

Introduction

Petrel is a software package, which is a product of Schlumberger that allows the user to build a reservoir model with properties to export to a simulator. Petrel is a Windows based software for 3D visualization, 3D mapping and 3D reservoir modeling and simulation. It was founded in 1996, and commercially released in 1998. It became part of the Schlumberger Information Solutions in January 2003.

In this BSC project, a 3D geological (static) model of a sample petroleum reservoir will be built. All steps will be shown in detail with screen shots of the necessary figures. The project is divided in chapters as indicated in the Petrel Workflow Tools shown in Fig. 2.1. After some modifications and enhancements to the Petrel Workflow, the chapters will be presented as follows:

1. Geomodeling.
2. Petrel Interface.
3. Data Set.
4. Data Import.
5. 3D Seismic Data.
6. Seismic Interpretation.
7. Fault Data.
8. Isochore.
9. Input Data Editing.
10. Well Correlation.
11. Fault Modeling.

12. Pillar Gridding.
13. Vertical Layering.
14. Geometrical Property Modeling.
15. Up-scaling in the Vertical Direction.
16. Facies Modeling.
17. Petrophysical Modeling.
18. Defining Fluid Contact.
19. Volume Calculations.

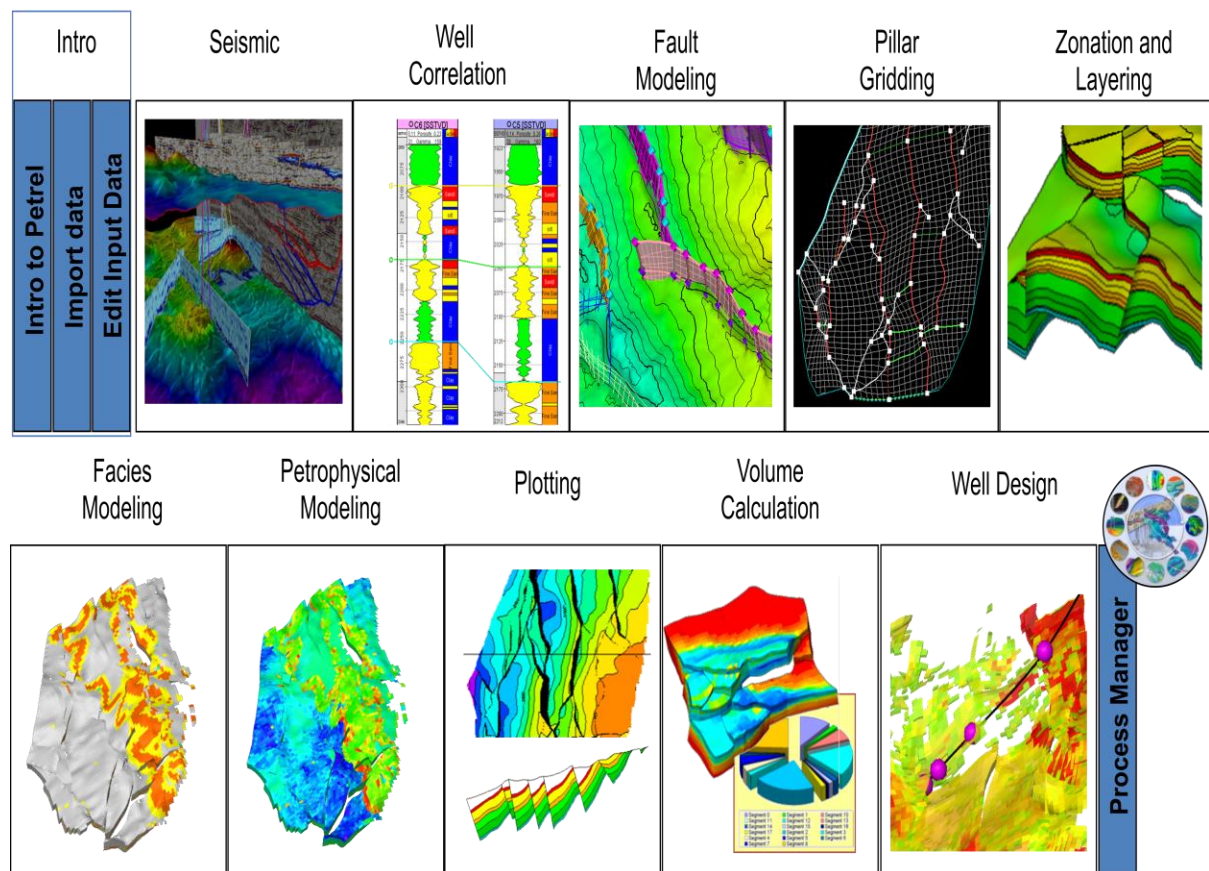
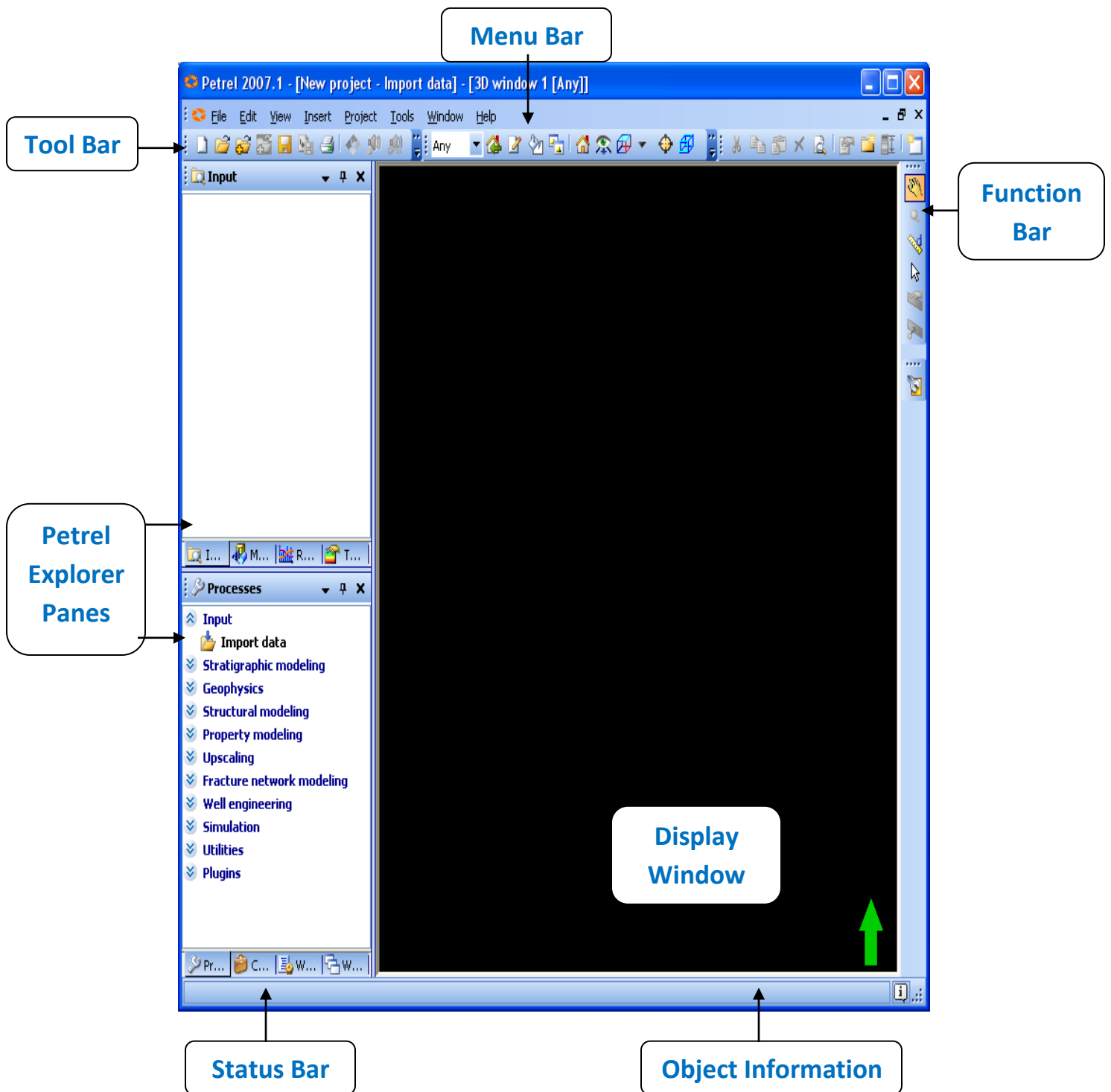


