

 **RadExPro** seismic software
for infield QC and fast-track processing of
2D/3D seismic data

DECO Geophysical Software Co.



History

The software took its origin in 1992 at the Geophysical Department, Faculty of Geology, Lomonosov Moscow State University and, since then, has been continuously developed and advanced.

In 2001 when the DECO Geophysical company was founded, the software transferred to the company together with its initial authors.



Lomonosov Moscow State University main building

 **RadExPro**
for infield QC and fast-track processing

The software provides all necessary facilities for 2D/3D seismic data QC and fast-track processing, either in field or at the office.

It is used for these purposes in a number of service and oil-and-gas companies both inside Russia and abroad.

Russian office of FairField Nodal company offers RadExPro as a standard solution for infield processing and QC, coming together with their seismic systems.



RadExPro

for infield QC and fast-track processing

On Windows:



Easy to install

- Does not require administrative expertise

Easy to learn and to use

- Handy graphical interface
- Manual and tutorials available

No specific hardware required

- Operates smoothly on just an average up-to-date laptop or desktop computer



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for infield QC and fast-track processing

Rapid input of data of any size

SEG-D Input

Files... From batch list

data|R1081_4951.1.0
data|R1081_4955.1.0
data|R1081_4959.1.0
data|R1081_4963.1.0
data|R1081_4967.1.0
data|R1081_4971.1.0
data|R1081_4975.1.0
data|R1081_4979.1.0
data|R1081_4983.1.0
data|R1081_4987.1.0
data|R1081_4991.1.0
data|R1081_4995.1.0

Station: Fairfield

Trace length: Generic

NP = (TE - T) Sercel 388 (TF - Start time)
 NP = (TE - T) Fairfield (TE - End time)
 Override trace length: 0 Samples

Apply pre-amplifier gain

Calculate Source Index manually

Set auxiliary trace channel number to negative

Suppress warnings

Time from stamp

Remap SEG-D trace header values

Skip records of types (-1 disables this feature): 2

Input channel type(s) (-1: input all channel types): -1

Specify seismic data channel type(s): 1

Remap SEG-D main header values

YEAR,,2B,,,10.5/DAY,,3B,,,12/HOUR,,2B,,,13.5/
MINUTE,,2B,,,14.5/SECOND,,2B,,,15.5/
SOURCE,,1L,,,76/

Load Remap... Save Remap... Load Remap... Save Remap...

Debug log file

Dump external headers

OK Cancel

Formats supported:

- SEG-D (with optional header remapping)
- SEG-Y (with optional header remapping)
- SEG-2 and more...
- Input seismic trace from ASCII

SEG-Y Input

File(s)

Data\line_1.sgy

Sample format: I1 I2 I4 R4

IBM Floating Point

Sample interval: 4

Number of traces: 0

Trace length: 750

Use trace weighting factor

Big-endian byte order (SEG-Y standard)
 Little-endian byte order

Sorted by: FFID:OFFSET

Get all Selection: *.*

3D Survey 2D Survey Profile ID: 1

Remap header value:

RECNO,4L,,181/ SOURCE,4L,,185/

Add... Delete Load list... Save list...

From batch list

OK Cancel



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SEG-Y Detective – flexible multi-purpose SEG-Y file analyzer

RadExPro Name	Offset	Value	Description
TRACENO	1	1	Trace sequence number within line
	5	1	Trace sequence number within reel
FFID	9	1	Original field record number
CHAN	13	1	Trace sequence number within field record
SOURCE	17	1	Energy source point number
CDP	21	103001	CDP ensemble number
SEQNO	25	0	Trace sequence number within CDP ensemble
TRC_TYPE	29	1	Trace identification code
STACKCNT	31	0	Number of vertically summed traces
TRFOLD	33	0	Number of horizontally stacked traces
	35	0	Data use (1 = production, 2 = test)
OFFSET	37	2072	Distance from source point to receiver group
REC_ELEV	41	810000	Receiver group elevation
SOU_ELEV	45	910000	Surface elevation at source
DEPTH	49	0	Source depth below surface
REC_DATUM	53	0	Datum elevation at receiver group
SOU_DATUM	57	0	Datum elevation at source
SOU_H2OD	61	0	Water depth at source
REC_H2OD	65	0	Water depth at receiver group
	69	-10000	Scalar for elevations and depths
	71	-10000	Scalar for coordinates
SOU_X	73	2992...	X source coordinate
SOU_Y	77	6965...	Y source coordinate
REC_X	81	2803...	X receiver group coordinate
REC_Y	85	7050...	Y receiver group coordinate
	89	3	Coordinate units (1 - meters or feet, 2 - arc seconds)
	91	0	Weathering velocity
	93	0	Subweathering velocity
UPHOLE	95	0	Uphole time at source
REC_UPHOLE	97	0	Uphole time at receiver group
SOU_STAT	99	0	Source static correction
REC_STAT	101	0	Receiver group static correction

-View SEG-Y headers and trace samples in any formats with any byte order

- Create user-defined headers of any formats with any (inc. odd) offsets and save them as a template

-Edit header field values

and more...

FREE DOWNLOAD from
www.radexpro.com



for infield QC and fast-track processing

Handy and flexible geometry assignment tools

- From trace headers (if the values are there)
- From SPS-files
- From UKOOA p1-90 files
- From arbitrary ASCII table files
- Built-in spreadsheet and header math editors

Import SPS X file

Definition of Field	Header Name	Change header...
Field record number	FFID	
Source line	S_LINE	
Source station location	SOU_SLOC	
From channel	CHAN	
To channel	CHAN	
Channel increment		
Receiver line	R_LINE	
First receiver station location	REC_SLOC	
Last receiver station location	REC_SLOC	
Receiver station location increment		

Lines: From 0 To 0

Text table type: Delimited Fixed width

9 — 11 Set pos

(1.1) Selection: 9 - 11

CH	SO	SO	CH	SO	SO	CH	SO	SO	CH
X31	288	5012	2291	1	240	1012			109
X31	287	5012	2311	1	240	1012			111
X31	286	5012	2331	1	240	1012			113
X31	285	5012	2351	1	240	1012			115
X31	284	5012	2371	1	240	1012			117
X31	283	5012	2391	1	240	1012			119
X31	282	5012	2401	1	240	1012			120
X31	281	5012	2411	1	240	1012			121
X31	280	5012	2451	1	240	1012			125
X31	279	5012	2471	1	240	1012			127
X31	278	5012	2491	1	240	1012			129
X31	277	5012	2511	1	240	1012			131
X31	276	5012	2531	1	240	1012			133
X31	275	5012	2551	1	240	1012			135
X31	274	5012	2571	1	240	1012			137
X31	273	5012	2591	1	240	1012			139
X31	272	5012	2611	1	240	1012			141

OK Cancel Load template... Save template... File...

line5746 - Geometry Spreadsheet

CHAN	SOU_X	SOU_Y
1	294579.30000	3203161.30000
2	294579.30000	3203161.30000
3	294579.30000	3203161.30000
4	294579.30000	3203161.30000
5	294579.30000	3203161.30000
6	294579.30000	3203161.30000
7	294579.30000	3203161.30000
8	294579.30000	3203161.30000
9	294579.30000	3203161.30000
10	294579.30000	3203161.30000
11	294579.30000	3203161.30000
12	294579.30000	3203161.30000
13	294579.30000	3203161.30000
14	294579.30000	3203161.30000
15	294579.30000	3203161.30000
16	294579.30000	3203161.30000
17	294579.30000	3203161.30000
18	294579.30000	3203161.30000
19	294579.30000	3203161.30000
20	294579.30000	3203161.30000
21	294579.30000	3203161.30000
22	294579.30000	3203161.30000
23	294579.30000	3203161.30000
24	294579.30000	3203161.30000
25	294579.30000	3203161.30000
26	294579.30000	3203161.30000
27	294579.30000	3203161.30000
28	294579.30000	3203161.30000
29	294579.30000	3203161.30000

Import UKOOA P1-90 file

Source format definition

Field Description	Beg	End	Header Name
Point number	20	25	FFID
X - Easting	47	55	SOU_X
Y - Northing	56	64	SOU_Y
Elev/Depth	65	70	SOU_ELEV

Receiver format definition

Field Description	Beg	End	Header Name
Chan	2	5	CHAN
X - Easting	6	14	REC_X
Y - Northing	15	23	REC_Y
Depth	24	27	REC_ELEV
Chan	28	31	CHAN
X - Easting	32	40	REC_X
Y - Northing	41	49	REC_Y
Depth	50	53	REC_ELEV
Chan	54	57	CHAN
X - Easting	58	66	REC_X
Y - Northing	67	75	REC_Y
Depth	76	79	REC_ELEV
Receiver line	80	80	R_LINE

(9.67) Selection: 47 - 55

Use R_LINE:CHAN for receiver match Set pos

U5826	1	002019290054.88N0950031.30W	304360.73211338.4	11.9212054030
E5826	1	002019290054.88N0950031.30W	304360.73211338.4	11.9212054030
S5826	11	002019290055.66N0950030.37W	304386.23211361.9	11.9212054030
T5826	1	1002019290059.72N0950030.00W	304398.43211486.8	11.9212054030
R5826	1	2002019290056.15N0950025.82W	304509.73211375.0	11.9212054030
R	10304440.73211497.803.6	20304443.03211499.803.6	30304445.43211501.903.61	
R	40304447.73211504.003.6	50304450.13211506.103.6	60304452.43211508.103.61	
R	70304454.73211510.203.6	80304457.13211512.303.6		1
R	10304453.53211502.103.5	20304455.83211504.203.5	30304458.23211506.303.52	
R	40304460.53211508.303.5	50304462.83211510.403.5	60304465.23211512.503.52	
R	70304467.53211514.603.5	80304469.83211516.603.5		2
R	10304466.43211505.803.2	20304468.73211507.803.2	30304471.13211509.903.23	
R	40304473.43211512.003.2	50304475.73211514.103.2	60304478.13211516.203.23	
R	70304480.43211518.203.2	80304482.83211520.303.2		3
R	10304479.33211508.503.0	20304481.73211510.603.0	30304484.03211512.703.04	
R	40304486.43211514.703.0	50304488.73211516.803.0	60304491.03211518.903.04	
R	70304493.43211521.003.0	80304495.73211523.003.0		4
R	10304492.33211509.902.6	20304494.63211512.002.6	30304497.03211514.102.65	
R	40304499.33211516.102.6	50304501.73211518.202.6	60304504.03211520.302.65	

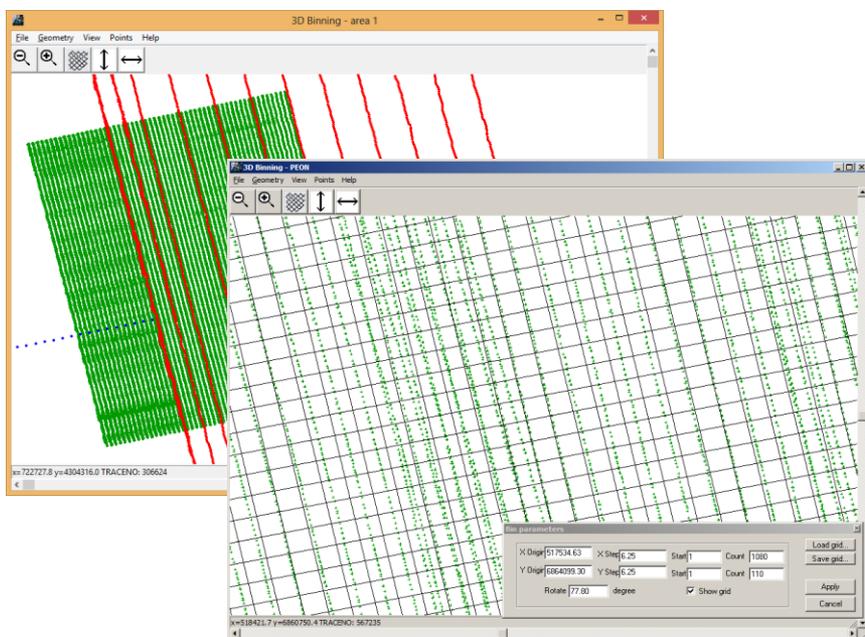
OK Cancel Load default Load template... Save template... File...



