

# Typical mode of 3D Visualization for 3D Geology Model

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**Abstract:** This paper introduces authors think about 3D GIS visualization to 3D geology model. The author thinks that there are five typical visualization modes to 3d model, i.e. landscape model, lift up cover landscape mode, perspective mode, profile mode and projection mode. In the paper the authors give the five typical visualization mode's cartography principle and example.

**Keywords:** 3D, GIS, Visualization, Mapping

## 0. INTRODUCE

GIS is developing from 2D, 2.5D to 3D and 4D. In 3D GIS, the 3D visualization mode is a key of user entering the 3D world. Many GIS software manufacture is matching to 3D GIS. Theory and technique of 3D complicated model's represent and visualization is still in development. Geology model is a typical 3D model. It needs display 3D relation and inner structure of geology object. Some professional geology software and mine design software systems have provided a lot of 3D model visualization methods and accumulated a lot of experiences in 3D model visualization. Induction and sum-up these 3D model visualization experiences to enrich the 3D cartography theory and 3D visualization theory will have a good guidance to development of 3D GIS. This paper gives author's thinking and practice in 3D visualization of geology model. From author's viewpoint, there are five typical 3D visualization modes. They will be discussed following.

## 1. LANDSCAPE MODE

It is also called bird-view mode. It allows users to

view 3D geology model surface from different position, different horizontal angle and different distance. To improve 3D realization effect, light model and texture mapping are often used to the surface of 3D landscape model. Landscape mode can give user a realization feeling, but it can only show surface of model, without any information of model inside. The example of landscape mode see figure 1.

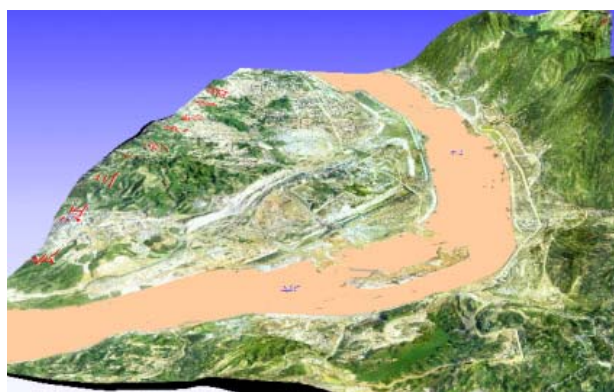


Fig.1 Landscape model

Most 2.5D GIS use this visualization mode. Airscape (photograph made by airplane) can be classified to this mode.

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## 2. LIFT UP OVER LYER LANDSCAPE MODE

It is on the base of 3D landscape. It presumes that user can uncover upper covering layer of the 3D model, to see underlay interface. It is a mutation of landscape mode. By it, user can see inside shape of 3D geology model by layer and layer.

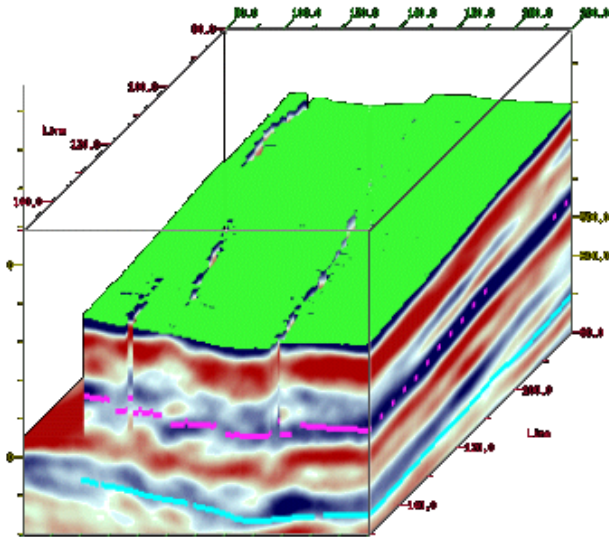


Fig 2. Lift up cover landscape mode

## 3. PERSPECTIVE MODE.

It presumes that user's sight can penetrate some part of geology body to see the inner interface which user interested in the model, seeing figure3, figure4. The interface can be displayed by wire-frame see figure3 or by color 晕渲, see figure 5.

