



**Tutorial**  
**tridicon™ CityDiscoverer**



## The tridicon™ 3D software package

### tridicon™-3D-Suite

Data Preparation

Data Formats

Data Models

Directories

Data Import

Analysis

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Earth View

References

### CityBuilder

#### Data preparation

Viewing and processing of many kinds of geospatial data

### Content Manager

#### Data management

Organisation  
Categorizing  
Preparation of 3D models

### CityDiscoverer

#### Data integration

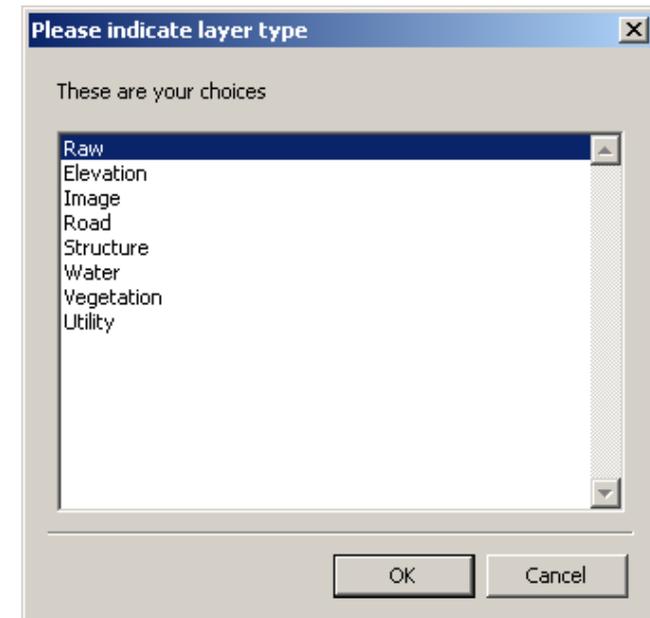
Visualisation of 3D city model

## Using the CityBuilder for data preparation

**CityBuilder** is a tool for viewing and processing geospatial data. It can import a wide variety of data formats, and output efficiently to 3D runtime software such as **CityDiscoverer**.

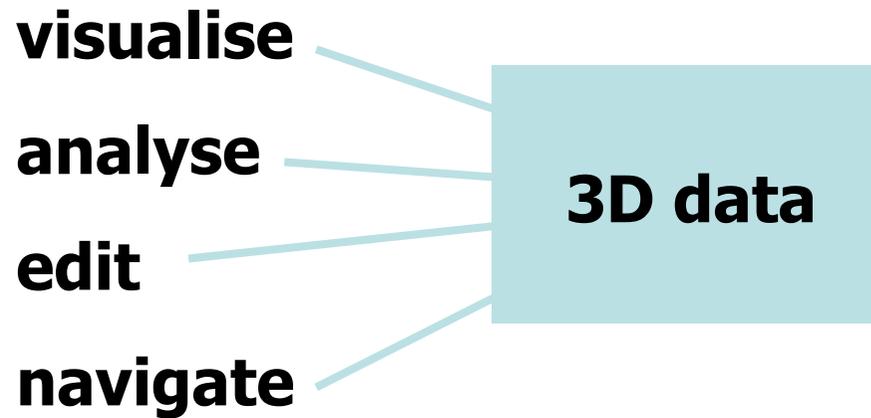
### The usual process is:

1. Acquire raw geospatial data (elevation, road vectors, etc.)
2. Read them into **CityBuilder**.
3. Clean up the data with operations such as bringing it into alignment, extracting areas of interest, merging and resampling, and supplying missing information.
4. Write the data out.



