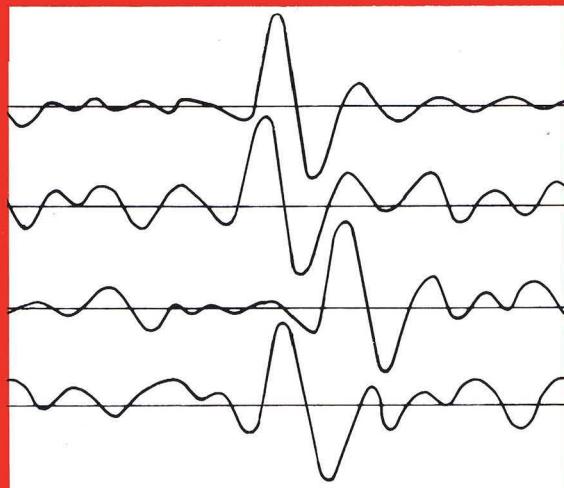
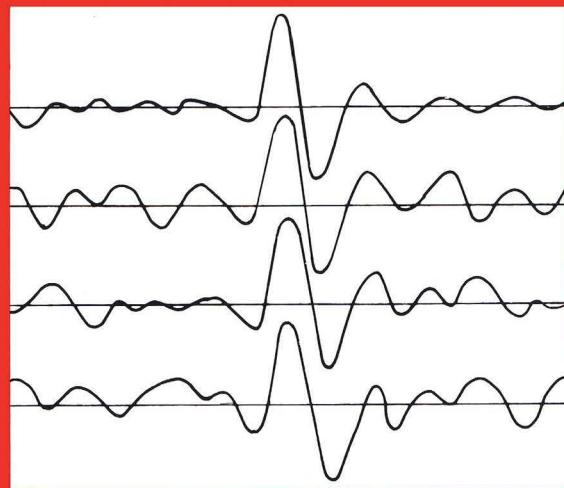


