



gvSIG Desktop 3D Extension





gvSIG Association

Plaza Don Juan de Villarrasa 14-5,

46001, Valencia (Spain)

Registro Nacional de Asociaciones: 596206

e-mail : info@gvsig.com

Web: www.gvsig.com

Web del proyecto: <http://www.gvsig.org/>

Todos los nombres propios de programas, sistemas operativos, equipo hardware, etc. que aparecen en este manual son marcas registradas de sus respectivas compañías u organizaciones.

© 2010 gvSIG Association

Esta obra está bajo una licencia Creative Commons Reconocimiento-CompartirIgual 3.0 Unported (<http://creativecommons.org/licenses/by-sa/3.0/deed.es>)

Usted es libre de:

- Compartir - copiar, distribuir, ejecutar y comunicar públicamente la obra.
- Hacer obras derivadas

Bajo las condiciones siguientes:

- Atribución — Debe reconocer los créditos de la obra de la manera especificada por el autor o el licenciante (pero no de una manera que sugiera que tiene su apoyo o que apoyan el uso que hace de su obra).
- Compartir bajo la Misma Licencia — Si altera o transforma esta obra, o genera una obra derivada, sólo puede distribuir la obra generada bajo una licencia idéntica a ésta.

Entendiendo que:

- Renuncia — Alguna de estas condiciones puede no aplicarse si se obtiene el permiso del titular de los derechos de autor.
- Dominio Público — Cuando la obra o alguno de sus elementos se halle en el dominio público según la ley vigente aplicable, esta situación no quedará afectada por la licencia.
- Otros derechos — Los derechos siguientes no quedan afectados por la licencia de ninguna manera:
 - Los derechos derivados de usos legítimos u otras limitaciones reconocidas por ley no se ven afectados por lo anterior.
 - Los derechos morales del autor.
 - Derechos que pueden ostentar otras personas sobre la propia obra o su uso, como por ejemplo derechos de imagen o de privacidad.

Esto es un resumen del texto legal (la licencia completa) que se muestra al final del presente manual.

Table of Contents

Introduction.....	5
Summary of functionalities.....	5
3D Views.....	7
Working with layers in 3D.....	14
3D object layers.....	20
Table of content.....	26
Remote search services.....	43
Attribution-ShareAlike 3.0 Unported.....	45
License.....	45
Creative Commons Notice.....	50
Introduction.....	5
Summary of functionalities.....	5
3D Views.....	7
Introduction.....	7
Creating a 3D View.....	7
3D view properties.....	8
Navigation Tools.....	9
Bookmarks manager.....	10
Save and retrieve 3D Views.....	11
Full Screen.....	11
Projection Mode.....	12
Stereoscopic view.....	12
Inserting a view in the layout.....	13
Working with layers in 3D.....	14
Introduction.....	14
Adding layers.....	14
Adding raster layer.....	15
Adding vector layers.....	15
Properties of 3D vector layers.....	17
Creating the visualisation cache.....	19
3D object layers.....	20
Load layers of 3D objects.....	20
Create layers of 3D objects.....	20
Save layers of 3D objects.....	21
Editing 3D object layers.....	22
Table of content.....	26
The context menu of the layers.....	27
Properties edition.....	28
Caching of the legend.....	30
3D Symbology.....	31
Extrusion.....	33
Labeling.....	36
Transparency.....	38
Specific Properties.....	39
Layer refresh.....	39
Zoom to layer.....	39



Copy, cut and paste layers.....	39
Working with tables.....	40
Information tool.....	41
Tool selection in view.....	42
Remote search services.....	43
Introduction.....	43
Search in the geodata catalogue.....	43
Search Placenames.....	44
Attribution-ShareAlike 3.0 Unported.....	45
License.....	45
Creative Commons Notice.....	50

Introduction

The purpose of this manual is to instruct the user in the use of the new 3D extension for gvSIG. It is intended here to give an exhaustive and systematic description of the functionalities that the 3D plugging has.

Summary of functionalities

The functionality of the 3D extension can be subdivided into two groups: on one hand new elements that have been added to the gvSIG user interface and on the other elements that were already present in gvSIG but that have been adapted to function from within the 3D extension in a transparent manner to the user.

- New Elements
 - New type of document, the 3D view
 - New type of 3D object layer
 - Properties window of the 3D view
 - Navigation tools
 - Combined navigation (includes the three following controls)
 - Control of displacement or panning
 - Control of altitude (zoom)
 - Control of azimuth and inclination (rotation around a central point)
 - Orientation mode (to the north or free)
 - Complete zoom
 - Menu options:
 - Tool of interactive control of the transparency
 - Option to refresh layer (In the contextual menu of the layers)
 - Properties of the 3D layers.
 - Visualization tools:
 - Visualization settings tool (stereo modes, display type).
 - Projection mode (perspective, ortographic)
 - Fullscreen mode.
 - Wireframe mode.
 - 3D Symbology, 3D objects in points
 - Extrusion legend



The elements shown next are kept the same, although in many cases there have been small modifications done to their codes so they can work in the 2D view as well as in the 3D view (see architecture section).

- Re-used elements
 - Project manager
 - Table of Content (TOC) of the view
 - Tool to add layers
 - Menu option and properties window of the layers, including symbology
 - Tool and window for setting management
 - Information tool
 - Selection tool
 - Tool and windows to search for geodata in catalogue services
 - Tools and windows to search for toponyms in nomenclator services
 - Menu options of the application
 - Project file (new, open, save)
 - View (console, project manager)
 - Layer
 - Erase selection
 - View attribute table
 - Window (same options are kept)
 - View
 - Add layer
 - Navigation (in addition to the tools described above):
 - Zoom to selection
 - Bookmark manager
 - View (3D) properties

- Contextual menu of the layers:
 - Rename
 - Change colour (for vector layers)
 - Properties
 - Raster and remote services properties (only read)
 - Zoom to layer
 - Delete layer
 - Cut / copy / paste layer

3D Views

Introduction

The 3D extension for gvSIG adds a new type of document called 3D View. In many ways, this new type of document behaves as the normal views.

Creating a 3D View

Once the 3D extension is installed in the gvSIG Project Manager, two new types of documents will show up, 3D View and Animation. All the options of the Project Manager can be applied to these types of documents: create a document, open, rename, delete and show properties. To create a new view, simply click on the button "New".

In this section the "3D View" document will be explained



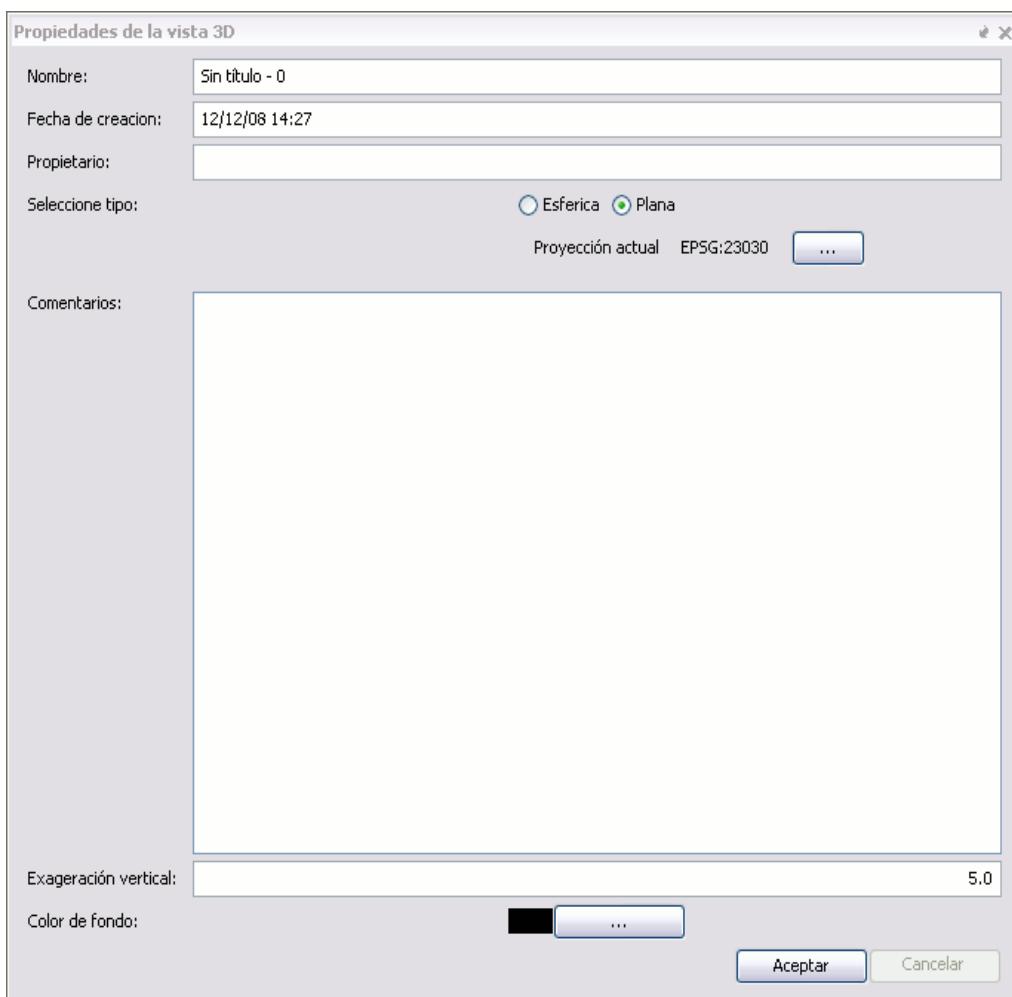


Project Manager

It is possible to create multiple 3D views and to work simultaneously with the other types of gvSIG documents: 2D views, tables and maps.