RadExPro

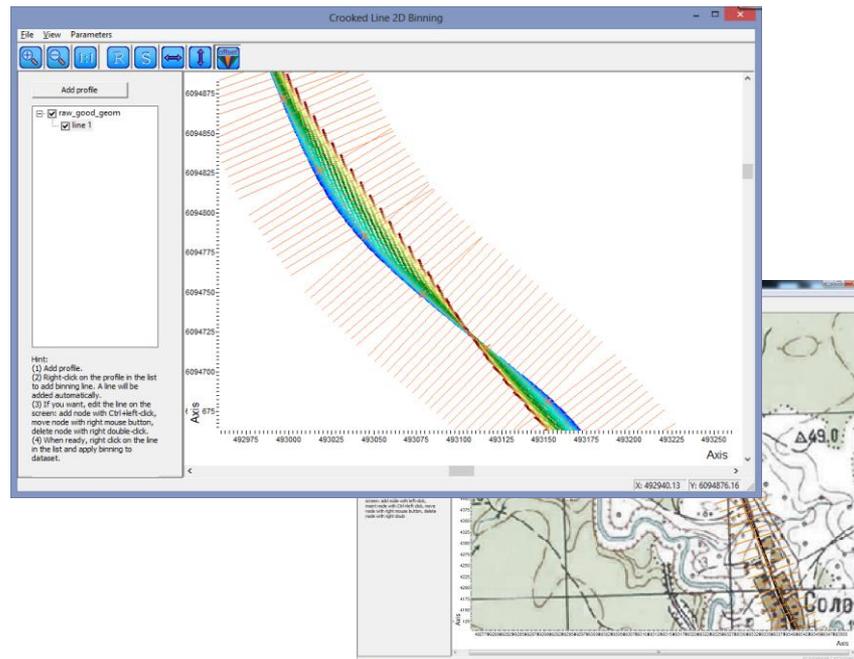
for infield QC and fast-track processing

Interactive CDP binning



- 3D

- 2D along arbitrary line (binning line offered automatically and can be edited interactively)



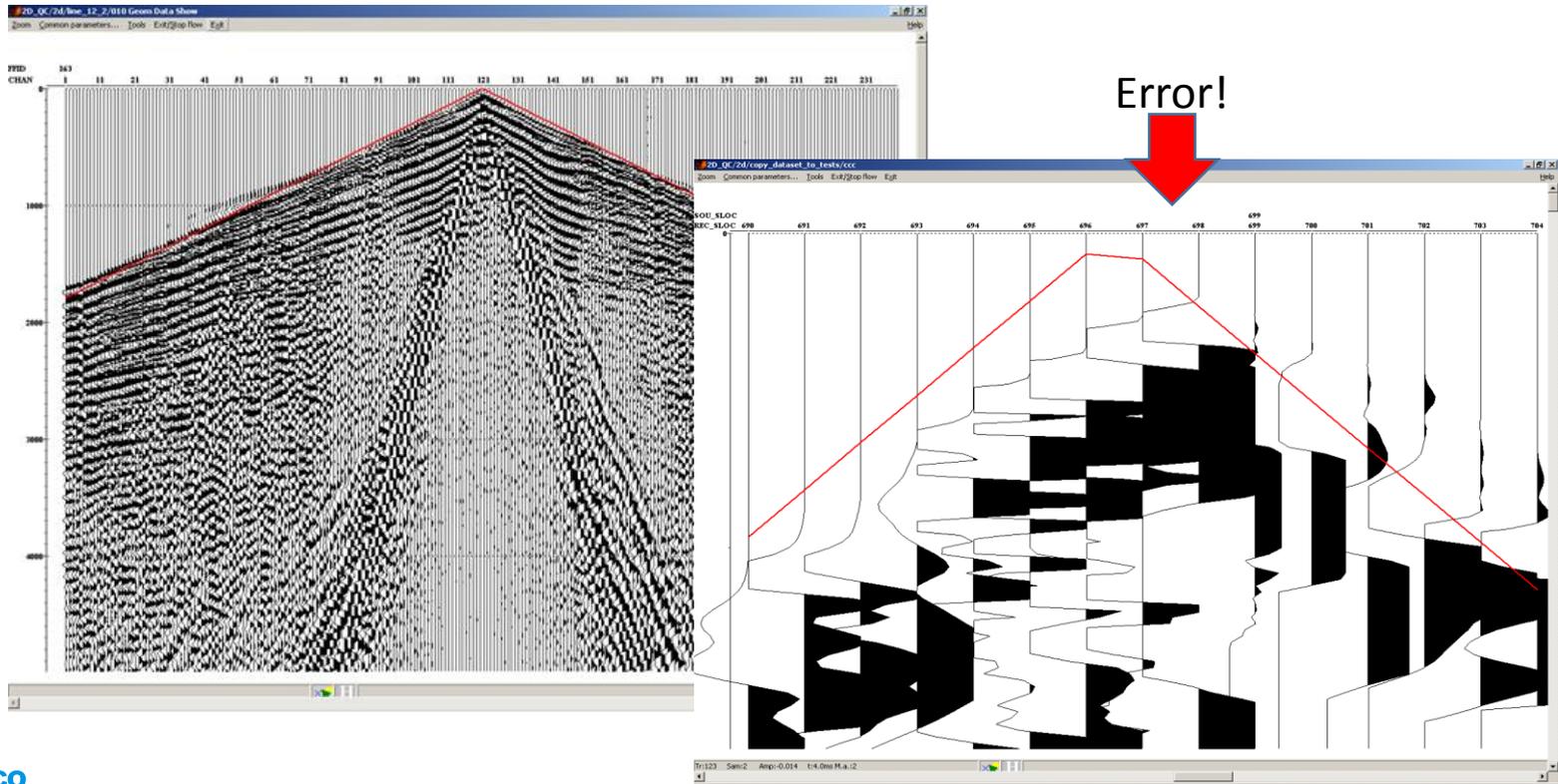


RadExPro

for infield QC and fast-track processing

Geometry QC

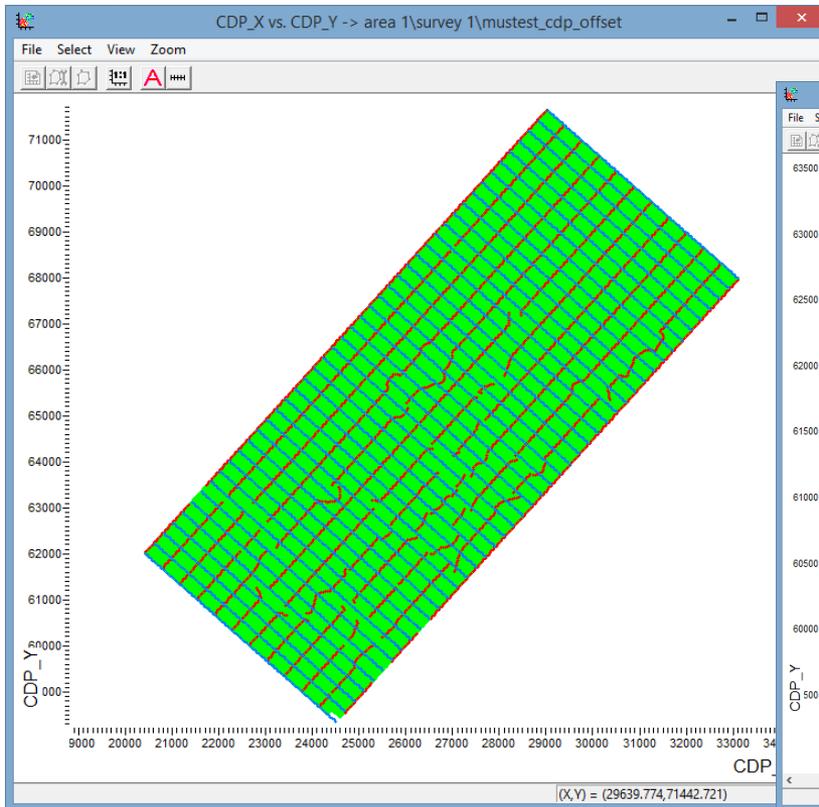
- First arrivals control



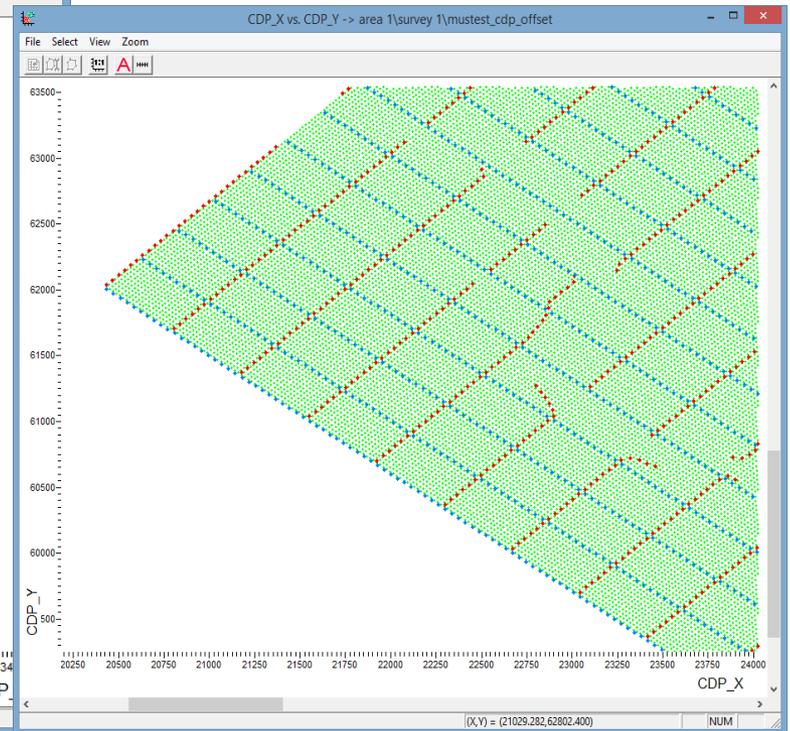


for infield QC and fast-track processing

Geometry QC



- Survey maps (sources, receivers, CMPs) (can be plotted on top of a bitmap image)