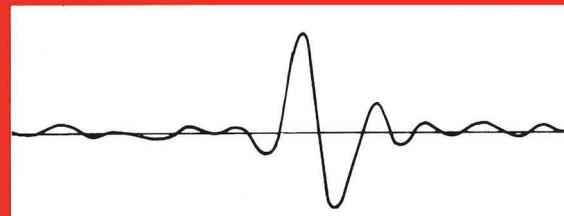
Iterative Residual Static Corrections



ASTA



STACK

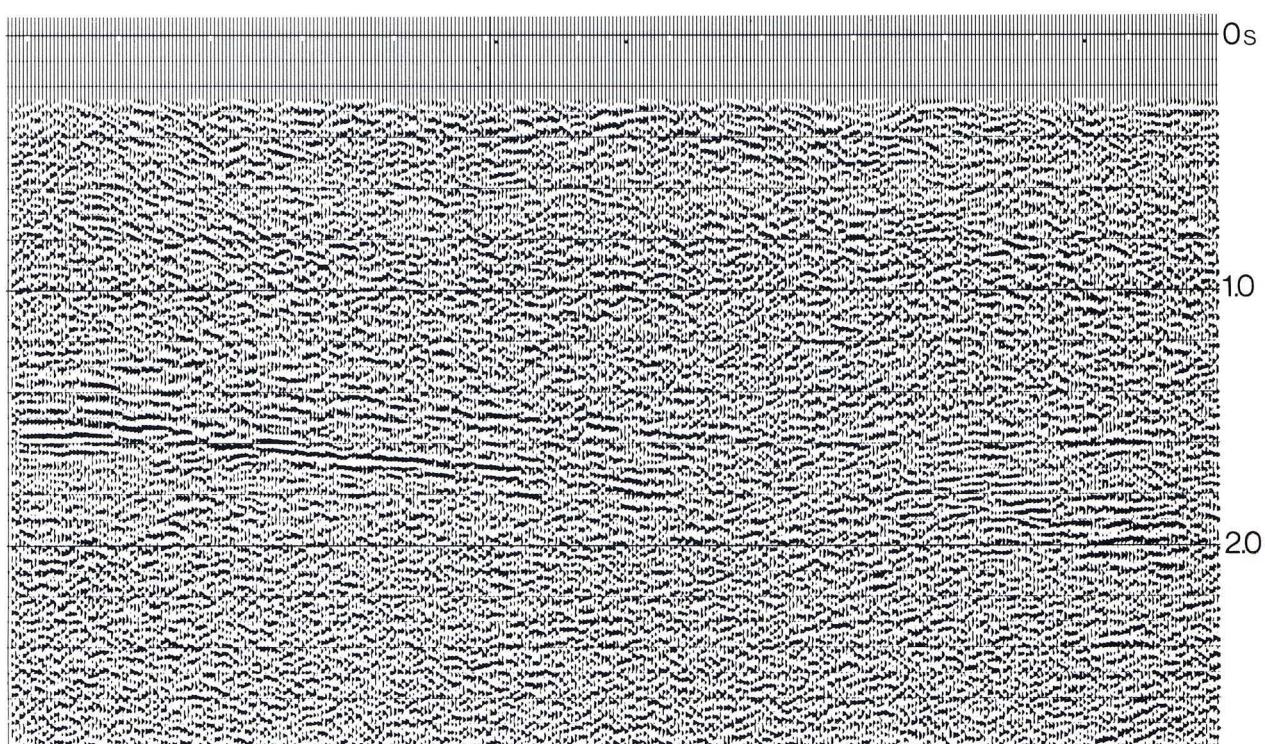
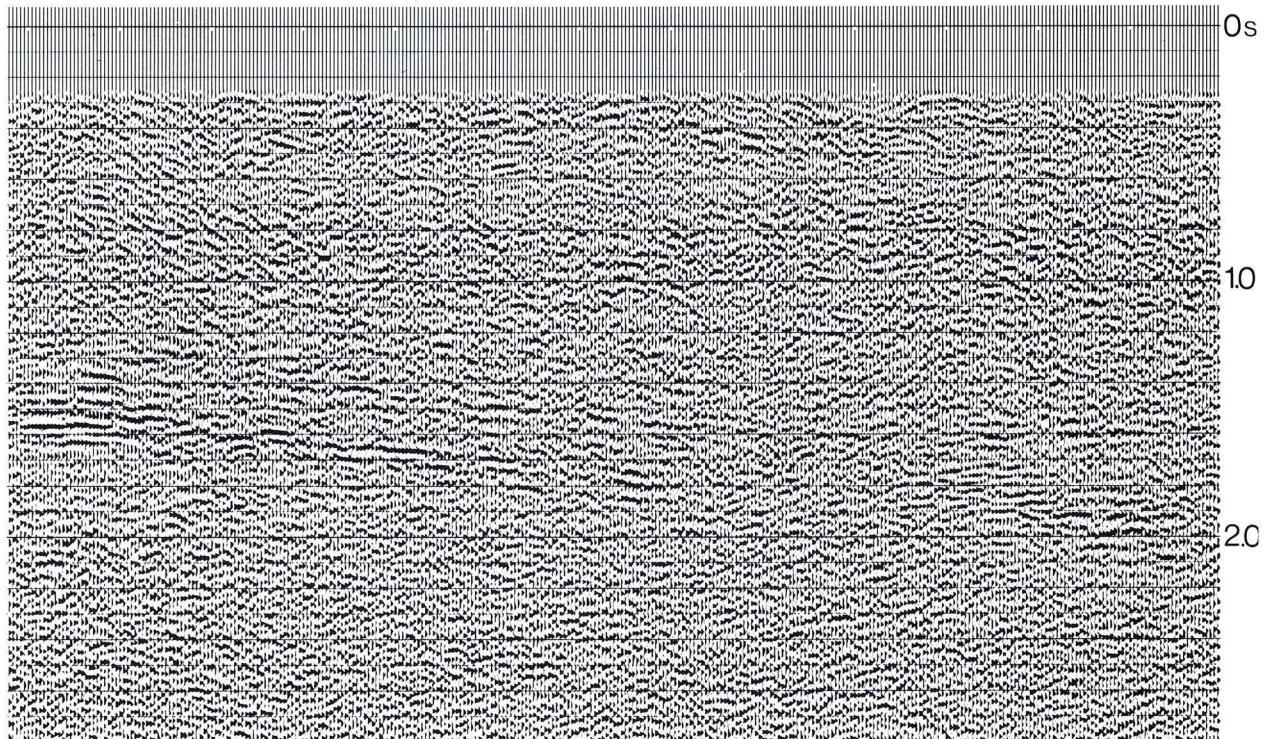


Iterative Residual Static Corrections

One of the most essential prerequisites for quality during processing of reflection seismic land and shallow water surveys is the optimization of static corrections. Even in cases where high quality field statics are available – PRAKLA-SEISMOS offers well-proved programs for altitude corrections, corrections derived from reflection information and from first breaks –, the calculation and consideration of residual statics is in most cases necessary.

