



Tutorial

tridicon™ CityDiscoverer

The tridicon™ 3D software package

tridicon™-3D-Suite

Data Preparation

Data Formats

Data Models

Directories

Data Import

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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

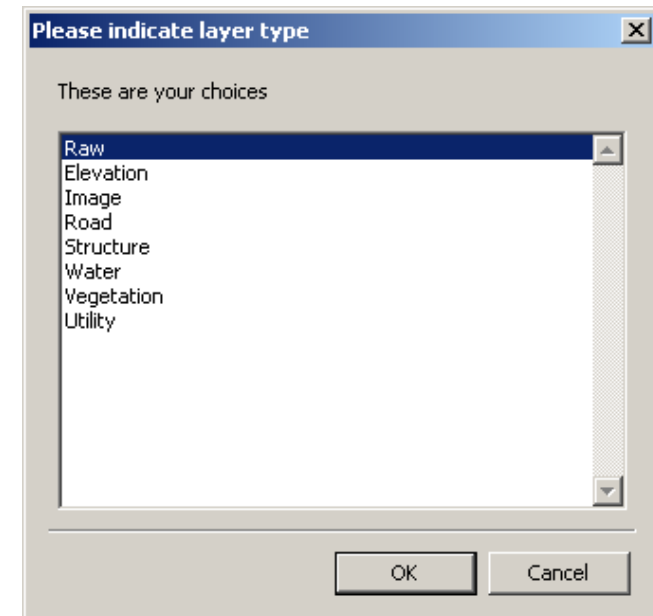
Visualisation
of 3D city model

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**.

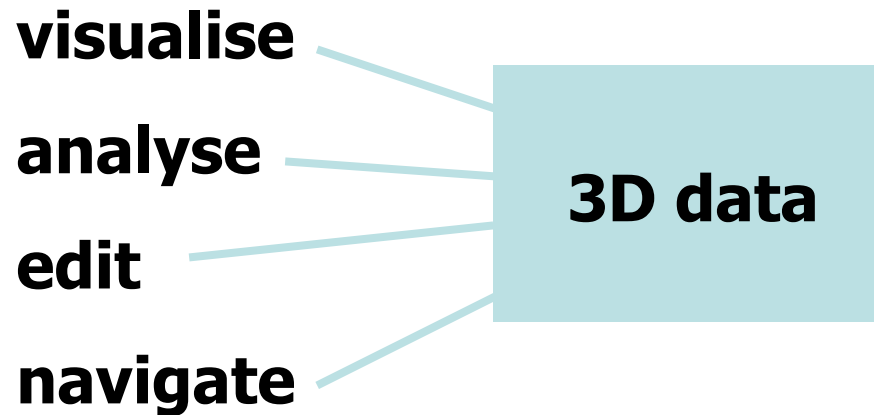
The usual process is:

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



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Data formats

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

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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:

Data	Location
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	Elevation
2. Image data	Orthophotos (TIF)	Tileset INI	Image
3. Structures	Buildings (CityGML) Landmarks (CityGML) Fences (ESRI SHP)	import CityGML → VTST + JPG / PNG	Culture
4. Streets	ESRI SHP	RMF	Culture
5. Streetnames	ESRI SHP	ESRI SHP	Culture
6. Vegetation	ESRI SHP	VF	Culture
7. Raw geometry data	points, lines, polylines, polygons	ESRI SHP	Abstract

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).