3D view properties

The 3D view is different from the normal 2D in that some of the properties must be initially specified and cannot be changed later on. Because of that, once a 3D view is open for the first time (by clicking on the "Open" button of the Project Manager or double-clicking on the view's name) the properties window of the 3D view will pop-up open.



Properties of a 3D view

Spherical and Planar Views

In the properties window there is a property, proper to the 3D view that specifies if the view is of the planar or spherical type. This property is defined at the moment of opening the view for the first time and it cannot be changed posteriorly. In a spherical view the data is visualised over a planetary ellipsoid, whereas in the planar view the geographical coordinates are visualised over the XY plane and the elevation along the Z axis.

In the planar 3D view it is possible to define the coordinate system. If we click in the button labelled as "Current Projection", it will be possible to select the projection we would like for the planar 3D view. On the other hand if we select the spherical or planetary view, the view will have by default the coordinate system WGS84 (projection 4326).

Vertical Exaggeration

Another of the properties specific to the 3D view is the vertical exaggeration factor. The elevation values will be multiplied by that factor at the moment of performing the visualisation, so that the elevation values stand out more or less. This value can be changed any time.

Background colour

In the case of the 3D view the background colour is applied to the background space where the planetary globe or planar view is visualised. This value can be changed any time.

Navigation Tools

In the gvSIG 3D plugging offers simple navigation tools. When the 3D view is active, the navigation tools can be found in the application tool bar or in the View menu.



Navigation Controls

These tools function the same way in the spheric and planar views.

Displacement / panning



This tool allows the user to displace the anchor point over the terrain surface or in other words, to move the surface in the 3D view.

Altitude control / zoom



Once this tool is active, the user could change the altitude with respect to the anchor point in the surface, by left-clicking and dragging the mouse up and down. This effect is more or less similar to the zoom in the 2D view.



Azimuth and inclination control (tilt and rotate)



When this tool is activated, the user can pivot around the anchor point over the surface. The horizontal displacements with the mouse control the azimuth (if the North-up orientation mode is not active) and the vertical displacements control the inclination.

Combined navigation



When this tool is selected, which is in fact the default active navigation tool, the three previous actions can be combined as follows:

- Left button of the mouse controls the displacement / panning.
- Middle button controls the azimuth and inclination.
- Right button controls altitude / zoom.

North-up orientation mode



When this mode is active (the red line disappears in the icon) the view is always oriented with the geographic North at the top of the view. This allows, for example to displace or pan without loosing the orientation.

Full Extent



When this tools is activated, the view will show the entire geographic space or globe.

Bookmarks manager



The Bookmark Manager Tool can be found in the tool bar and also in the View menu. Once this tool is activated it will open the Bookmark which is identical to the one used in the normal (2D) views.

By using this manager, actual positions within the 3D view can be saved with names and can be retrieved to be used within the same 3D view or others views defined within the project. These bookmarks however, are kept separate from those saved from within the 2D views.

Save and retrieve 3D Views

To save the content of the 3D views simply use the menu option File/Save Project or the corresponding tool in the toolbar. When the project is saved in a .gvp file all the properties corresponding to 3D view are stored in that project file. In the project it is also saved the bookmarks list defined for the 3D view which could be used in posterior sessions.

To retrieve a project where there are saved 3D views, it is only necessary to use the File/Open Project menu or the corresponding tool. The 3D views will be restored to the position in which they were saved, including the layers and extent.

Full Screen

The tool to set full  screen can be found in the toolbar when a 3D view is active.

This tool is used to set the contents of a specific 3D view to full screen. It has been implemented inside the 3D extension so it can be used for presentations and shows. This tool is the perfect complement to the stereo one since by combining both they can be used to look at 3D views in virtual reality immersive systems.

Tool Options:

- Synchronize cameras: If this option is selected the cameras from the gvSIG views and from the full screen are synchronized. This is option is used when there is an animation running over the 3D view, this way the full screen view moves with the animation.
- Screen selection: By activating this option the user could select in which screen to visualize the full screen. This is useful when the user has more than one monitor.
- Window Mode: It is used to show the view in window view only. This will show only the interior of the 3D view (without the TOC or the locator).
 - Origin position: It shows the position of the upper left corner of the window.
 - Resolution: It shows the width and height of the window.
- Enable Philips WOW display stereo mode: Configures the fullscreen mode for the visualization on Philips autostereoscopic displays.

Note: The full screen mode duplicates the 3D view that gvSIG is using. This causes a drop in the system performance if there is no sufficient memory and graphics hardware available.



Projection Mode

The projection mode tool can be found in the toolbar when a 3D view is active.

This tool is used to change the way in which the 3D graphics are projected (it has nothing to do with the view or layer projections). In other words, the 3D views can be projected basically in two ways: orthographic or perspective. This tool changes between these two types of projections.

Note: When the orthographic mode is active it is not possible to zoom in the view. There are only the options of panning or rotating.

Stereoscopic view

The stereo tool can be found in the toolbar when the 3D view is active.

This tool is used to activate or deactivate the stereo in the view. It is made up by the following options:

- Stereo visualisation: Indicates the stereo mode to create the stereo.
Stereo types:
 - None.
 - Anaglyph.
 - Horizontal interlacing.
 - Vertical interlacing.
 - Horizontal Split.
 - Left eye.
 - Right eye.
 - Quad buffer.
- Interocular Distance: Distance between the eyes. Usually between 0,06 y 0,055.
- Screen type: Screen over which the stereo content will be visualised.
Options:
 - Monitor.
 - Head-mounted display.
 - Powerwall.
 - Virtual reality centre.

- Distance to screen: Distance from observer to the screen.
- Fusion distance increment. Modifies the fusion distance used to in the stereo calculation.

Inserting a view in the layout

The steps to follow in order to insert a view in the layout are the following (assuming one or several 3D views):

- Create a type of map document.
- Click in the insert 3D view button  in the layout.
- Move the 3D view to adjust as desire.

Note: Unlike the 2D view of gvSIG, in order to adjust the 3D view in the map it is necessary to move the view itself. If the adjustment is done on the inserted view in the map, there will be no effect over the view.



Working with layers in 3D

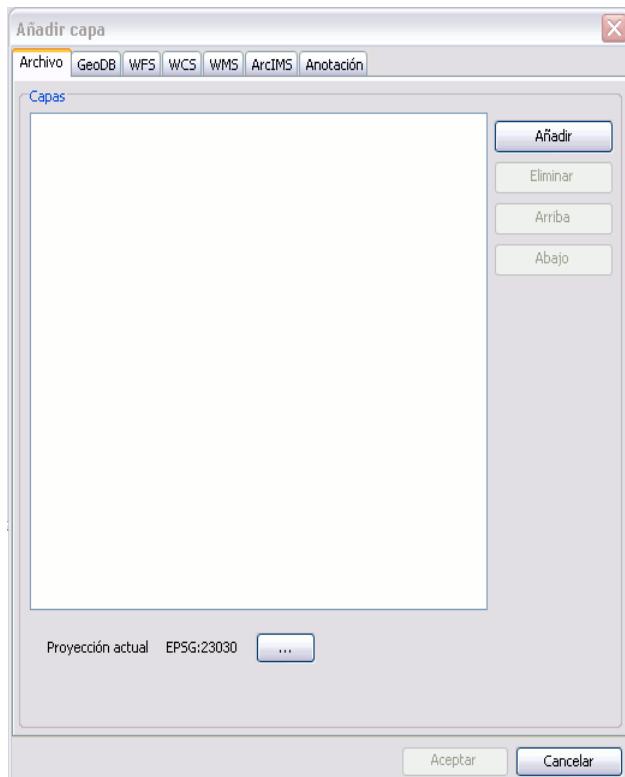
Introduction

The layers of information in the 3D views are exactly the same as in the normal views, thus the way to work with them is the same.

In the 3D extension a new layer type has been added. They are called 3D objects. These layers contain objects tridimensional modelled. Their functioning will be explained later on.

Adding layers

The same tool “Add Layer” used in the normal views to add layers is used in the 3D views, using the same data source types. The window to select the layers to be added is exactly the same:



Adding layer window

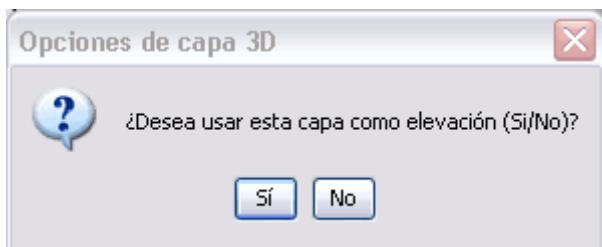
Adding raster layer

The data sources providing information of raster type are raster files and the WMS, WCS and ArcIMS Map services. The 3D views allow representing the raster data in two ways: as images (flat over the terrain surface) and as elevation (defining the terrain relief).

