

Imagi by AGRsoft

* a so called user manual

a simple seismic modeling exercise
GUI-shing CREWES algorithm

Ver 0.1 – December 2008
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Installation

- ✓ 0. Make sure you have Matlab Installed,
- ✓ Make sure you have CREWES correctly installed,
- ✓ Get your copy,
<http://s2ui.gm2001.net/sandbox/agrsoft/imagi-0.1.zip>
- ✓ Unzip it, put under Matlab work directory
- ✓ You will have 4 folder, but just keep an eye for *data* directory, this is where you put your data (model, synthetic, etc.)

1. Launching Imagi

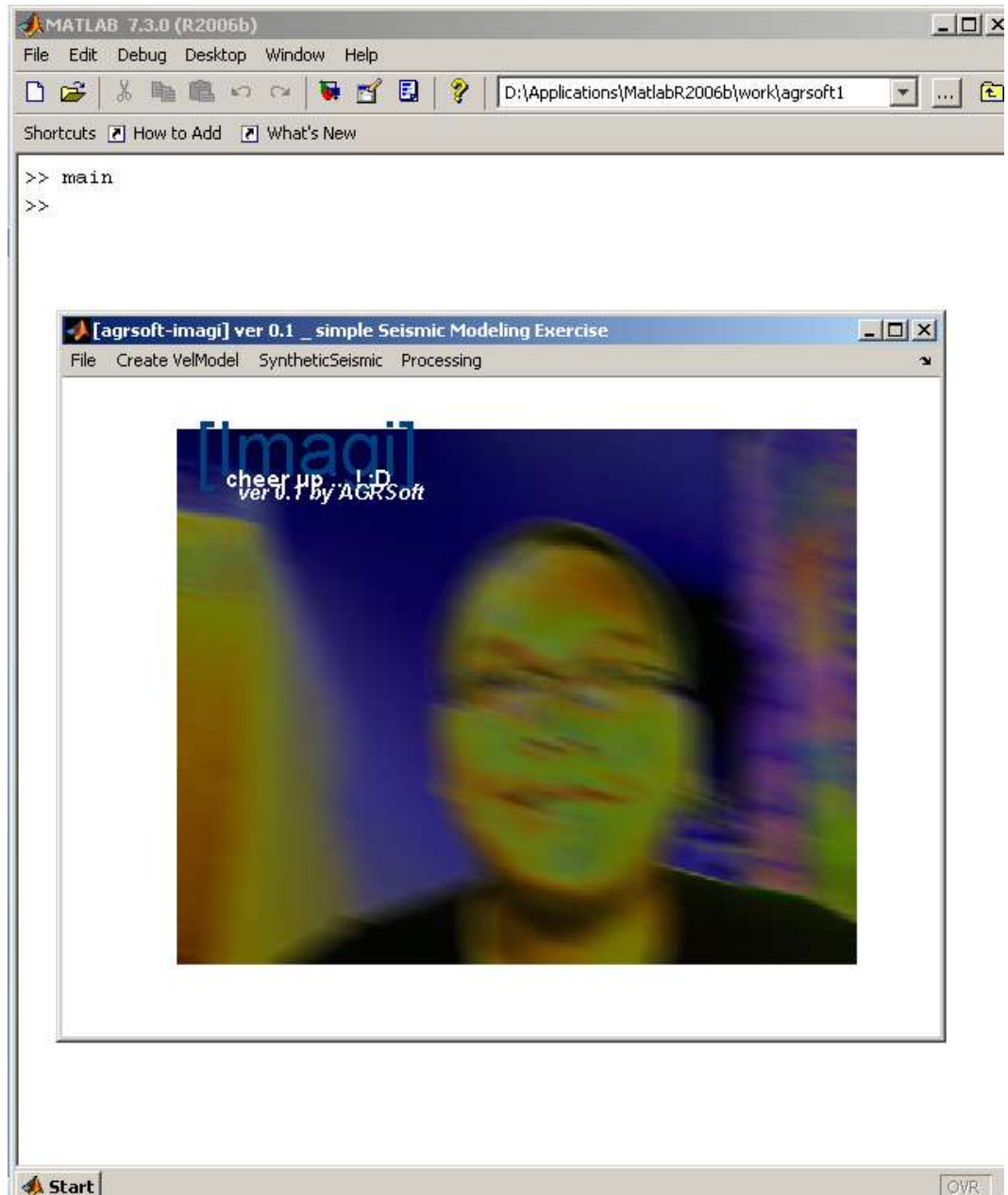
- Open Matlab
- Go to Imagi directory

```
>> cd agrsoft1
```

- Launch it by typing *main*

```
>> main
```

On your left is the first interface you see when you launched Imagi



2. Initialize your Velocity Model to Build Synthetic Data

- Click *Create VelModel*, and select *Define InitialSetting*

- You will see a Define Initial Setting window, this is where you specify the dimension of your model.

- The model is built using *afd_vmodel* from *CREWES*. Which require X (horizontal) dimension should be the same with Z (vertical) dimension.

PLEASE NOTE

- In order to create Variable in matlab using TextInput GUI, you have to press enter in each TextInput.

