

VSPvelmod3D – 3D velocity model and migration results viewer.

1 Function

The program is intended for 3D visualization of next types of data:

- 3D velocity model prepared for 3D VSP modeling (**vsprtmod3d**) and 3D VSP migration (**vsprtmigr3d**).
- 3D seismic image in depth scale after migration (**vsprtmigr3d**).
- VSP observation geometry (well, shot points, receivers) extracted from some seismic file stored in GeoEast database. It is reasonable to use seismic file inputted to 3D VSP migration (**vsprtmigr3d**) or outputted from 3D VSP modeling (**vsprtmod3d**).
- Ray trace paths produced by 3D VSP modeling program (**vsprtmod3d**). Ray trace paths are stored in one file of special binary format with arbitrary filename.

The program allows also to import 3D VSP velocity model.

2 Input and Output

2.1 Input data

- 3D velocity model in GeoEast format.
- 3D velocity model in text file format.
- 1D velocity model in GeoEast format.
- Migration image in GeoEast seismic format.
- Ray traces in <what?> file format.
- Observation system in GeoEast seismic format.

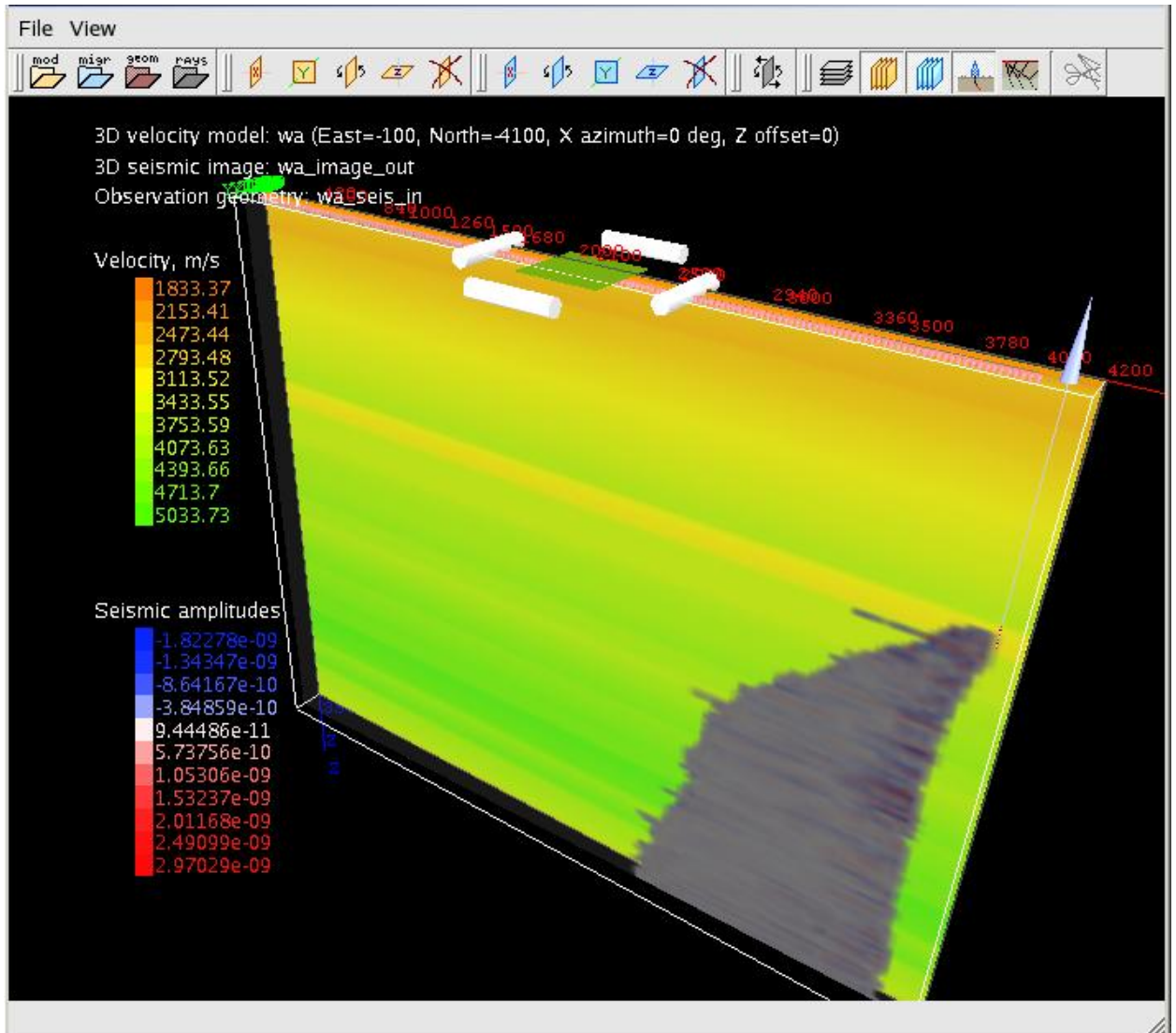
2.2 Output Data

- 3D velocity model in GeoEast format.