The 3D extension offers to the user the option to represent a raster as elevation in the following cases:

- For raster files, when they only have one band (normal situation with digital terrain models - DTM's).
- For WMS services, when the TIFF or geoTIFF formats are selected. In the case the raster is to be used as elevation, it would be necessary to choose a style allowing for those values, usually indicated as "integer", "unsigned int", or 16 (or more) bits per pixel.
- For WCS services, when the GEOTIFF_INT16 is selected and there are no parameters (bands) selected.

In the case that is possible to use the raster as elevation the following dialog will appear:



Loading option dialog of layer as elevation layer.

Only one elevation layer will accepted in each 3D view. If the user tries to add additional layers to the view the following message will appear:



Control of additional elevation layers dialog.

At the moment gvSIG is able to reproject rasters, therefore there should not be any problem using layers with different reference systems to the view.

Adding vector layers

The data sources that can provide information of vector type are the vector files (SHP, DWG...), the vector databases and the WFS y ArcIMS Feature services.

The 3D views allow representing vector data in two ways: rasterised, as images glued over the terrain surface, and as three dimensional objects. The 3D extension offers the user the two options for all the mentioned data sources, although the results obtained with the ArcIMS Feature Service is not



adequate for representation as 3D objects given how it draws this type of layer.

When the user adds a vector layer to the view the following dialog will show:



Vector layer options.

When the rasterisation option is deactivated to represent the vector data as objects in 3D, the elevation values (Z component) given by the geometry of the data can be used. If this option is selected and the geometry does not contain Z values, it will default to zero. This can complicate the visualisation in 3D since the terrain surface will mask the data.

Because of that, if the vector data does not contain elevation it would be better if the user assigns an elevation value in meters using the entry field in the lower part of the dialog.



Example: Capture of layer with rasterised polygons in Europe.

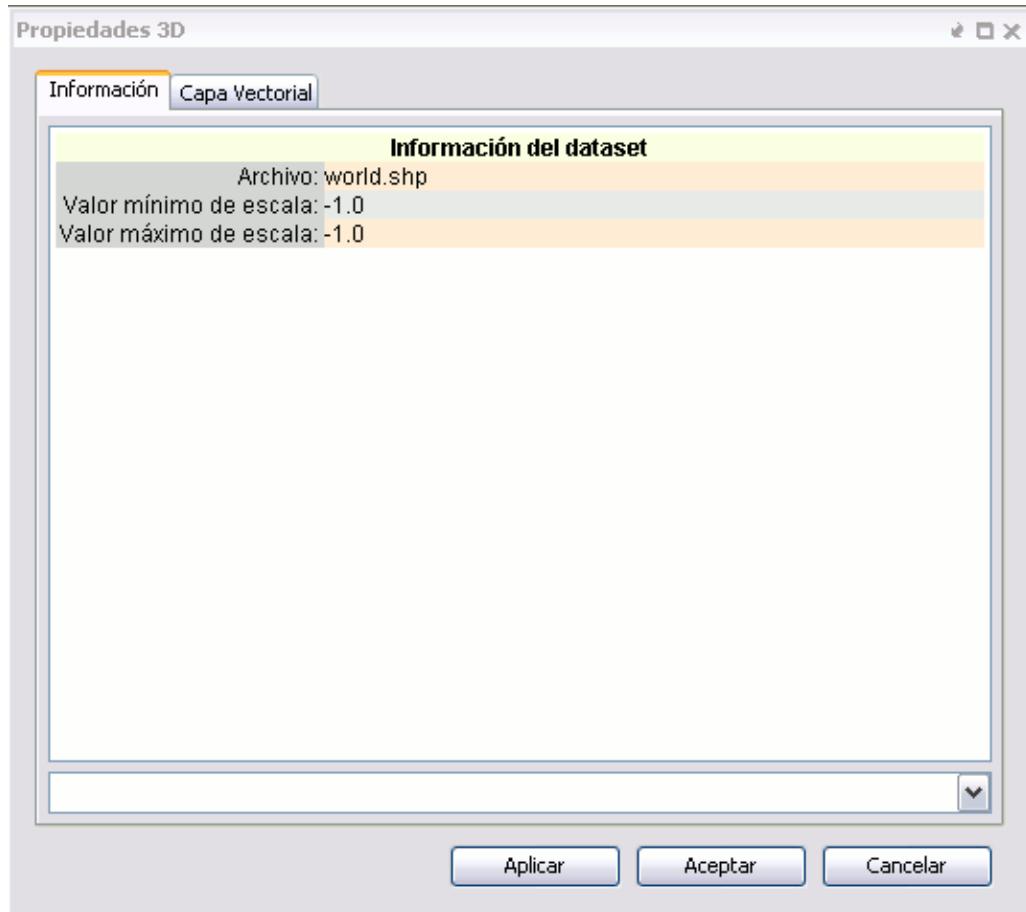


Example: Capture of layer with un-rasterised polygons in Europe.

Properties of 3D vector layers

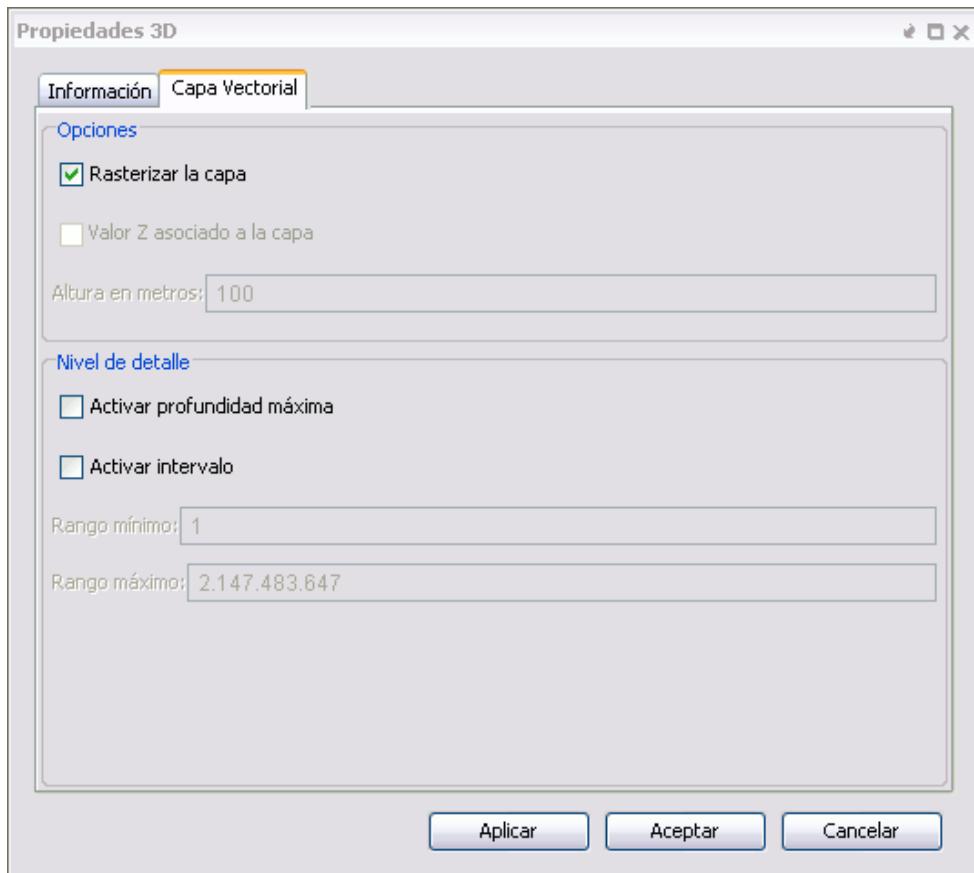
As it was shown in the previous section, it is necessary to indicate in which way the vector layers will be represented in the 3D view. It is possible to change the type of representation by using the 3D properties of a layer.

If we go to the TOC and right-click over the vector layer, a context menu will appear. We will select “Propiedades 3D” and the following dialog will show up:





If we go to "Opciones" in the "Capa vectorial" tab, we could modify the way to represent the 3D layer.



In the same windows we could see there is another section "Nivel de detalle" and there are several other related options:

- *Activar profundidad máxima*: This option calculates the maximum depth to which the layer is valid and does not continue subdividing.
- *Activar intervalo*: This option indicates over which subdivision interval the layer is visible.

Creating the visualisation cache

Once having added layers, either as images or elevation layers it should be noted that data takes some time to become visible at their maximum resolution. This happens because the 3D extension creates a multi-resolution representation of the layer in the local hard drive which is used for quick visualisation of the data at different scales. This visualisation cache is actually stored in the local folder gvSIG\.\data\cache\Earth within the user's root directory.

The first time data is visualised or when the scale or the view is changed, the cache generation process is executed automatically. The speed of the cache creation will depend on the speed to access the source (it will be much slower for remote services) and the complexity of the data (e.g., vector quantity). Once the cache is created, panning within the same area will render fast and interactive visualisation. However, if the properties of the layer are changed and they affect the existing cache, this will be recreated automatically.

There is a way to force a cache to be invalid (See the "Refresh Layer" section).



3D object layers

Load layers of 3D objects

The layers of 3D objects are loaded in the same way that layers are loaded for a vector or raster file.

In the dialog of add layer from file, click on the add button and under "Select file type" select *GvSIG OSG Driver*

The formats of 3D object layers that GvSIG can load are files of type .osg and .Ive.

To learn how to generate those formats refer to the section *Create layers of 3D objects* and *Save layers of 3D objects*.

