



断层解释的OpendTect操作

手册的附录D

Li



以下内容来自: *14 Appendix D - Wacom Digitizing Tablets*, 见断层解释操作.pptx

OpendText is the first Seismic Interpretation System to support Wacom Digitizing Tablets. Workflows for horizon tracking, fault interpretation, drawing of polygons and bodies etc. have been adapted to benefit from the superior hand-eye co-ordination offered by the pen/tablet combination device.

OpendText是第一个支持Wacom Digitizing Tablets的地震解释系统。层位跟踪、断层解释、绘制多边形和Body等, 得益于手-眼的协调互动, 依靠pen/tablet联合完成。

Windows Surfer Pro ?



使用Pen做手动断层/层位解释



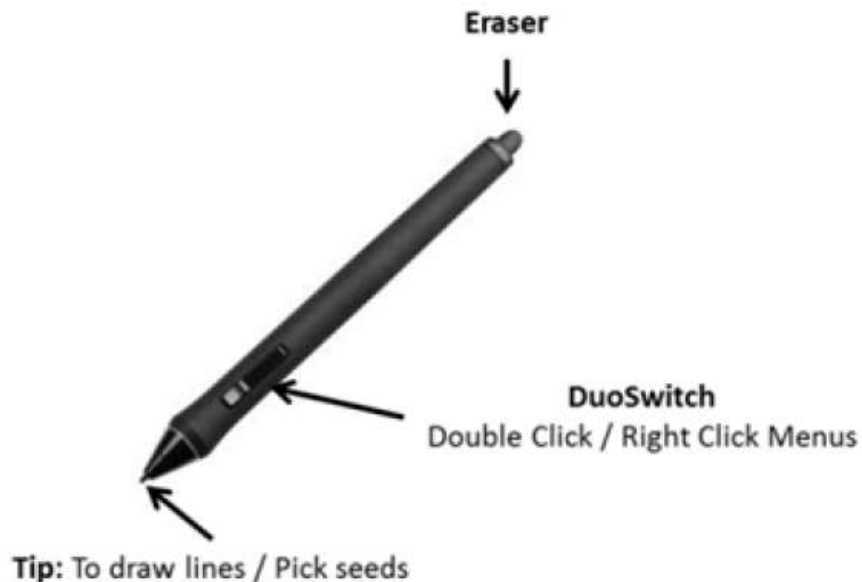
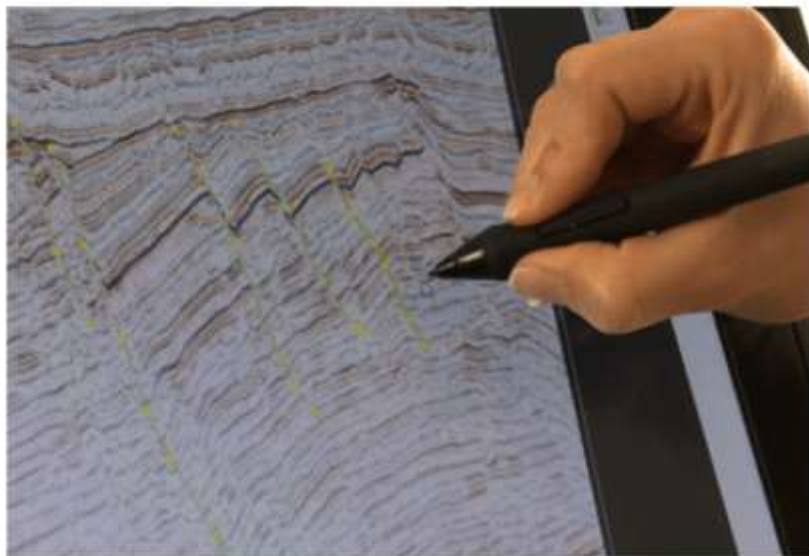
OpenText combined with a Wacom Tablet has become a key application for hand-eye coordination. It has proven to be vital in manual interpretations with OpenText.