PRAKLA-SEISMOS' residual static correction method ASTA is an iterative procedure, which can be applied several times successively. ASTA operates using cross correlations of each single trace against reference traces for the derivation of time differences, and using an updating method for the calculation of the surface-consistent shot- and geophone corrections. The processing sequence is described in the following:

1. The input CDP-Data are corrected with field statics (t_{gd} , t_{sd}) and stacking velocities.
2. The line-up of the seismic reflections is estimated by a special filter thus obtaining the reference section.
3. Trace by trace the time difference Δt between each trace and its reference trace is determined by an improved correlation technique, in which, within a selected time gate, many time-shifts and their corresponding coherencies yield, by weighting, the time shift value Δt and the corresponding standard deviation.
4. The splitting of the time-shift-values Δt into surface-consistent shot corrections Δs and geophone correction Δg is performed, which is realized by a very fast updating-procedure, based on sequential least-mean-squares estimation techniques.
5. An improved stack under consideration of the newly calculated static corrections is carried out.



6. The procedure can be repeated starting again at step No. 2: The line-up of the events is estimated with an improved accuracy.

The iteration can be repeated as often as desired — generally, however, the first run already yields a definite improvement; in most cases two or three runs are carried out.

The correlation described in 3. can also be executed in several smaller time gates instead of in one large one.

The results obtained in different iterations are stored and can be recalled. Thus, the following data can be presented

- Stacking after each run
- Corresponding single coverages
- Reference traces
- Residual shot and geophone corrections (Δs , Δg)
- Total shot and geophone corrections (t_{sd} , t_{gd})
- The unsplittable residual values, r , of the individual traces, which remain after splitting described under 4.

An example is presented in fig. 1–3. It shows a seismic section with field-static corrections only, the same section after one ASTA-run and after three ASTA-runs.

Fig. 5 shows ASTA-residual and total shot and geophone corrections graphically and as lists.

In the cases where static corrections cannot be regarded as surface-consistent due to complex conditions in the overburden, the program ASTA offers the following possibilities:

1. The surface-consistent corrections, calculated from several gates, are not averaged, but applied at their domain of determination.
2. The unsplittable residual values, r , of the individual traces, calculated from step 4, are applied up to a certain threshold fully or by selectable percentages (see fig. 4).