e.g. inside Initial Setting Window on your left,

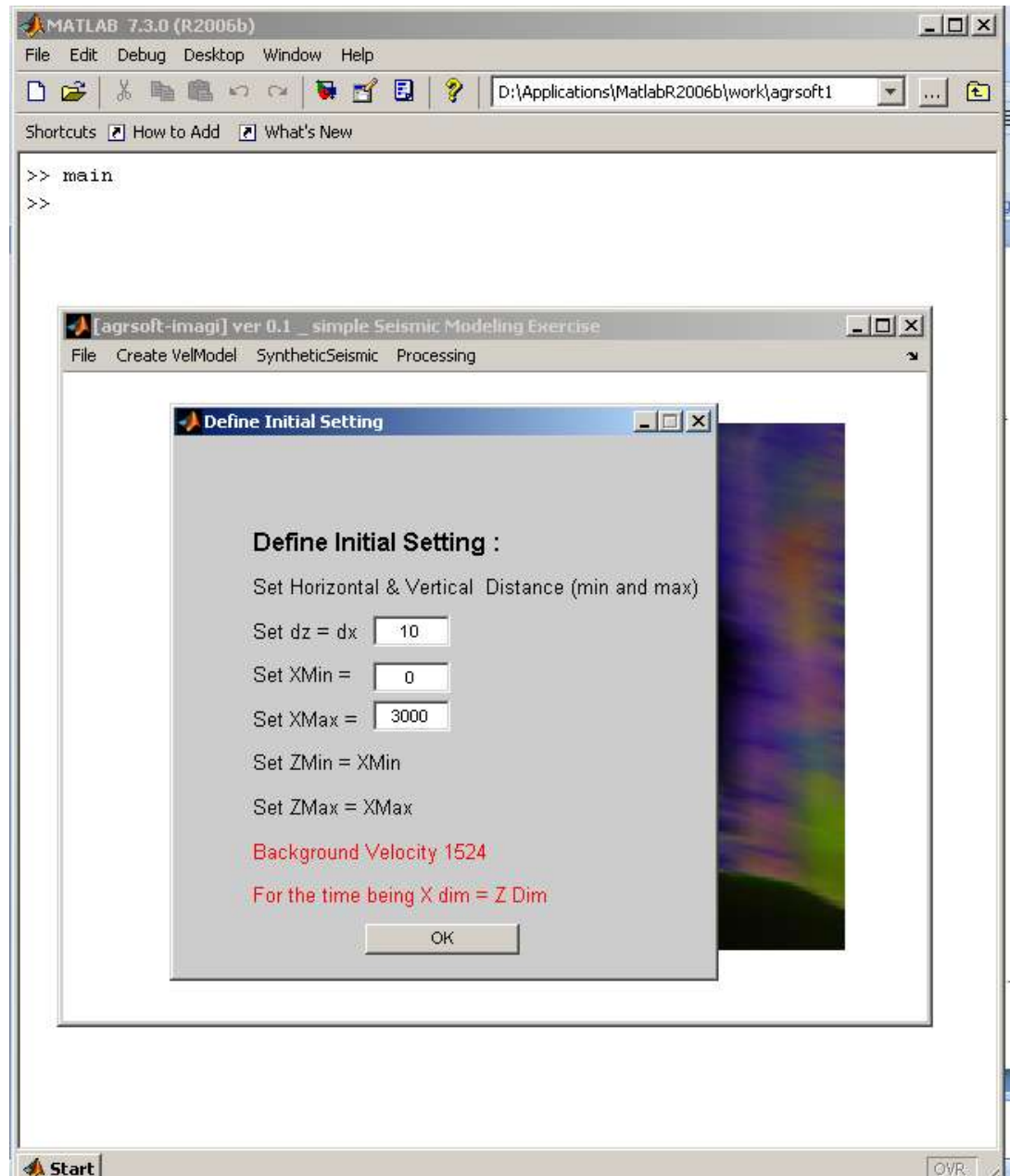
Click at 10, press enter

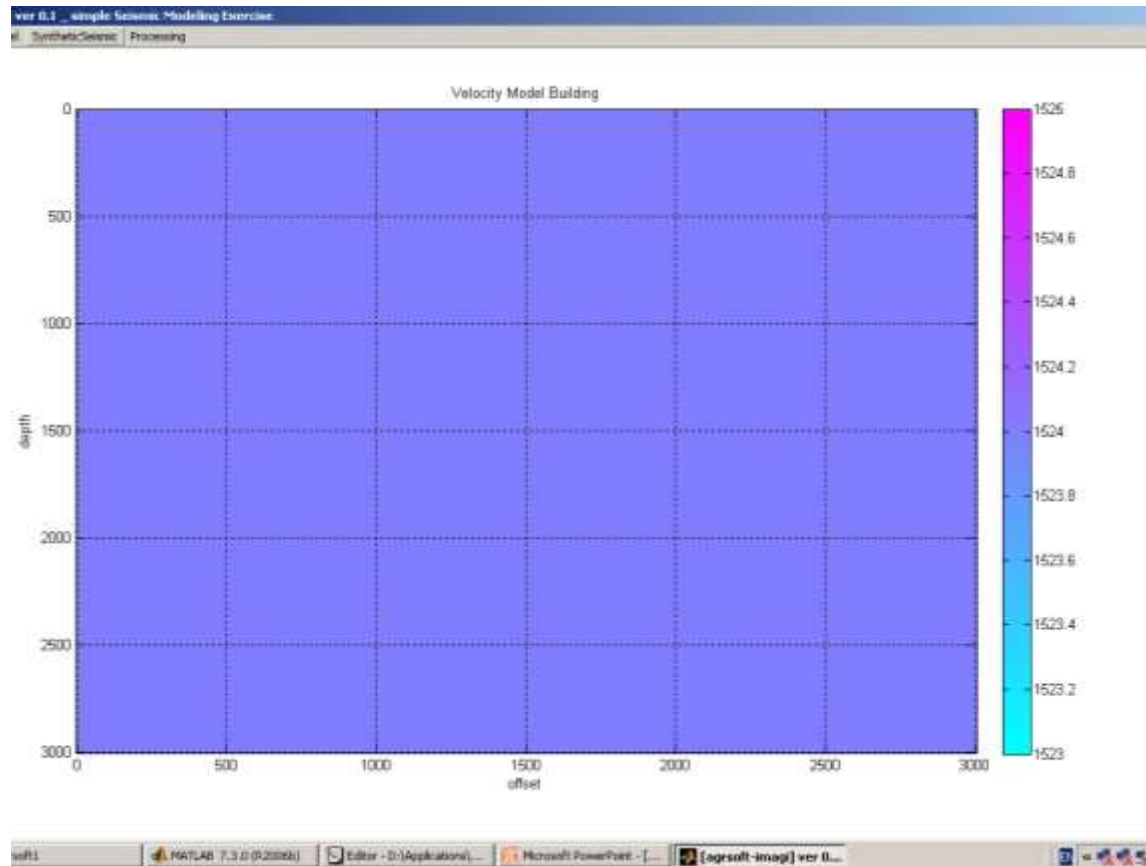
Click at 0, press enter

Click at 3000, press enter

and then Click Ok

This will apply on TextInput GUI for all window. Sorry :)



