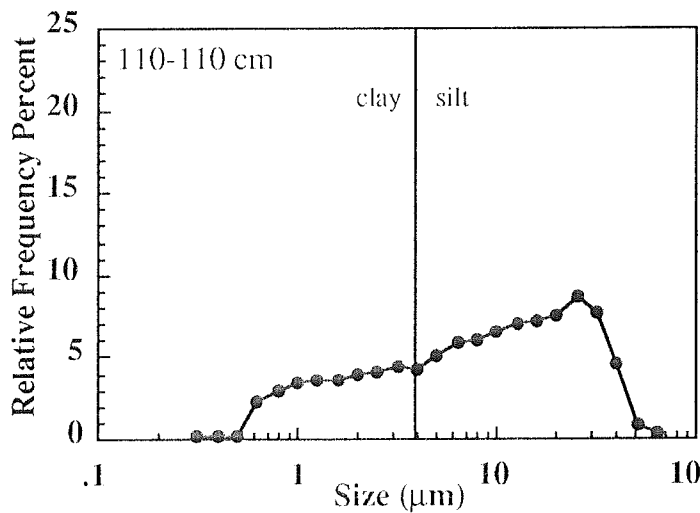
I.D.
105338

sand= 25%
silt= 44%
clay= 31%
silt/clay=1.4
org. car.=0.70%



I.D.
105339

sand= 10%
silt= 53%
clay= 37%
silt/clay=1.5
org. car.=1.32%



I.D.
105340

sand= 10%
silt= 60%
clay= 30%
silt/clay=2.0
org. car.=1.07%