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## tridicon™ CityDiscoverer can



## Data formats

<b>2D data</b>	ESRI SHP, DLG, TIGER, etc.
<b>3D data</b>	CityGML, OP3D, OSG, OBJ, 3DS
<b>Image formats</b>	georeferenced orthophotos, JPEG, TIFF, BMP, PNG
<b>CityDiscoverer formats</b>	VTST RMF      Road data BT        Elevation data LOC       Locations VTAP      Animations

## Data model

### Culture Objects

#### Realworld-Objects

1 road layer  
1 vegetation layer  
n structure layers

### Abstract Layers

#### Non-Realworld-Objects

political boundaries  
property areas  
waypoints  
GPS tracks

### Image Layers

#### Image data

Aerial images  
Orthophotos  
other images like GIS  
raster data  
Logos

## Directories (folders)

Put your data in the following directories:

<b>Data</b>	<b>Location</b>
Built structure data (VTST files) also profiles for linear structures (SHP)	Data/BuildingData
Building models and textures, including facade textures (JPG, PNG, etc.)	Data/BuildingModels
Elevation data (BT and PRJ files) also .ini for elevation tilesets	Data/Elevation
Geospecific images (JPG, TIF, BMP files) also .ini for imagery tilesets	Data/GeoSpecific
Locations (LOC and VTAP)	Data/Locations
Vegetation (species.xml and VF files)	Data/PlantData
Vegetation billboard images	Data/PlantModels
Raw (abstract) GIS files	Data/PointData
Raw (abstract) GIS files Data/PointData Road data (RMF files)	Data/RoadData
Skydome textures (hemispherical)	Data/Sky
Terrain definitions (XML)	Data/Terrains
Whole earth images for Earth view	Data/WholeEarth

## Tutorial data import

Data	Original data format	CityDiscoverer format	Data model
1. Elevation	DEM (ESRI TIN)	BT	<b>Elevation</b>
2. Image data	Orthophotos (TIF)	Tileset INI	<b>Image</b>
3. Structures	Buildings (CityGML) Landmarks (CityGML) Fences (ESRI SHP)	import CityGML → VTST + JPG / PNG	<b>Culture</b>
4. Streets	ESRI SHP	RMF	<b>Culture</b>
5. Streetnames	ESRI SHP	ESRI SHP	<b>Culture</b>
6. Vegetation	ESRI SHP	VF	<b>Culture</b>
7. Raw geometry data	points, lines, polylines, polygons	ESRI SHP	<b>Abstract</b>

## Data import: Elevation

1. start CityBuilder
2. import data  
layer type: elevation  
a Digital Elevation Model (DEM)  
example: ESRI TIN
3. specify projection
4. specify map extent (area tool)
5. merge and resample
6. write out BT file

**Tip:** If you can't get hold of a DEM, prepare a flat TIN which can be used as a base to place your 3D buildings on.

## Data import: Image data

### Images must

- be georeferenced.
- have the same CRS as the terrain.
- be within the size limits of your graphics card.

To add an image layer, **edit** your **terrain properties**. Under the **Texture** tab, under **Image Layers**, double-click to choose from a list of all the image files that are located in any **GeoSpecific** folder on your data path.

## Data import: Image data - orthophotos

### Before you start

start CityBuilder, → load DEM Munich\_Clip.BT  
Layer → import data → Layer type "Image"  
choose all orthophoto TIF files  
→ activate BT layer (click on layer in layer list)  
Area Tool → Set to Layer Extent

→ Project →  
check Preferences

### Tile your DEM

#### Area Tool →

#### Optimized Resample Elevation to Tileset

Choose a filename that contains your parameter settings  
such as Munich\_1024\_21\_13.ini

### Tile your images

#### Area Tool →

#### Optimized Resample Imagery to Tileset

Choose a filename that contains your  
parameter settings  
such as Munich\_IMG\_1024\_21\_13.ini

Number of LODs: 0 is  
best, 8 is the most  
generalized

Spacing of LOD 0:  
resolution should be  
similar to the spacing of  
the existing data (original  
DEM resolution).