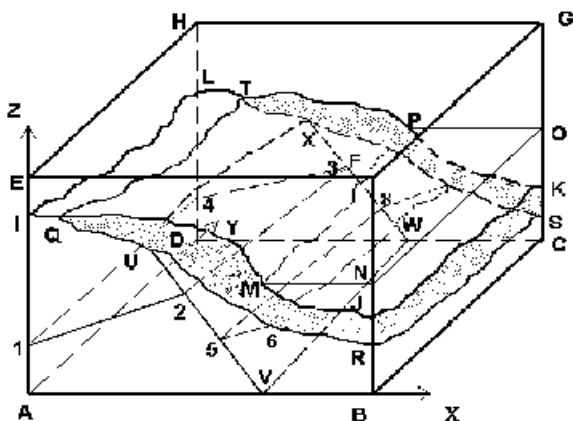


Fig 3 Perspective Mode

Perspective mode is a good method to understand 3D relation of spatial geology objects, but difficult in modifying 3D geology model.

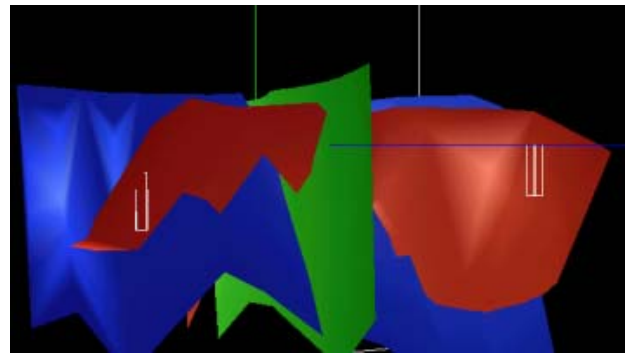


Fig4 Perspective Mode

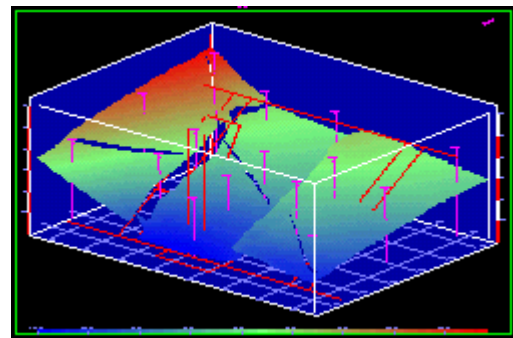


Fig5. Perspective Mode

## 4. PROFILE MODE:

It presumes that user can cut 3D geology model forming a 2D profile (section), to see vertical or horizontal profile of geology model, seeing fig6.

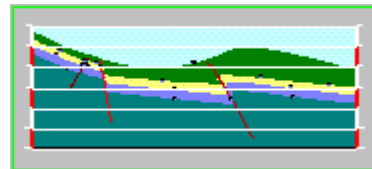


Fig.6 Profile mode

In 2D profile, it is easy to measure and modify shape and position of spatial objects, so it is a good method of expressing and modifying inside structure of 3D geology model. In traditional geology work, geology profile is prototype of this method. By supporting of 3D model and 3D visualization method, profile model can link 2D profile to 3D model, i.e. modifying 2D profile, the result immediately reflected in 3D model.

The profile mode can forms many different combination, such as a series of parallel vertical or horizontal profiles (seeing figure7, figure8), or two group cross vertical profiles (seeing figure 9).

