Modeling using Seismic and Well-log Data

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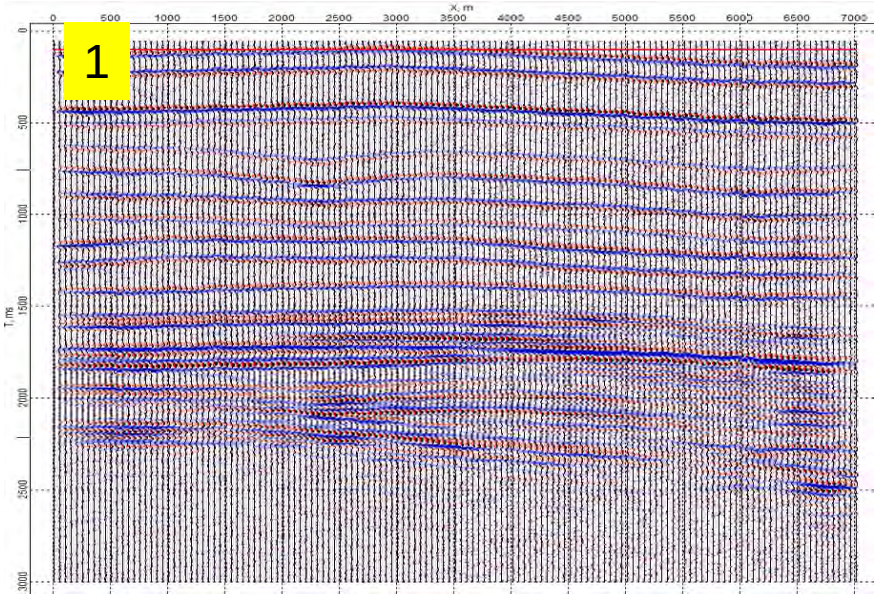
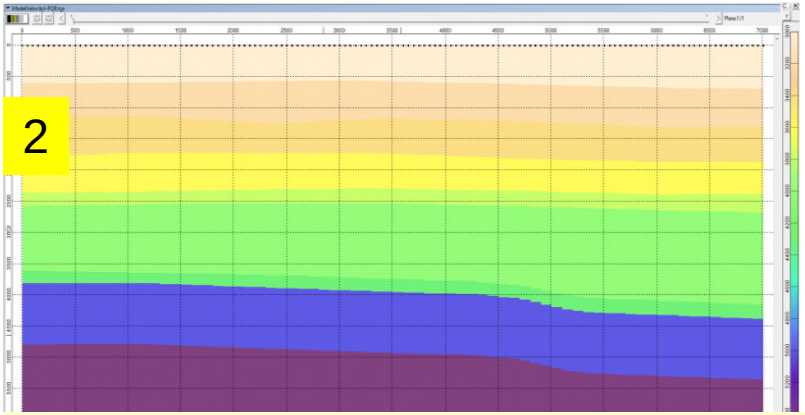
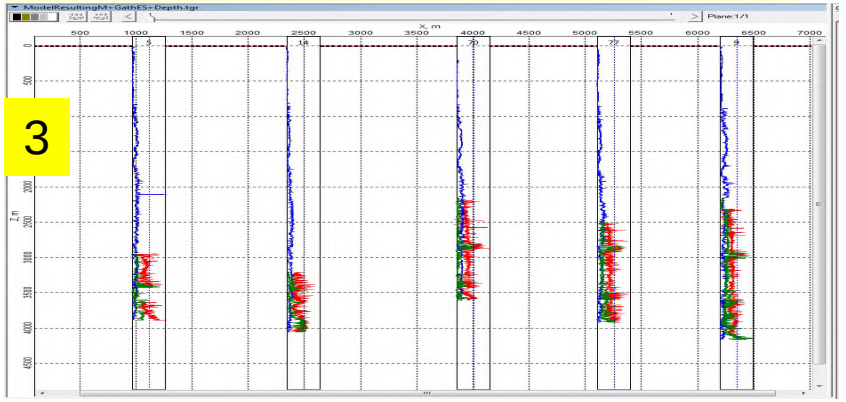
Step 1



Seismic and well-logs:
what data user must have
to model in Tesseral (2D and Pro)

1. Seismic time cross-section;
2. Interval velocity model
3. Sonic well-logs (optionally density logs) and other well data (Pro).