3 Windows Description

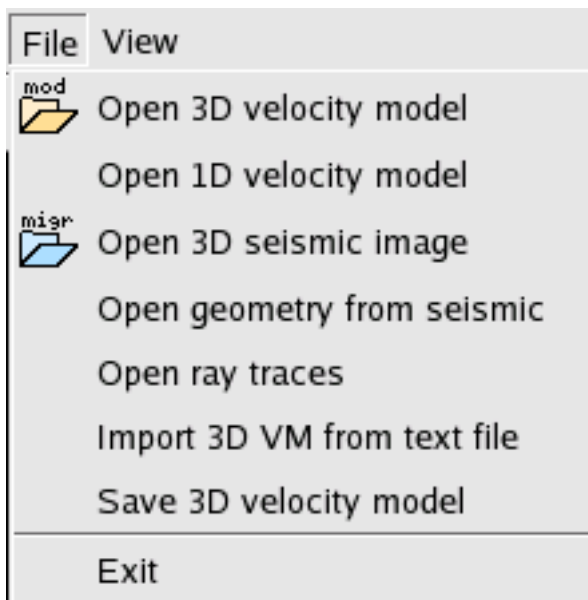
3.1 Main Window

The main window includes menu bar, data open tool bar, model slices manipulation tool bar, migration slices manipulation tool bar, view mode toolbar and work area.



3.1.1 Menu Bar

File menu



Open 3D velocity model

A dialog of 3D velocity model selection appears. After opening it is possible to view 3D velocity model and load other kinds of data. After loading information string is displayed on 3D scene (label "3D velocity model").

Open 1D velocity model

A dialog of 1D velocity model selection appears. Selected model will be converted into 3D velocity model. After opening it is possible to view 3D velocity model and load other kinds of data.

Open 3D seismic image

A dialog of seismic selection appears. User should select seismic with migration results. After opening it is possible to view slices of migration results. After loading information string is displayed on 3D scene (label 3D seismic image).

Open geometry from seismic.

A dialog of seismic selection appears. User should select seismic with observation system information.

After opening it is possible to view observation system (Well, shot points, receivers). After loading information string is displayed on 3D scene (label 3D Observation geometry).

IMPORTANT: To achieve right combined view of geometry and migration results, one must load proper velocity model, because migration results are stored in model coordinate system.

Open ray traces.

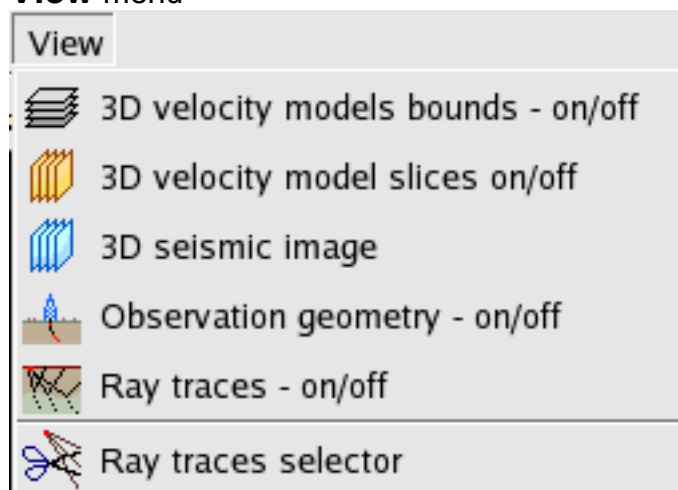
A standart file selection dilalog appears. User should select file with ray traces. After opening it is possible to view ray traces. User can select which rays to draw using View->RayTraces selector.

Import 3D VM from text file.**Save 3D velocity model.**

A dialog of 3D velocity model selection appears. User must select name to save model or input new name by clicking "new name" button and typing new name in appearing window.

Exit.

Terminate program.

View menu**3D velocity model bounds – on/off**

Toggles drawing of 3D velocity model bounds. If model is not loaded, model selection dialog appears.

3D velocity model slices – on/off.

Toggles drawing of 3D velocity model slices. When this menu item activated first time, slices data is calculated. If model is not loaded, model selection dialog appears.

3D seismic image slices – on/off.