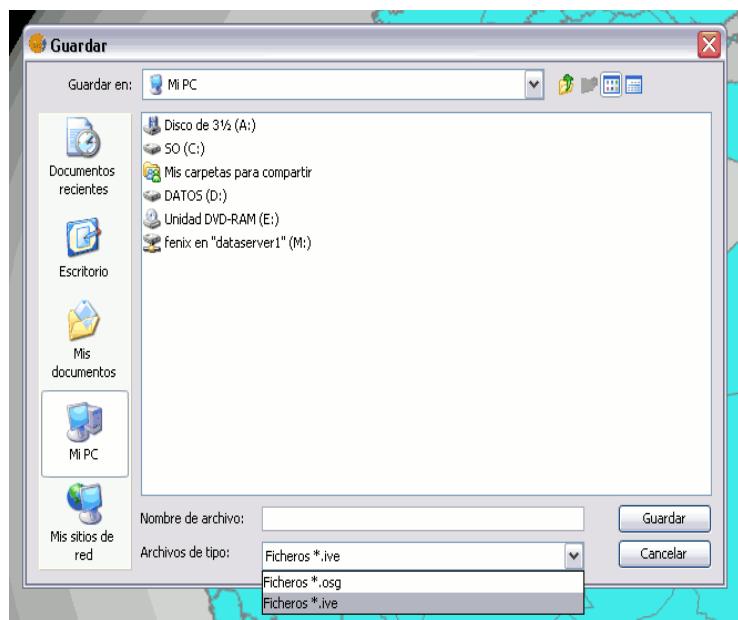
Create layers of 3D objects

The tool to create 3D object layer can be found on the toolbar when a 3D view is active.

When you click on the create 3D layer button, a new layer of vector type is created immediately and a message appears indicating that the layer has been automatically set to editing mode.

Save layers of 3D objects

The tool to save layers with 3D objects  can be found in the toolbar when you select a 3D objects layer in a 3D view and is also it activates the editing mode of that layer. If we click on it you will get the following dialog box, where we can select the path and file format (*.osg or *.ive) in which we want to save the layer.



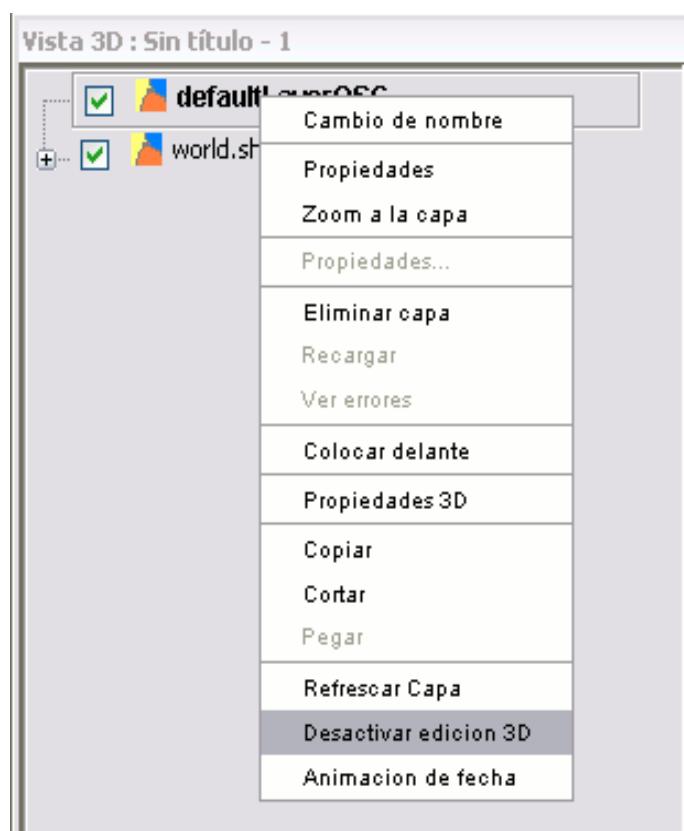
Note: The file format *.osg is an ASCII type while the file format *.ive is a binary type.



Editing 3D object layers

Enabling/disabling editing of 3D object layers

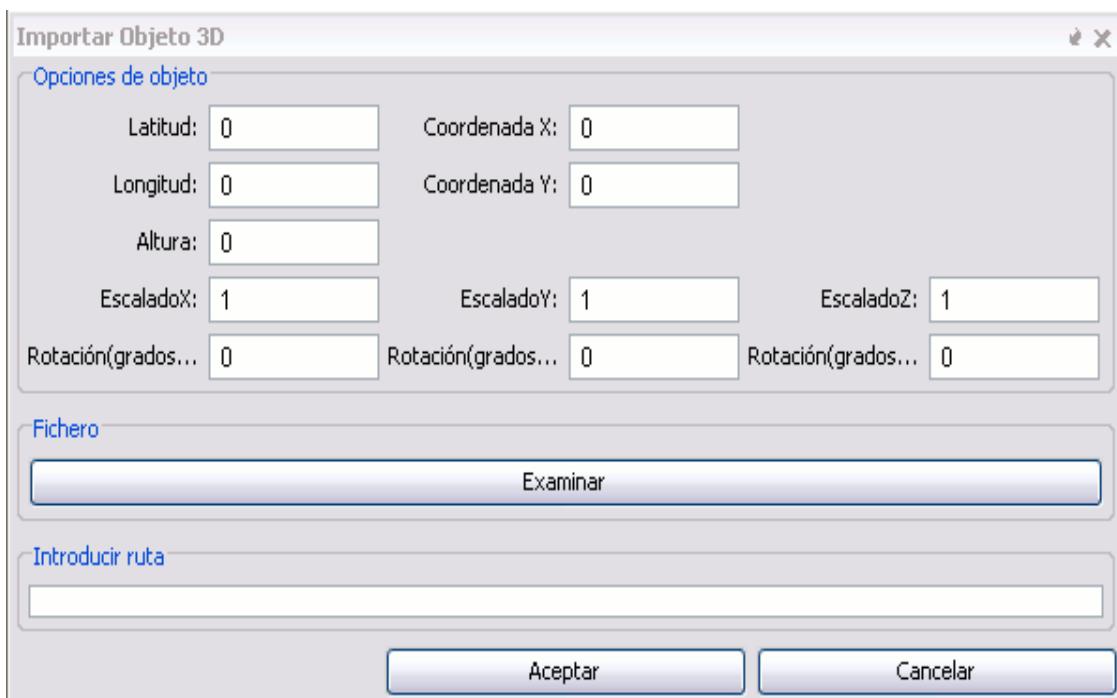
To enable/disable editing of 3D object layers simply click on the selected layer and right-click on it. In the context menu select Enable 3D editing, if you want to activate the 3D edition or Off 3D editing, if you want to disable the 3D edition.



Insert 3D objects

The tool to insert 3D objects  can be found in the toolbar when you select a 3D objects layer from a 3D view and also the active layer is in editing mode.

If you click on it you will see the following dialog box:



Where each item means:

- Object options
 - Latitude, longitude and height: Position of the 3D object is defined by its latitude, longitude and height. Contingent to the projection (spherical or planar) of the object view, they need to be set to meters or degrees.
 - X and Y coordinates: These are the X and Y coordinates of the screen.
 - Scale X, Y and Z: Scale that we want to give the object initially. You can change it posteriorly, look at *manipulation of 3D objects*
 - Rotation X, Y and Z: rotation that we want to give the object initially. You can change it posteriorly, look at *manipulation of 3D objects*
- File: If you click on the browse button, you can choose the 3D object you want to load.
- Enter path: You can enter the path to the file containing the 3D object.

Insertion using the mouse: Once you open a dialog to insert 3D objects, if you click on the 3D view the fields of latitude, longitude and height are automatically filled in order to visually place the 3D objects.



- Note: * The file formats supported are *.ive, *.osg, *.3ds, * obj. (Future versions will include more).

Manipulating 3D Objects

To manipulate 3D objects is necessary to enable the editing of 3D layers and have selected the layer to be manipulated.

- Selecting a 3D object: Clicking the left mouse button on the item you want to select.
- Unselecting a 3D object: Clicking the left mouse button outside the 3D object.
- Ungroup 3D object: With the object selected click on the icon from the toolbar or press the letter **G**.
- Group 3D object: With the object selected click on the icon from the toolbar or press the letter **U**.

Types of manipulators:

- Tab Box Dragger: Manipulator where a wrapping box appears around the object, and through which the 3D object can move in any direction. You can also use it to scale the 3D object



Icon on the toolbar.



- Track Ball Dragger: Manipulator where there is a sphere enclosing the object, and by which you can rotate the 3D object in any of its axes.



Icon on the toolbar.