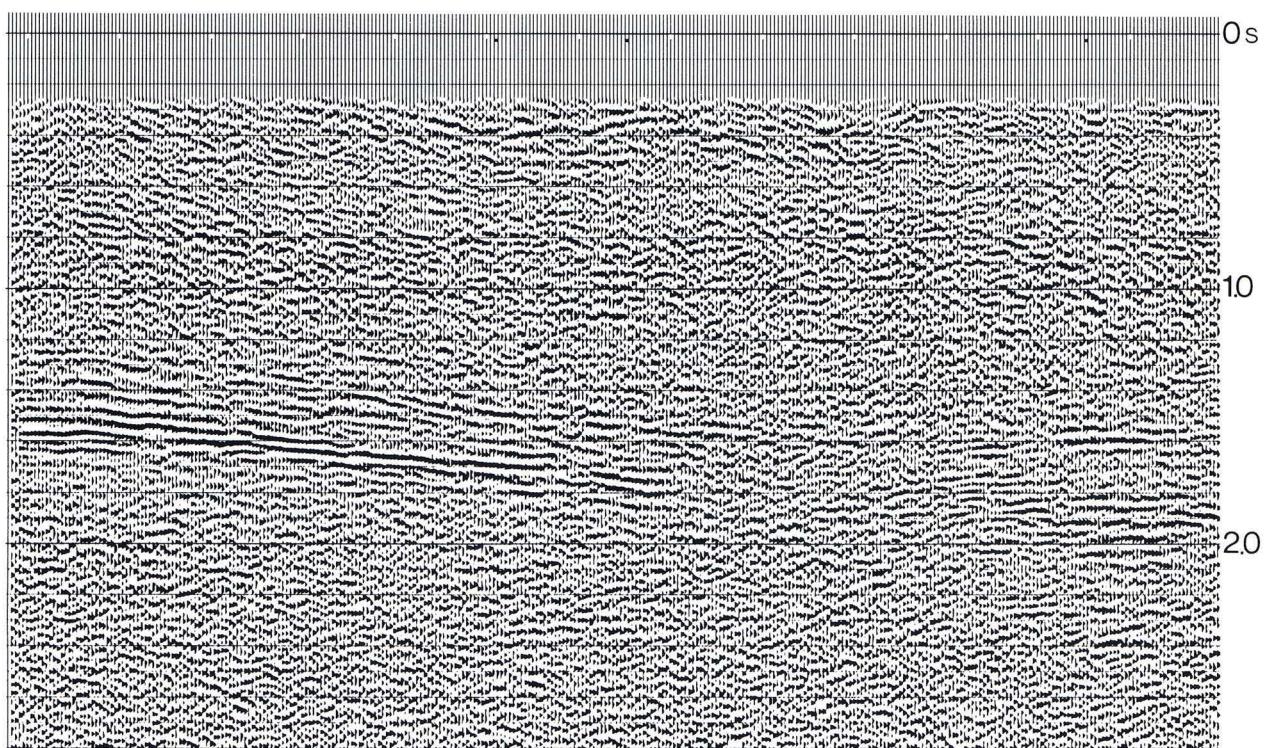


Fig. 3:
Same section
with ASTA-residual
corrections from
three runs

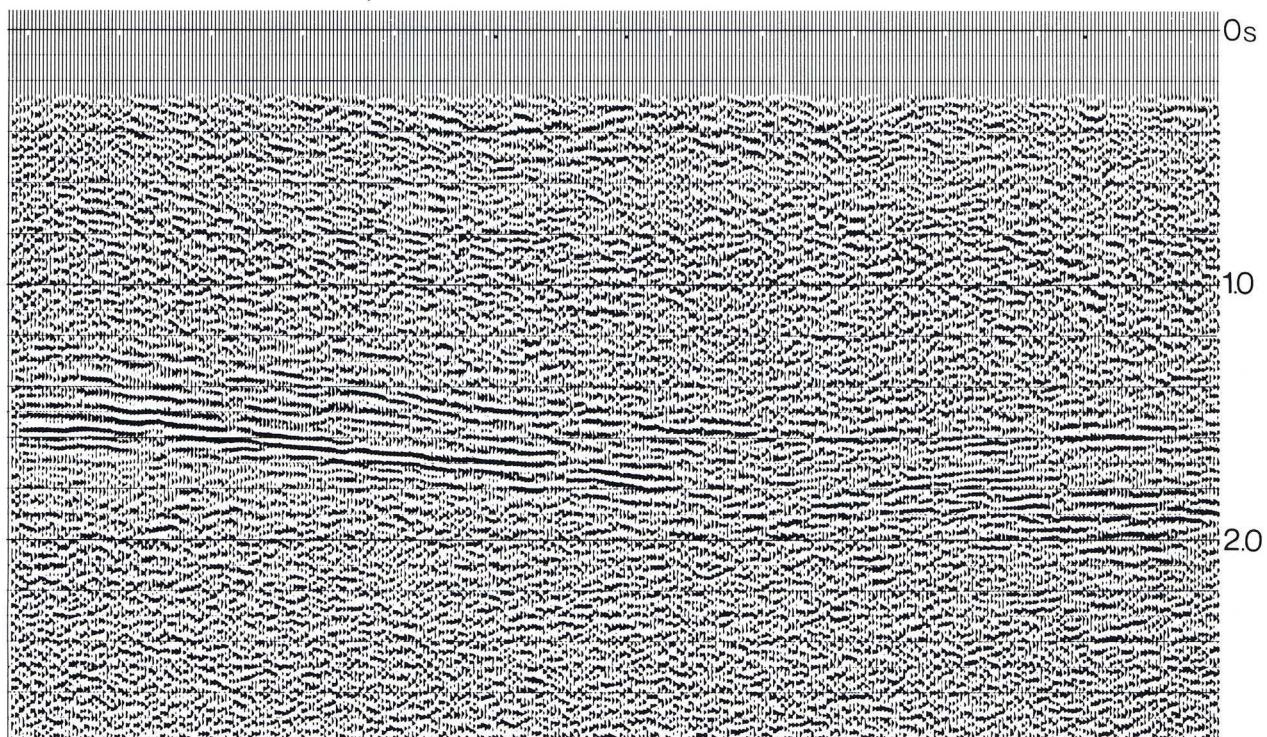


Fig. 4:
Same section with
ASTA-residual
corrections from
three runs with
partial application
of the unsplittable
residual values
(100 % up to ± 3 ms)