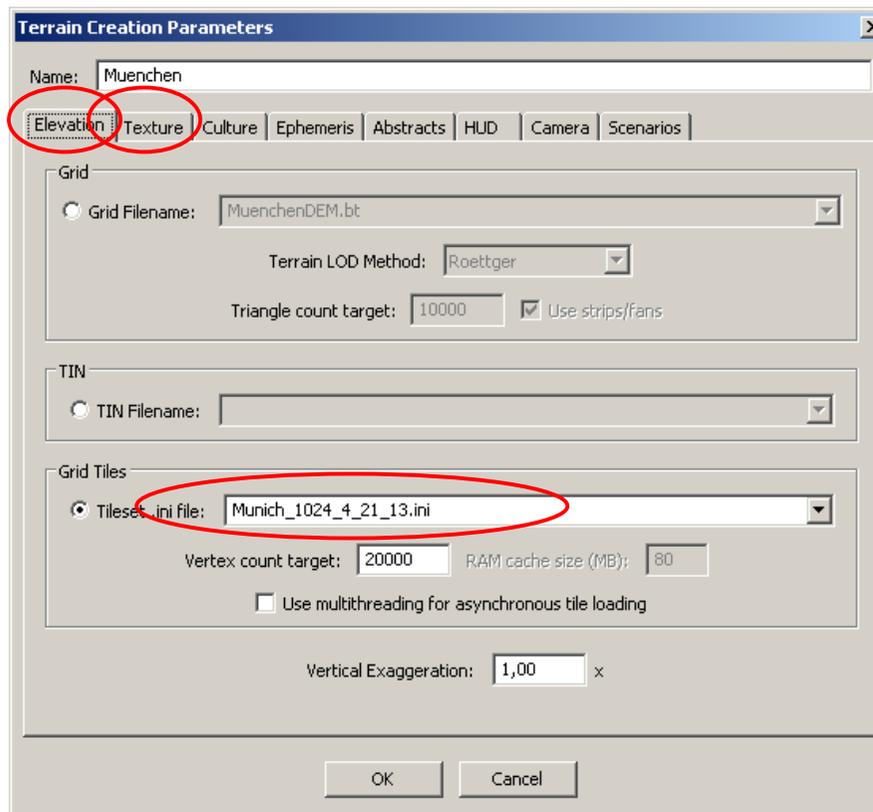
# Image Data: Terrain Creation Properties

## Elevation tab

set tileset .ini file  
 of your DEM  
 Munich\_1024\_21\_13.ini

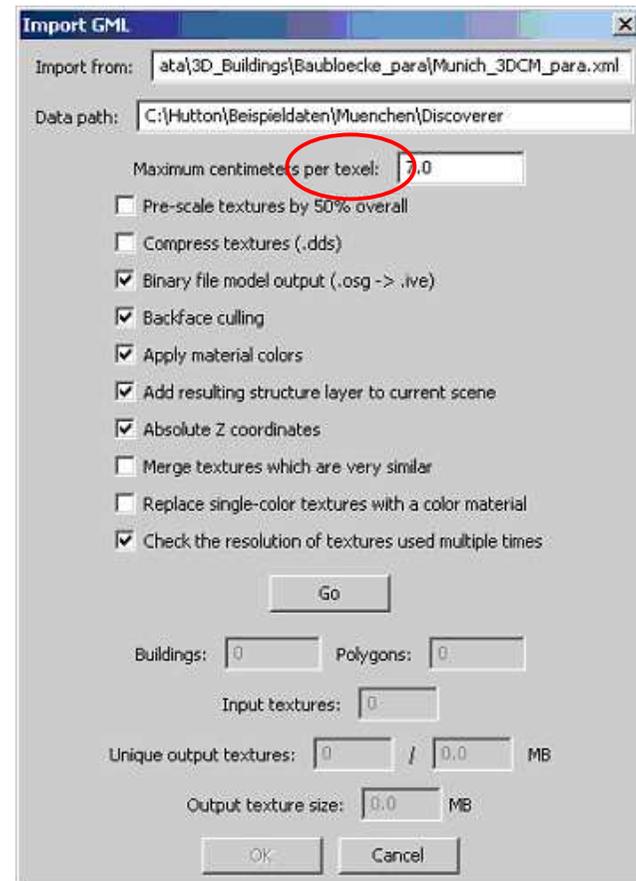
## Texture tab

set tileset .ini file  
 of your images  
 Munich\_IMG\_1024\_21\_13.ini



## Data import: 3D buildings

- tridicon menu:  
import from CityGML  
(XML file)
- import creates
  - a VTST file and
  - a subdirectory  
contains IVE and JPG files