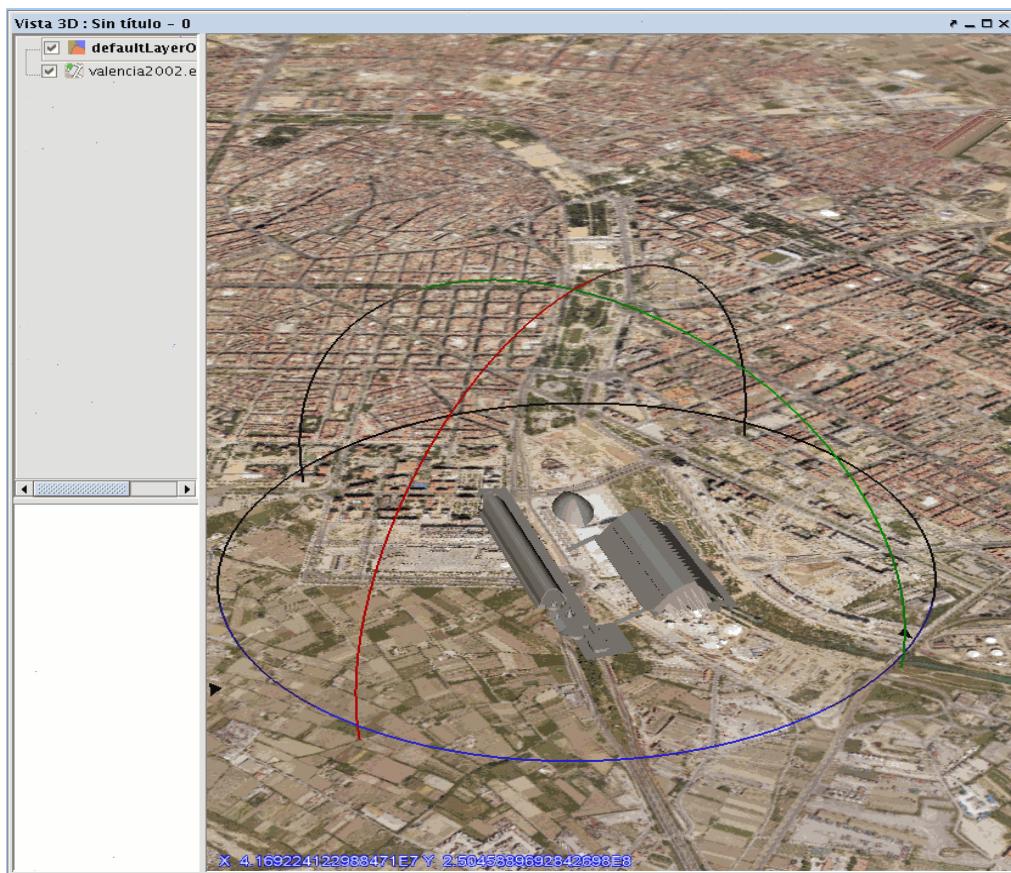
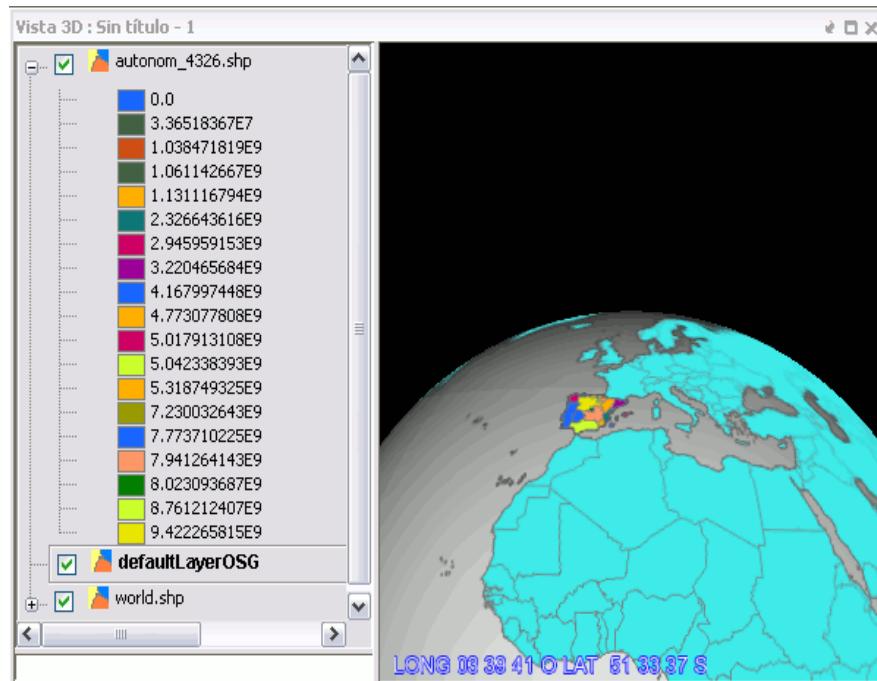


Table of content

The Table of Contents (TOC for short) included in the 3D view behaves exactly like the TOC of the 2D view, showing the layers added to the view and legend.

As in the 2D view, you can use the TOC to easily change layer visibility. In the case of the elevation layer, if this is made not visible the elevation will disappear from view, leaving surface with no relief.

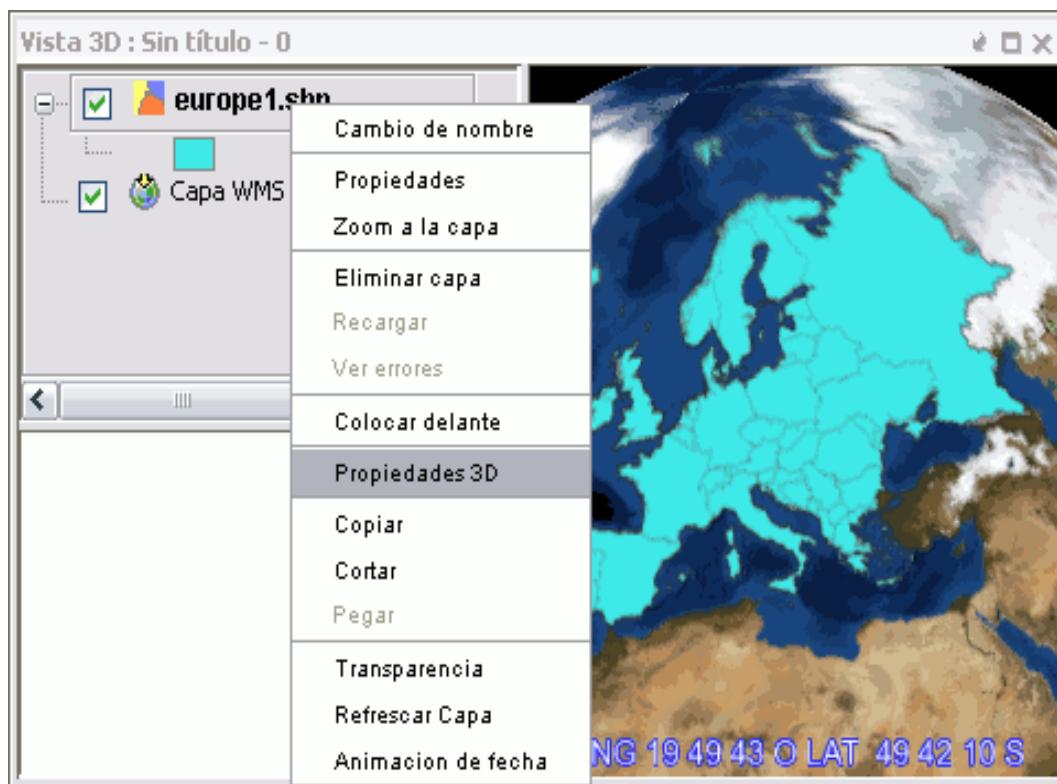
Another feature of the TOC is to control the display order of the layers (which are visible over the others). That is achieved by dragging the layers up or down. In the 3D view this order applies only to the vector or raster image layers, but does not affect the layers of 3D objects or elevation layer. The following example shows how the order affects two vector raster layers but has no effect on the elevation layer.



TOC and corresponding 3D view

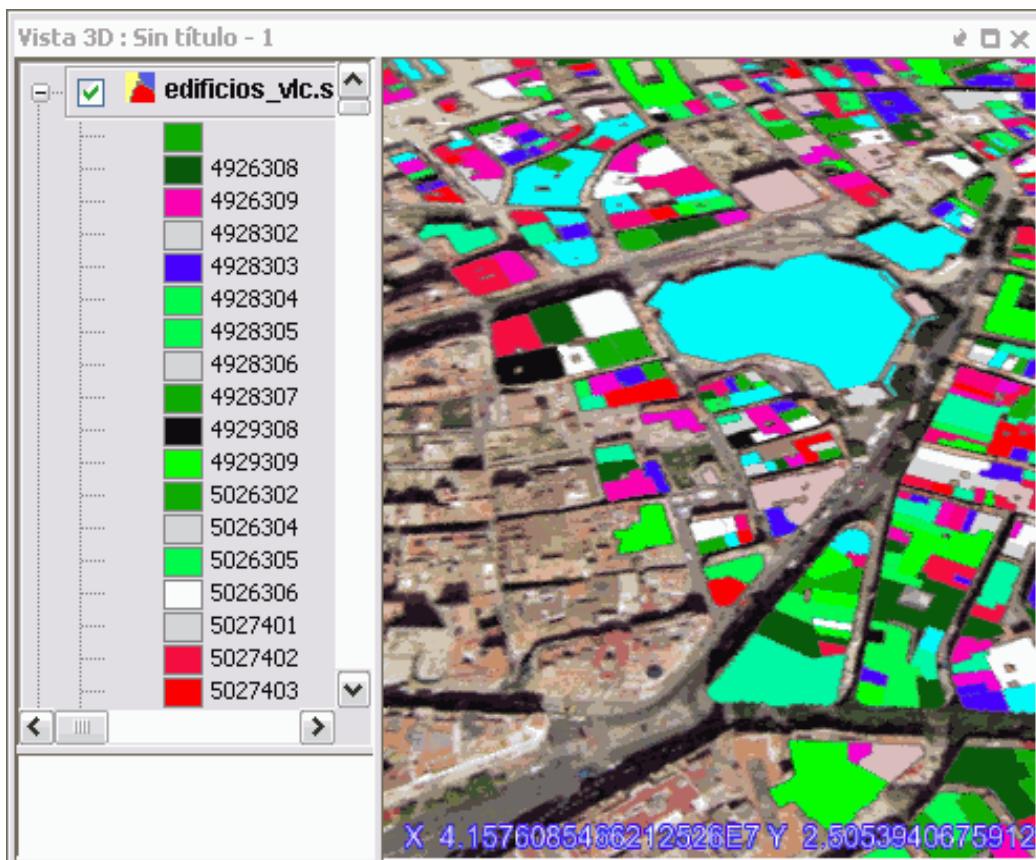
The context menu of the layers

In the 3D view TOC layers have a context menu practically the same as the normal view, with some additional tools. We will discuss the most relevant options.