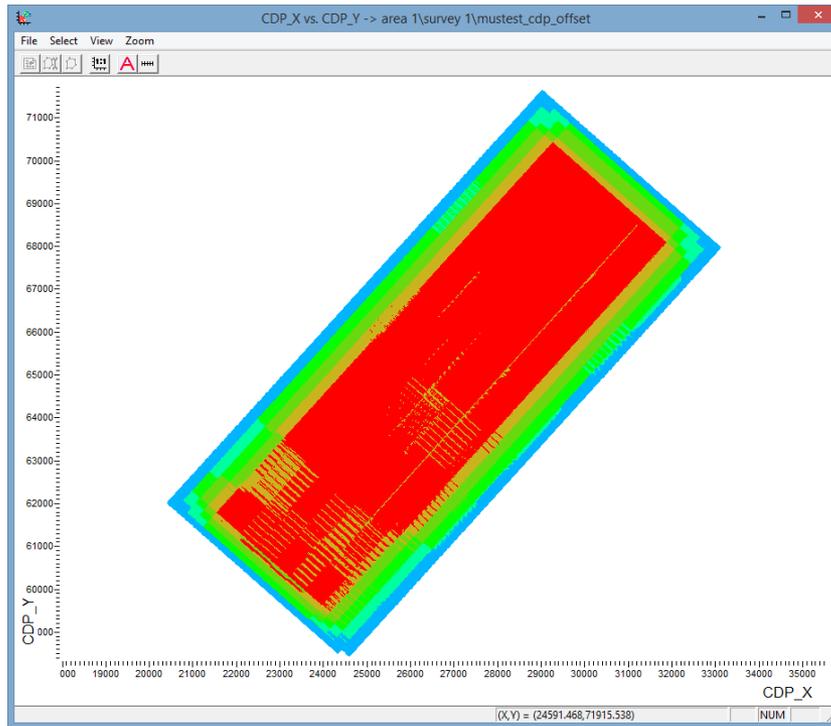




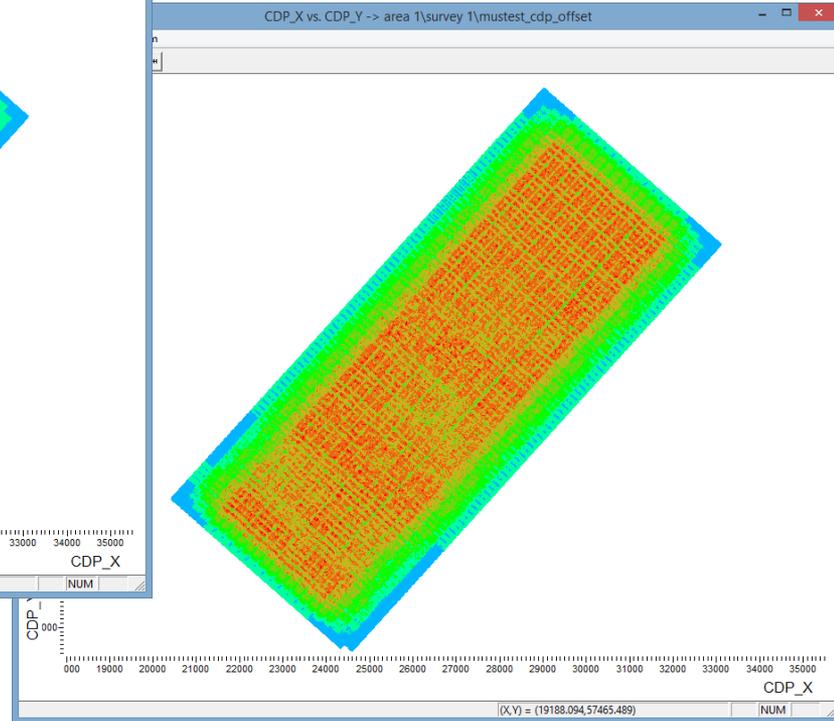
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for infield QC and fast-track processing

Geometry QC



- *Fold and offset sampling maps*

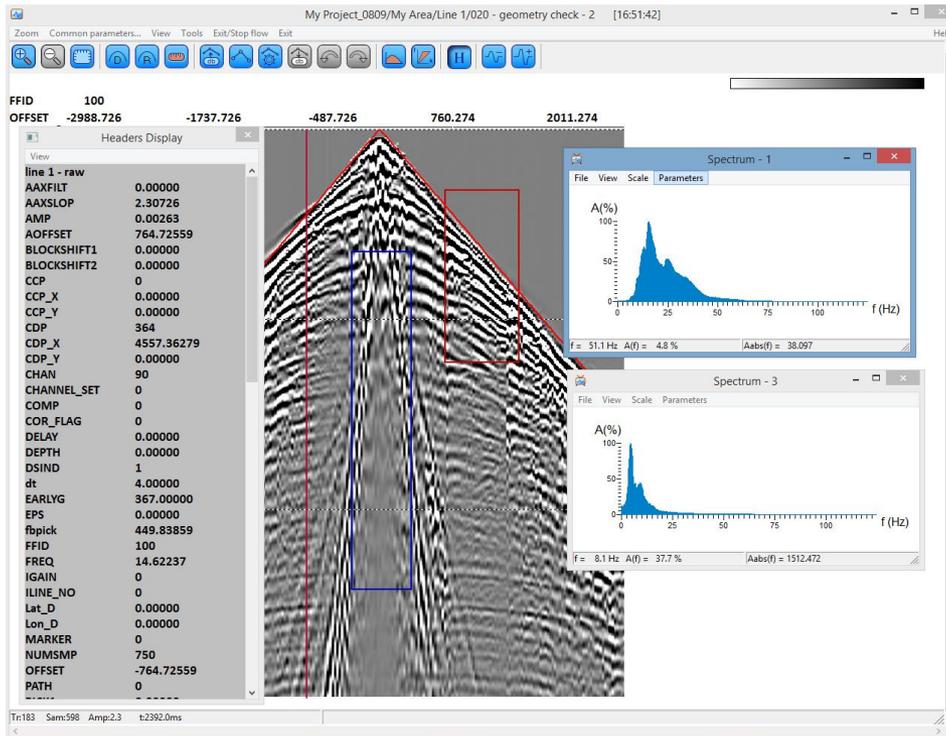




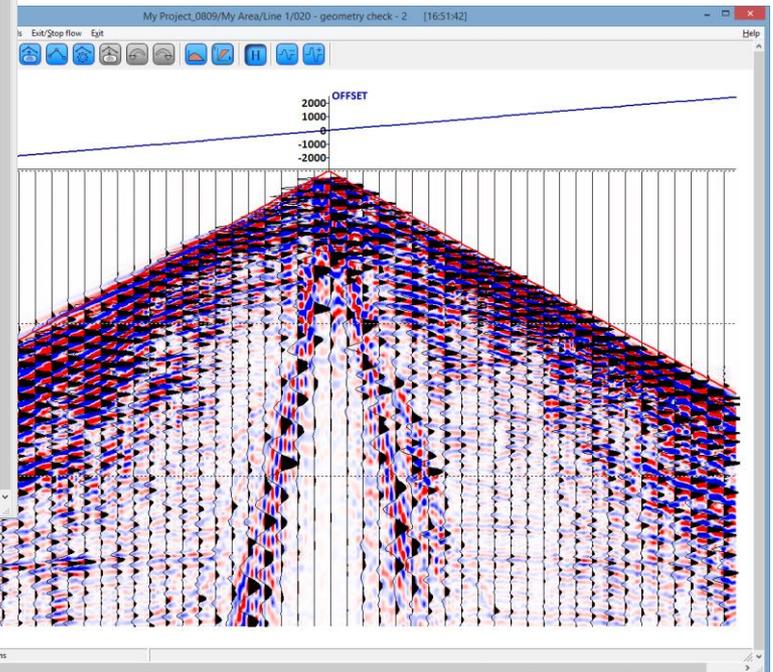
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for infield QC and fast-track processing

Visual QC and data analysis



- Any ways of data display
- View of every N-th gather
- Check headers of any trace
- Display header value diagrams
- View frequency and F-K spectrums of arbitrary data fragments