Several aspects of 3D interpretation will be covered:

- How to use the Wacom Pen device instead of a conventional mouse
- How to draw interpretations in OpenText with a Wacom tablet
- Polygon/pointsets
- Horizon Interpretation
- Fault Interpretation

手工解释断层
了解断层解释的一般步骤和过程，详细过程参考附录D

Interpret Faults





介绍手动的层位解释(Horizon Interpretation)

使用笔，而不是鼠标

Setup an orthogonal Display:

Display seismic data:

Add a New Horizon:

Pick seeds and Auto-track:

Manual Tracking:

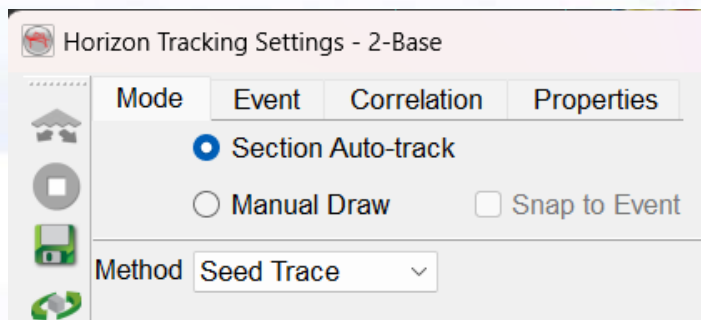
Save Horizon(s):

Save Session:

Manually Edit Horizons

在Inline/Crossline上显示地震数据

添加一个新层位，在跟踪。要是有很多个层位需要跟踪怎么办？工作量很大。



观看youtube的教学视频



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下面介绍： 手动的和自动的断层解释

中国地质大学



Faults in OpenText can be interpreted as a FaultStickSets or directly as fault planes. The FaultStickSet (in the tree) is a set of sticks that can be converted to 3D fault planes. The FaultStickSet element can be used for a 2D line or for a 3D volume (inline/crossline/timeslice). Contrary to the FaultStickSet, the Fault element in the tree is generally used to interpret a single 3D fault plane in a 3D survey, however FaultStickSets can be converted and merged to new or existing single or grouped faults at any time (and vice versa).

In this manual, you will learn the use of both mentioned methods of interpreting faults in a 3D survey. 下面学习3D调查中的断层解释

In the following workflow, use the pen device instead of mouse. Tap/Press/Select in this workflow refers to the tip of the pen device. 利用触摸屏原理

断层可解释为FaultStickSets，或直接为断层面(fault plane)
FaultStickSets可是一系列的断层束，可转换为3D断层面。
与FaultStickSets相反，Fault元素，通常用来解释一个单独的3D断层面，但是FaultStickSets可转换并合并为新的或到已有的单个或分组的断层（反之也行）。



Basic Fault Interpretation for 3D Seismic Data:

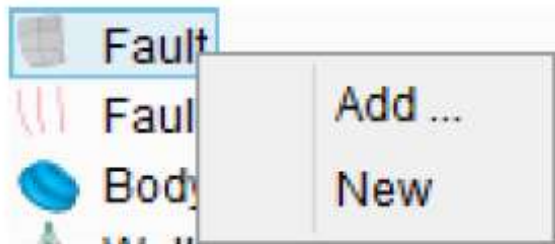
从3D地震数据手动解释断层的8个步骤

1. Display an inline (or a cross-line) in the scene. [Make sure that the seismic data has already been displayed along the displayed inline]. **Optional:** Position the inline to a location at where you want to start the 3D fault interpretation. To position, you may use the slice position controls



在视图中显示一条inline或crossline（确保已经沿着显示的inline显示地震数据）

2. Click on the *Fault* element to add a *New Fault* sub-element in the tree. Next, make sure that it is selected / active