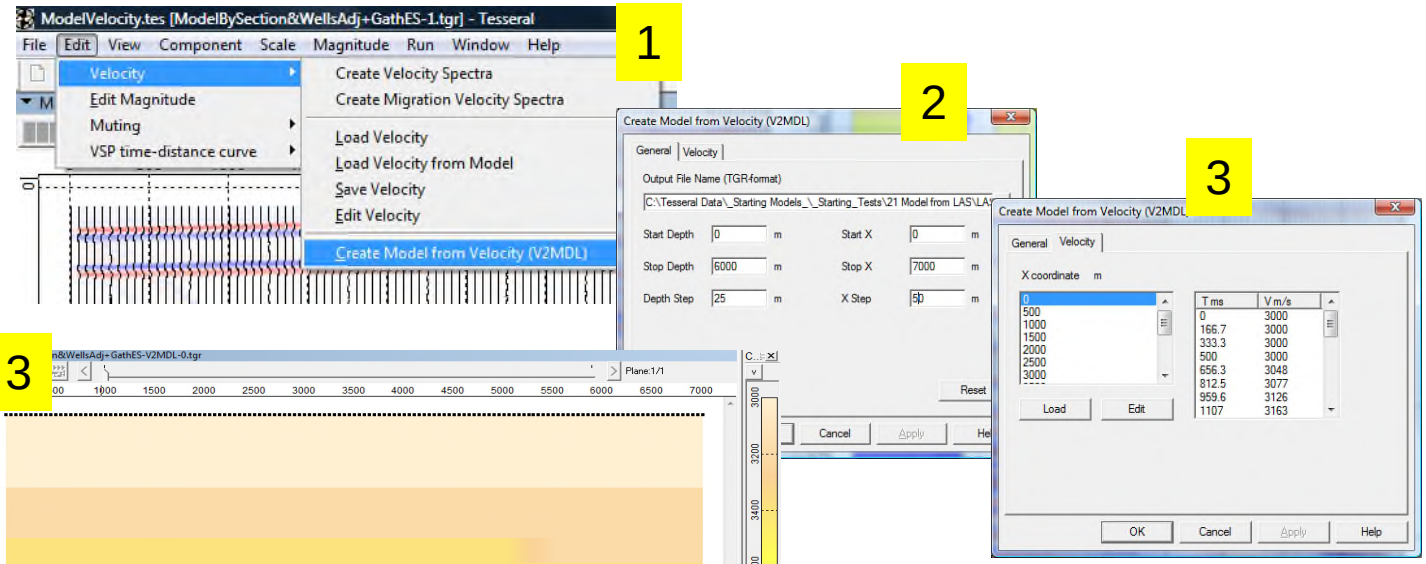


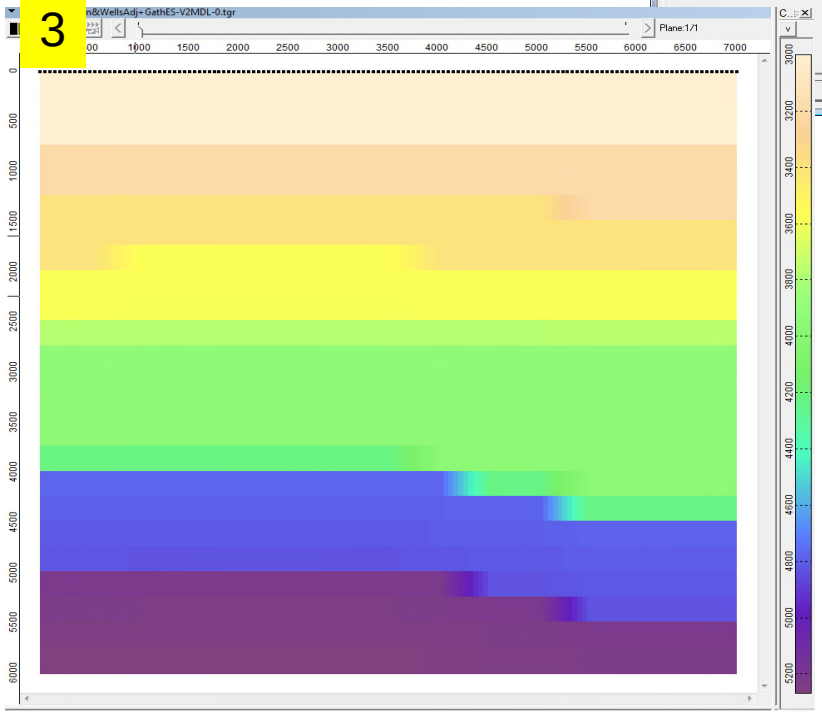
Velocity model (picture 2) may be obtained as :

