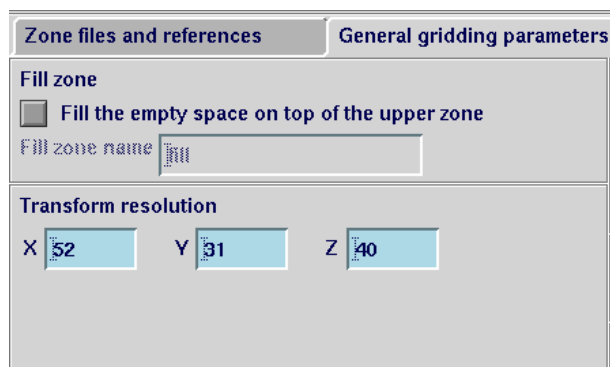




Transform Size

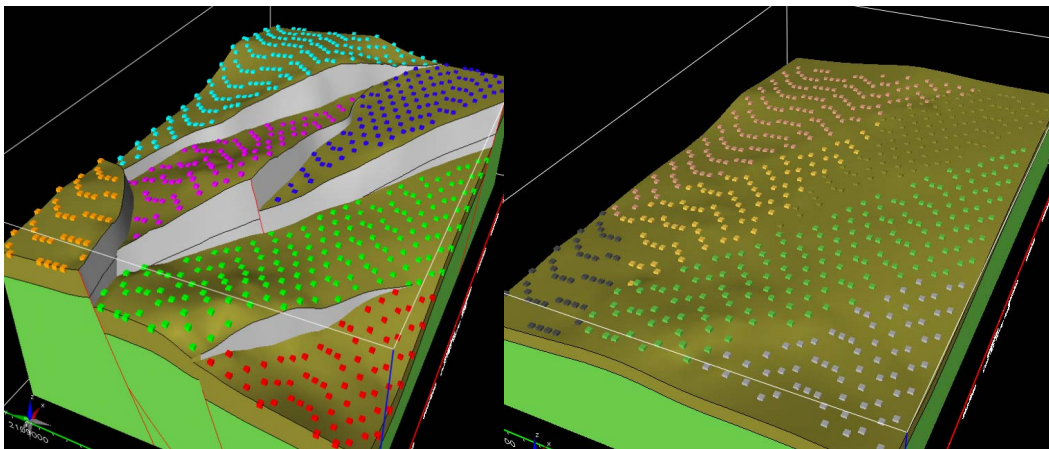
Horizon Gridding Project Paper III

During horizon gridding, the user is presented with a parameter called **Transform Resolution**. In the Workflow Manager, it is found on the Stratigraphic Sequence and Horizon Modeling menu under the **General Gridding Parameters** tab:



Users often what ask what this parameter is and how it affects horizon gridding.

The **Transform Resolution** numbers here represent the X-Columns, Y-Rows, and Z-levels of a 70,000 node 3D grid that is at the very core of the horizon gridding process. Before horizon gridding can take place, the horizon data must be transformed into an unfaulted space and fault polygons must be honored. On the left below is an image of a horizon dataset in faulted space. On the right is the same dataset displayed after transformation into unfaulted space:



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The 3D transform grid contains information to allow this transformation to be made. After the horizon gridding is done in unfaulted space, the same 3D grid is used to “re-fault” the horizon grid back into faulted space. (In addition to its use in horizon gridding, the 3D transform grid is also used in property modeling when the **True Reconstruction** method is used.)

Will increasing the transform resolution improve horizon gridding?

It is a common misconception that increasing these **transform resolution** numbers will increase the *accuracy* of the horizon grids. This is not strictly true. The horizon gridding accuracy has to do more with the horizon gridding parameters such as horizon grid size, etc. The transform 3D grid does, however, affect horizon gridding because it controls how the data are transformed into unfaulted space. If that 3D grid calculation does not properly model the throws, etc. in the data, then the horizon grids can be badly off because the data will be placed into a non-optimal unfaulted domain. Horizon gridding problems due to bad transform values include:

- bumps in the surface not related to data
- surfaces that creep up (or down) the fault face
- sections of a horizon surface that don't match the horizon data

Are there situations where changing the resolution helps horizon gridding?

Yes. For example in some models with one or more low angle faults, it is often helpful to change the transform resolution. In order to change how the 3D transform gridding is done, it is more important to change the ratio of the transform number than to just uniformly increase or decrease them. So, if the default values of 50x30x40 didn't produce satisfactory horizon grids in a model with low-angle faults, a user could try: 50x30x10 or 100x60x20 rather than something like 100x60x80. Coarsening the Z component in transform resolution tends to help resolve horizon gridding problems with low angle faults.

Does the transform resolution affect mapping?

Yes. The bounding fault polygon controls the horizon surface so there is no throw outside the active area of the fault. To make the surface smooth, however, the horizon is allowed to have slight throw outside the fault bounding polygon at a distance of one transform cell size. So a model with an X,Y range of 7000,4200 and a transform resolution of 50x30x40 would have a transform grid X,Y cell size of 140x140 (diagonal of 198). On a map, therefore, a user might see some small throw in a horizon surface up to 198 units away from the active area of a fault. To reduce this distance, the transform resolution can be increased uniformly, such as to 100x60x80.

Can I see the grids and data in unfaulted space?

Yes. In the project directory created by the WorkFlow Manager, there is a folder named “<Project-Name>.tmp_unfaulted” In that directory you will find an unfaulted sequence file (op.seq) and the transformed data.

Is there a limit to the transform resolution size that can be entered?

Yes. The 3D grid has to be held in memory so very large transform sizes are not currently supported. Often an increase of four-fold does not usually cause problems (200x120x160 in the above example).

What are my options if I cannot find a transform size that produces good horizons?

Often problems occur in a transform grid because data in different zones or different fault blocks conflict with each other and produce an inconsistent transform grid. There are Zone Grouping and Fault Grouping options in horizon gridding that help this problem because basically each group has its own transform grid. It is like automatically making several independent models and merging the results. So Zone and Fault Grouping is often a great way to address these problems.

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