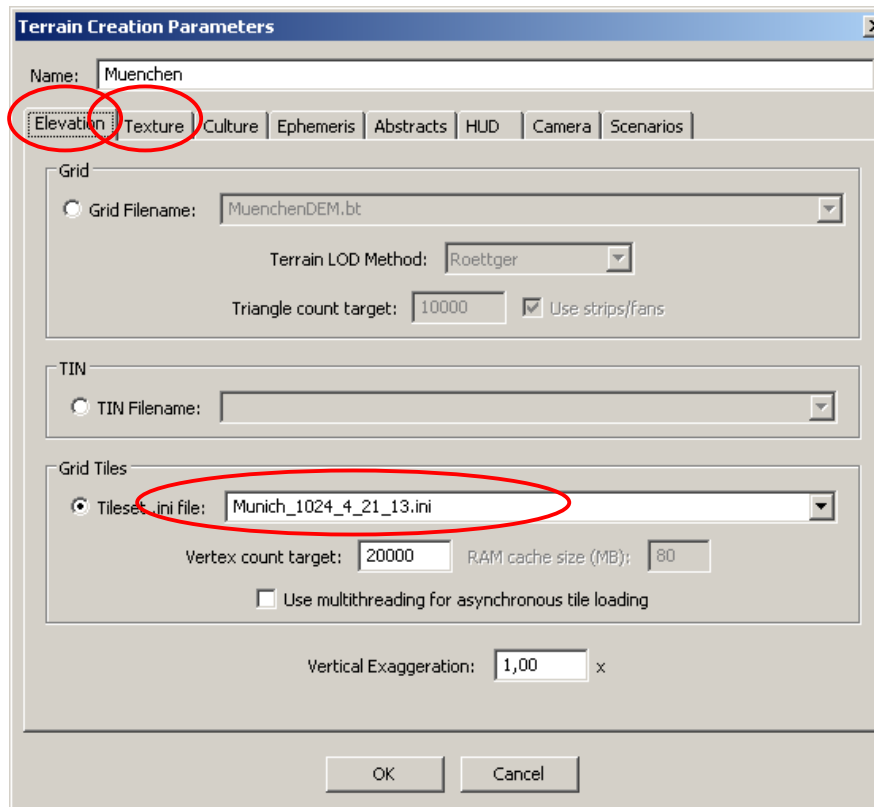
Image Data: Terrain Creation Properties

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



Terrain Creation Parameters

Name: Muenchen

Elevation | Texture | Culture | Ephemeris | Abstracts | HUD | Camera | Scenarios

Grid

☐ Grid Filename: MuenchenDEM.bt

Terrain LOD Method: Roettger

Triangle count target: 10000 ☒ Use strips/fans

TIN

☐ TIN Filename:

Grid Tiles

☒ Tileset .ini file: Munich_1024_4_21_13.ini

Vertex count target: 20000 RAM cache size (MB): 80

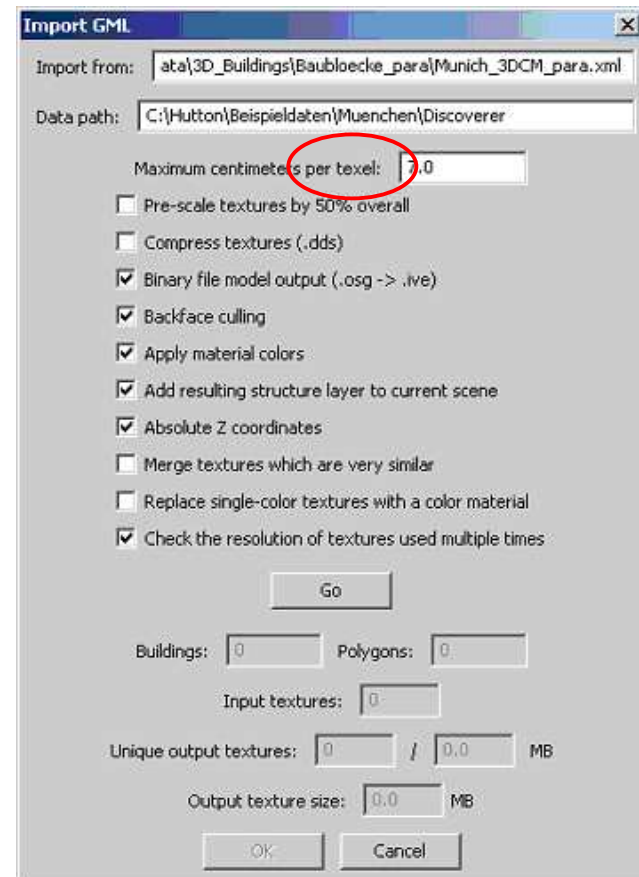
☐ Use multithreading for asynchronous tile loading

Vertical Exaggeration: 1,00 x

OK Cancel

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)