1. Result of processing in time domain (time stack and migration) are columns of RMS velocities– must be converted into interval depth velocity model (see next slide), or
2. Result of processing in depth domain (depth migration) - ready

Converting RMS velocities into interval depth velocity model:

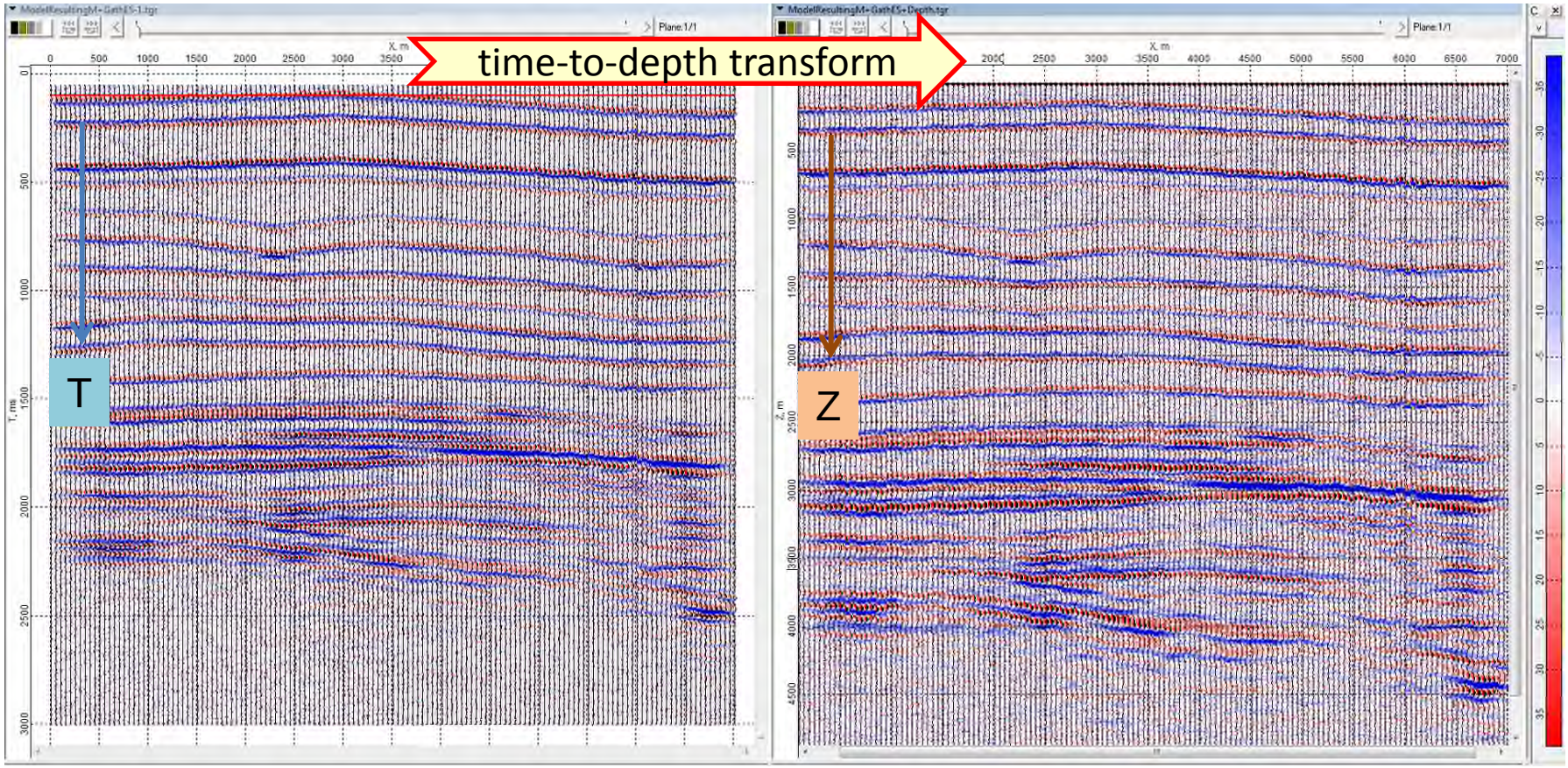
1. import (if processing was done outside) or create inside of the Tesseral RMS velocity columns, which are used in time stacking and migrations (file with extension .vel, picture 3)