Fig. 5: ASTA-residual and total shot and geophone corrections

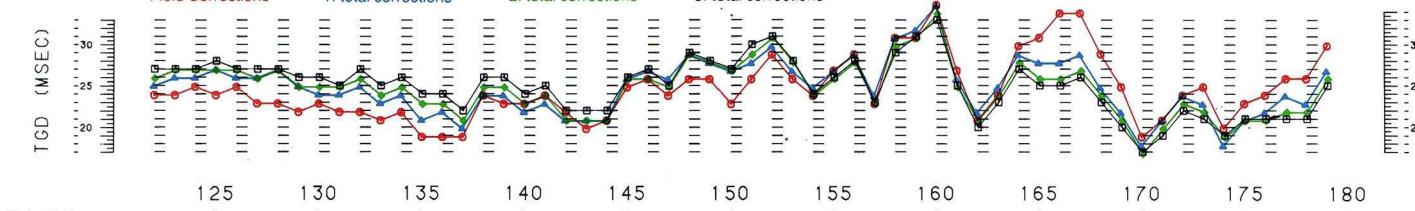
SP No.	Field corr.	1. res.	1. total	2. res.	2. total	3. res.	3. total	PG No.	Field corr.	1. res.	1. total	2. res.	2. total	3. res.	3. total
20	-30.0	0.7	-29.0	-0.3	-29.0	0.1	-29.0	122	-24.0	-1.4	-25.0	-1.1	-25.0	-0.5	-27.0
21	-33.0	2.2	-31.0	0.2	-31.0	0.5	-30.0	123	-24.0	-1.5	-26.0	-0.6	-27.0	-0.0	-27.0
22	-30.0	0.9	-29.0	0.3	-29.0	0.7	-28.0	124	-25.0	-0.7	-26.0	-0.6	-27.0	-0.1	-27.0
23	-31.0	1.2	-30.0	0.6	-29.0	0.2	-29.0	125	-24.0	-2.5	-27.0	-0.5	-27.0	-0.7	-28.0
24	-31.0	0.3	-31.0	0.6	-30.0	0.2	-30.0	126	-25.0	-1.3	-26.0	-0.5	-27.0	-0.0	-27.0
25	-28.0	-1.6	-29.0	1.2	-28.0	0.9	-27.0	127	-23.0	-2.7	-26.0	-0.1	-26.0	-0.5	-27.0
26	-27.0	-1.7	-29.0	1.2	-28.0	0.8	-27.0	128	-23.0	-3.6	-27.0	-0.1	-27.0	-0.4	-27.0
27	-27.0	-1.4	-28.0	0.2	-28.0	0.7	-27.0	129	-22.0	-2.9	-25.0	-0.2	-25.0	-0.5	-26.0
28	-26.0	-0.3	-28.0	0.0	-28.0	0.3	-28.0	130	-23.0	-1.4	-24.0	-0.9	-25.0	-0.5	-26.0
29	-28.0	-0.6	-29.0	0.3	-29.0	0.6	-28.0	131	-22.0	-1.9	-24.0	-0.7	-25.0	-0.4	-25.0
30	-25.0	-0.0	-30.0	-0.6	-31.0	0.4	-31.0	132	-22.0	-2.8	-25.0	-1.0	-26.0	-0.6	-27.0
31	-28.0	-1.2	-29.0	-0.9	-30.0	0.0	-30.0	133	-21.0	-1.8	-23.0	-1.0	-24.0	-0.8	-25.0
32	-24.0	-0.5	-27.0	-0.1	-27.0	-0.2	-27.0	134	-22.0	-1.8	-24.0	-1.1	-25.0	-0.9	-26.0
33	-24.0	-1.8	-26.0	-0.4	-26.0	-0.4	-26.0	135	-19.0	-2.3	-21.0	-1.6	-23.0	-0.7	-24.0
34	-25.0	-1.0	-26.0	-0.6	-27.0	0.1	-27.0	136	-19.0	-2.5	-22.0	-0.8	-23.0	-0.8	-24.0
35	-26.0	-1.4	-26.0	-0.7	-27.0	-0.1	-27.0	137	-19.0	-2.9	-20.0	-1.0	-21.0	-1.0	-22.0
36	-26.0	-1.8	-27.0	-0.2	-27.0	-0.4	-27.0	138	-24.0	-0.0	-24.0	-1.1	-25.0	-1.1	-26.0
37	-28.0	-1.3	-28.0	-0.8	-29.0	-0.2	-29.0	139	-23.0	-0.7	-24.0	-1.0	-25.0	-1.0	-26.0