Fig. 2.1: Petrel Workflow Tools

**Fig. 2.2:** Petrel User Interface.

The main items of Petrel Interface are presented as Panes, which are shown in Fig. 2.3. The **Input**, **Models**, **Results**, and **Templates** are shown in the middle part of the left side of the screen. The **Processes**, **Cases**, **Workflows**, and **Windows** are shown in the bottom part of the left side of the screen. The Processes Pane gives the user an overview of the suggested workflow in Petrel.

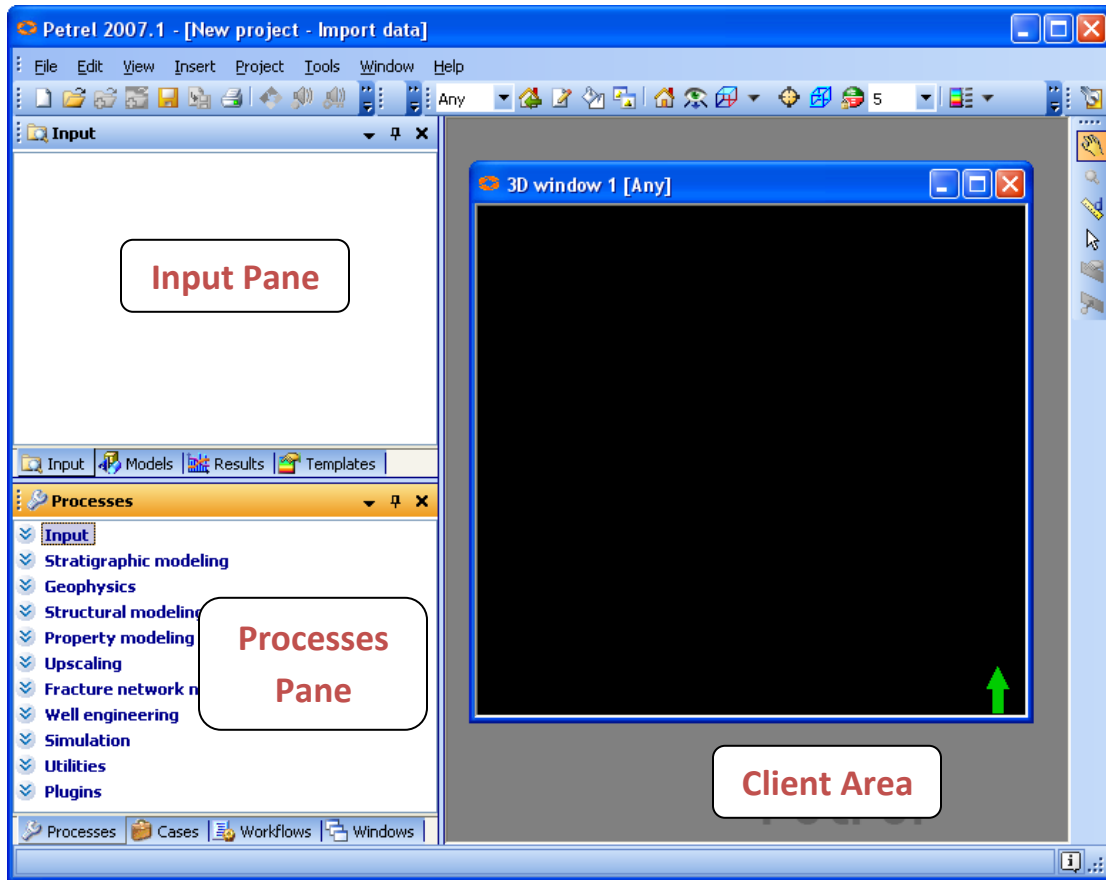


Fig. 2.3: Petrel User Interface.

1. Client Area

The Client Area is the parent window of Petrel (gray area). It forms the area where a variety of windows, which are listed under the **Windows** menu command, can be hosted. Examples are 3D and 2D windows, well section windows (for well correlation), interpretation windows (for seismic interpretation), map/intersection windows (for plotting), etc.

2. Input Pane

The input data is imported from files - one file for each data object. All input data are organized in the Input Pane as shown in Fig.2.2. Import Data describes the data import procedure and the various data formats supported. Imported data such as wells, well tops, interpreted lines, polygons, gridded surfaces and SEG-Y data is stored here.

3. Models Pane

Internally created data connected with a 3D model (such as faults, trends and 3D grids) is stored here. Imported grids (3D models or parts of models) and properties will also be put here.

4. Results Pane

The numerical results of volume calculations and simulations are held on this pane such that they can be browsed and any reports made.

5. Template

Color tables and all the different templates are stored under this pane.

6. Processes Pane

This pane contains a list of all available processes in Petrel. They are sorted in the order they should be used, and the first processes will have to be executed before you get access to other processes down the list. For example, you must create a 3D grid before you can insert horizons into it, and you must create zones before you can insert layers into them. Activating a particular process will cause the tools associated with that process to appear on the Function bar. Double clicking a process will open the process dialog.

7. Cases Pane

Gives access to all cases defined for simulation and volume calculation.

8. Workflows Pane

Provides access to the workflow manager and any workflows which have been created in the current project.

9. Windows Pane

Provides access to the windows and plots that have been created in the open project.

Petrel User Interface

When starting Petrel, it displays all Panes along with an empty 3D window as shown in Fig. 2.2 All windows are either docked or float. Double-clicking the window toggles its docking state. If one of the Panes is not shown, it can be displayed from the **View** menu command using **Panes**. On the other hand, if a 2D/3D window is not shown, it can be displayed using the **Windows** Panes as shown in Fig. 2.4.