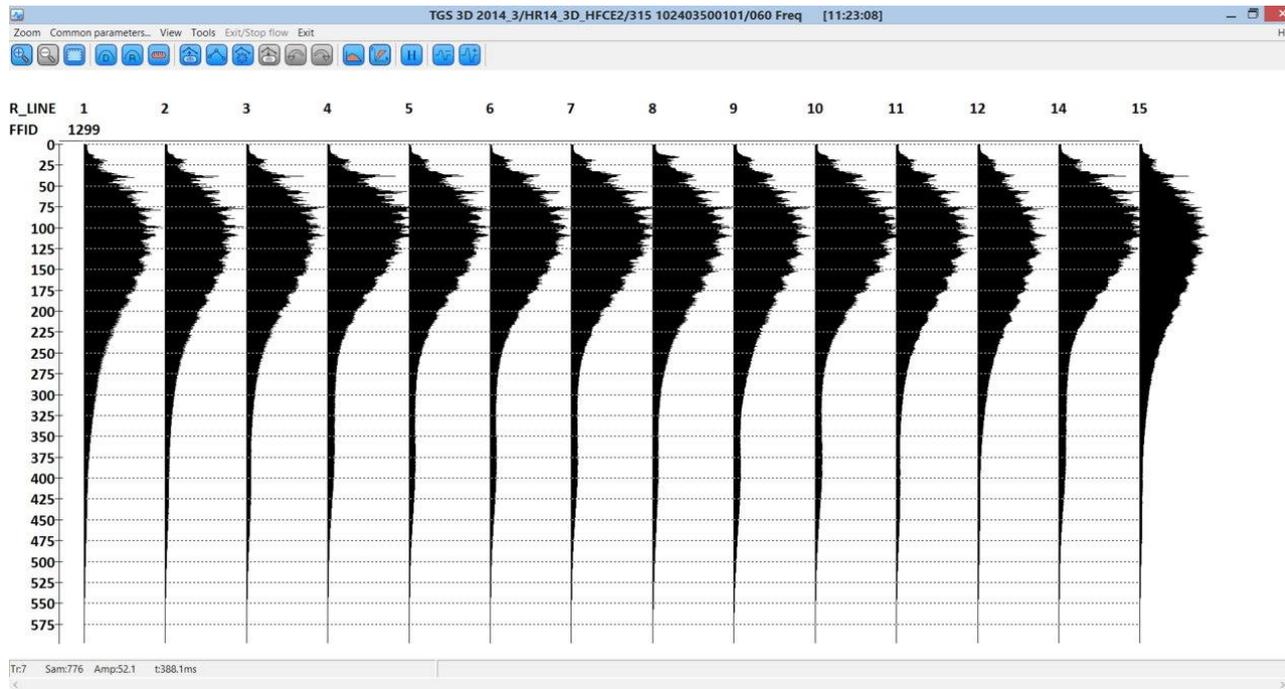




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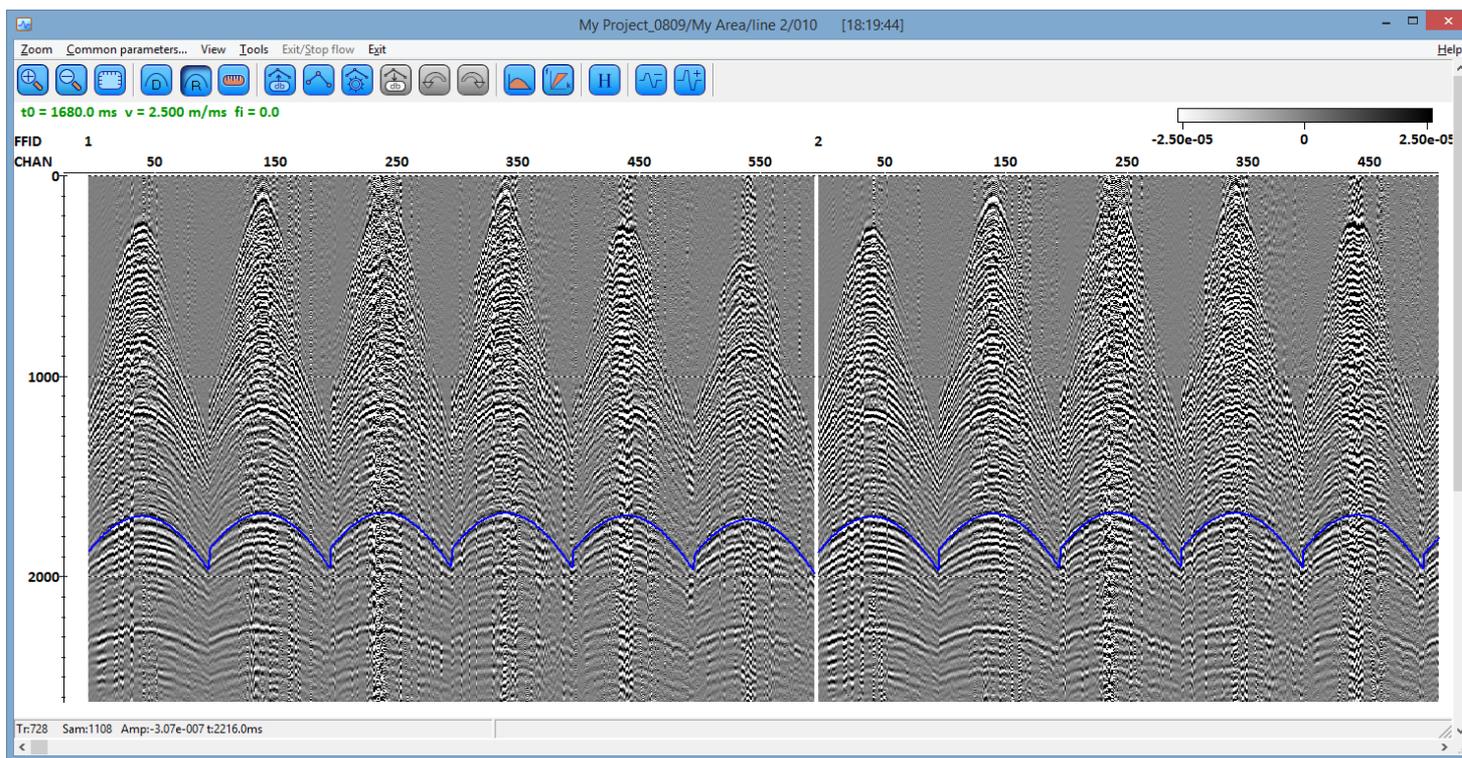
Visual QC and data analysis



- Display frequency spectra of every N-th channel

 **RadExPro**
for infield QC and fast-track processing
Visual QC and data analysis

- *Interactive estimation of seismic velocities of all wave types*

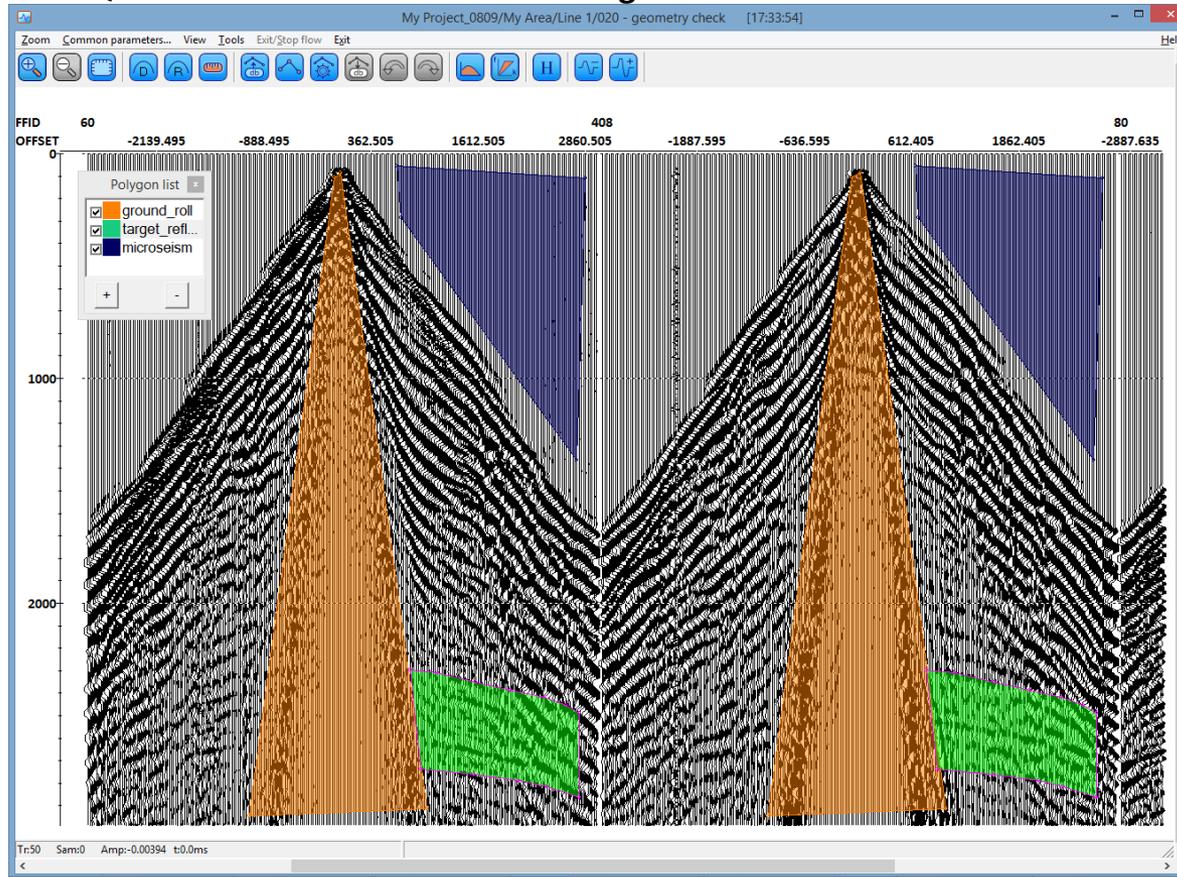




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QC attribute calculation for seismic gathers

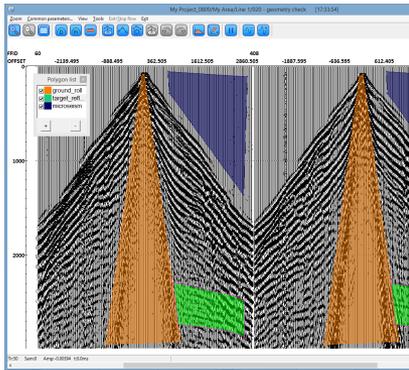


- Interactively define windows for attribute calculation



for infield QC and fast-track processing

QC attribute calculation for seismic gathers



Ensemble QC Compute

Window
 Polygonal
line 1\020 - geometry check\target_reflections
 Square
Min offset: 1000 Max offset: 2000
Min: 0 Max: 2000

Amplitude
 Mean Trace Header
 2D RMS AMP
 Mean 1D RMS

Signal / Noise ratio
 Compute Signal/Noise Ratio SNR
Min: 0 Max: 125 Max: 10
Mode: Normal
 Use model trace
 Treat model trace as signal
 Treat first trace in each ensemble as model

Resolution
 Compute resolution SOU_H20D Max time of ACF to: 50
Mode: Use mean ACF Use mean CCF Use separate CCFs
 Normalize CF [affects Apparent Frequency estimation also]

Apparent frequency
 Compute apparent frequency FREQ
Mode: Number of sign changes ACF Mean ACF

OK Cancel

Trace Header Math

```
SNR2 = [AMP]/[AMP_N]  
Q = cond([SNR2]<10 || [FREQ]<30, 0, 1)
```

Line 1 Pos 1
OK Cancel Check syntax Load template... Save template...

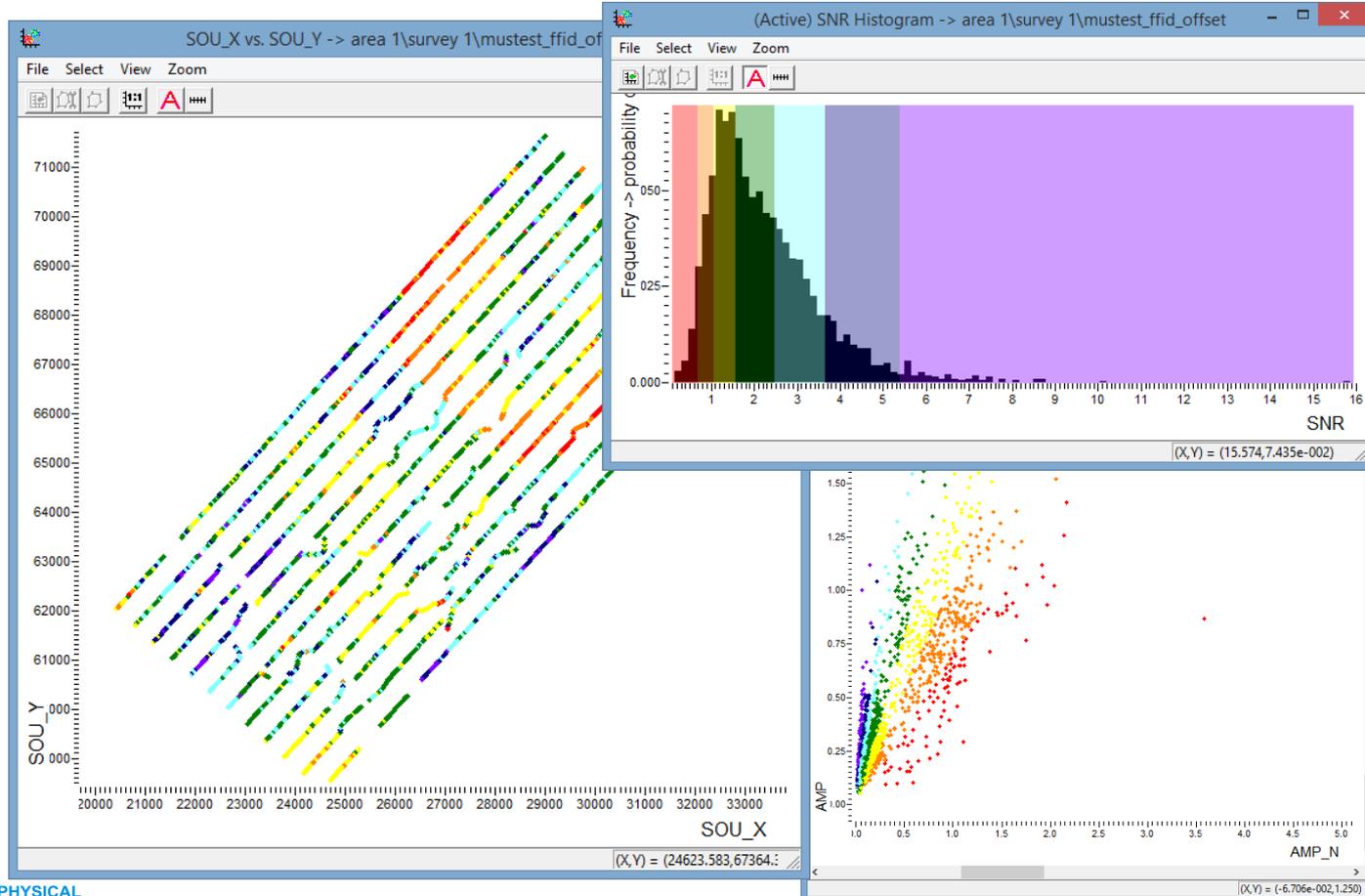
- Evaluate amplitude and frequency attributes individually for each window
- Calculate SNR within a specified frequency band basing of correlation function spectra (either through CCF of neighboring traces, or with a stacked trace to remove coherent noise from the signal estimate)
- Calculate any combined attributes and their relations