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## Data import: 3D landmarks

- import from CityGML (XML file)
- same procedure as with 3D buildings





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## Data import: linear features

### Examples:

Fences

Walls

Utility lines

## Data import: streets

The extent of your shapefiles generally needs to match the existing DEM or the existing 3D buildings. The same applies to street data. You can crop your street data in your GIS program or you can use the **CityBuilder**.

1. start **CityBuilder**  
load your DEM to set the right projection: → layer → open layer → Munich\_Clip.BT
2. import your street data (ESRI SHP)  
→ layer → import data → roads --> choose MunichStreets.SHP
3. activate your street layer and select all the streets within your elevation data extent
4. → **Edit** → **invert selection** in order to **delete** all selected elements
5. → **Roads** → **clean RoadMap** to merge redundant nodes etc.  
→ select roads and click the right mouse button; set Highway Name from -1 to 1 and Hard Shoulder Width to 0,01
6. → Layer → Save layer as ...  
in you RoadData directory ../Discoverer/Road Data/MunichStreets.RMF

- start **CityDiscoverer**  
→ Edit Terrain Properties  
→ Culture → activate road layer



## Data import: streetnames

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# Data import: Vegetation - Point Data

Types of vegetation data:

- Biotype (polygons)
- Density (polygons)
- Explicit (instances)

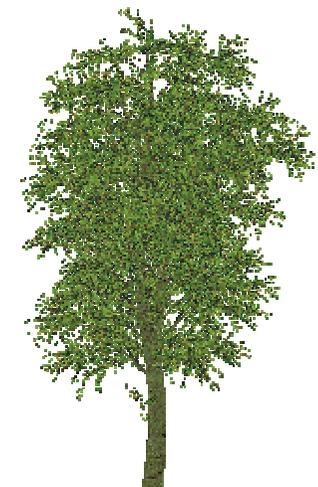
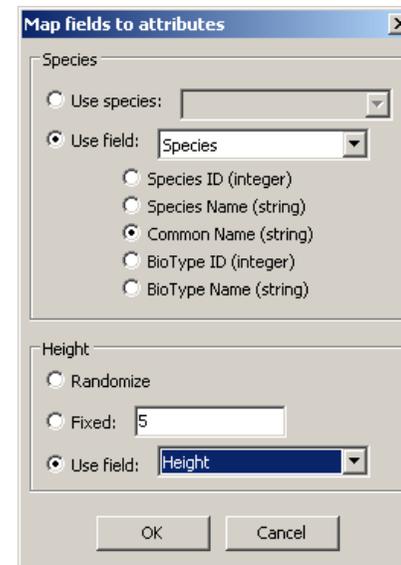
You'll need:

../PlantData/**species.xml**

../PlantModels/**SpeciesPicture.PNGs**

## Point Data

start CityBuilder  
 layer → import data  
 → vegetation  
 choose your TreePoints.SHP  
 save layer to a VF file