Toggles drawing of 3D seismic image (migration results) slices. If seismic image is not loaded, seismic selection dialog appears.

Observation geometry – on/off

Toggles drawing of observation geometry (well, shots, receivers). If observation system is not loaded, seismic selection dialog appears. User must select seismic with geometry data.

Ray Traces – on/off

Toggles drawing of ray traces. If traces are not loaded, file selection dialog appears. User should select file with ray traces.

3.1.2 File tool bar.



Through Data open tool bar one can open different models, seismic, geometry and rays. The functions of buttons in the tool bar are corresponded to that of menu item. Tool bar buttons description is as follows.

Open 3D velocity model

Open 3D seismic image.

Open geometry from seismic

Open ray traces

3.1.3 Model slices operations tool bar.



This tool bar is used to create and remove 3D velocity model slices. Tool bar buttons description is as follows.

Add X velocity profile – adds slice transversely to X axis.

Add Y velocity profile – adds slice transversely to Y axis.

Add rotating velocity profile – adds slice one can rotate against vertical (Z) axis.

Add Z velocity profile – adds horizontal slice.

Delete selected velocity profile – deletes model slice currently selected.

3.1.4 Migration slices operation tool bar.



This tool bar is used to create and remove 3D seismic image (migration results) slices. It is similar to Model slices operation tool bar but applies to seismic slices. Tool bar buttons description is as follows.

Add X migration profile

Add Y migration profile

Add rotating migration profile

Add Y migration profile

Delete selected migration profile

3.1.5 Switch scene observing / profile movement tool bar.



This tool bar has single button.

Switch scene observing / profile movement – when it is pushed an user can move slices, otherwise user can rotate move and zoom scene.

3.1.6 View tool bar



Through this tool bar an user can toggle drawing of different types of data. The functions of buttons in the tool bar are corresponded to that of menu item. Tool bar buttons description is as follows.