38	-26.0	-0.0	-28.0	0.8	-29.0	-0.3	-29.0	140	-23.0	-0.7	-22.0	-1.1	-23.0	-1.0	-24.0
39	-23.0	-3.9	-27.0	-0.9	-28.0	-0.5	-29.0	141	-24.0	-0.6	-23.0	-0.5	-24.0	-0.7	-25.0
40	-25.0	-0.6	-28.0	-0.5	-29.0	-0.1	-29.0	142	-22.0	-0.7	-21.0	-0.3	-21.0	-1.0	-22.0
41	-21.0	-3.1	-24.0	-0.5	-25.0	-0.2	-25.0	143	-20.0	-0.8	-21.0	0.0	-21.0	-0.5	-22.0
42	-24.0	-0.1	-26.0	-1.1	-27.0	-0.7	-28.0	144	-21.0	-0.3	-21.0	-0.2	-21.0	-0.7	-22.0
43	-27.0	-2.4	-29.0	-1.0	-30.0	-0.7	-31.0	145	-25.0	-1.0	-26.0	0.3	-25.0	-0.1	-26.0
44	-29.0	-0.4	-31.0	-0.9	-32.0	-0.6	-33.0	146	-26.0	-0.6	-27.0	0.5	-26.0	-0.5	-27.0
45	-25.0	-3.1	-28.0	-0.4	-28.0	-0.8	-29.0	147	-24.0	-1.5	-26.0	0.5	-25.0	-0.4	-25.0
46	-27.0	-3.1	-30.0	-0.4	-30.0	-0.7	-31.0	148	-26.0	-2.5	-29.0	0.4	-29.0	0.3	-29.0
47	-28.0	-0.8	-31.0	-1.0	-32.0	-0.5	-33.0	149	-26.0	-1.8	-28.0	-0.2	-28.0	-0.4	-28.0
48	-30.0	-1.9	-32.0	-1.3	-33.0	-1.0	-34.0	150	-23.0	-3.7	-27.0	-0.1	-27.0	-0.4	-27.0
49	-31.0	-1.9	-33.0	-1.6	-35.0	-0.7	-36.0	151	-26.0	-2.4	-28.0	-1.1	-29.0	-0.5	-30.0
50	-32.0	-1.9	-34.0	-2.6	-37.0	-1.2	-38.0	152	-29.0	-1.4	-30.0	-0.7	-31.0	-0.2	-31.0
51	-33.0	-1.3	-34.0	-2.3	-36.0	-1.7	-38.0	153	-26.0	-1.3	-27.0	-0.7	-28.0	-0.3	-28.0
52	-31.0	-0.7	-32.0	-1.6	-34.0	-1.1	-35.0	154	-24.0	-0.7	-25.0	0.5	-24.0	-0.3	-24.0
53	-29.0	-1.6	-31.0	-1.6	-33.0	-1.3	-34.0	155	-27.0	0.0	-27.0	0.7	-26.0	0.0	-26.0
54	-34.0	1.8	-32.0	3.0	-29.0	0.5	-28.0	156	-29.0	-0.0	-29.0	0.9	-28.0	0.2	-28.0
55	-27.0	0.8	-26.0	-2.1	-28.0	-1.5	-30.0	157	-23.0	-0.6	-24.0	1.0	-23.0	0.4	-23.0
56	-30.0	0.3	-30.0	-0.3	-30.0	-0.8	-31.0	158	-31.0	0.3	-31.0	1.2	-30.0	0.8	-29.0
57	-35.0	-1.3	-36.0	0.7	-35.0	-0.2	-35.0	159	-31.0	-1.0	-32.0	0.7	-31.0	0.2	-31.0