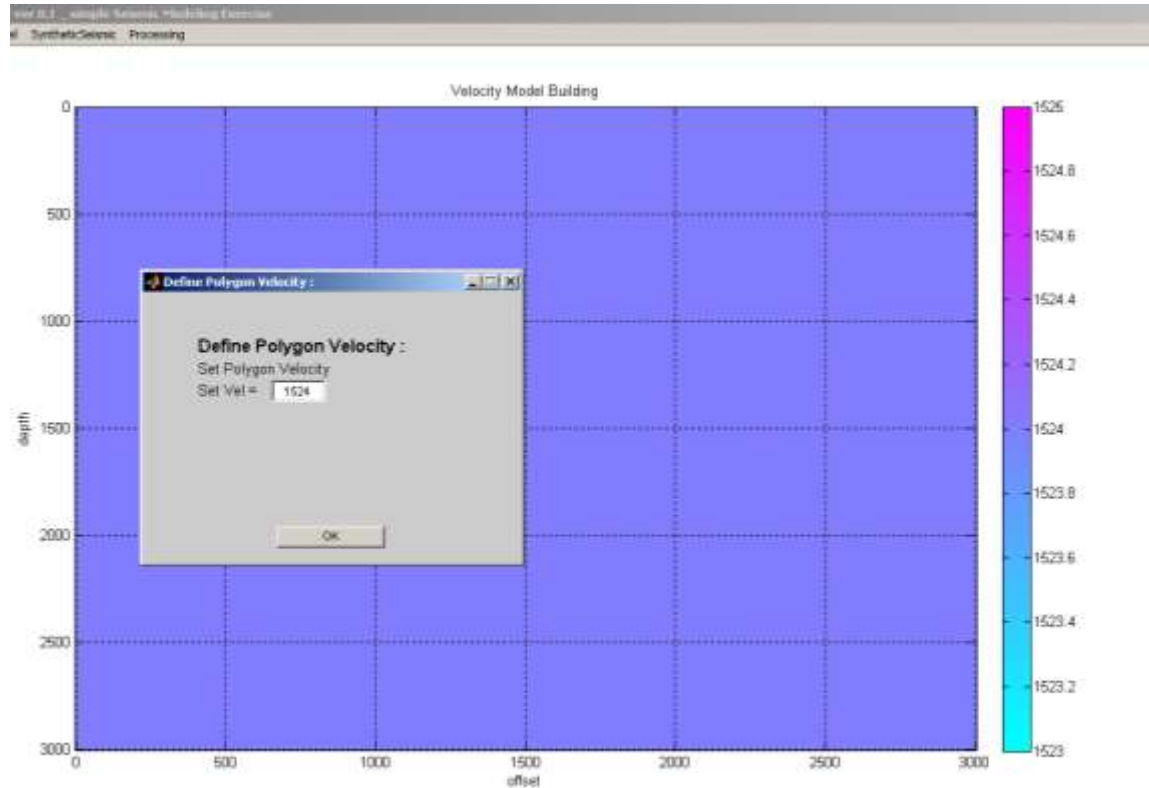


2.a. after Initial Model Setting

You will have a graphic to define your velocity model.

This is a 2D Array data, which contain background velocity model of 1524 (units vel)

This is where you define your layer using polygon.

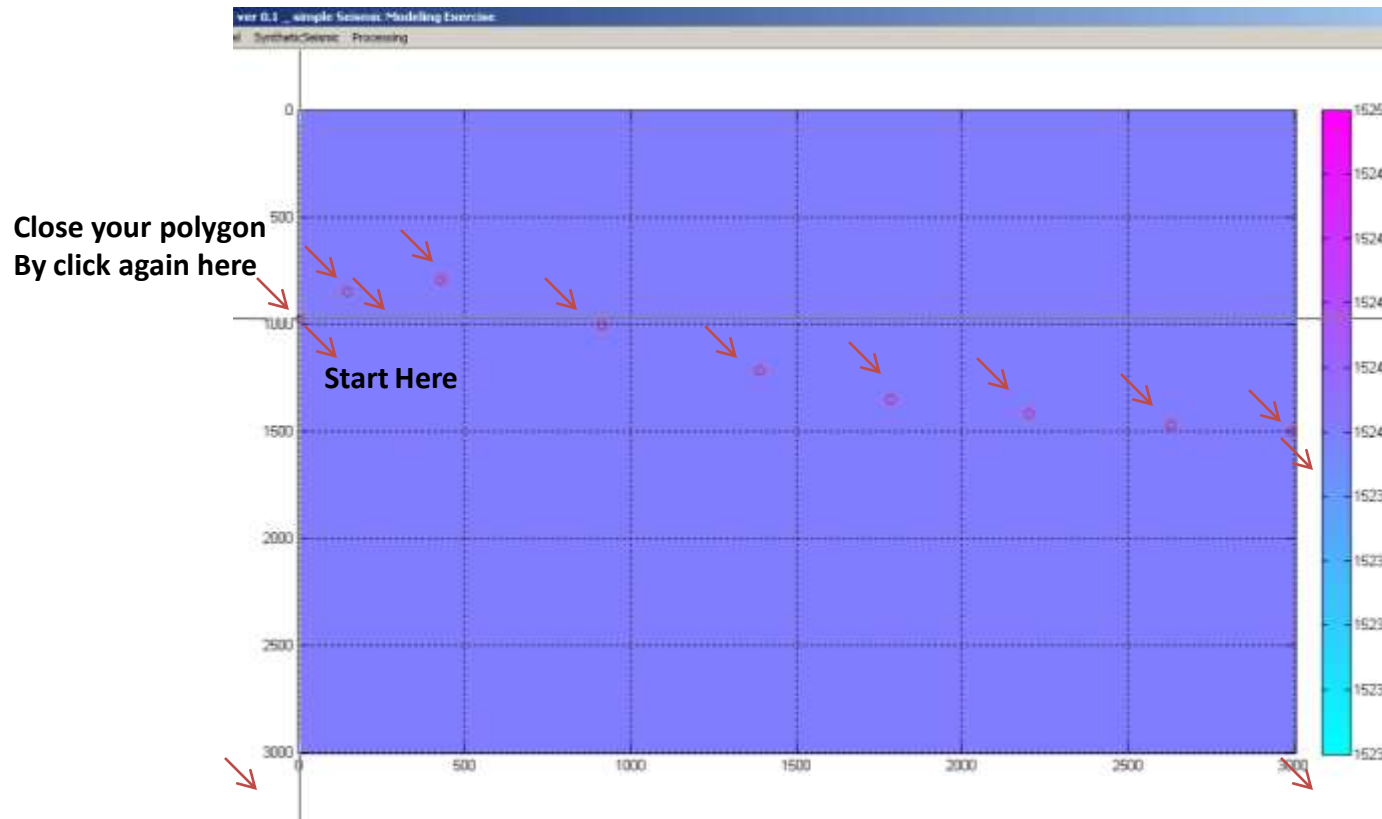


3. Define Your Layer

Click *Create VelModel > Define Polygon*

It will popup Define Polygon Velocity Window, here you specify your velocity layer. Remember you have background velocity of 1524.