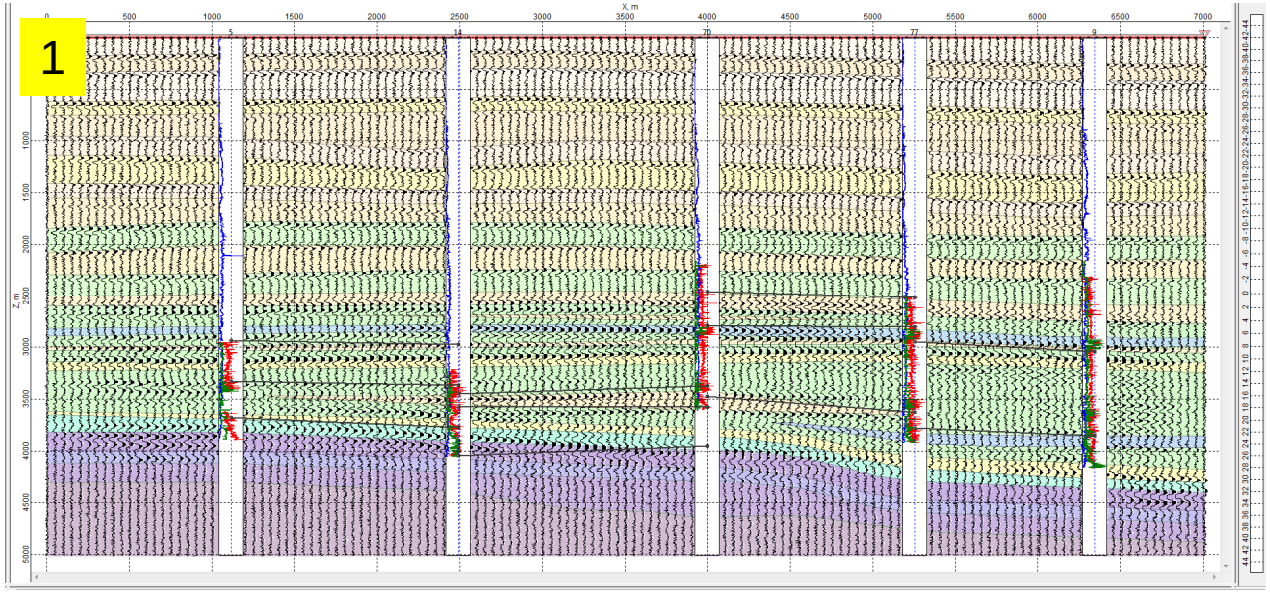
2. use “Create Model from Velocity (V2DML, picture 1) to obtain initial interval velocity model in depth domain (picture 4)