58	-39.0	0.1	-39.0	-0.6	-40.0	-0.1	-40.0	160	-35.0	0.1	-35.0	1.3	-34.0	1.1	-33.0
59	-29.0	1.6	-27.0	-2.2	-29.0	-1.7	-31.0	161	-27.0	0.6	-26.0	0.7	-25.0	0.3	-25.0
60	-30.0	0.4	-30.0	-0.5	-31.0	-0.3	-31.0	162	-21.0	-1.1	-22.0	0.7	-21.0	0.5	-20.0
61	-23.0	0.5	-22.0	-2.5	-25.0	-1.0	-26.0	163	-24.0	-0.5	-25.0	0.8	-24.0	0.7	-23.0
62	-23.0	0.7	-22.0	-1.4	-23.0	-1.5	-25.0	164	-30.0	0.6	-29.0	1.0	-28.0	0.9	-27.0
63	-24.0	1.4	-23.0	-0.2	-23.0	-1.1	-24.0	165	-31.0	3.1	-28.0	2.0	-26.0	1.2	-25.0
64	-20.0	0.2	-20.0	-2.3	-22.0	-1.6	-24.0	166	-34.0	5.8	-28.0	1.9	-26.0	1.3	-25.0
65	-23.0	1.8	-21.0	-0.9	-22.0	-0.9	-23.0	167	-34.0	4.5	-29.0	1.8	-27.0	1.1	-26.0
66	-23.0	0.7	-22.0	0.2	-22.0	-0.1	-22.0	168	-29.0	3.6	-25.0	1.3	-24.0	1.3	-23.0
67	-25.0	1.8	-23.0	0.8	-22.0	-0.4	-22.0	169	-25.0	2.5	-22.0	1.2	-21.0	1.1	-20.0
68	-24.0	1.4	-23.0	1.2	-22.0	0.2	-22.0	170	-19.0	0.8	-18.0	0.6	-17.0	0.3	-17.0
69	-24.0	2.3	-22.0	0.7	-21.0	-0.1	-21.0	171	-21.0	-0.3	-21.0	1.4	-20.0	1.1	-19.0
70	-27.0	1.4	-26.0	1.8	-24.0	0.4	-24.0	172	-24.0	0.1	-24.0	1.4	-23.0	1.4	-22.0
71	-28.0	1.7	-26.0	1.2	-25.0	0.7	-24.0	173	-25.0	1.5	-23.0	0.8	-22.0	0.5	-21.0
72	-24.0	1.3	-23.0	-1.2	-24.0	-0.1	-24.0	174	-20.0	1.8	-18.0	-0.6	-19.0	0.3	-19.0
73	-23.0	-1.3	-23.0	-1.8	-25.0	-0.2	-25.0	175	-23.0	1.5	-21.0	0.4	-21.0	0.4	-21.0
74	-26.0	0.4	-26.0	0.0	-26.0	0.1	-26.0	176	-24.0	2.1	-22.0	0.6	-21.0	0.3	-21.0
75	-27.0	-1.6	-29.0	2.2	-27.0	0.8	-26.0	177	-26.0	2.2	-24.0	1.5	-22.0	0.5	-21.0
76	-32.0	-0.7	-33.0	2.8	-30.0	1.1	-29.0	178	-26.0	3.4	-23.0	0.7	-22.0	0.5	-21.0
77	-33.0	-0.0	-35.0	3.0	-32.0	1.5	-30.0	179	-30.0	2.7	-27.0	0.7	-26.0	0.5	-25.0
78	-34.0	-2.3	-36.0	1.7	-34.0	1.8	-32.0	180	-33.0	3.7	-29.0	0.4	-29.0	1.0	-28.0

Fig. 5a: Lists

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