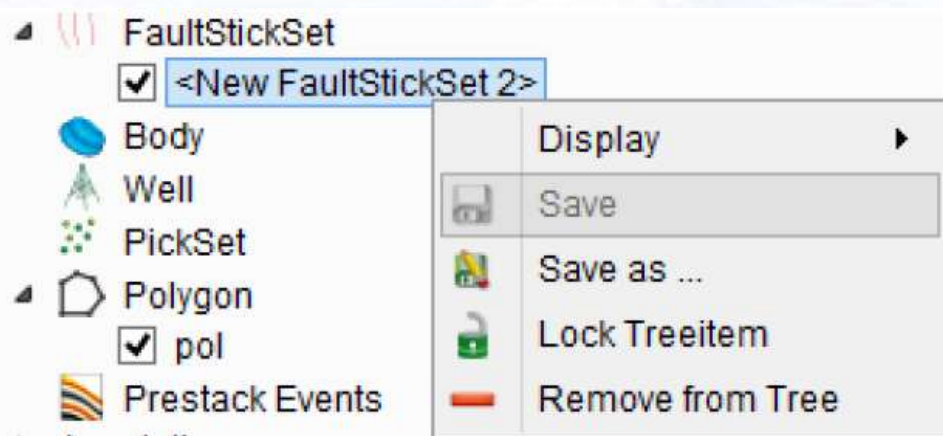


点击Fault，添加New（Fault）

手动断层解释（使用OpendText）



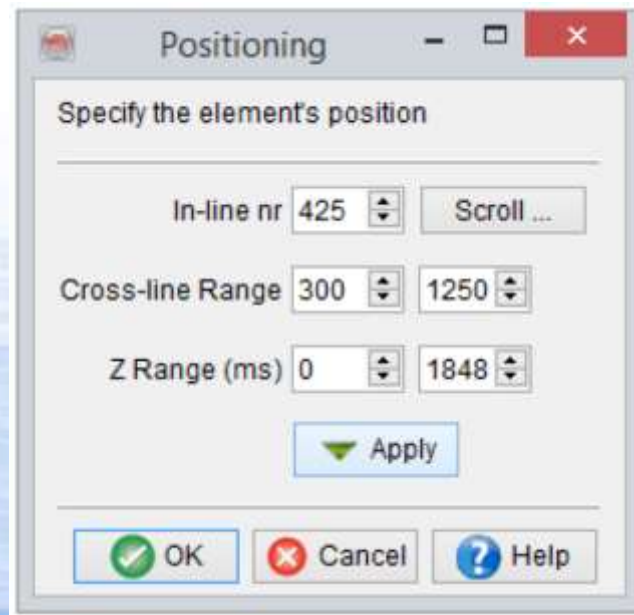
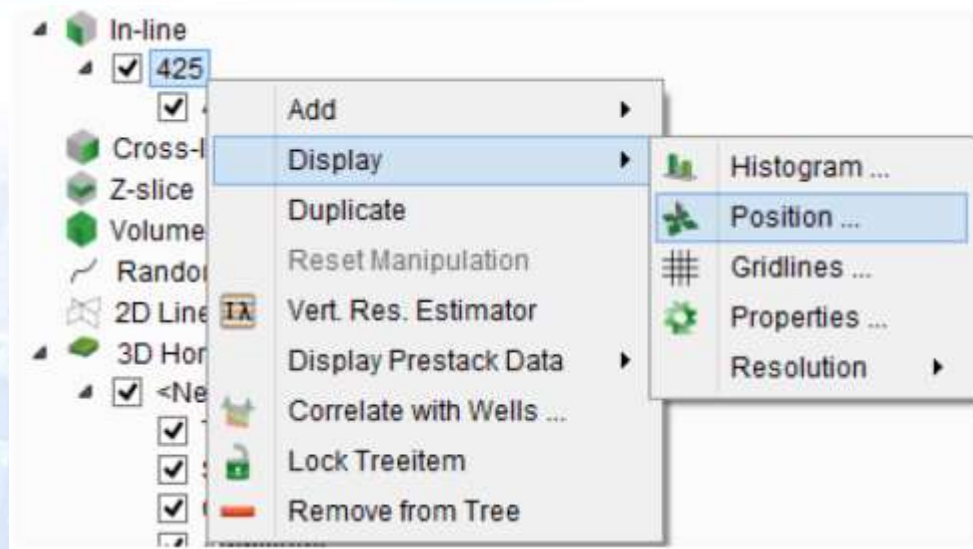
3. Now in the scene, start drawing the fault stick on the inline. [Drag the pen over the inline at fault plane location]
4. To remove a seed of a fault plane, you may use the *Eraser* of the pen
5. To position a seed to a new location, you may move the seed by clicking and dragging it in any direction
6. Move (step) the inline to the next position to interpret another stick of the fault in a new location (5 or 10 inlines forward or backward or smaller steps if continuation is unclear). **[Tip: Display the fault plane on sections online. For this use may use the lower button of the DuoSwitch to launch the pop-up menu. In the pop-up menu please select the Display option]**
7. Repeat the steps to interpret the fault on other inline/cross-lines
8. Use the lower button of DuoSwitch to Save the <New Fault 1>