Step 2



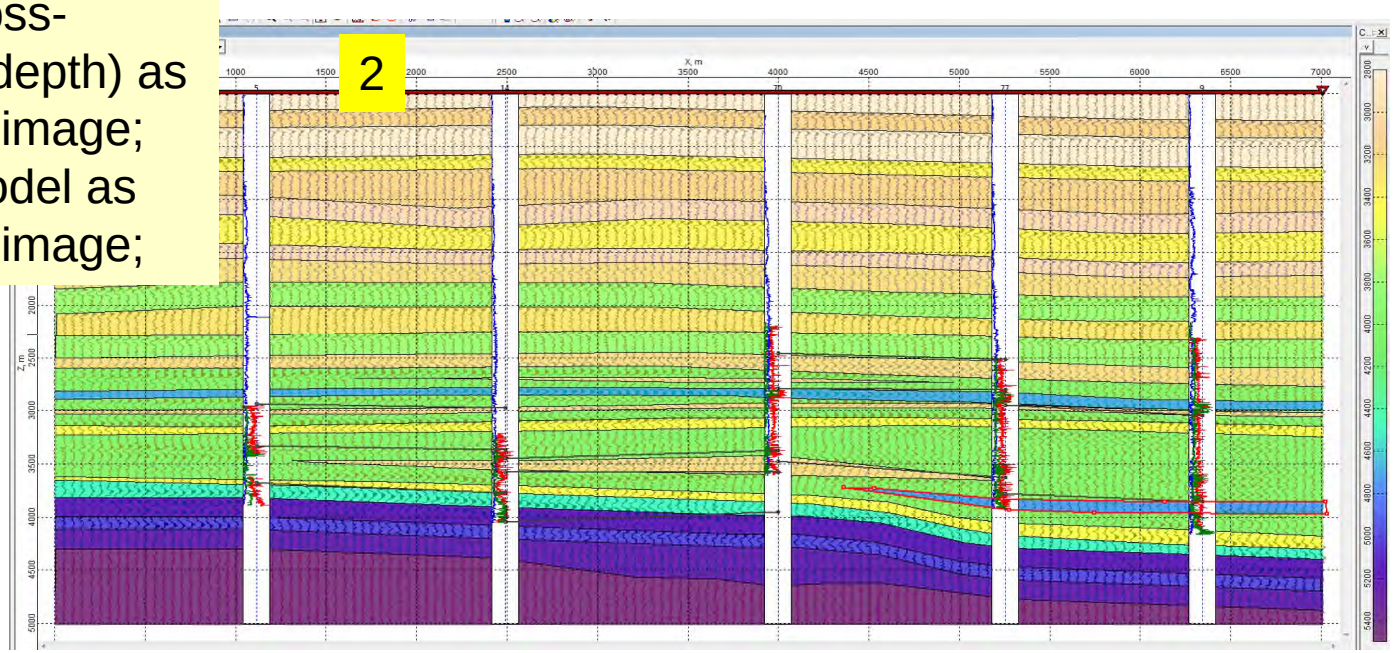
To compare (time) seismic cross-section with well-logs it must be converted into depth scale using interval velocity model