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Attribute analysis on linked cross-plots





RadExPro

for infield QC and fast-track processing

Fast-track processing

Complete set of industry-standard algorithms

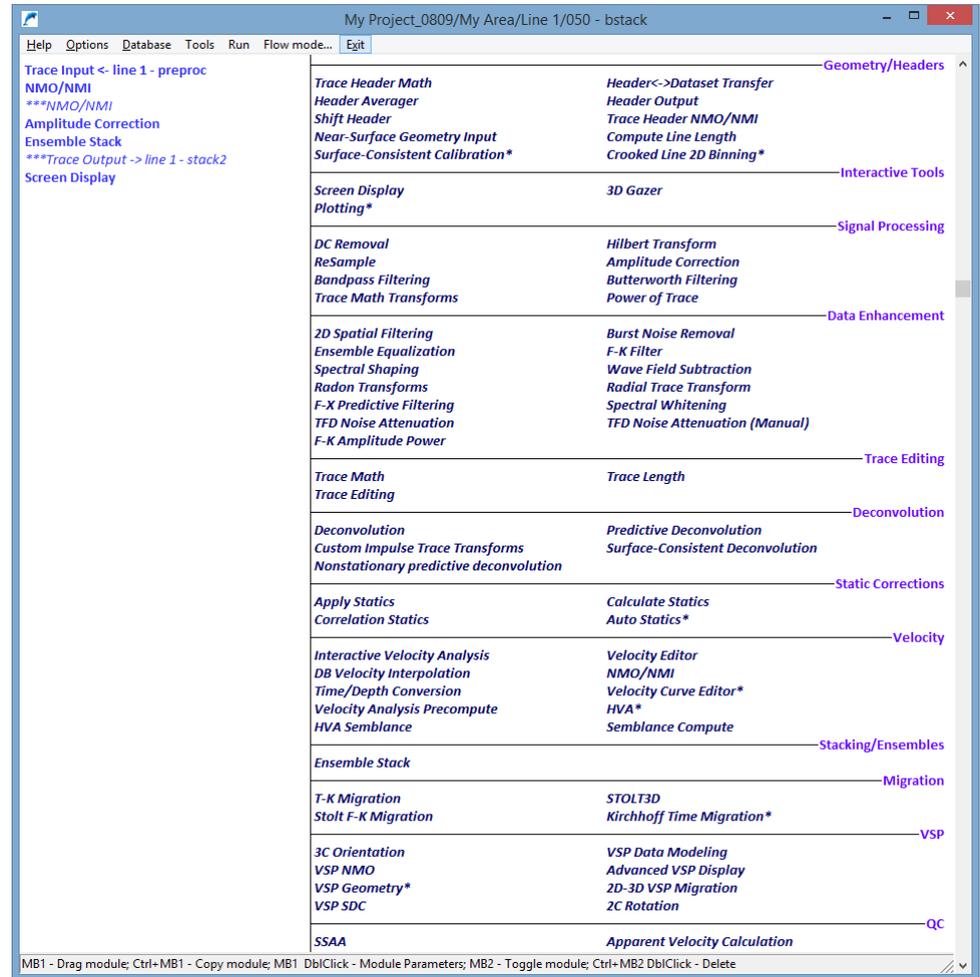
Vibroseis correlation, trace editing, band-pass and 2D filtering, ground-roll suppression, amplitude correction, deconvolutionms, interactive velocity analysis, statics, NMO-correction, DMO, stacking, migrations, etc.

Handy data management tools

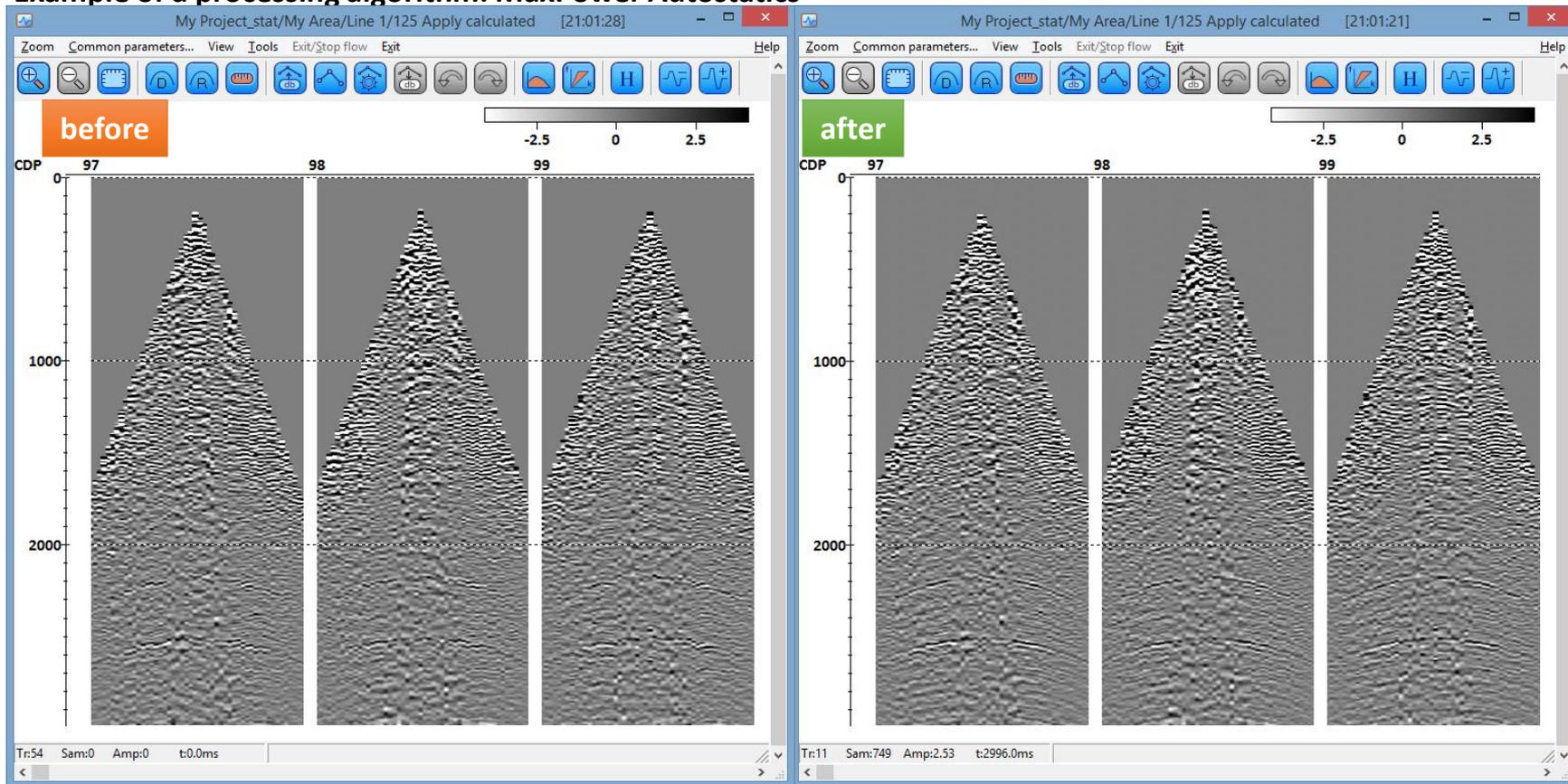
- Processing in projects, data is stored together with processing parameters.
- Processing history is available for each dataset.

Efficiently handle data of any size

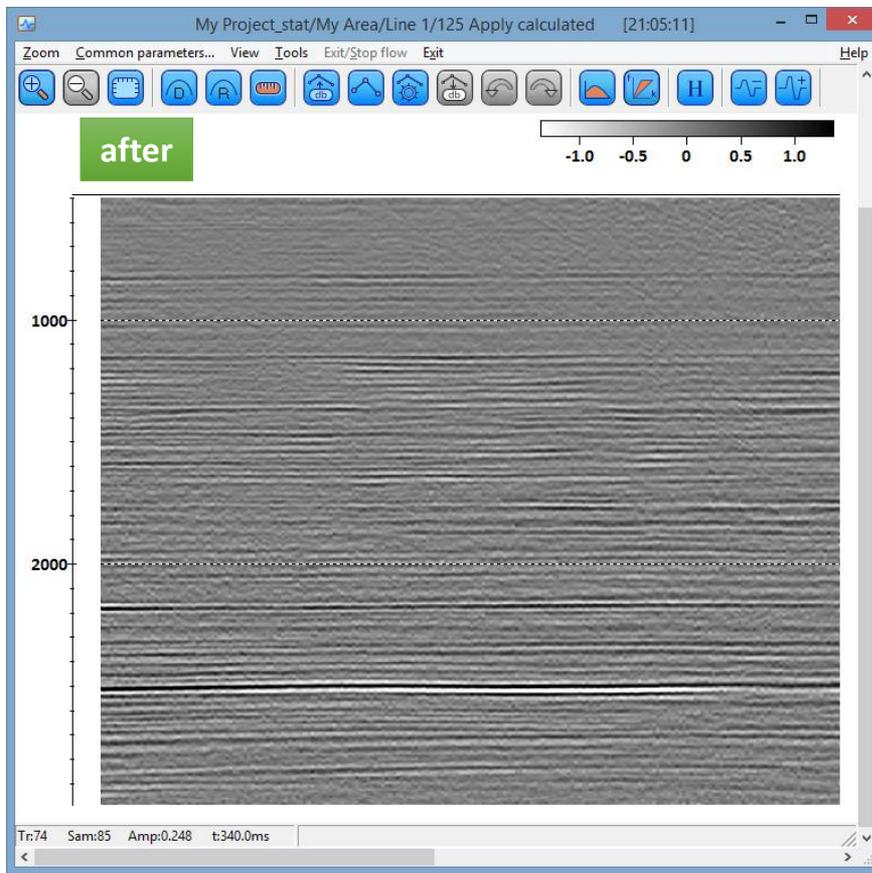
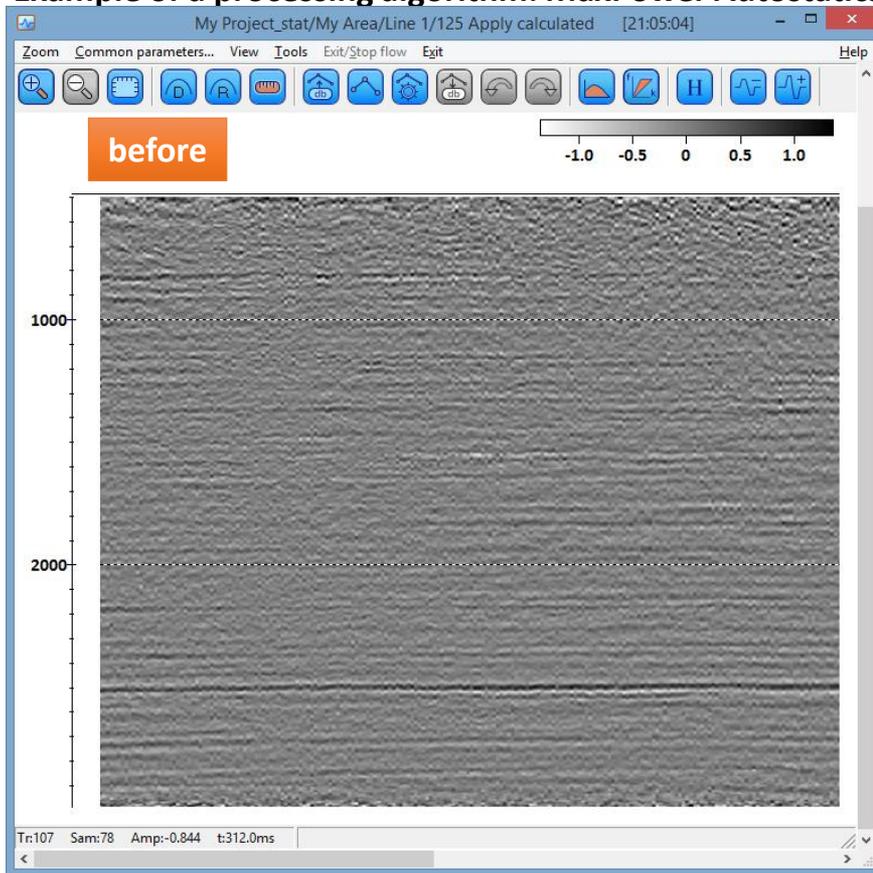
- Framed mode of flow execution.
- Fast resorting of big data volumes.
- Parallelization – up to 4 queues to run in parallel