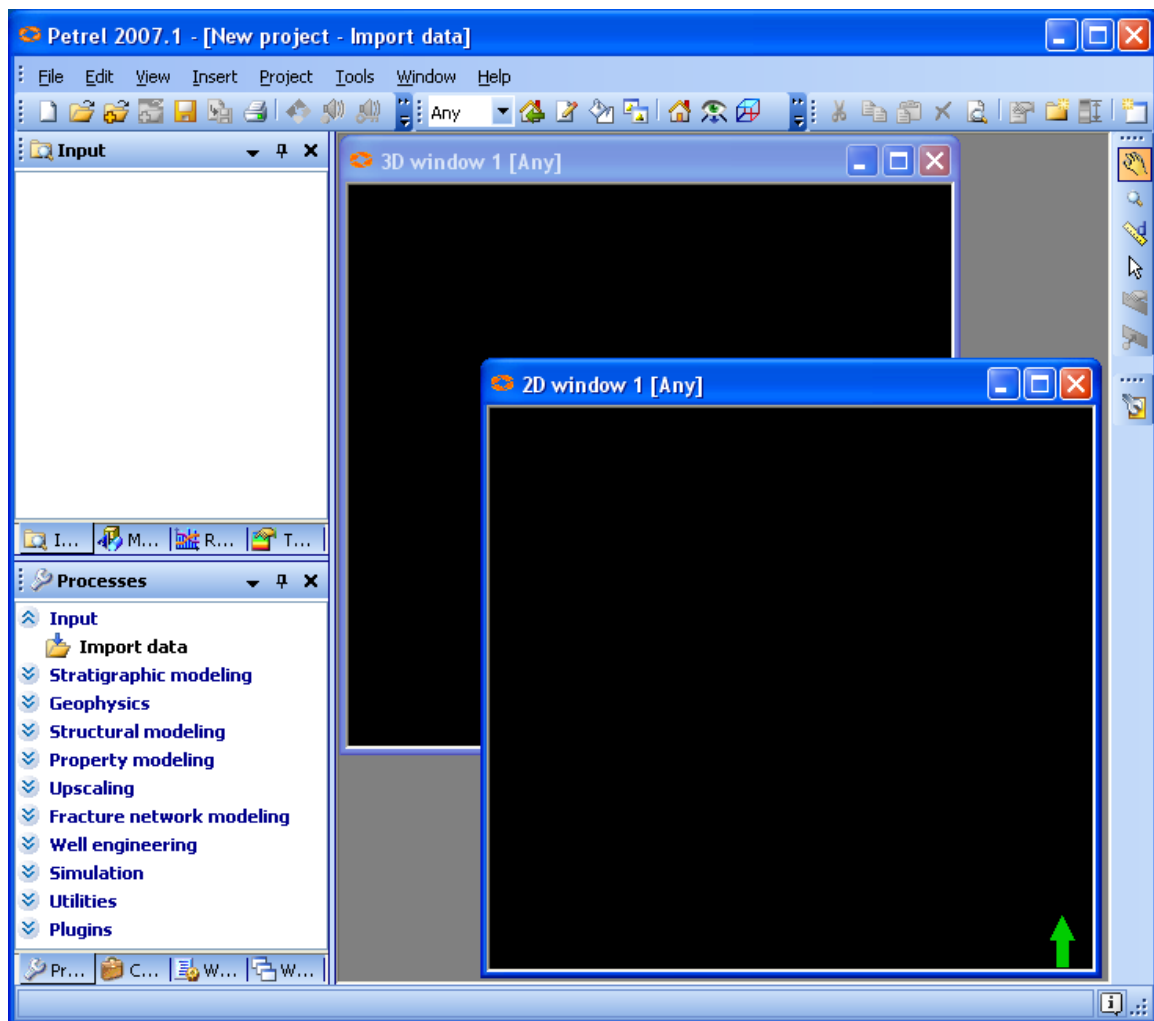


Fig. 2.4: The 2D/3D displayed in the Client Area

Toolbars

The basic toolbars in Petrel are:

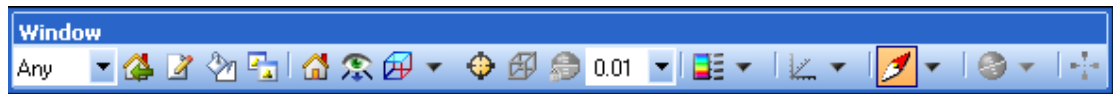
1. File Actions:



2. Edit Actions:



3. Window:



4. Tools:



5. Actions:

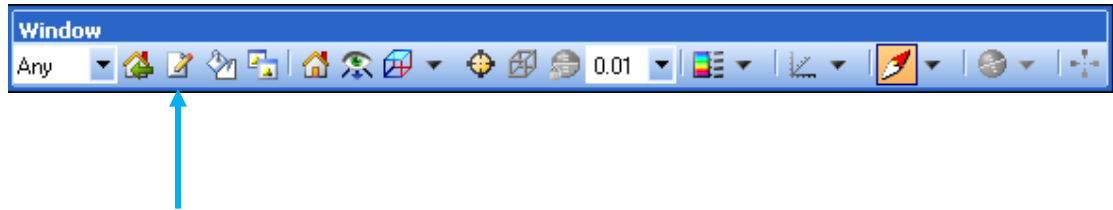


The File actions, Edit actions and Actions toolbars are relevant to the Input Pane and the Process Pane windows. The other two toolbars are relevant to 2D/3D Windows.