## Data import: Vegetation - Polygon Data

### Polygon Data

start CityBuilder

Vegetation → load species.xml

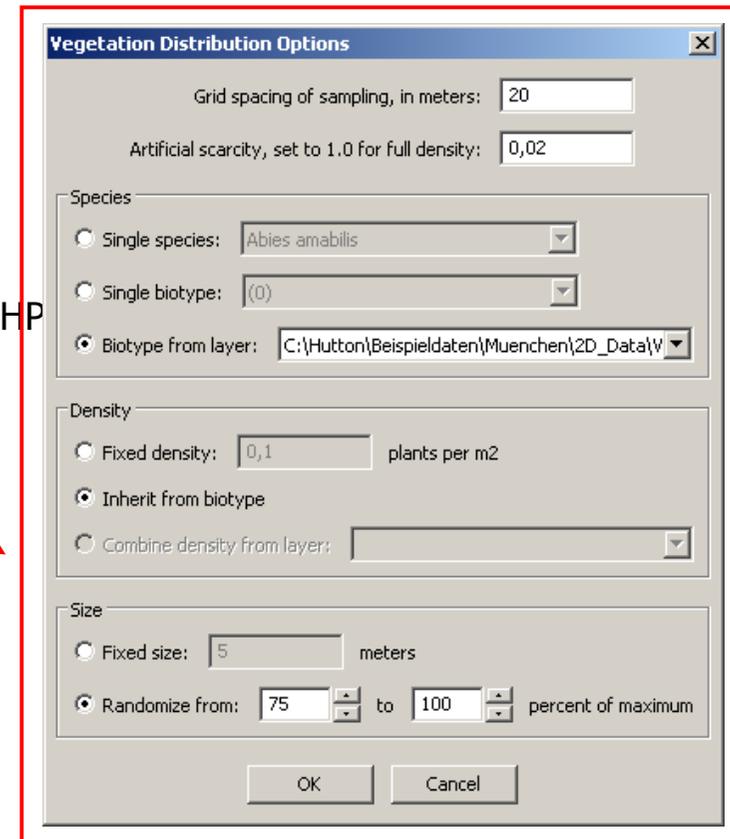
Vegetation → load Bioregions.txt

→ import layer → Vegetation  
 → choose your VegetationPolygons.SHP  
 → specify your biotype field

Area Tool → Set to Layer Extents

Area Tool → **Generate Vegetation**

→ load the produced VF file  
 to check your results



## Data import: Abstract layers

You can load a shapefile with suitable (no) Z-values directly into CityDiscoverer.

A field in the feature attribute table can be used for labelling.

You can remove features from the shapefile but not add features. This affects the original shapefile once you have saved the layer.

Polygons from shapefiles can either be displayed as contours or you use CityBuilder to convert them into flat roofs to give them a structure or a solid colour.

- **Object Geometry**
- **Line Geometry**
- **Text labels**
- **Texture Overlay**

Check that you have copied the directory  
../Culture into your ../Discoverer/.. directory

## Terrain Manager

### Terrain Creation Parameters

<b>Tab</b>	<b>Parameters</b>
<b>Elevation</b>	grid / TIN / tileset (.ini) filename
<b>Texture</b>	no texture / single texture / derive texture from elevation / 4x4 tiled texture / tileset
<b>Culture</b>	plants (VF), roads (RMF), structure files (VTST), shadows, paging
<b>Ephemeris</b>	sky, ocean, horizon, fog, time
<b>Abstracts</b>	abstract layers (style) and image layers
<b>HUD</b>	window overlay, overview map, compass
<b>Camera</b>	navigation, location file, animation paths
<b>Scenarios</b>	define different scenarios, start scenario

## Analysis

- **Find objects by attributes**

You'll find this command in the **Tridicon** menu.  
**CityDiscoverer** will zoom to the selected object.  
Find by street name, landmark name etc.

- **Select objects**

Select / Select Box / Select and Move

- **Measure distances**

Line / Path option

- **Line of sight analysis**

provides a visual indication of whether specific locations in the 3D model can be seen from a selected position or not.

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## Editing

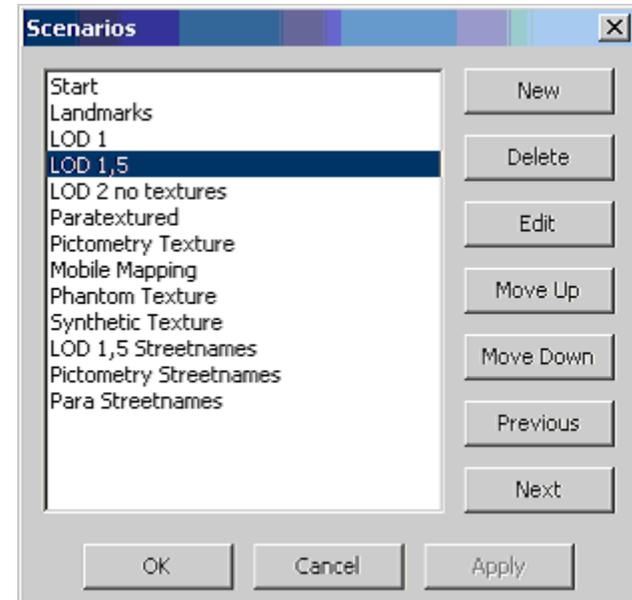
- Create, edit and remove features in existing or new structure layers
- Create a 3D building
- Tools for adding 3D objects
- Move and rotate objects