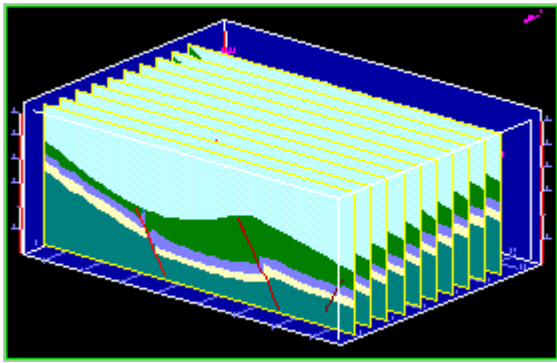


Fig.7. A series of parallel vertical profile

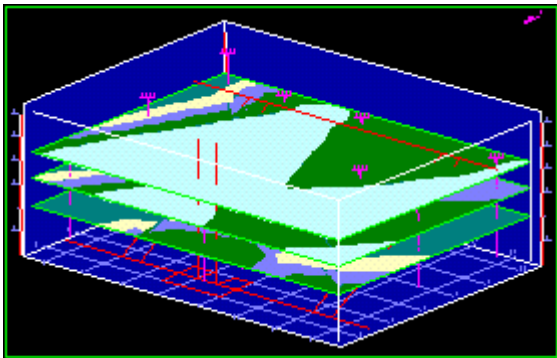


Fig 8. A series of parallel horizontal profile

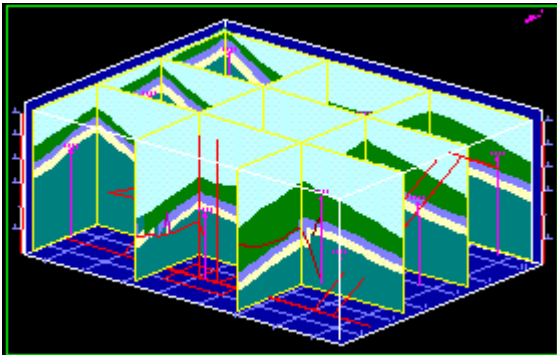


Fig 9. Cross parallel vertical profiles

## 5 PROJECTIVE MODE

Projective contour or intersect line of geology model's interface to horizontal plane or vertical plane. If the lines are projected to horizontal plane, a contour map is formed (seeing figure 10). If the lines are projected to vertical plane, a vertical map is formed.

In traditional geology work, exploration engineering plane map, ore reserves calculation map, mine engineering map and so on, these are prototype of projection mode. Engineers of geology and mine are very familiar with understanding and modifying

3D geology model by contour map. This is a good method to modify 3D model by 2D method.

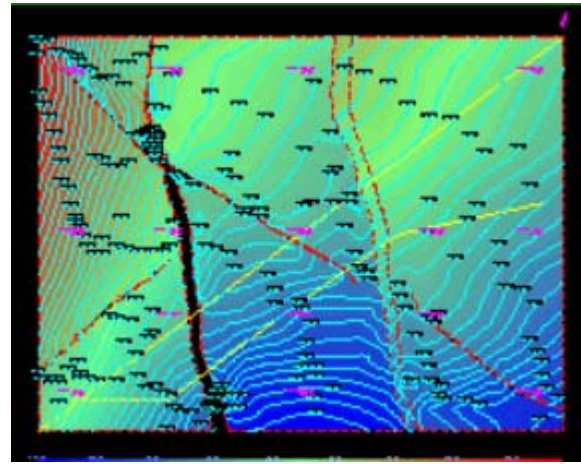


Fig.10 Projection Mode (contour map)

## 6.CONCLUSION

Some excellent geology software systems have many practices in 3D model visualization, 3D GIS should learn from them. The authors think that there are five typical 3D visualization modes in 3D model. Every mode has its characters.

- (1) Landscape mode is typical 2.5D visualization mode, it can only visualize ground surface.
- (2) Lift up cover landscape mode is a variety of landscape, but it let user can see the interface underground.
- (3) Prospective mode let user can see interface which user want to see.
- (4) Profile mode let user can understand, measure and modify 3D model in 2D section.
- (5) Projective mode can understand, measure and modify 3D model by contour line.

## Reference

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