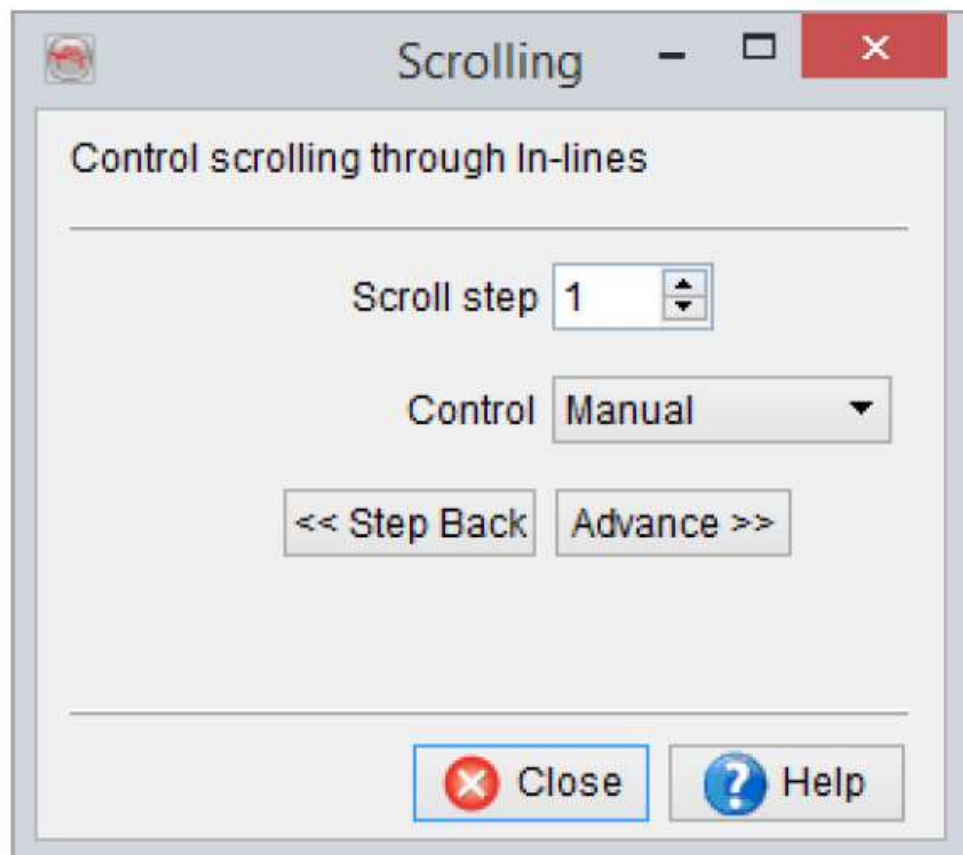


使用Auto-scroll方法的自动交互式断层解释 workflow（是快速3D断层解释的另一种方法）：

1. Preload the seismic data on which you are intended to interpret faults. **[Tip: Use the Survey menu i.e. Survey > Preload > Seismics]**
2. Display an inline (or a crossline) in the scene. [Make sure that the seismic data has already been displayed along the displayed inline]
3. Click on the *Fault* element to add a New Fault sub-element in the tree. This will add a <New Fault 1> fault under *Fault* element. [Make sure that it is clicked / active]
4. Use the lower button of DuoSwitch on the Inline to launch the drop-down list and select *Position...* In the *Positioning* dialog, please click on the Scroll button



5. In the scrolling dialog, set the *scroll* step (i.e. number of inlines/cross-lines to move, use positive number for forward *scrolling* and negative number for backward scrolling) and *time* to scroll the inline to the next position (use for example 5 seconds)



手动断层解释在OpenText
需要这10步

6. Click on the to activate it
7. Now in the scene, start drawing the fault stick on the inline. Drag the pen over the inline at where you observe the fault. Once you have interpreted a fault stick on the current inline, wait for a few seconds for the inline to be moved forward/backward automatically
8. Continue the fault interpretation on all lines (step p-q)
9. Use the lower button of DuoSwitch to Save the <New Fault 1>