3D velocity model bounds – on/off

3D velocity model slices – on/off

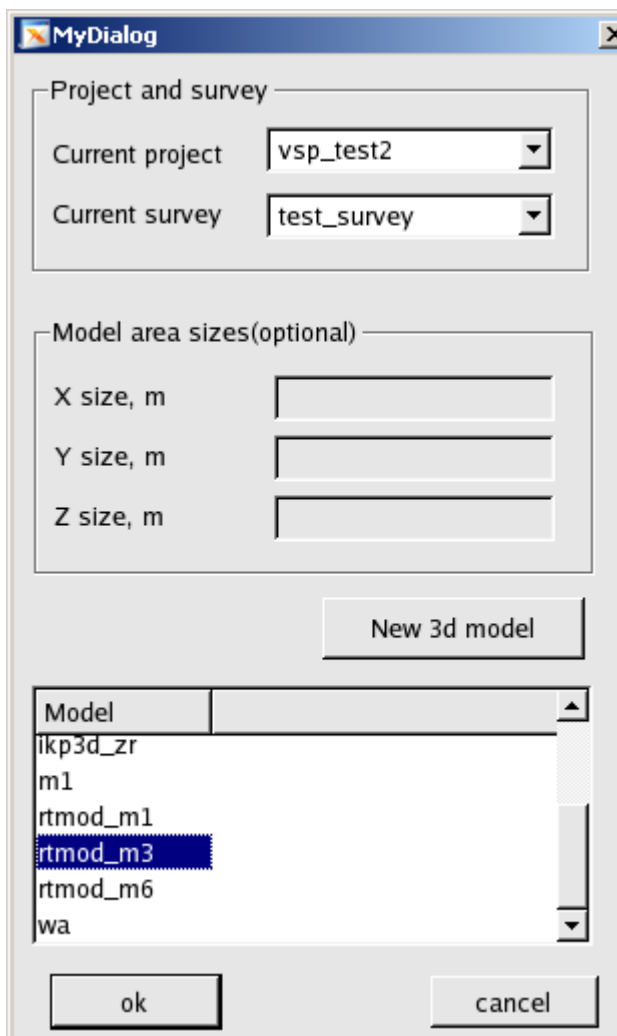
3D seismic images slices – on/off

Observation geometry – on/off

Ray traces – on/off

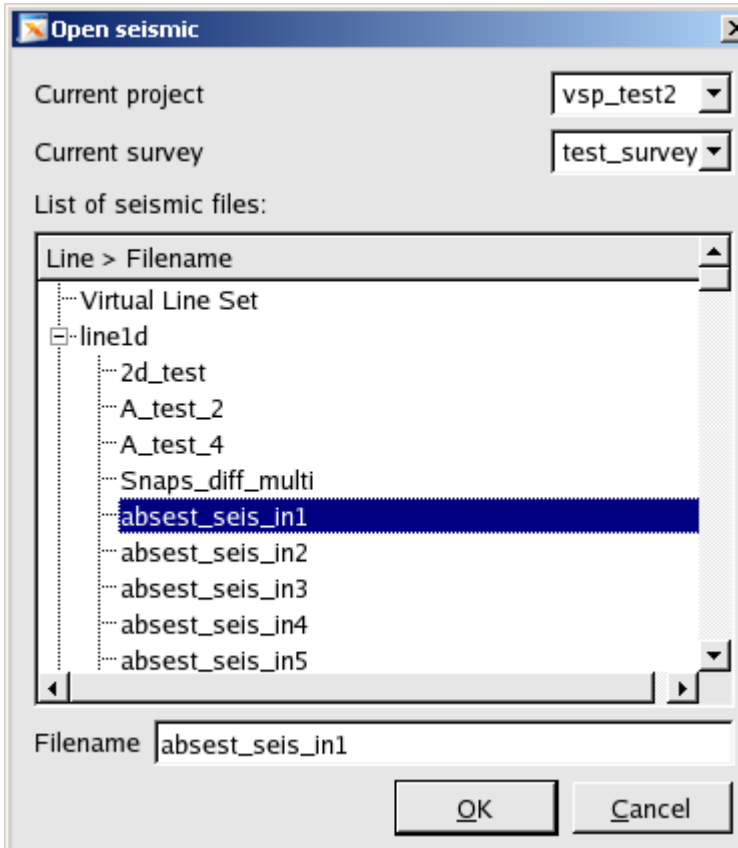
Ray traces selector

3.2 Model selection dilaog.



This dialog appears if user tries to open 3D or 1D speed model or to save 3D speed model. User must select project and survey, then select model to load from the list below. If user saves 3D model, he can push "New name" button and enter name. When opening model, "new name" button is disabled.

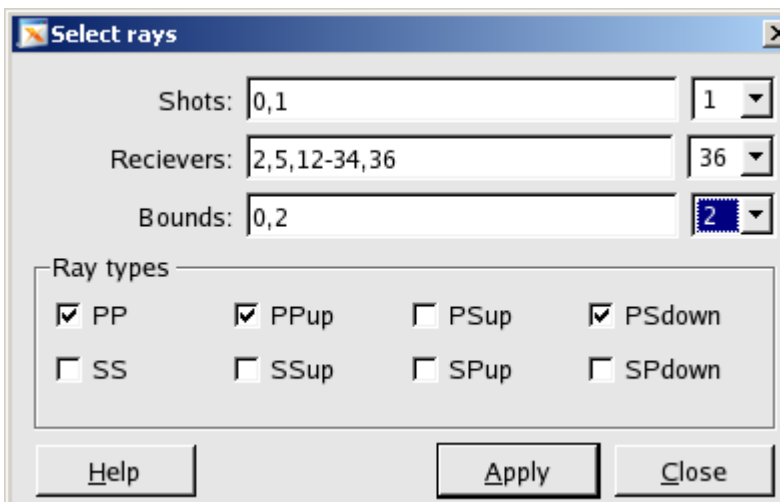
3.3 Seismic selection dialog.



This dialog appears if user tries to open seismic file with migration results or geometry data.

User must select project and survey, then select model to load from the tree below.

3.4 Ray traces selector.



One can spawn this dialog if it is useful to fade some rays.

User can select rays belong to specific shot points, receivers, model bound and of specific type.

Needed shots, receivers and bounds are specified in corresponding edit fields. At the right there are combo boxes which help user to select desired values. Needed ray types are checked below.

4. Execution procedure

Typically user first loads 3D seismic model using File->Open 3D seismic model or by clicking "Open 3D velocity model" button on File toolbar or by pushing "Toggle model bounds" button on view toolbar and selecting needed model in model selection dialog.

After loading model bounds are displayed.

User may rotate, zoom, move scene using mouse.

If user push "Toggle model slices" button on View toolbar, slices data would be generated and one rotating slice would be displayed.

To operate with slices user must push "Switch scene observing / profile movement" button.

After that user can add/delete/move slices, but can not rotate scene. If user pops "Switch scene observing / profile movement" button he will return to scene observing mode.

User can open migration results similar to opening model but using desired menu items and toolbar buttons (see interface description). After loading migration results one rotating migration slice would be displayed. Working with migration results slices is similar to working with model slices but is doing through Migration slices operation tool bar.

User may load observation geometry. Procedure is similar to opening migration results but is doing through desired menu items and buttons. **WARNING!** To achieve right displaying of migration results and observation system user **MUST** load desired 3D speed model.