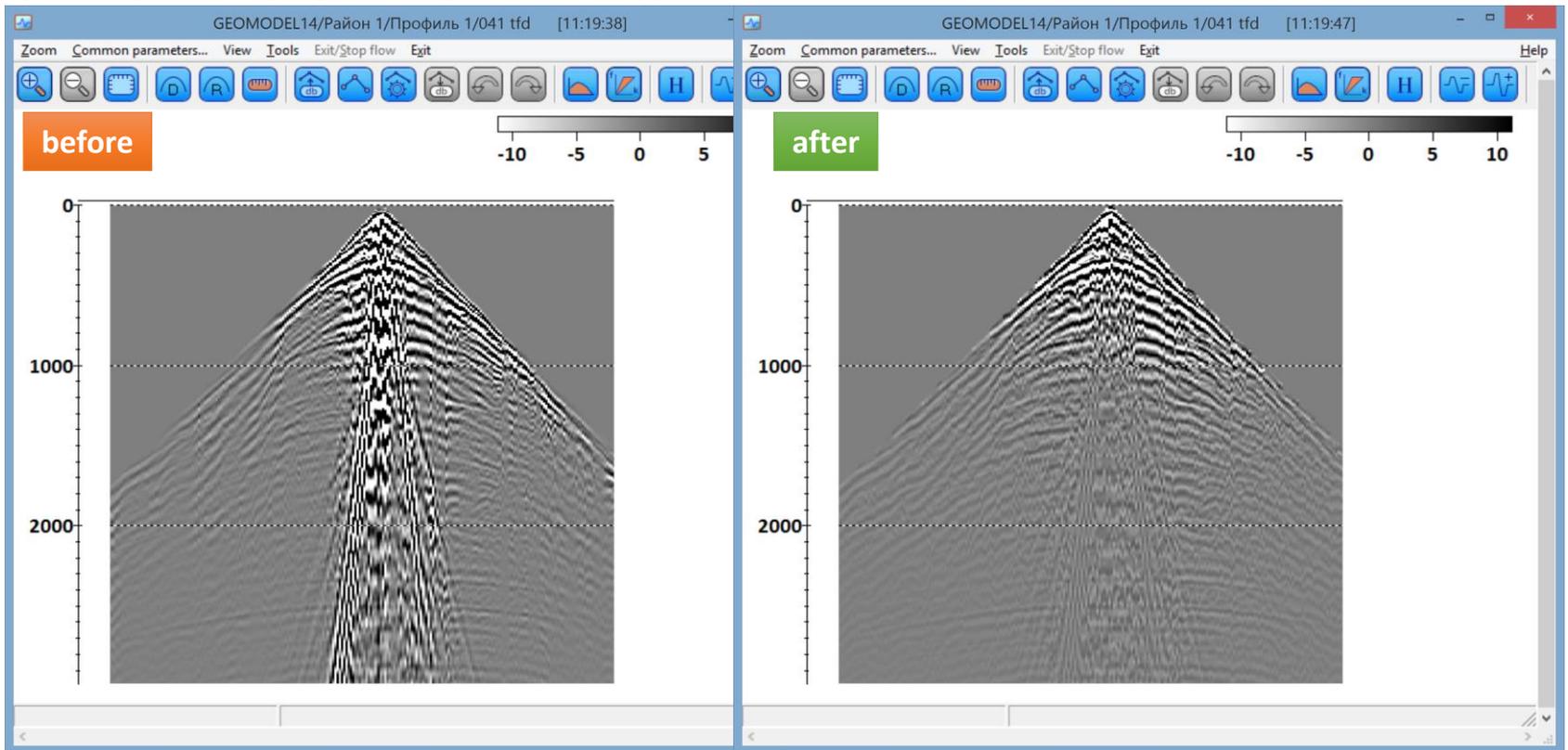
Example of a processing algorithm: MaxPower Autostatistics



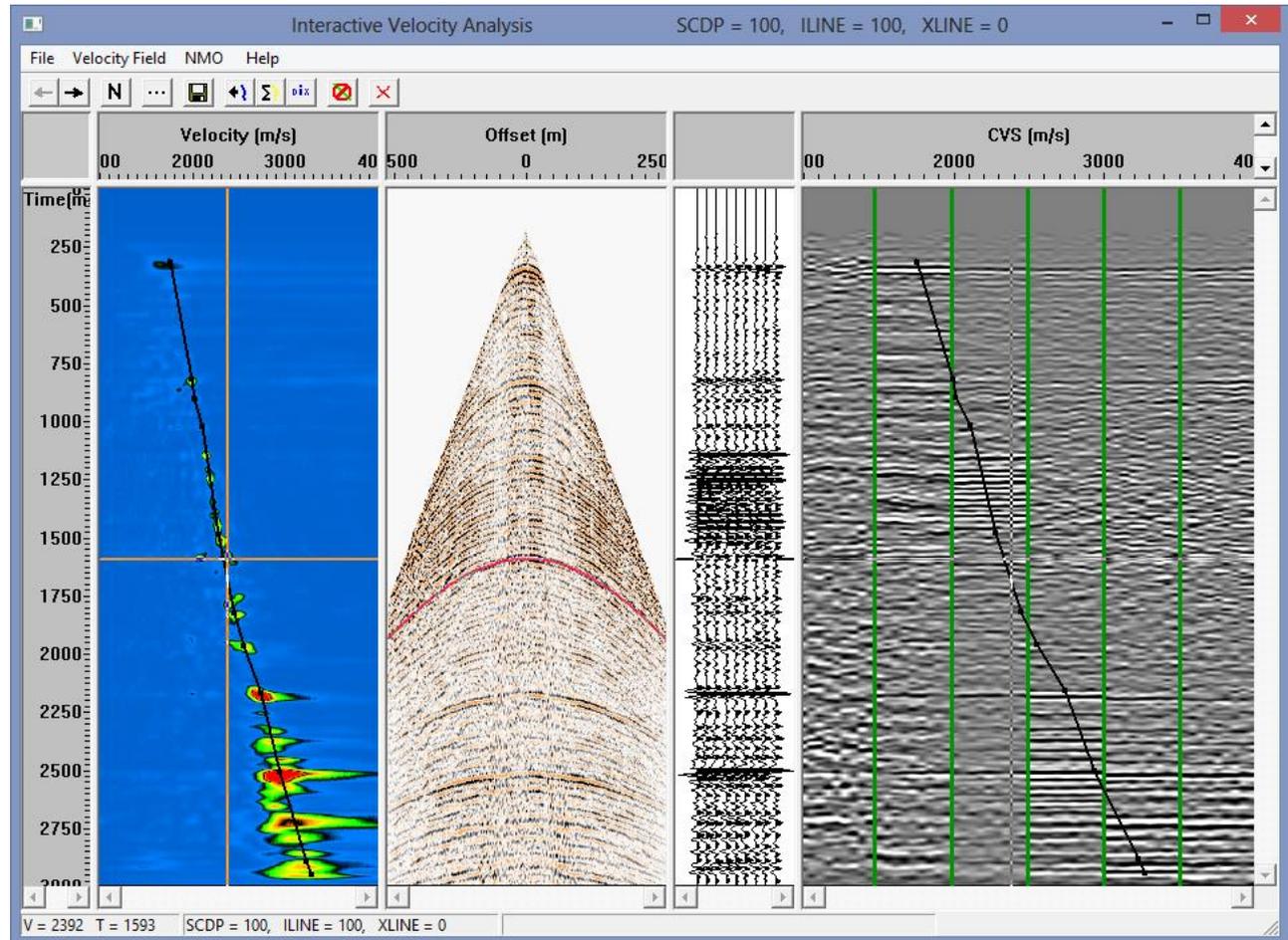
Example of a processing algorithm: MaxPower Autostatics