Click Ok

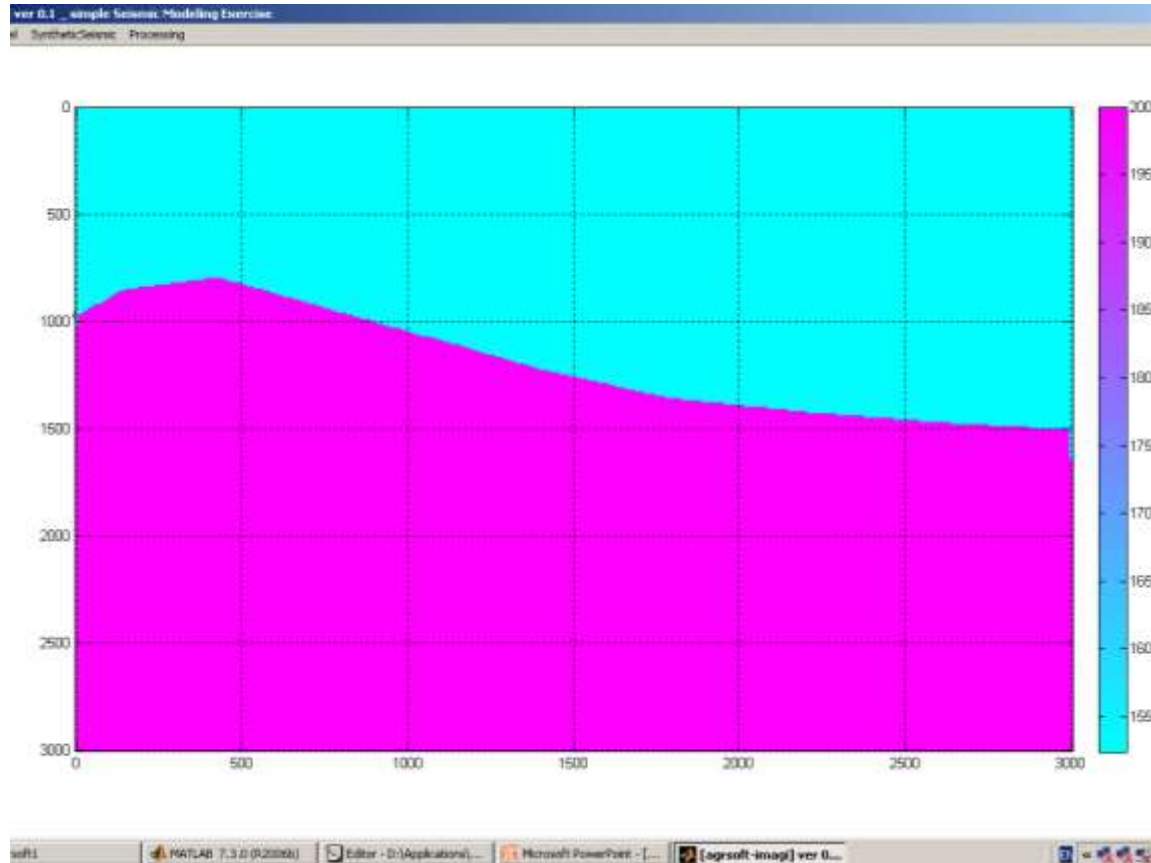


3.a. Create you layer by define closed loop polygon

You define your layer by creating a closed loop polygon. Click on each point that you want to put layer, and then click again at the very first point of your polygon to closed the polygon.

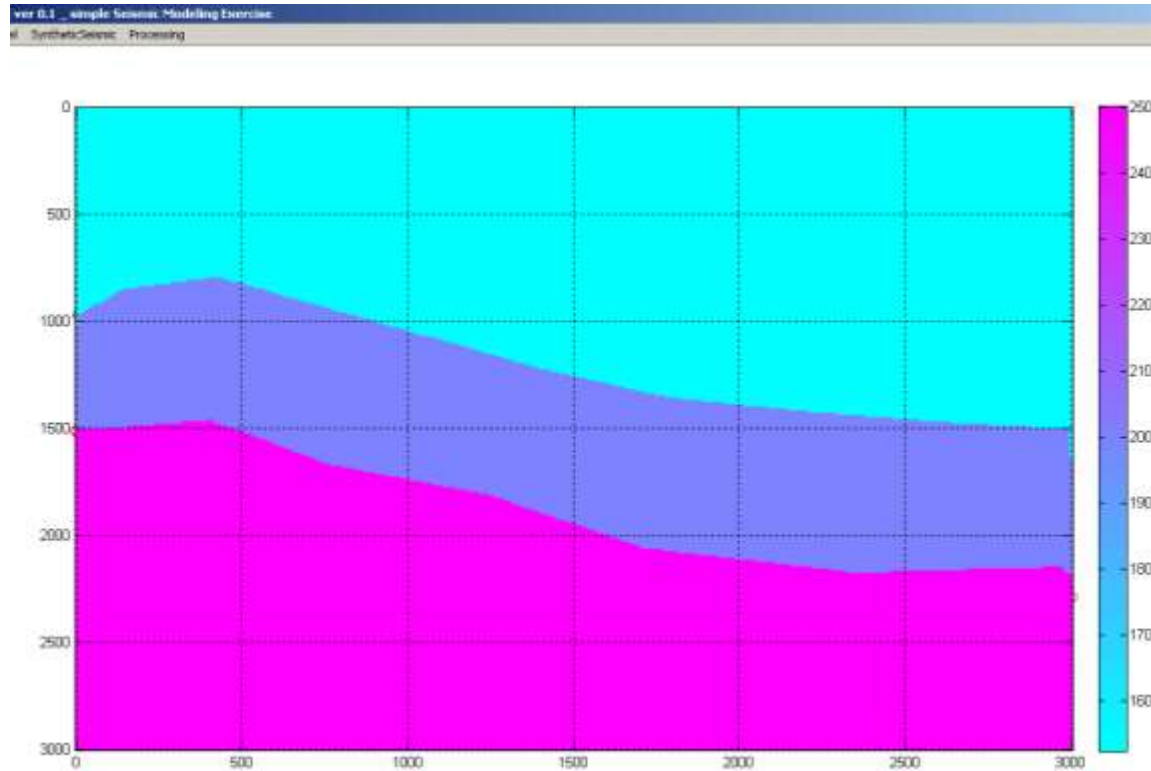
Red Arrow showing where I click to make a polygon.

