VOXEL BUILDER MODULE

Voxel Builder — a GeoScene3D Module

The Voxel Builder is a specialized add-on module for building voxel models in GeoScene3D. The module is well suited for tasks involving compilation and interpretation or visualization of a variety of data types, and when there is a need for high resolution geological models.

Task examples for the Voxel Builder Module

Geologic models supporting applications in:

- Smart-city development
- Engineering geology
- Groundwater
- Soil contamination
- Surface near water flow in the field of WSUD
- Future climatic assessments

Voxel Builder contains several tools developed to assist the geologist in the modeling process.

Tools have been added to simplify inclusion of infrastructure features into geologic models (e.g., pipelines, roads, buildings). These tools allow easy integration of Geo-Scene3D voxel models into detailed smart-city applications.

3D voxel grids and sizes

Voxel models in GeoScene3D are based on regular 3D grids where each grid cell defines a voxel. Voxels can be assigned to represent different parameters (e.g., lithology, age, transmissivity, porosity), and can be used with models of any resolution. GeoScene3D allows the user to group voxels by value or spatial location, and to customize the model volume and cell size to their application needs.
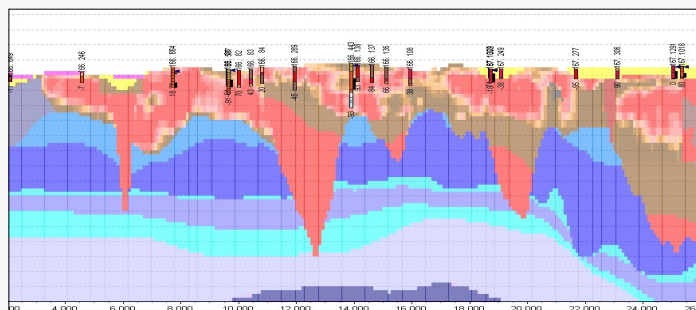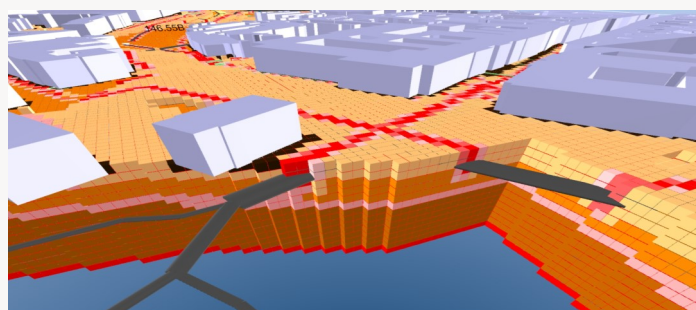
Modeling tools and data

A large number of data types can be visualized and used to select and fill out voxels, including:

- Borehole information
- Geophysical data
- Layer boundaries
- XYZ point information
- 3D grids
- Vector based data (e.g., water pipes, roadbeds and basements)
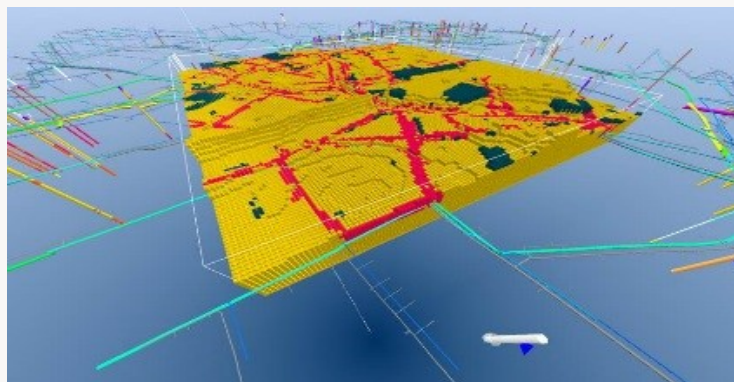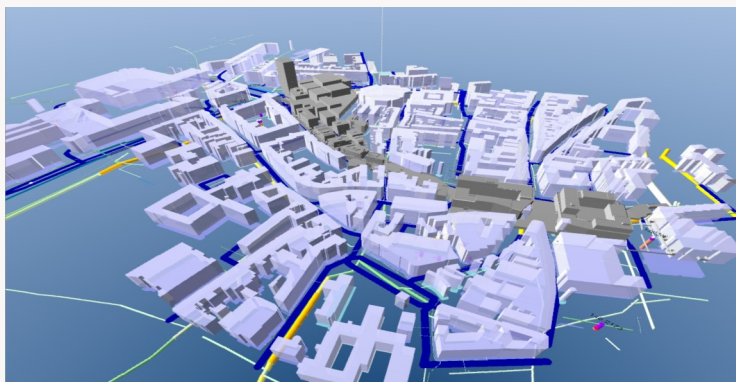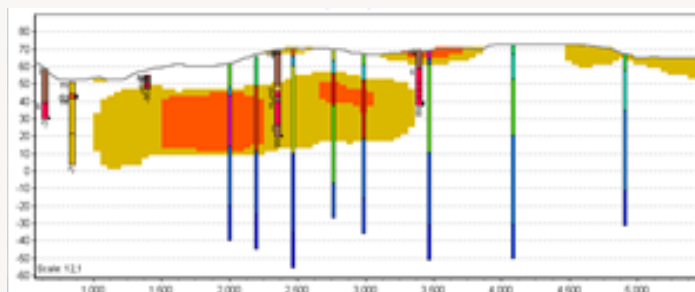
GEOScene3D