Step 3

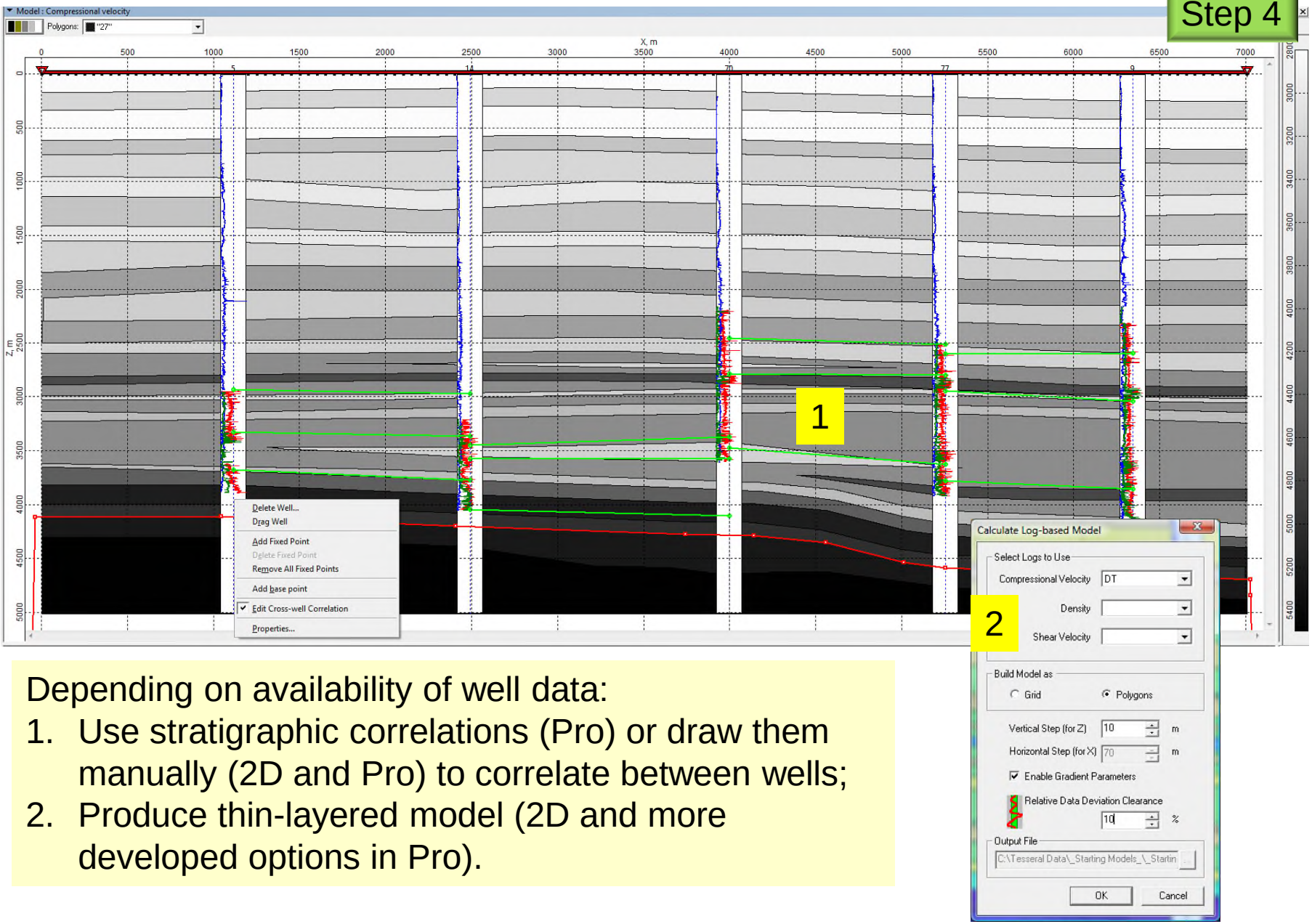


Depending on data conditions and availability of other well data:
draw thick layer model using cross-section (depth), well-logs and velocity model

1. Seismic cross-section (in depth) as foreground image;
2. Polygon model as foreground image;



Step 4

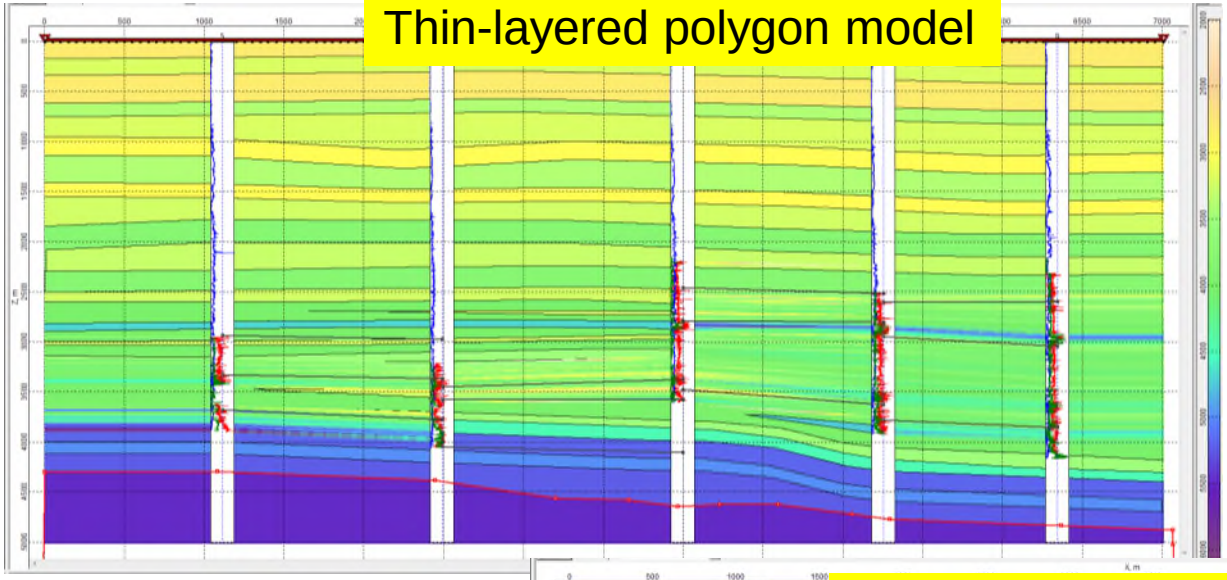


Depending on availability of well data:

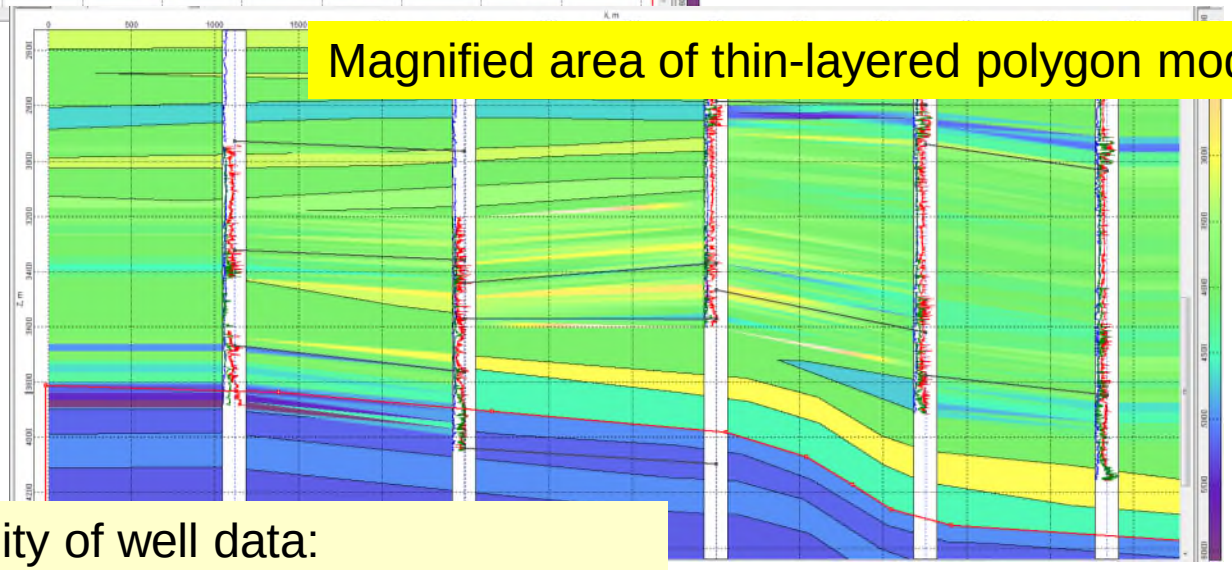
1. Use stratigraphic correlations (Pro) or draw them manually (2D and Pro) to correlate between wells;
2. Produce thin-layered model (2D and more developed options in Pro).

Step 5

Thin-layered polygon model



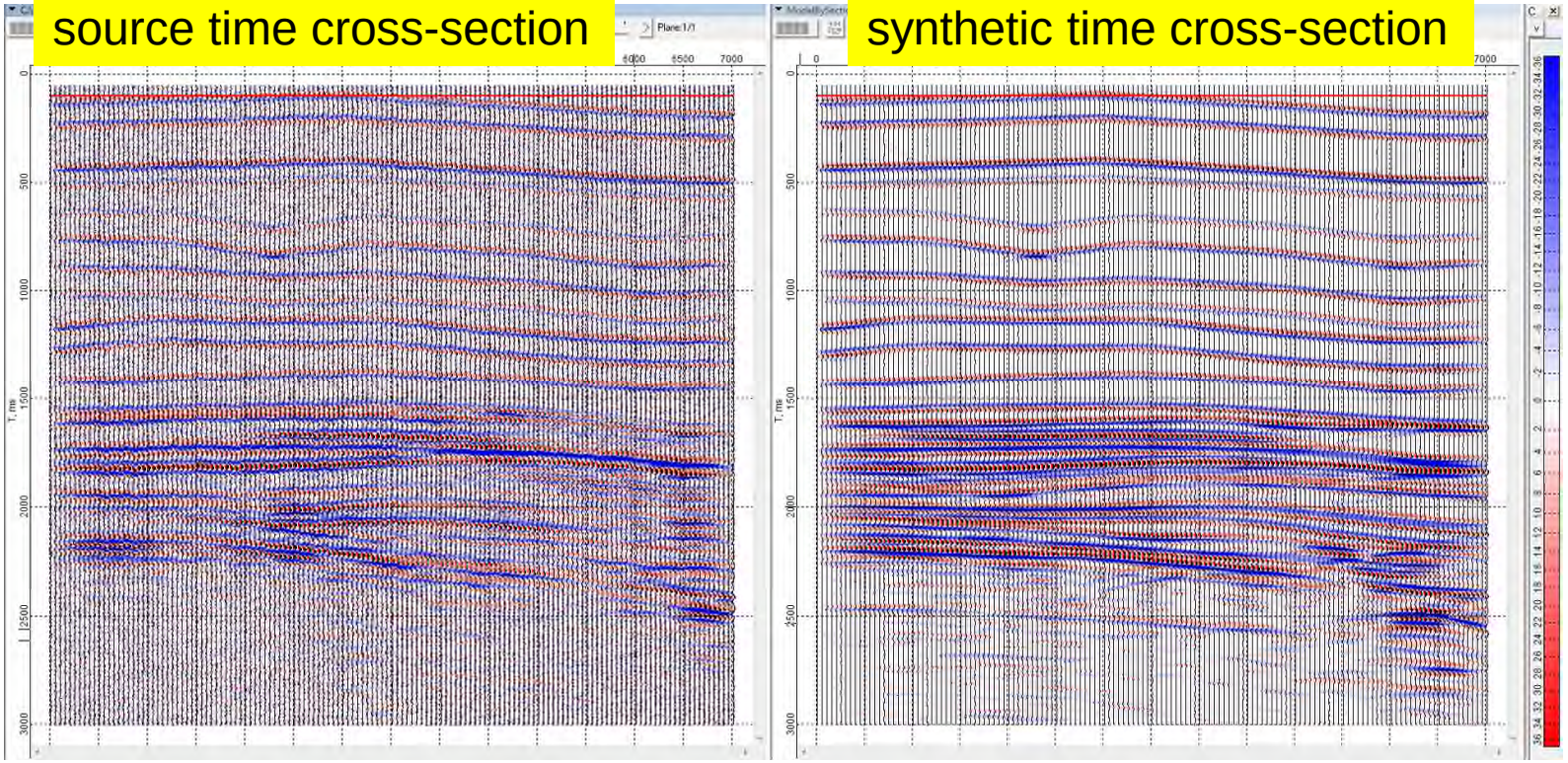
Magnified area of thin-layered polygon model