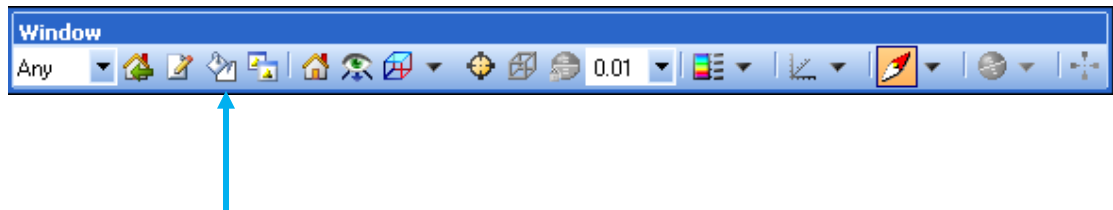
Changing the Background Color of a 2D/3D Window

The color of a 2D/3D window can be changed as follows:

1. Select **Open Window Settings for Color/Name** from the 3D Buttons toolbar as shown in the toolbar below



2. Select the “**Toggle Background Color and Black**” from the 3D Buttons toolbar as shown in the toolbar below



3. Go to **Windows** Pane as shown in Fig.2.5.
4. Double click on the **3D window A** "Settings for '3D Window 1'" dialog box appears as shown in Fig. 2.6. Select the desired color from the **Color** drop-down combo box, and press the **OK** button.

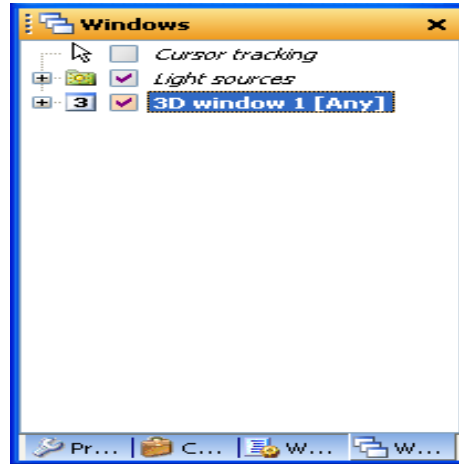


Fig.2.5: Windows Pane form

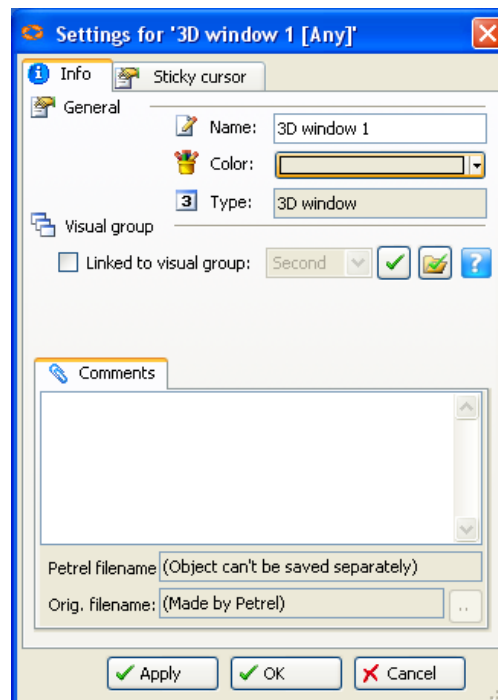


Fig. 2.6: Settings for '3D Window 1'