## Scenarios

**A scenario is a set of visible layers.**

You can switch between these scenarios to show different sets of visible layers:

- to show different planning alternatives
- to show different LODs (para-textured buildings, buildings with pictometry),
- to show different historic states



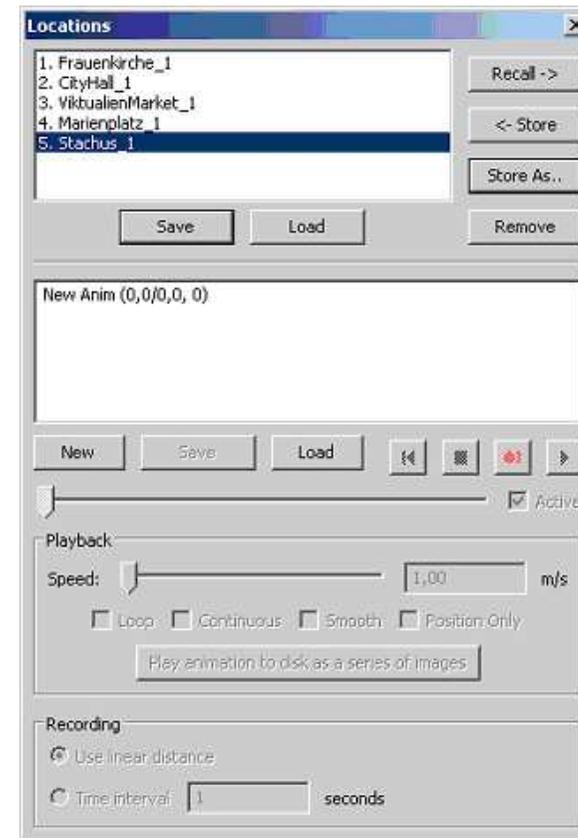
## Snapshots

### Store/Recall Locations

Give your locations names.

Save all your locations in a LOC file in your **Locations** directory.

In your next session you can load the LOC file and recall your locations.

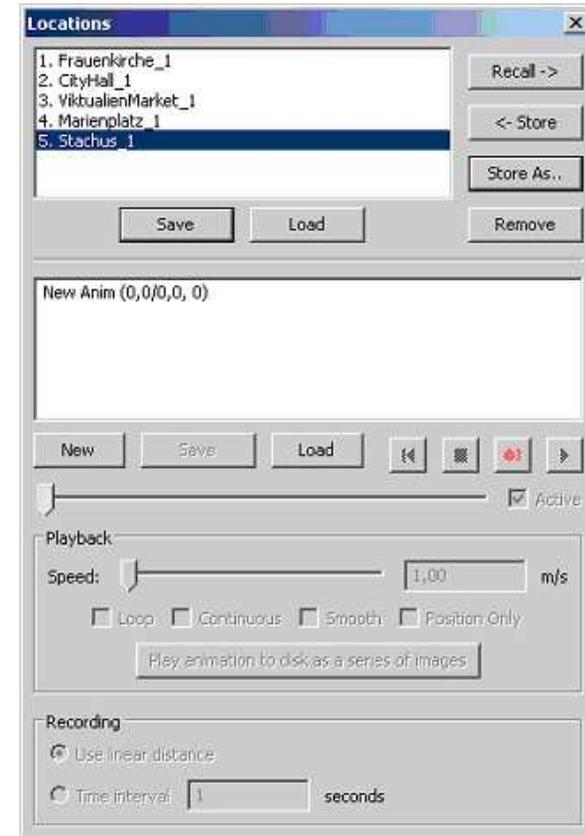


## Animations

### Record Animation Paths

Create a new animation with **New**, then save ordered locations with the red button. After saving your locations **save** the animation path in your **Locations** directory. **Load** animation from there.