Depending on availability of well data:

1. Analyse thin-layered model;
2. Compare thin-layered model with thick layers background and “fill” gaps in thin-layered model with analogous thick layers (polygons).

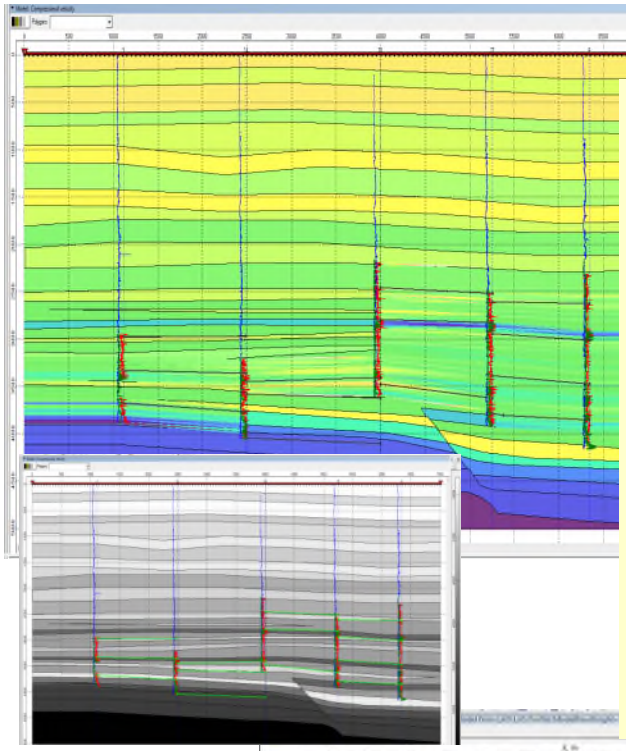
Step 6



Calculate synthetic analog of source (real) time cross-section, analyze and compare results

At intermediate steps of interpretation can be used express methods of modeling, like “exploding surface” or “exploding reflectors”. Latter is more appropriate for significantly non-stratigraphic sections (considerable layers inclinations, abrupt lateral heterogeneities, etc)

Step 7



Depending on task and conditions:

1. Amend think layered polygon background using synthetic cross-section as additional reference;
2. Repeat creating of thin-layered model (delete (menu “Edit”) previous automatically created polygons);
3. Repeat modeling and interpreting steps until getting necessary “likeness” between real and synthetic time cross-sections or having enough understanding of remaining geological “ambiguities”.