You also have to specify point outside your grid, to make closed loop polygon.



3.b. This is how your layer look like

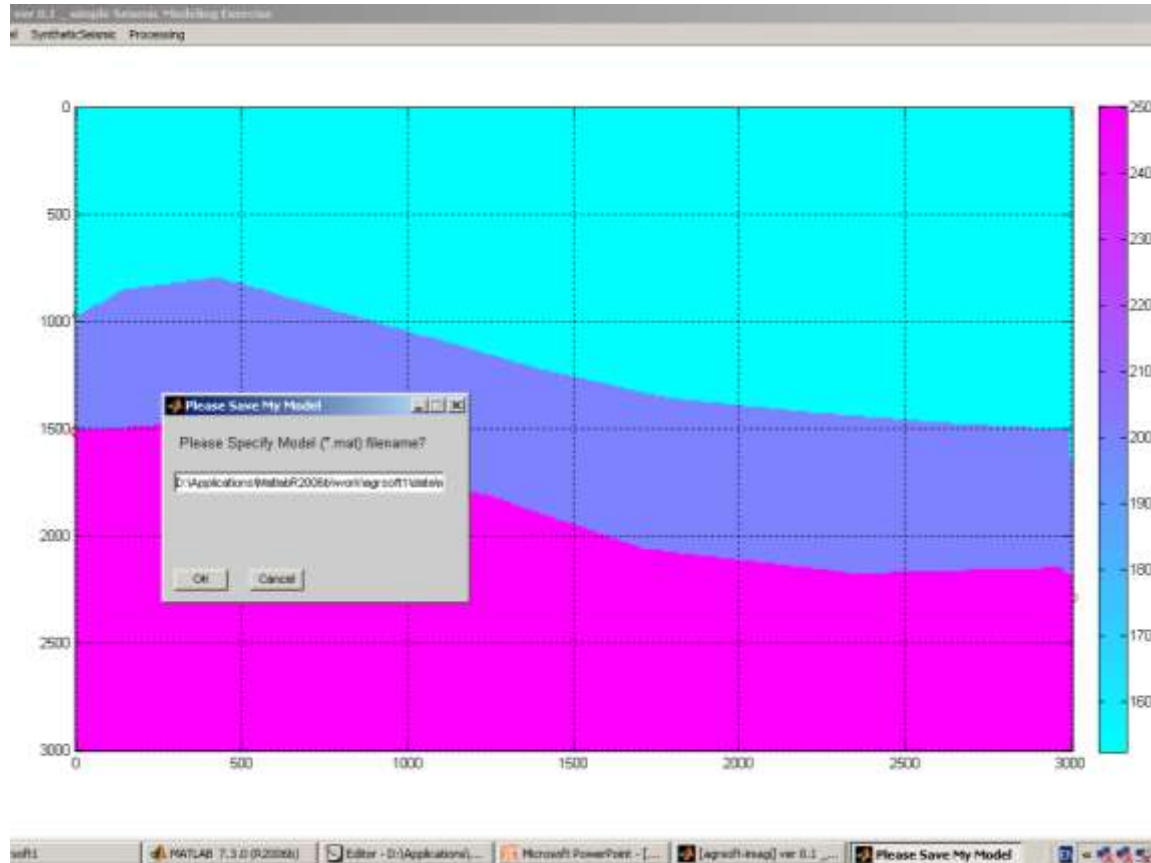
We successfully created our first layer. Sometimes the polygon is not that smooth, you can revise it by creating small polygon with the same velocity.



3.c. Repeat Previous Steps for the next layer

We created the second layer with velocity of 2500.

Now we have three layer, 1st with velocity of 1524, 2nd with velocity of 2000, third 3rd with velocity of 2500