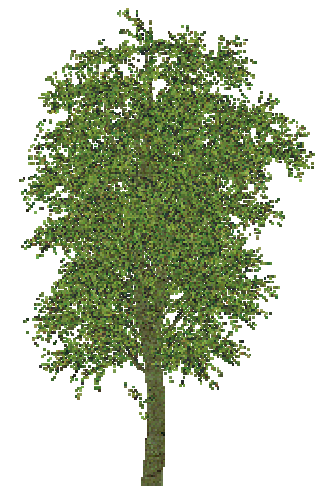
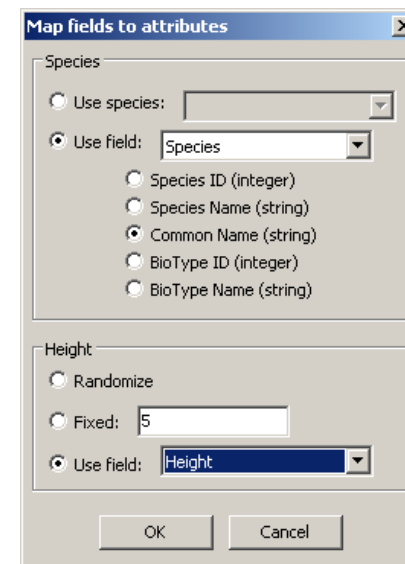
You'll need:

../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

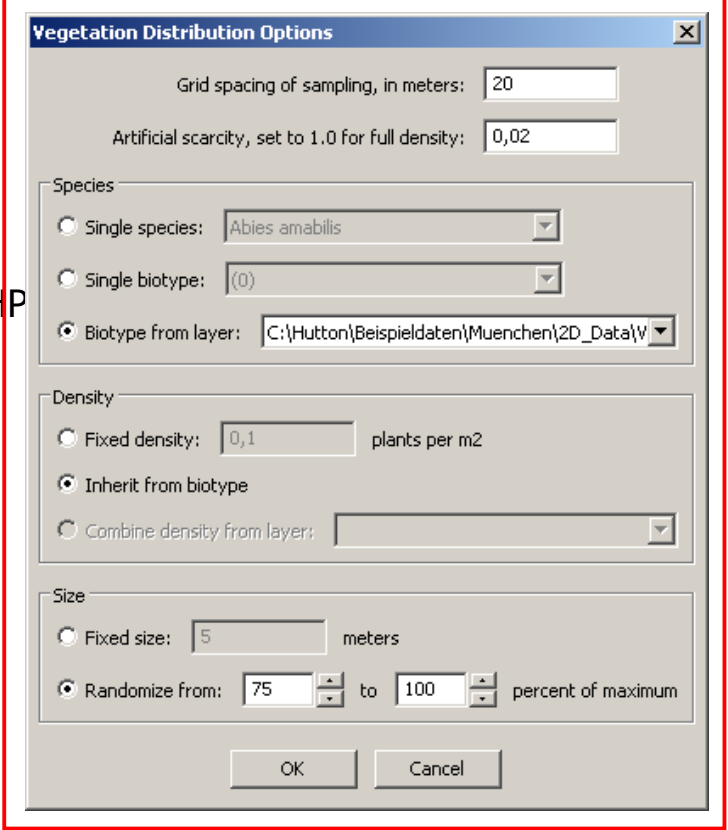
→ choose your VegetationPolygons.SHP

→ specify your biotype field

Area Tool → Set to Layer Extents

Area Tool → **Generate Vegetation**

→ load the produced VF file
to check your results



The dialog box 'Vegetation Distribution Options' contains the following settings:

- Grid spacing of sampling, in meters: 20
- Artificial scarcity, set to 1.0 for full density: 0,02
- Species:
 - ☐ Single species: Abies amabilis
 - ☐ Single biotype: (0)
 - ☒ Biotype from layer: C:\Hutton\Beispieldaten\Muenchen\2D_Data\W
- Density:
 - ☐ Fixed density: 0,1 plants per m2
 - ☒ Inherit from biotype
 - ☐ Combine density from layer:
- Size:
 - ☐ Fixed size: 5 meters
 - ☒ Randomize from: 75 to 100 percent of maximum

Buttons: OK, Cancel

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

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

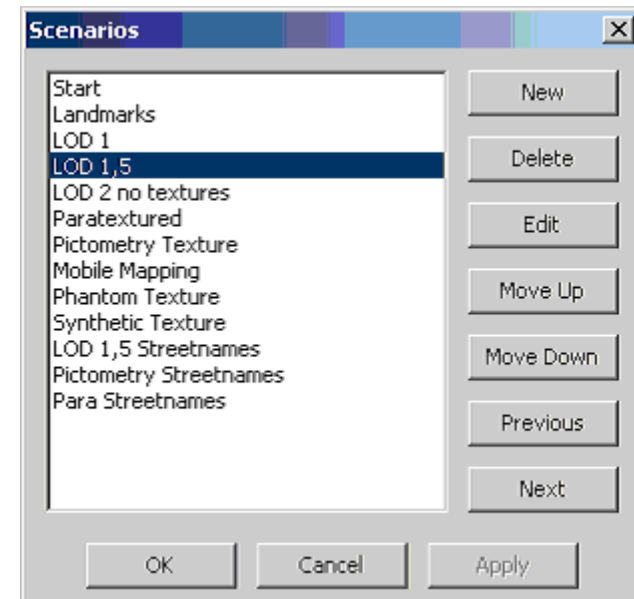
- Create, edit and remove features in existing or new structure layers
- Create a 3D building
- Tools for adding 3D objects
- Move and rotate objects

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.