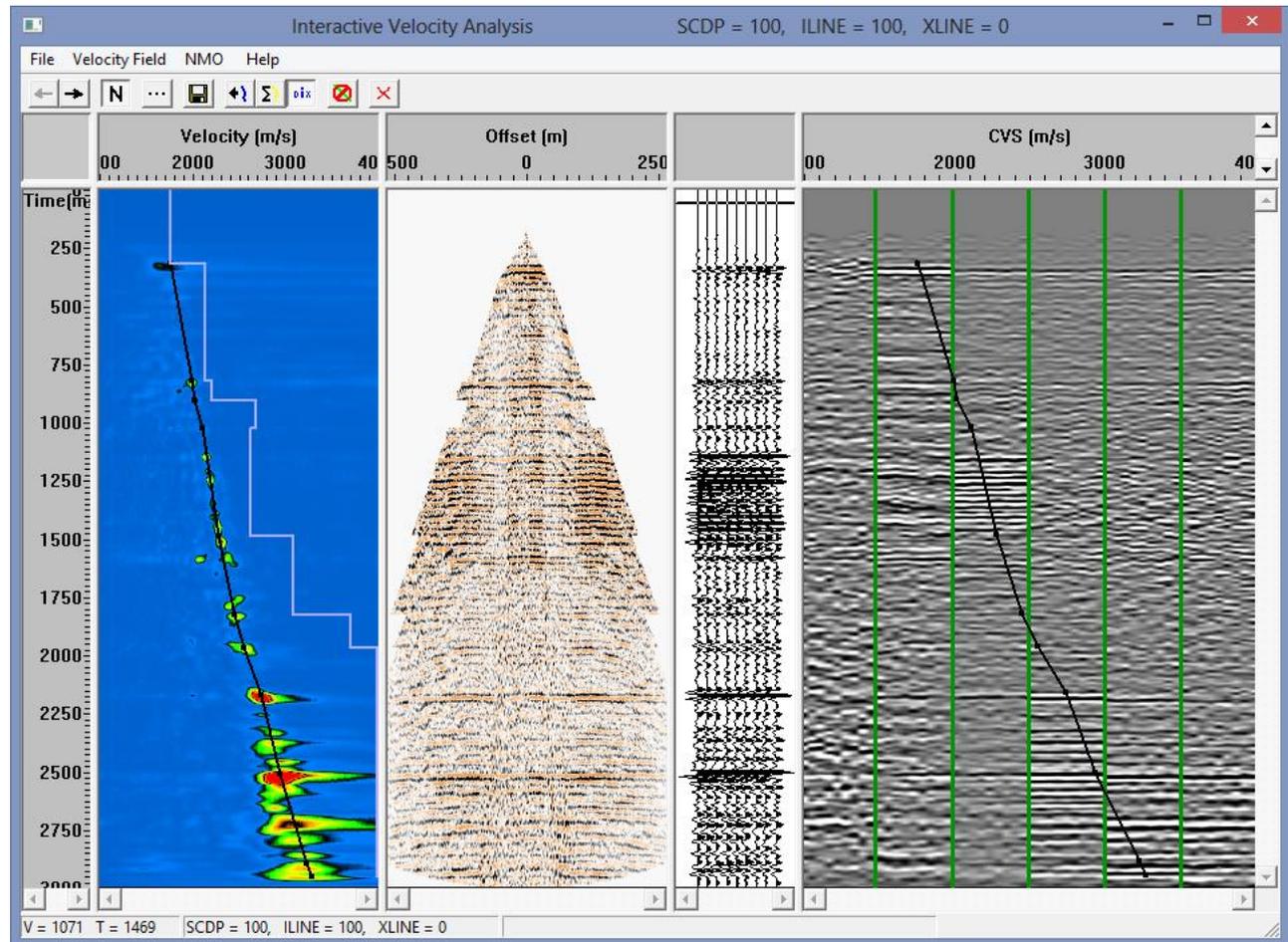
Example of a processing algorithm: ground-roll suppression (TFD Noise Attenuation)



Example of a processing algorithm: interactive velocity analysis



Example of a processing algorithm: interactive velocity analysis – apply NMO in the real time!

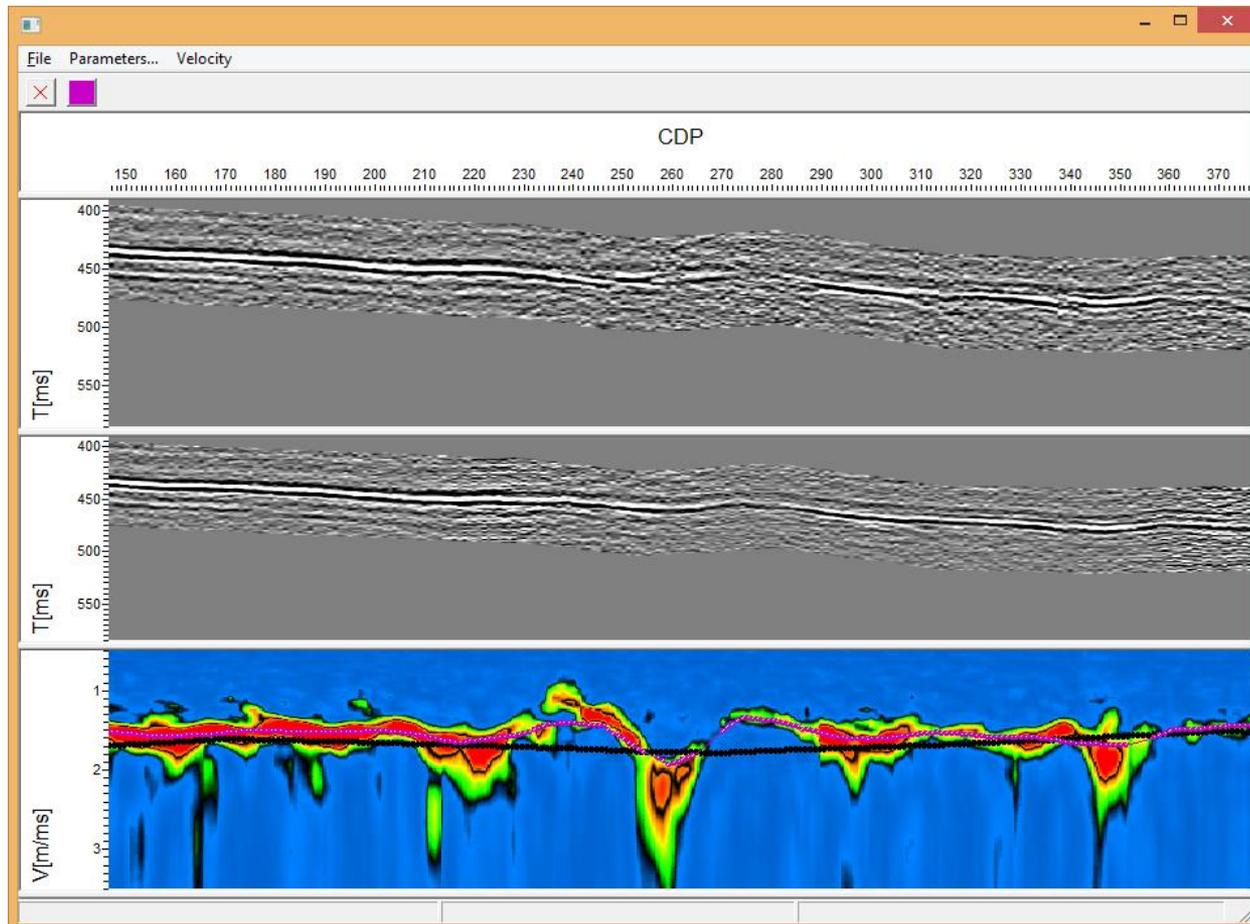




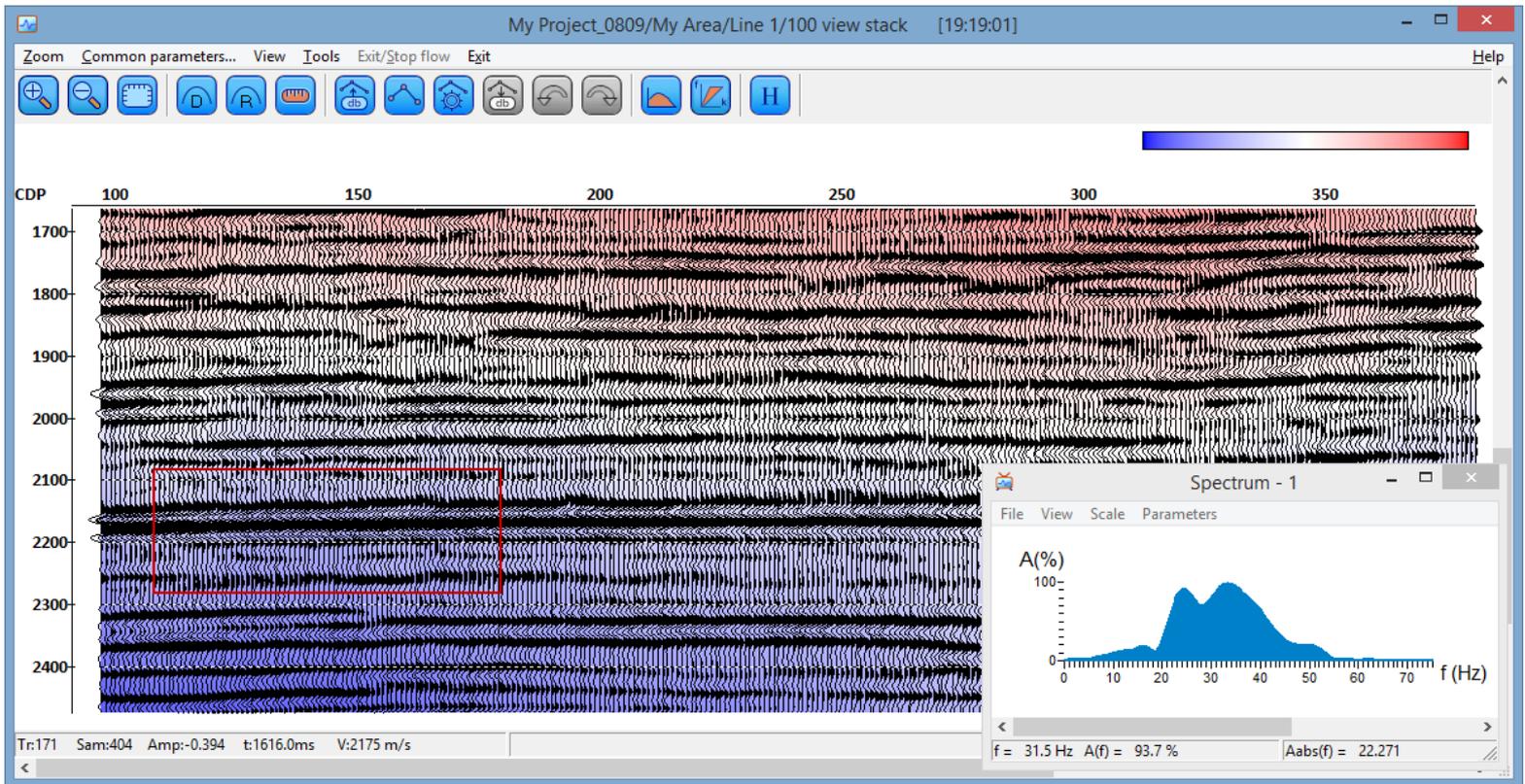
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Example of a processing algorithm: horizon-based velocity analysis for detailed velocity information



Display of seismic brute stack on top of color-coded stacking velocity field





for infield QC and fast-track processing

Deliverables: Export to SEG-Y – 100% adjustable and customizable!

- Any sample format and byte order
- Edit EBCDIC header
- Edit binary file header
- Optional remap of trace headers
- Optional remap of headers affected by coordinate and elevation scalars

The main dialog box, titled "SEG-Y Output", contains the following sections:

- File:** "output.sgy" with a "Browse..." button.
- Batch:** From batch list, "Batch output settings..." button.
- Sample format:** Radio buttons for I1, I2 (selected), I4, R4, and IBM floating point.
- Byte order:** Radio buttons for Big-endian byte order (SEG-Y standard) (selected) and Little-endian byte order.
- Trace weighting:** Allow trace weighting, Allow negative weighting factor, Suppress out-of-range warnings.
- Scalars:** Input fields for "Scalar for elevations and depths" (value: -10) and "Scalar for coordinates" (value: -10), both with multiplier options.
- Coordinate units:** Radio buttons for Length in meters or feet (selected) and Length in arc second.
- Remap header values:** Remap header values.
- SegY headers:** Fill EBCDIC header, "Display EBCDIC" button, "Edit binary header" button.
- Buttons:** "Load remap", "Save remap", "OK", "Cancel".