By increasing the **speed** you can adjust flight speed to your needs.



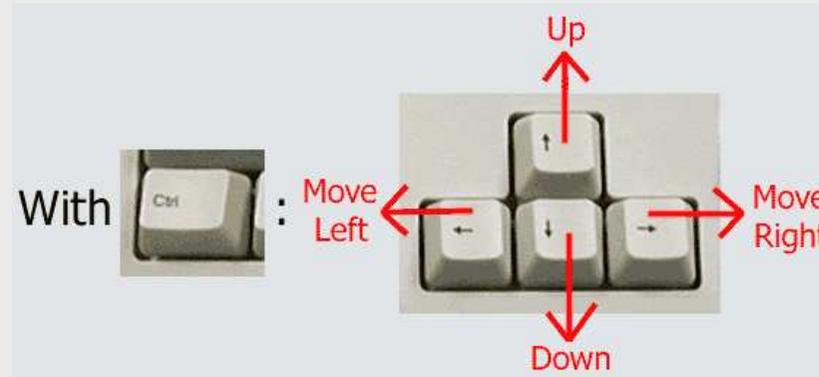
## Keyboard navigation

### Keyboard / Mouse / Joystick

#### Different navigation styles

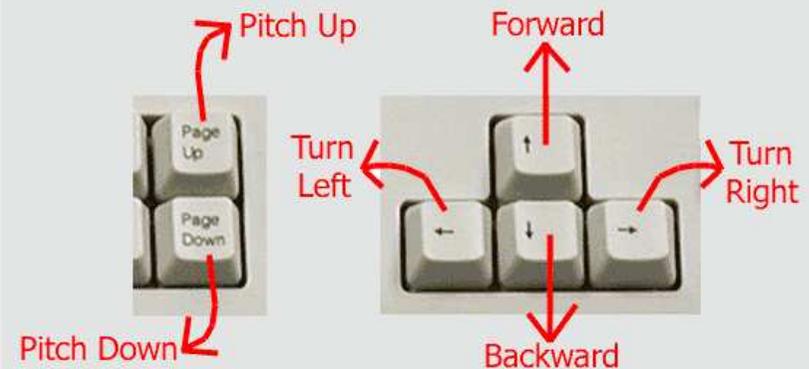
- Fly Slower - Decrease flight speed
- Fly Faster - Increase flight speed
- Maintain height above ground (toggle) - Keeps the camera at a fixed height above the terrain.
- Navigation Style - Choose from several styles of navigation to find one you like.
  - Normal Terrain Flyer
  - Flyer with Velocity
  - Grab-Pivot
  - Panoramic Flyer

## Keyboard navigation



The SHIFT key accelerates all other keys.

Same as with mouse navigation, the 'F'/'S' shortcut keys ("faster / slower") can be used to change speed.



## Earth View

### Show Shading

Shows the earth illuminated by sunlight based on real, current time and date. Alternately, you can show the earth fully illuminated with no shading.

### Show Axes

**Yellow arrow:** direction of light from the sun

**Green vertical axis:** the earth's axis of rotation

**Red vertical axis:** perpendicular to the plane of the earth's orbit

**Green array:** direction of the earth's motion around the sun

### Seasonal Tilt

Toggle: tilt of the earth's axis due to day of the year

**Unfold** → Dymaxion projection

### Load Clouds ...

**Load Clouds from URL ...** <http://xplanet.sourceforge.net/clouds.php>





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## References and further information

<http://vterrain.org/index.html>  
<http://www.vterrain.org/Enviro>  
<http://www.vterrain.org/Builder>

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