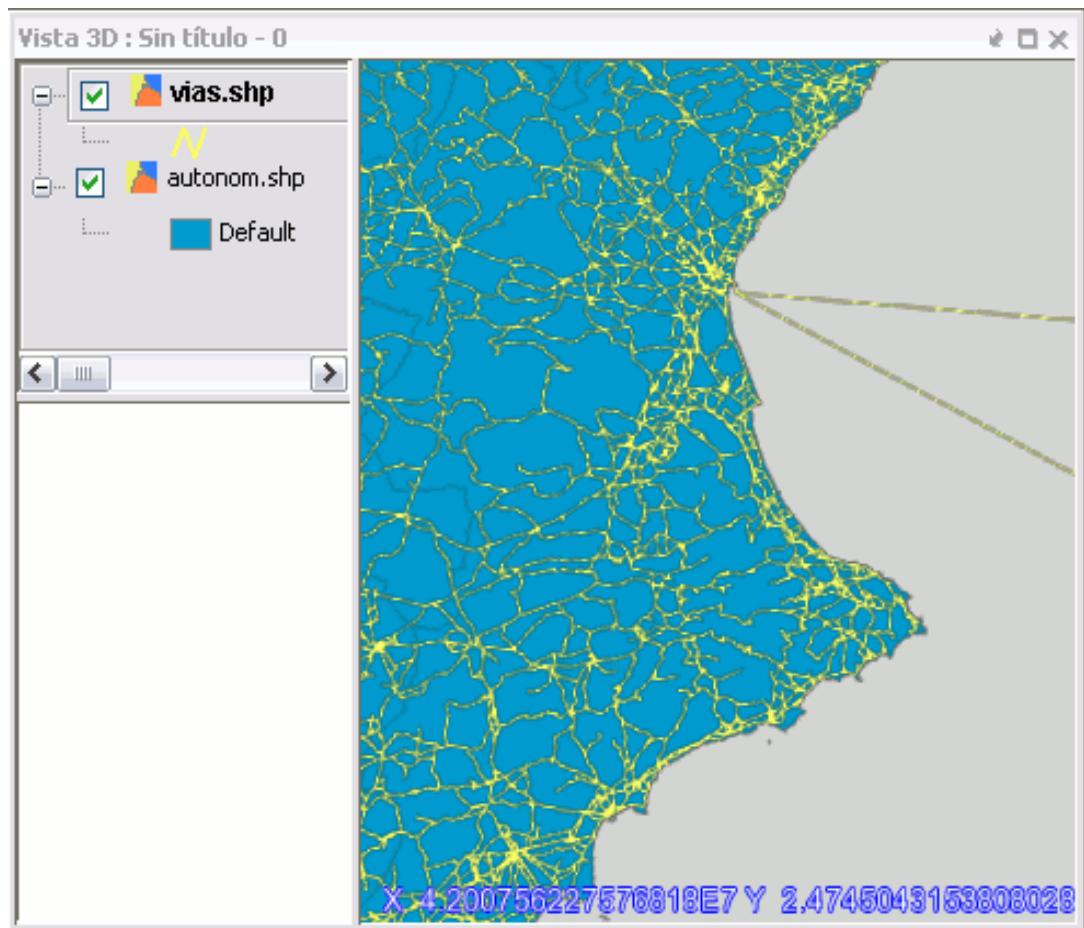


Properties edition

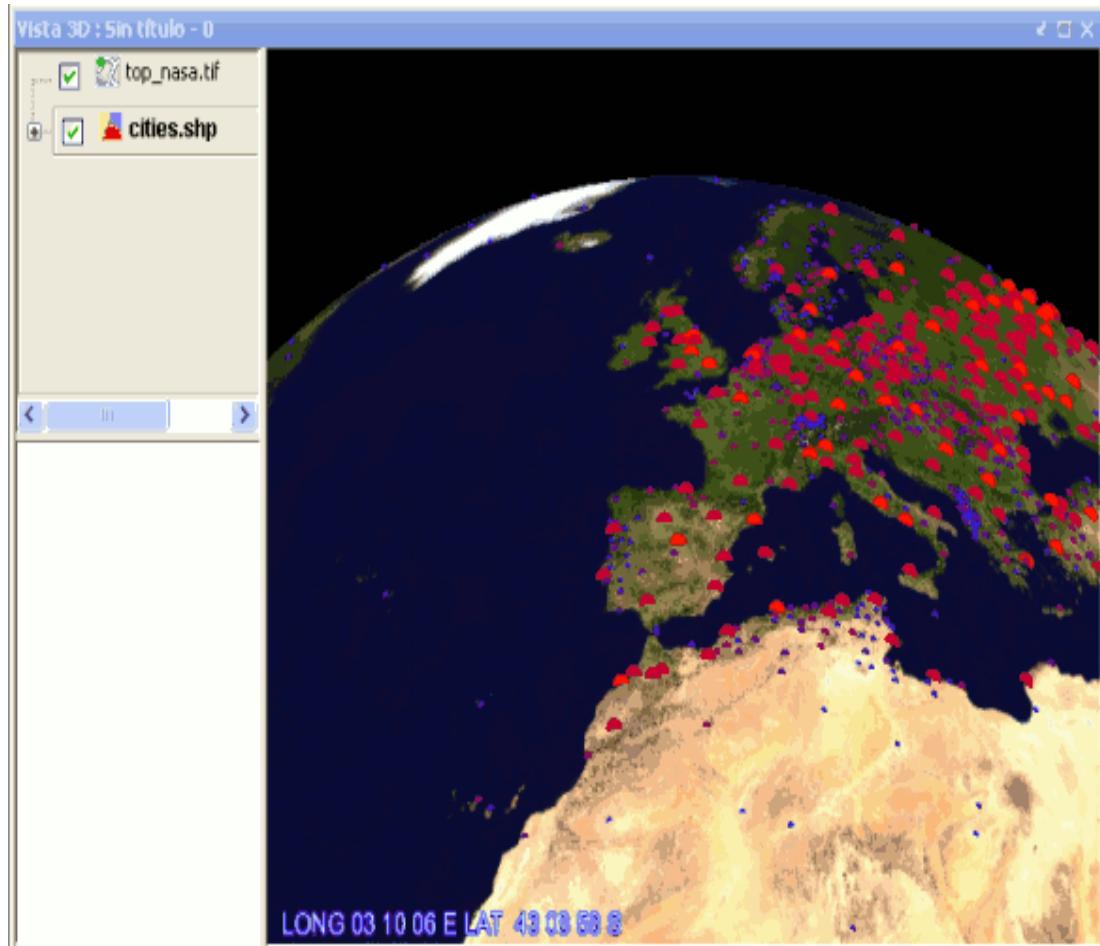
Using the context menu you can change the name of the layer, color (in the case of a vector layer with single symbol) and edit its properties window. In the case of changing certain properties, like the legend, the display cache is re-calculated layer, usually automatically. The figure shows the appearance of a polygon layer used in previous examples, after changing his legend to unique values.



The properties of symbols are applied to layers represented as images in the same way as would apply in a 2D view (eg the thickness and style of the lines).



Moreover, in the case of vector data represented as 3D objects, the application of the symbology is limited to the size of dots and lines, and color of symbols.



Note: A new type of legend called extrusion and a new kind of symbol for 3D points have been created. Look in the **Extrusion** and **3D Symbology** sections.