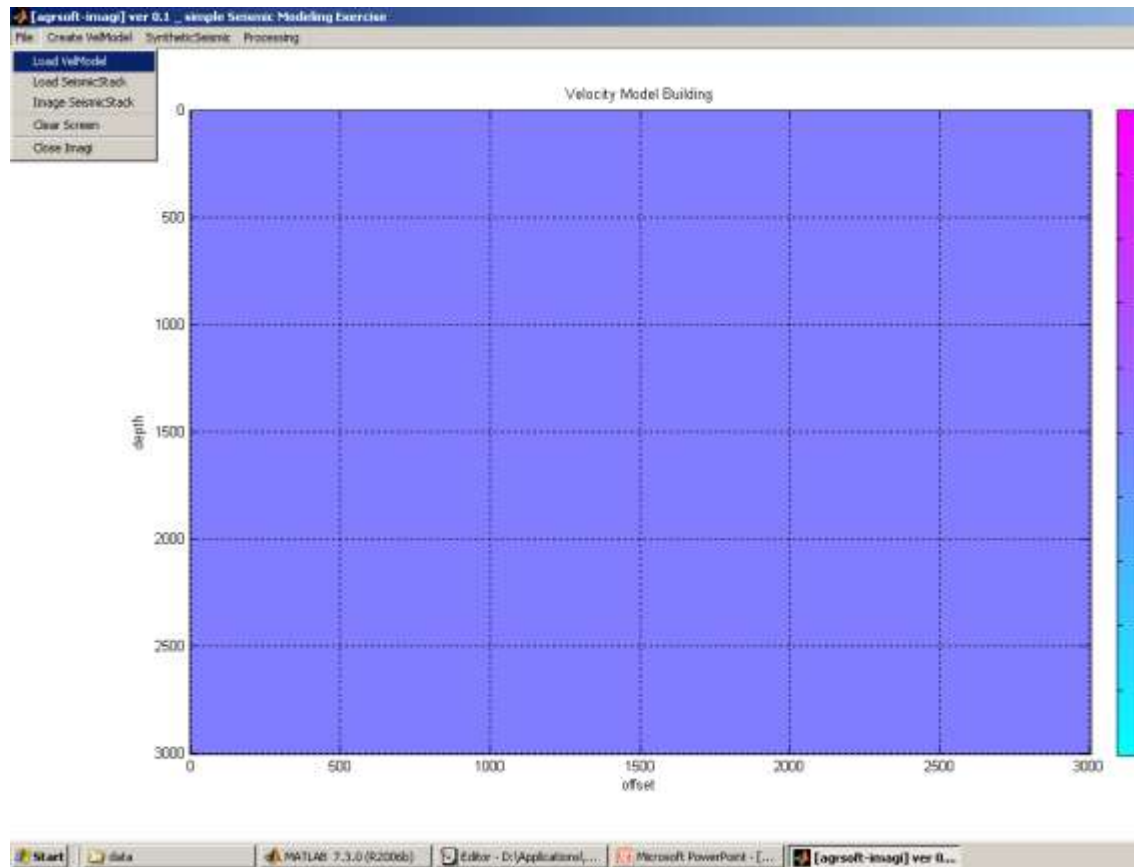
4. Don't Forget to Save Your Model

Click Create *VelModel* > *Save Model*

On TextInput Gui, specify full path of your model.

DON'T FORGET TO PRESS ENTER, after specify your filename.

Click Ok



4.a. Velocity Model Small Utility

To clear your model screen, you can click on *Create VelModel > Reset Model*

To load your model, click from *File > Load VelModel*. Make sure you pick the right *.MAT file

5. Exploding Reflector Modeling

So, after we have the velocity model.

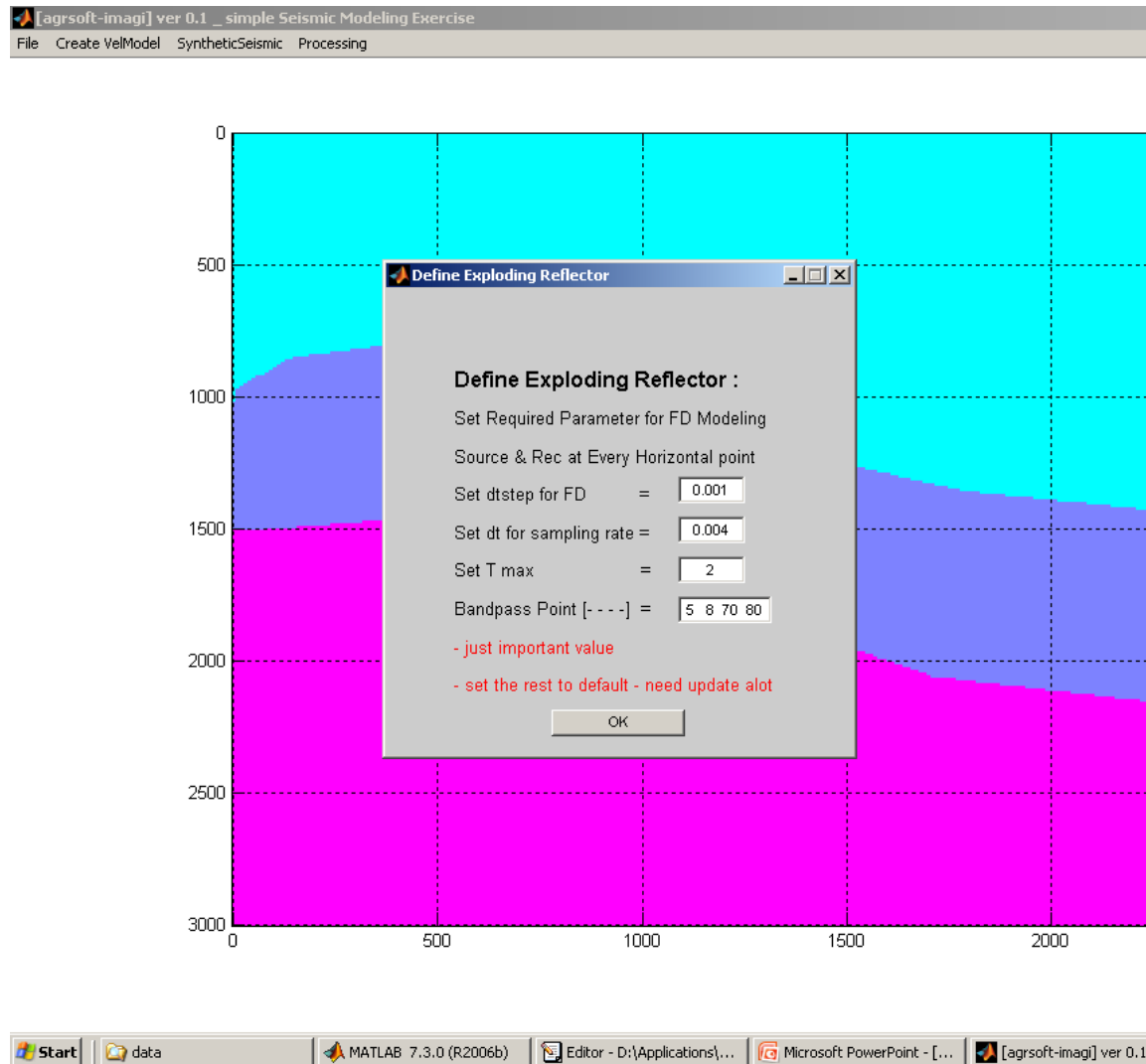
Let's create synthetic seismic stack record , using *afd_explode* from CREWES.