Sub-dialogs include:

- Multipled fields:** Shows a list of fields: CDP_X,CDP_Y,SOU_X,SOU_Y,REC_X,REC_Y.
- EBCDIC header:** Shows a list of header fields (C1-C17) with their descriptions.
- Binary header editor:** A table for editing header fields.

Offset	Description	From header	Header list	Constant value
3201	Job identification number	<input type="checkbox"/>		0
3205	Line number	<input type="checkbox"/>		0
3209	Reel number	<input type="checkbox"/>		0
3213	Number of data traces per ensemble	<input type="checkbox"/>		0
3215	Number of auxiliary traces per ensemble	<input type="checkbox"/>		0
3217	Sample interval in microseconds (µs) (= 1000 × ...)	<input checked="" type="checkbox"/>	dt	0
3219	Sample interval in microseconds (µs) of original field recording (= ...)	<input type="checkbox"/>		0
3221	Number of samples per data trace	<input checked="" type="checkbox"/>	NUMSMP	0
3223	Number of samples per data trace for original field recording	<input type="checkbox"/>		0
3225	Data sample format code 1 = 4-byte IBM floating-point 2 = 4-byte inte...	<input type="checkbox"/>		Auto
3227	Ensemble fold - The expected number of data traces per trace ens...	<input type="checkbox"/>		0
3229	Trace sorting code (i.e. type of ensemble)	<input type="checkbox"/>		0
3231	Vertical sum code	<input type="checkbox"/>		0



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Deliverables: print with preview!

Plotting parameters

Dataset: White Sea\line 5\stack_final

Sort fields: CDP

Selection: 1100-2200

From t= 50 to 200

Additional scalar: 0.3

Bias: 0

Line width (mm): 0.01

Display: WT, WT, VA, Gra, R/B, Cus

Variable spacing: field...

Ensemble boundaries: Ensembles' gap: 2 traces

Use excursion: 2 traces

Normalizing: None, Entire set, Individual

Scales: T Scale: 12 ms/cm, X Scale: 60 traces/cm

General Layout... T Axis... X Axis...

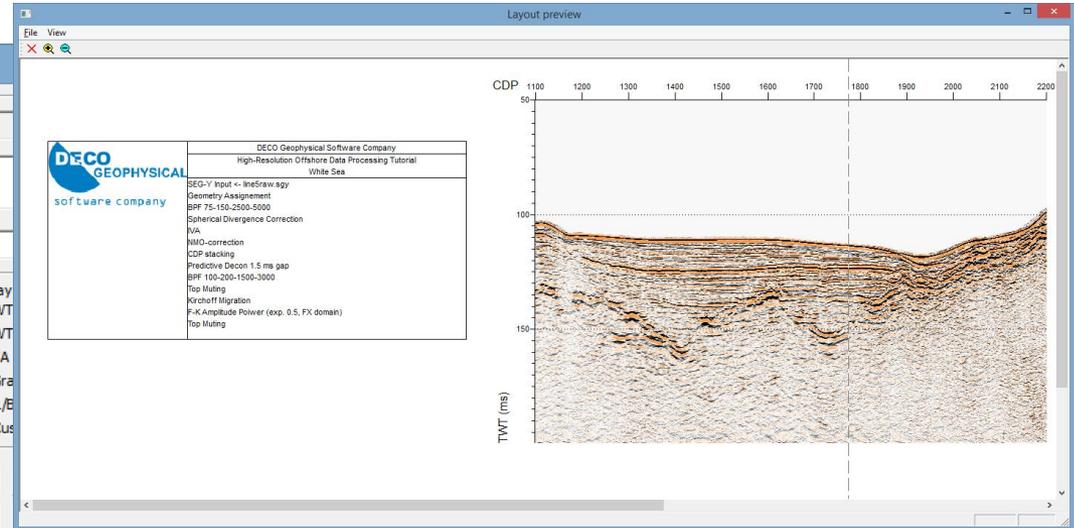
Microsoft XPS Document Writer

Print setup...

Update Preview

Display traces in Layout Preview

OK Cancel



- *Print processing results with a preview to any Windows-printer*



RadExPro

for infield QC and fast-track processing

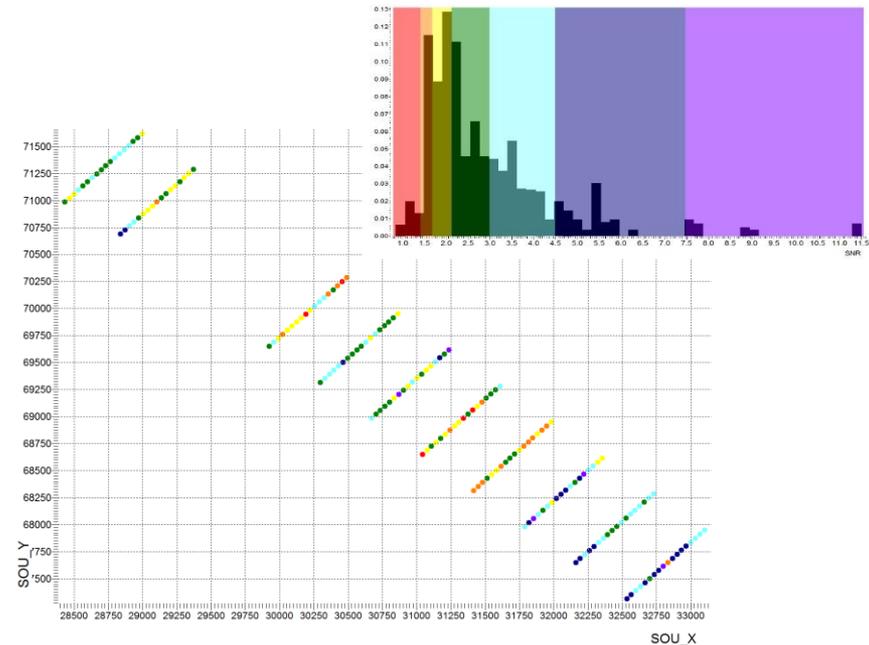
Deliverables: attributes and coordinates

ExportHeaders.txt — Блокнот

FFID	AMP	AMP_N	FREQ	FREQ_N	SNR	SOU_X	SOU_Y
1	0.40780	0.00404	17.18436	11.40157	2.31017	-12.50000	2713.54541
2	0.45047	0.00295	16.19009	12.38495	2.42503	38.53920	2713.69238
3	0.44036	0.00525	15.81659	10.66598	2.58533	88.54920	2713.80005
4	0.28959	0.00412	15.41971	13.12504	2.22132	137.54919	2713.88232
5	0.40477	0.00364	16.54680	13.00957	1.56203	187.54919	2713.89478
6	0.32324	0.00363	16.29476	13.28199	1.70511	237.54919	2713.90479
7	0.46186	0.00738	13.71095	12.34985	1.42773	288.54919	2713.91309
9	0.55527	0.00373	14.74238	13.92968	1.65314	387.55942	2713.92603
10	0.84220	0.00342	15.36733	13.20636	2.23475	437.56940	2713.93115
11	0.76150	0.00393	14.98869	15.32059	2.10012	487.57941	2713.90332
12	0.56859	0.00350	14.54371	12.96010	1.54241	537.57941	2713.87891
13	0.55225	0.00353	13.72338	12.14873	1.88807	587.58942	2713.84277
14	0.58447	0.00333	14.96383	15.10681	1.30344	637.58942	2713.79736
15	0.54245	0.00456	15.42029	12.48737	0.90051	687.59943	2713.75635
16	0.60316	0.00461	14.45383	14.02443	0.85021	737.59943	2713.71948
17	0.77343	0.00477	12.95721	14.73512	0.75991	787.60938	2713.68604
19	0.67094	0.00741	11.78627	15.67359	0.65103	885.71307	2713.62769
20	0.66868	0.00926	11.84008	13.50540	0.61142	934.71307	2713.58154
21	0.64874	0.01031	11.31537	17.56605	0.54757	985.72284	2713.55884
22	0.54006	0.00712	11.52600	14.56207	0.74262	1037.73242	2713.53784
23	0.48283	0.00959	11.61851	14.46981	0.55119	1088.82068	2713.51807
24	0.60930	0.01046	15.49097	15.78631	0.49083	1163.84729	2713.49146
25	0.47919	0.01058	16.09502	17.82988	0.49014	1188.92712	2713.48315
26	0.57723	0.01204	15.43734	15.38037	0.65329	1237.96802	2713.48364
27	0.79876	0.01247	15.55790	14.89894	0.53239	1313.97449	2713.48438
28	0.66504	0.00927	15.58137	17.72635	0.49675	1338.97449	2713.48462
30	0.71848	0.01529	15.58392	15.97586	0.75715	1438.22485	2713.51440
31	0.50405	0.01688	14.95415	11.69521	0.71301	1488.23486	2713.52088
32	0.54298	0.00769	15.56439	18.62620	1.23585	1539.23486	2713.53418
33	0.43817	0.01059	15.82579	19.76657	1.82030	1588.23486	2713.53345
34	0.40370	0.01258	16.72662	17.70386	1.86233	1637.27563	2713.53247
35	0.46802	0.00826	18.70637	15.29631	2.26211	1689.28528	2713.53174
36	0.36120	0.01061	17.30173	15.71662	1.96963	1739.28528	2713.53711
37	0.23180	0.00809	19.60849	16.21332	1.80604	1789.28528	2713.53613
38	0.44917	0.01035	18.32579	13.27274	2.08608	1836.29590	2713.52344
39	0.53951	0.01172	15.82292	11.25987	0.97701	1888.30554	2713.51733
40	0.34360	0.00577	16.54863	13.33638	0.61791	1940.30554	2713.52246
41	0.26758	0.00426	17.08064	15.23038	0.88790	1990.34546	2713.52197
42	0.27155	0.00500	16.06999	14.55667	0.81715	2043.35498	2713.52148
43	0.44234	0.00806	16.08420	13.82697	0.62161	2088.35498	2713.52100

- Print and export images of cross-plots/histograms

- Export to ASCII





Open architecture

Missing some specific algorithm? Code it yourself and get it integrated into the system!

We provide open API for developing your own modules on C++.

A dedicated Wizard for MS Visual C++ will generate an empty processing module for you, you will only need to populate it with your own processing code.



The Software Offers:

- Input of field or post-stack data from standard or modified formats.
- Data resorting
- Vibroseis correlation
- Data display and interactive analysis
- Visual and quantitative data QC
- Geometry assignment and QC
- Attribute analysis in windows (pre-stack) or along horizons (post-stack)
- Fast-track processing/post-processing of seismic data
- Export seismic data to SEG-Y and making hard copies, export and hard-copying of maps, export attributes and any header information to ASCII
- Open architecture and API for developers

At that, highly price-efficient:

- ✓ Runs smoothly on just average modern PCs
- ✓ No system administration required
- ✓ Operator shall possess entry level computer skills only