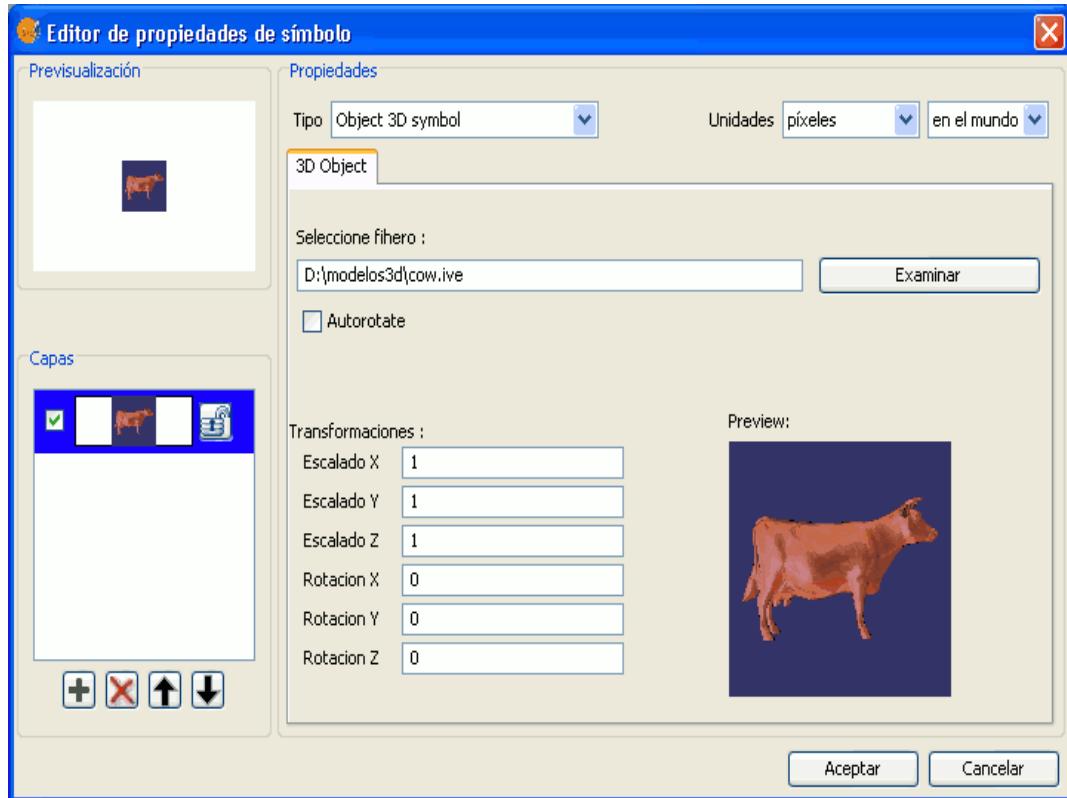
Caching of the legend

In the cache for rasterized vector layers, the legend is also saved in .xml. When the same vector data source is added back as a layer, this legend is assigned by default, allowing for the reuse of the cached images. If the legend changes (see above), the cache is rebuilt and the new .xml file is saved.

3D Symbology

Using the power of the new symbology framework. The 3D plugin has added the possibility of inserting a new symbology for points. Specifically, we can generate a 3D Object type symbol and insert it as a symbol in a 3D layer-type vector point.

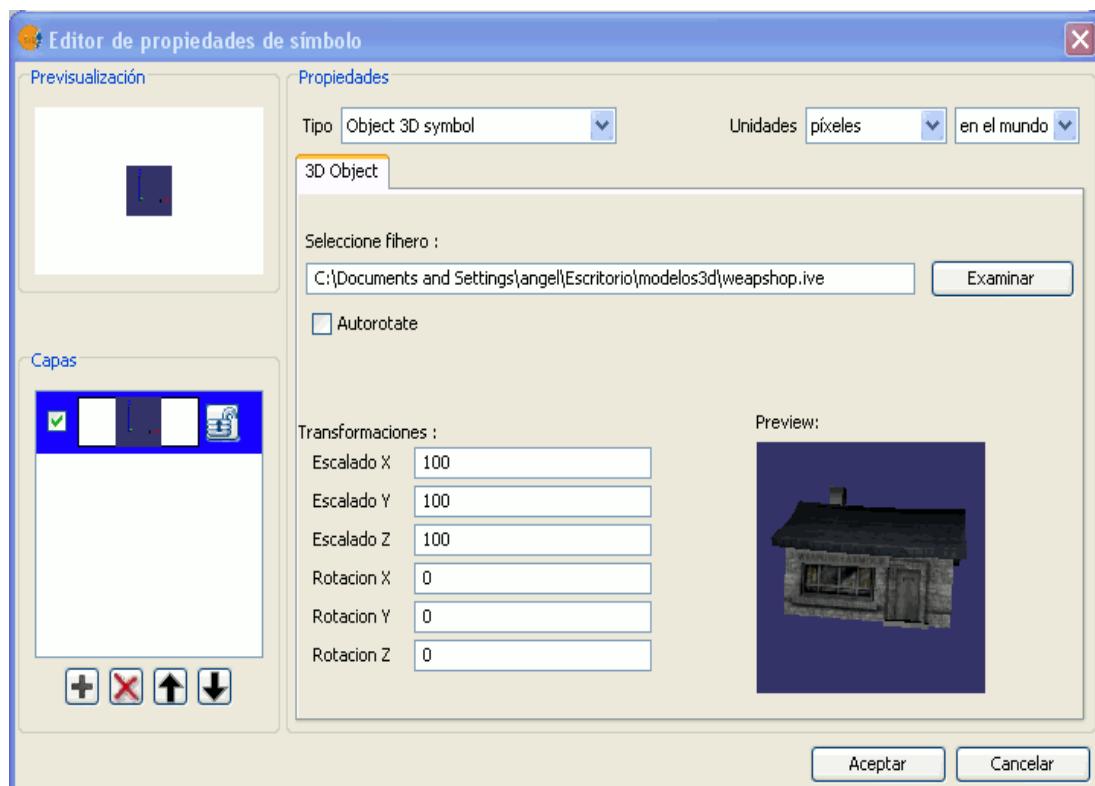
To do this open the "Symbol Properties Editor" (see the manual gvSIG version 1.9-Alpha or later). In the panel for "Properties" we will deploy the list and select where it says *Object 3D symbol* and a panel will appear as shown below:



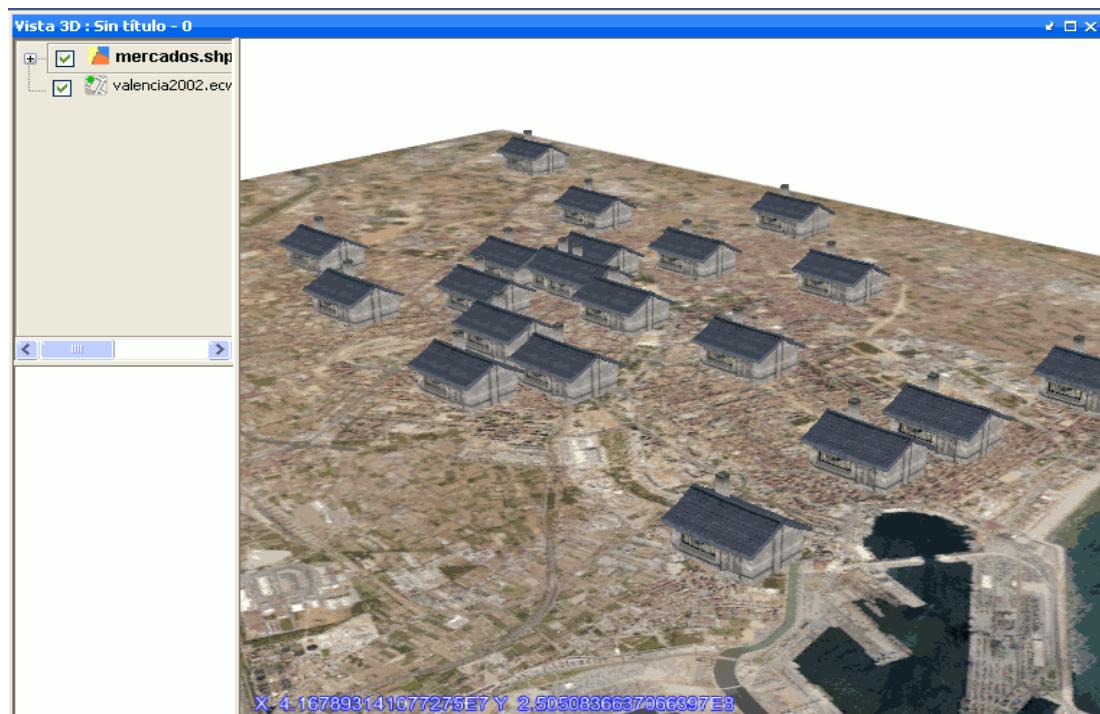
And where the boxes mean:

- Select files: You must indicate the file containing the 3D geometry.
- Autorotate: If selected, the model is always facing the camera.
- Transformations:
 - Scale X, Y and Z: Scale to be applied to the model.
 - Rotate X, Y and Z: Indicates the rotation to be applied to the model.
- Preview: Shows a preview of the 3D object. By default a sample model will show.

Then add the new model and delete the one given by default and it would show as follows:



And the result would be.