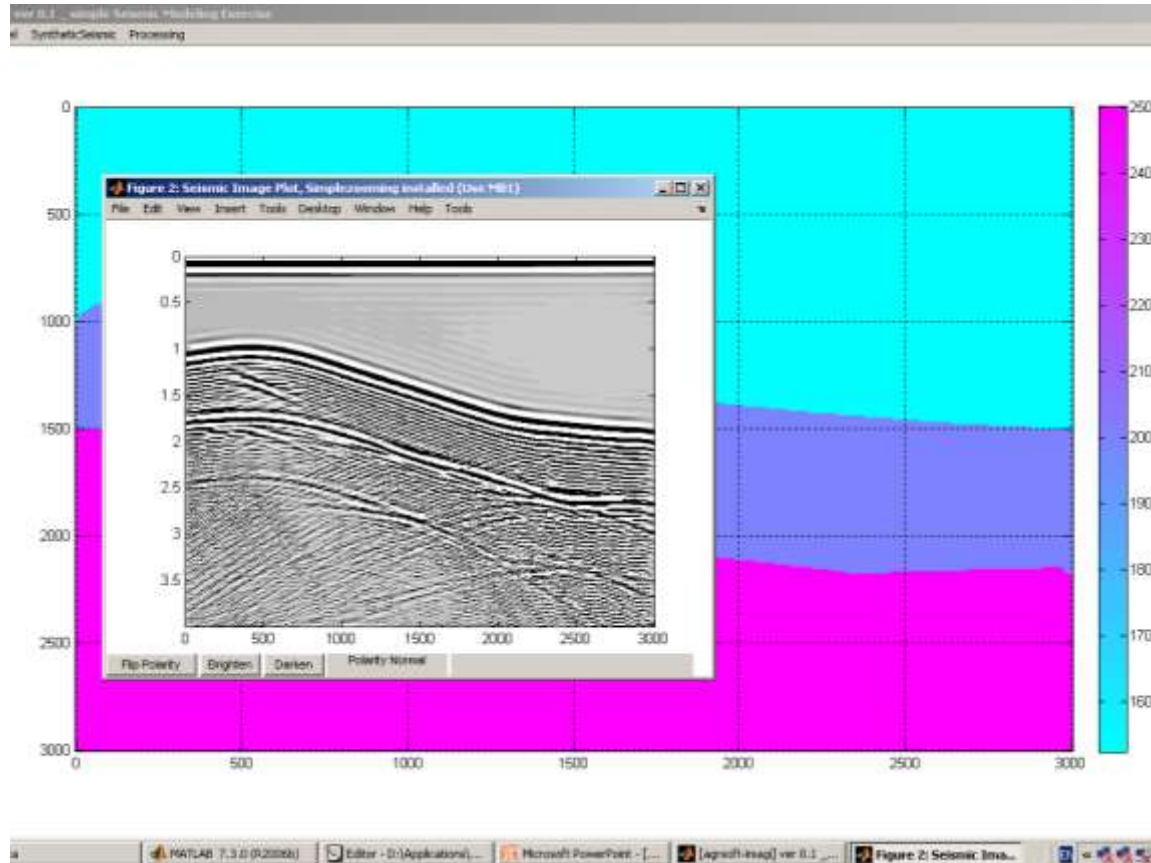
Here in *Imagi*, we interface and run the modeling, from *SyntheticSeismic* menu, and click *FD Exploding Reflector*.

- A window will popped-up, specify the *dtstep* for FD modeling,
- *dt* for record sampling rate,
- *Tmax* for maximum recording time, make sure this cover all data,
- Bandpass point.

DON'T FORGET TO PRESS ENTER ON EACH TEXTINPUT BOX.

Press Ok, and wait for a momment, you can see the verbose message on Command Window





5.a. Yatta!!! There's Your Synthetic Seismic Stack Section

A *plotimage* window from CREWES will popped up, showing your FD Exploding Reflector result.

Don't' forget to save it from menu *SyntheticSeismic* > *Save Synthetic*

End of Part I

- So, part I, was only about basic interface on CREWES modeling suite. Especially in GUI-ing Velocity Model Building.
- Following is a bunch of script for you to test Post Stack Migration from CREWES, we will include this feature in Imagi.

VINTZ to VRMST

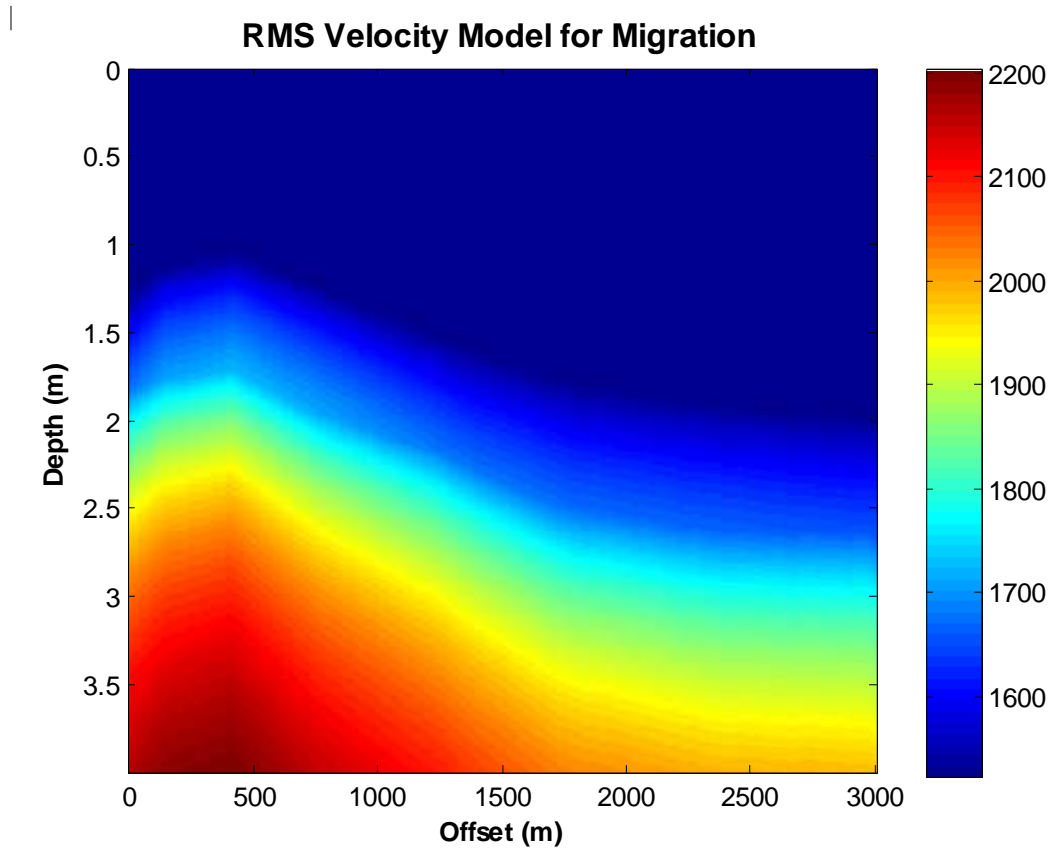
- Time Migration require RMS velocity model. We are now doing Exercise to convert our model that we created (that is in Interval Velocity model in depth domain), to RMS velocity model in time domain.
- This conversion performed using KonvToVRMS.m

