Shore - Marine CDP profile Modeling and Depth Migration -case study-



Jan-12



• Scanned profile picture (part taken for modeling)

4000-



• Built model (with the source profile pad image); compressional velocity component



Framework

| Free Horizontal line Cable Interval Projected Default Oefault Number : 111 1nterval : 50 | Cross-se | ection Source Receivers Position Free Cable Inter Move with | Observation Horizontal lin Ival Pri source | n Horizo ne 💌 | ons Time | | |
|--|------------------|--|---|------------------|--|---------------------------|-------------|
| Surface Wave angle: 45 deg Max angle: 50 deg Parameters Default Mode: Compression: | N M M M | Default From : To : Interval : Margin : | 101 -5500 -500 50 2500 | m m m m | Default Start : Stop : Sample : | 1251 0 2.5 0.002 | s s s |
| Frequency: 30 Hz Wavelet: Symmetric V V OK Cancel Help | - N | Snapshots | 10 ation | XXXX | I Start : I Sample : | 25 0.1 0.1 | s s |

L

CDP observation system parameter determining: (a)
 "Source" page; (b) "Observation" page



• Shotgather #44: (a) in color; (b) black & white



• Snapshot for shotpoint #44 at time=1s (**a**) in color; (**b**) gray

b



a

b

• Shotpoint #44: (**a**) timefield of first arrivals; (**b**) energy field of first arrivals

Processing



Pre-stack Depth Kirchhoff migration (<u>Eikonal</u>)
 <u>in time scale</u>: (a) color; (b) gray

a

b



Pre-setack Depth Kirchhoff migration (Eikonal) converted in depth scale: (a) color; (**b**) gray. Source model is shown in background



a

b

VWKM (Maximum Energy) in time scale: (a) color;(b) gray



Vector Wave Kirchhoff Migration (VWKM depth pre-stack Maximum Energy) converted in depth scale: (**a**) color; (**b**) gray. Source model is shown in background



VWKM (Maximum Energy) converted in depth scale: (**a**) color; (**b**) gray. No source model in background

| bas acciliant a service observation monizons | Framework |
|--|--|
| Free Horizontal line Cable Interval Projected Default Default Number: 231 25 n Default 231 Interval: 25 25 n Max angle: 50 Default Mode: Compression: Image: | Cross-section Source Observation Horizons Receivers Position Time Free Horizontal line Image: Comparison of the section of the secti |

Next CDP observation system parameter determining:
(a) "Source" page; (b) "Observation" page

a



Result of VWKM (Maximum Energy) migration (Elastic modeling). «Lower bodies» are images very well, even canyons (are shown with green arrow).

«Lower bodies», which are not images or poorly images are out of the observation aperture.

Lower boundary (just added to fill lower part of the model) in some places is very week (shown with red arrow).

Cause - velocity contrast on 3% level.

There are intensive (multiple?) waves (shown with blue arrows).

There are waves of onknown origin, which could be taken for tops of the «lower bodies» (are shown with **yellow arrow**).

It must be taken into account during interpretation, that is why such modeling can be very useful.



Interpretation of **cross section in time scale** is quite complex. It also must be taken into account



Result of VWKM (Maximum energy) migration with «Invisible» observation surface.

Background of multiple waves relating to the surface is much weaker. Main difference from preceeding result consists in better imaging of lower discontinuity (shown with red arrow).