Modeling Tools and Data

GeoScene3D simplifies model setup and data import/export are by providing wizards to help the user. The Voxel Builder interface is simple, intuitive and fully integrated with the basic GeoScene3D user interface design.

Profile Polygon Tool

The Polygon Profile Tool can be used to manually select and relabel voxels using the Cross Section View. This tool is particularly useful when interpreting borehole data (e.g., geophysical wireline logs).
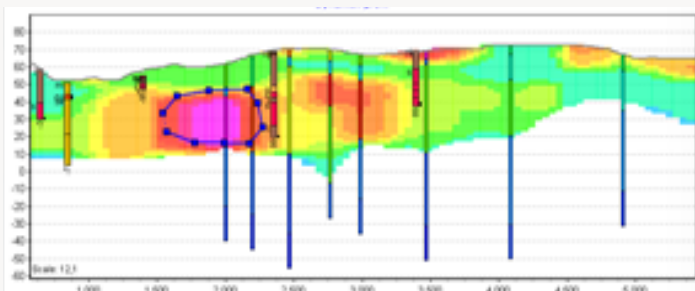
In this example the polygon (dark-blue line with dots) is used to select voxels based on geophysical resistivity (AEM).


Voxel selected in the figure above assigned lithology.

Map Polygon Tool

The Map Polygon Tool is used to manually draw a polygon within a GIS Map View window. In GeoScene3D, these types of polygons can be used for various reasons, including voxel relabeling and voxel grouping.

Layer models to voxel models

GeoScene3D layer models, created with the Layer Builder Module, can be converted to voxel models within the Voxel Builder Module. Layers and polygons (from either Cross Section or GIS Map Views) can be used as limits during assignment of voxel values. The two cross sections, below, show steps in converting a layer model to a voxel model.
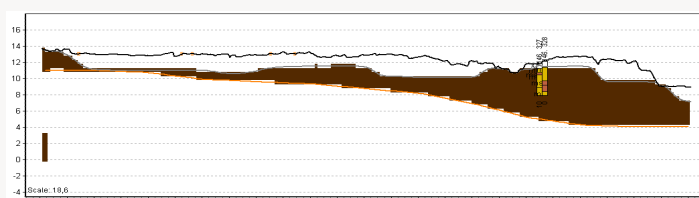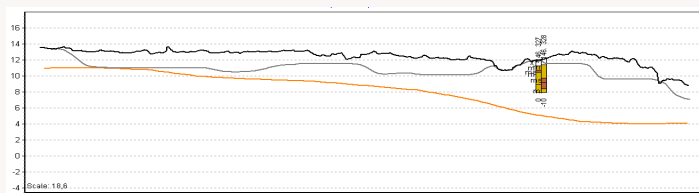
Vector Theme Tool

Shape files can be imported and used as the basis for selecting and assigning voxel values within a voxel model. Feature attributes like pipeline diameter or construction year can be used for either voxel assignment or enhanced visualization.