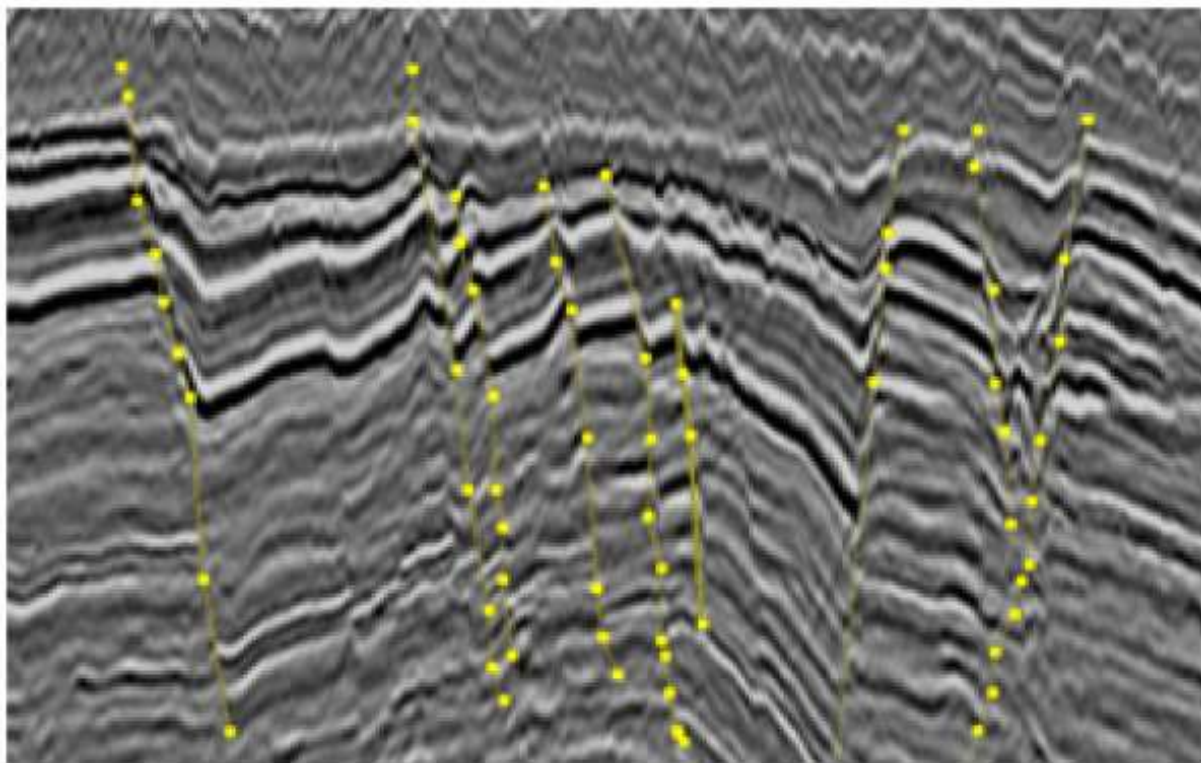
FaultSticks解释需要这7步

Fault Sticks Interpretation for 3D Seismic Data:

This workflow allows for interpreting fault sticks only, which can later be converted to 3D fault planes. The benefit of this workflow is that you can interpret multiple sticks on an inline/crossline. 仅做fault sticks解释，之后可转换为3D断层面。

1. Display an inline/crossline in the scene. **[Tip: Click on the Inline element to add a new inline]**
2. Add a new FaultStickSet in the tree. [Click on the FaultStickSet, and select the Add option in the pop-up menu.]
3. Start drawing multiple fault sticks in the scene. To split sticks, use lower DuoSwitch
4. If you want to move a node of a fault stick, place the tip of the pen over the node to be modified. Click and drag the node in 3D and position it to a correct location