KonvToVRMS.m

- Inside the script, all you need to do is specify all files to be loaded that are,
 - Synthetic Seismic Data
 - Velocity Model

For the moment, you can find where you should change it right :)

Last but not least, please also specify the filename where you want to save your new VRMS



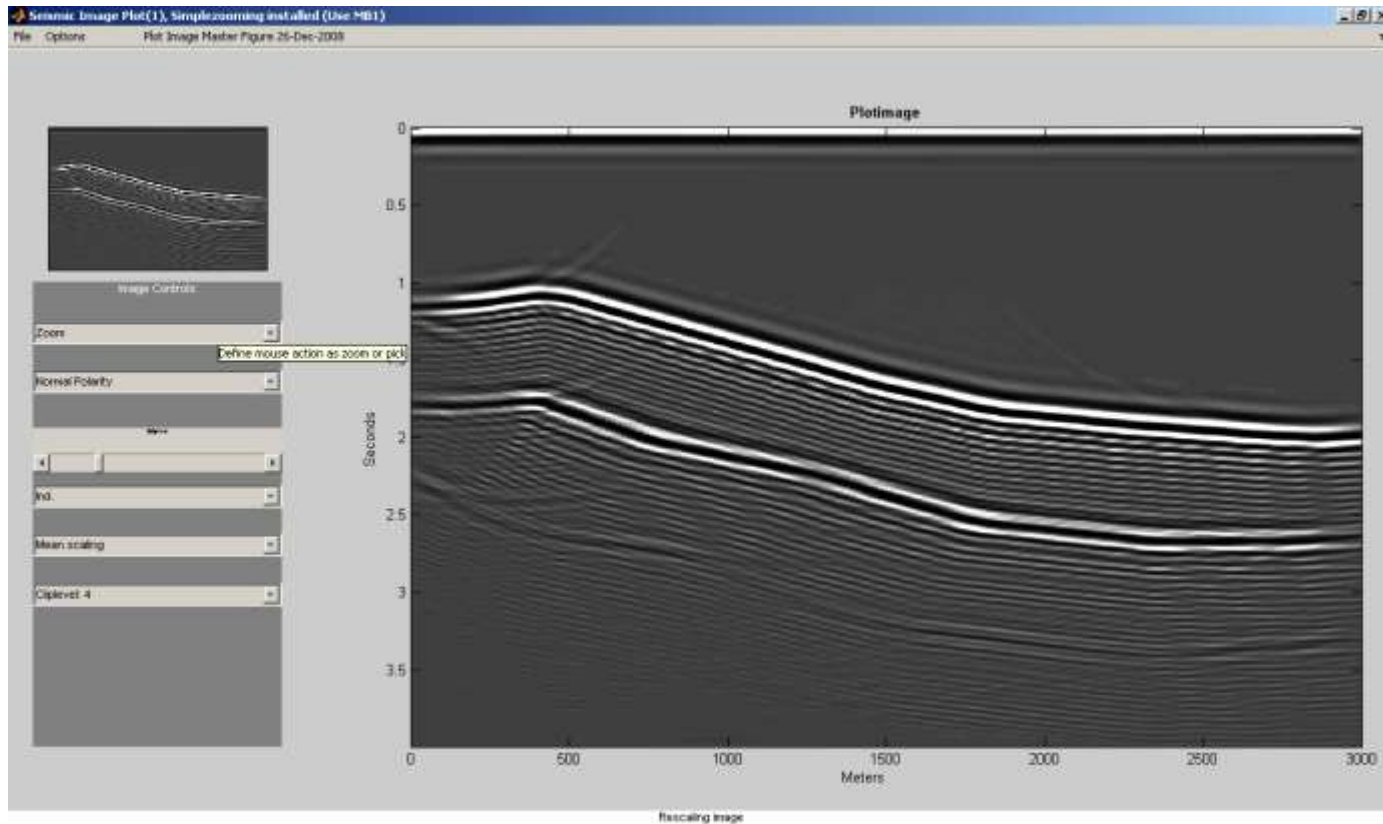
RMS Velocity Model for Migration from Our Model

Kirchhoff Migration Test

- Let's try doing some migration on our synthetic model, using Kirchhoff Post Stack Time Migration,
- Open testKirchoff.m in your matlab editor,
- Change velocity model and synthetic data to correct MAT file.
- Run it.
- Don't forget to uncomment line if you want to save your result.

Note on Migration Exercise

- A lot of parameters can be test on migration parameter, for time being, let's do exercise on scaling velocity model, by changing *velfact* variable on each script.



Kirchhoff Migration Result

It's seems that we did some imaging here.

You can test other migration method, just few changed in specifying the synthetic data and vmst model for every migration script.

Note

- This script is just an exercise on Matlab capability for GUI programming.
- This script was inspired by Pro@SU by Dr. Wahyu Triyoso of Dept. Geophysics & Meteorology ITB.
- AGRsoft is a fictive software company.
- No AGR has been sacrificed in making this script.
- Contact me at sjobs@macsux.com