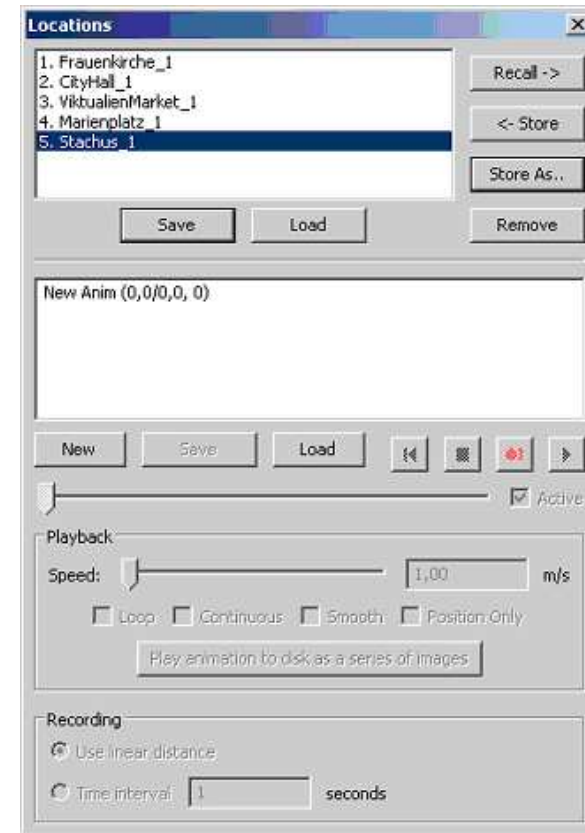


Animations

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

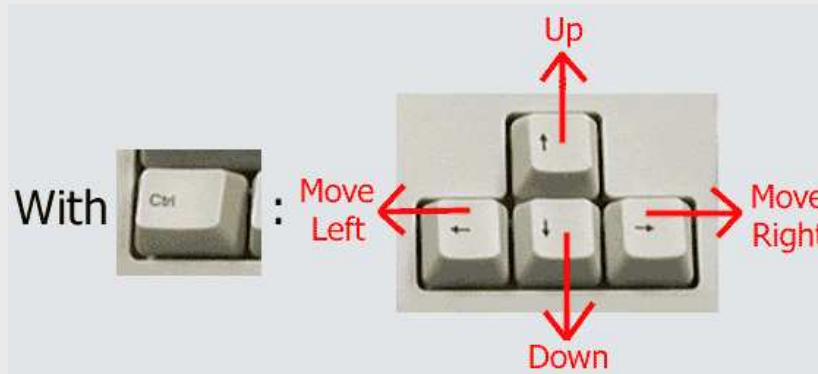
Keyboard / Mouse / Joystick

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

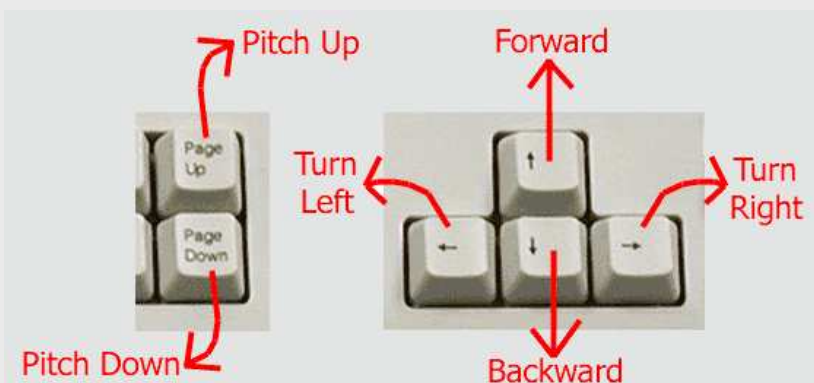
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Keyboard navigation



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>