5. Save the FaultStickSet by launching the drop-down list **[Tip: Use the lower DuoSwitch button.]**
6. Move the inline/crossline to the next position and continue the interpretation
7. While moving the inline/crossline, you may still observe the sticks from previously interpreted sections. To hide them (and therefore avoid confusion), please display the fault sticks at sections only. **[Tip: Use the pop-up menu for the fault stick set.]**

Optional: Optionally combine the FaultStickSet interpretation workflow above with the auto-scrolling method. 上述步骤可与FaultStickSet解释工作流程联合使用，使用auto-scrolling方法



红色线为解释的Fault Sticks



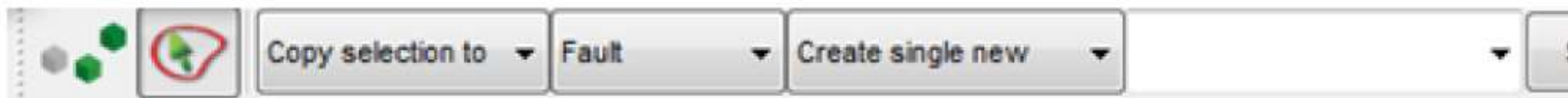
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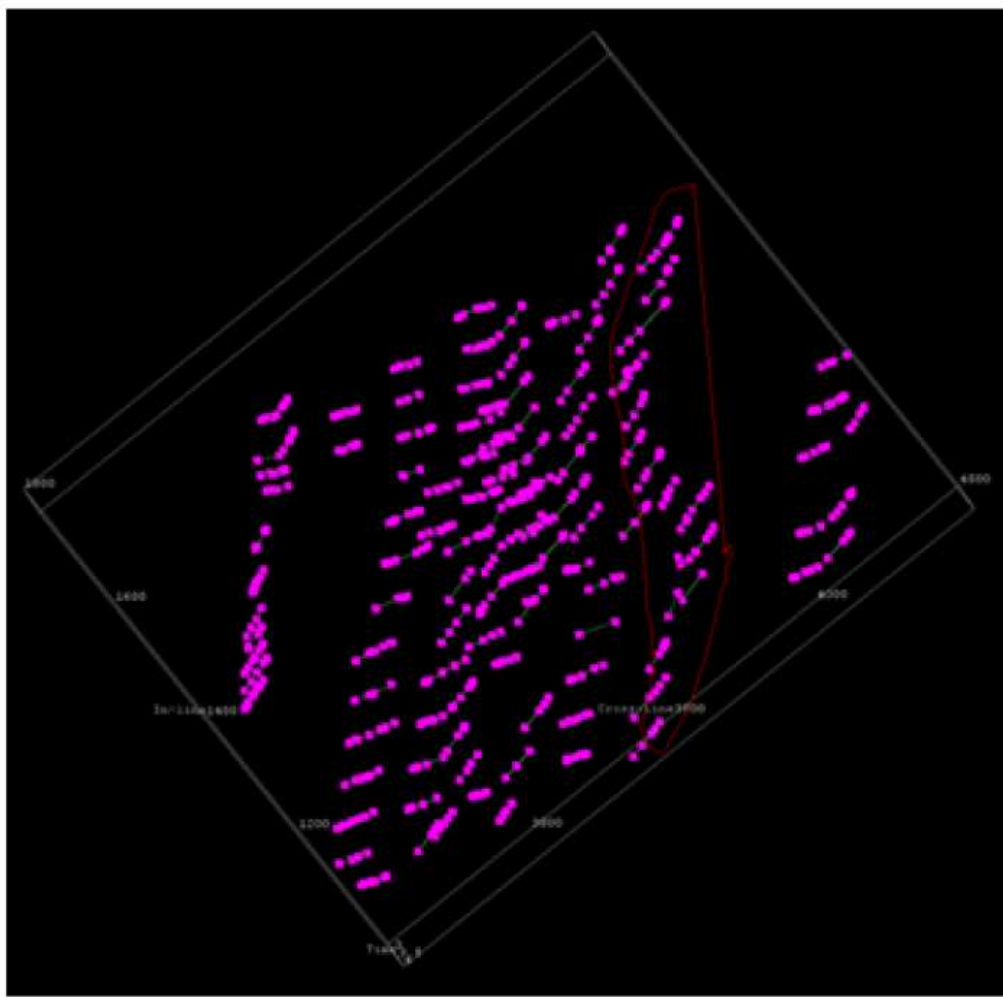
Convert Fault Sticks to Fault Planes:

将FaultSticks转换为断层面

To convert fault sticks into fault planes, you will need to familiarize yourself with the Fault Sticks Toolbar (shown below). By default, this toolbar appears at the bottom of the OpenText window.



1. Display a time slice of similarity attribute, so that you can identify the fault trends
2. Display the fault sticks in a 3D scene. **[Tip: Use the pop-up menu for the fault stick set.]**
3. Optional: Position the time slice (step-a) at where you can see the tops of the fault sticks
4. Activate the select sticks button 
5. Make sure that you are in interact mode
6. In the scene, draw a polygon to select the sticks that you want to convert into a fault plane. [Use the pen device and draw a red colored polygon.]
7. Once the tip of the pen is lifted away from the tablet, observe that the sticks within the polygon turn green. This means that the sticks have been selected (and can be converted to a fault plane)
8. Next, *copy* or *move* the selection to a single new fault plane. This option is illustrated in the above fault stick toolbar
9. Give a name in the text field of the toolbar
10. Hit the Go button to save and display the fault plane in the scene and tree



在3D视图中展示FaultSticks



关于Fault Sticks工具条的建议

- The 'Copy selection to' option is used to copy the selected fault sticks to a fault plane without remove the fault sticks from the original fault stick set. Contrary to this, the 'Move selection to' option removes the selected fault sticks from the original fault stick set and moves them to a fault plane.
- The Fault/FaultStickSet option is used to convert the selected fault sticks to a fault plane or to another fault stick set.
- There are different ways to name faults/FaultStickSets. This is done via the output operations list box i.e. Create single new (to create a new single fault plane or a fault stick set), Create new in series (automatically labels the faults with a numeric index), Merge with existing (to merge the fault plane to an existing fault plane or fault stick set), and Replace the existing (replace the selected fault plane with the newly selected sticks).
- The trash button in the toolbar is used to remove the selected fault sticks

以上手动解释使用Watcom设备完成。Watcom目前仅支持Windows和Mac系统。Linux系统下使用，需要参考Sourceforge的Linux Watcom。