Extrusion

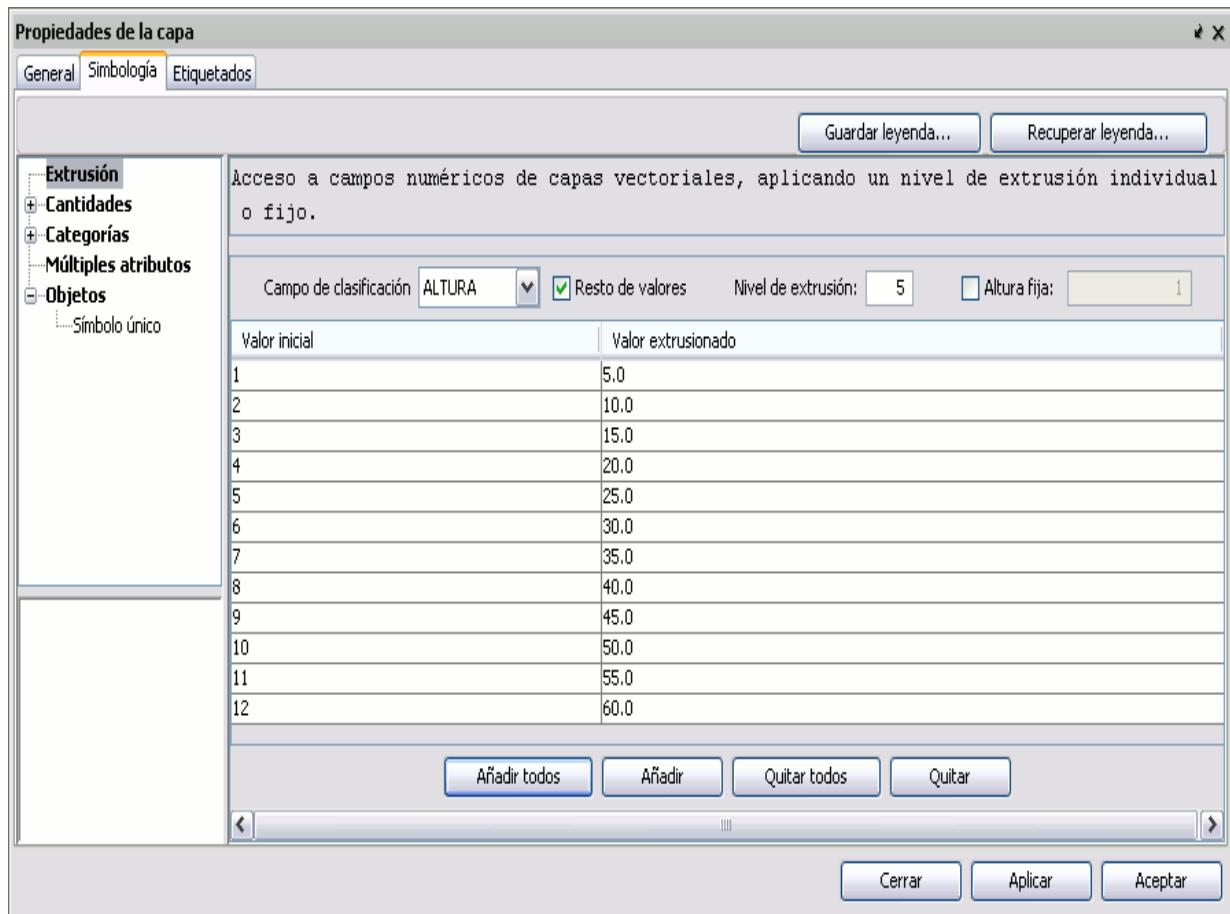
Extrusion is a new kind of legend that has been created in the 3D plugin. This legend is used to extrude any primitive type (points, lines and polygons) that contains a vector layer in function of a given multiplication value.

A more technical definition of extrusion is:

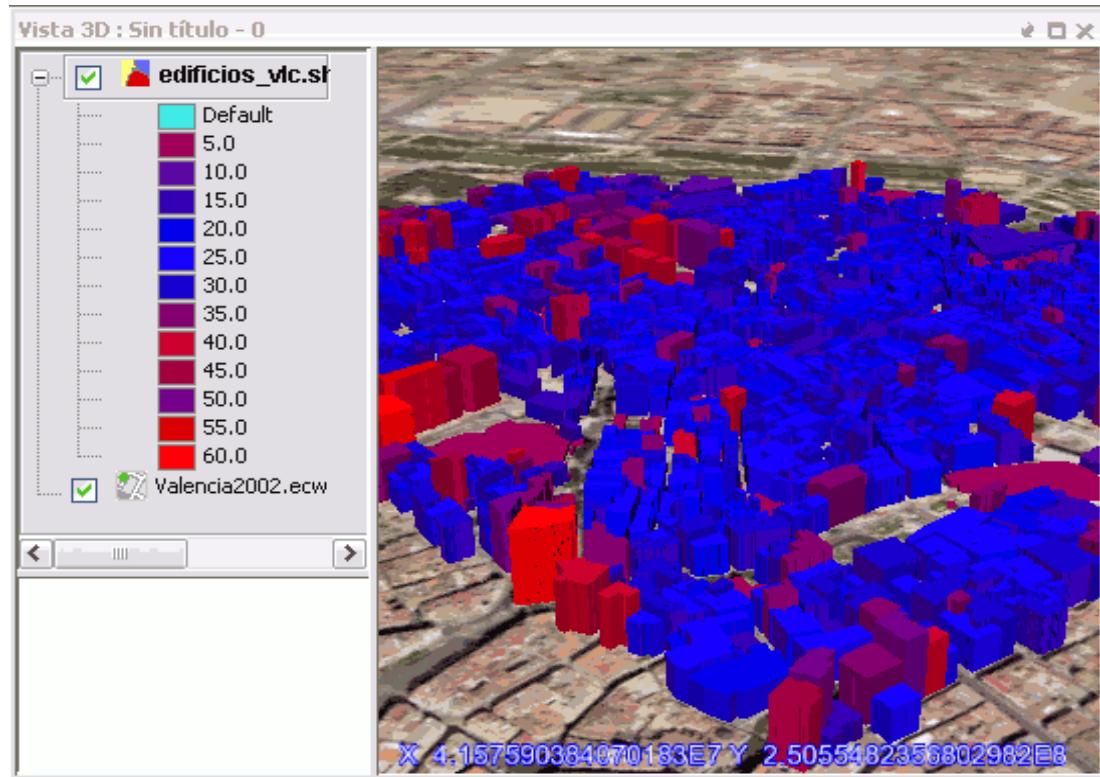
Generating an object of dimension $n+1$ by the extension of a object dimension along a defined range in an additional dimension.

To use this new type of legend we have chosen to display as 3D vectors the layer that has been inserted in the 3D view.

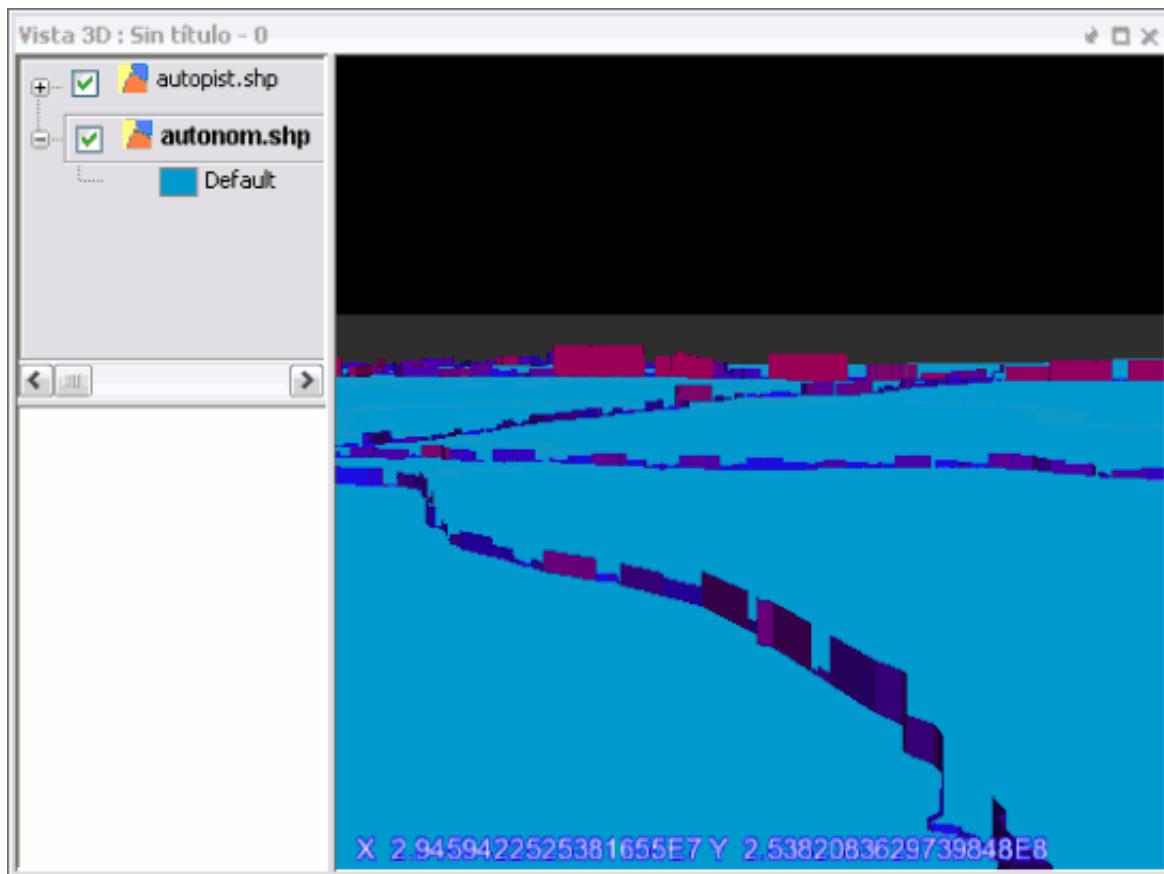
Open the legend window and select where it says Extrusion. This window looks much like the legend of unique values. The following screen appears.



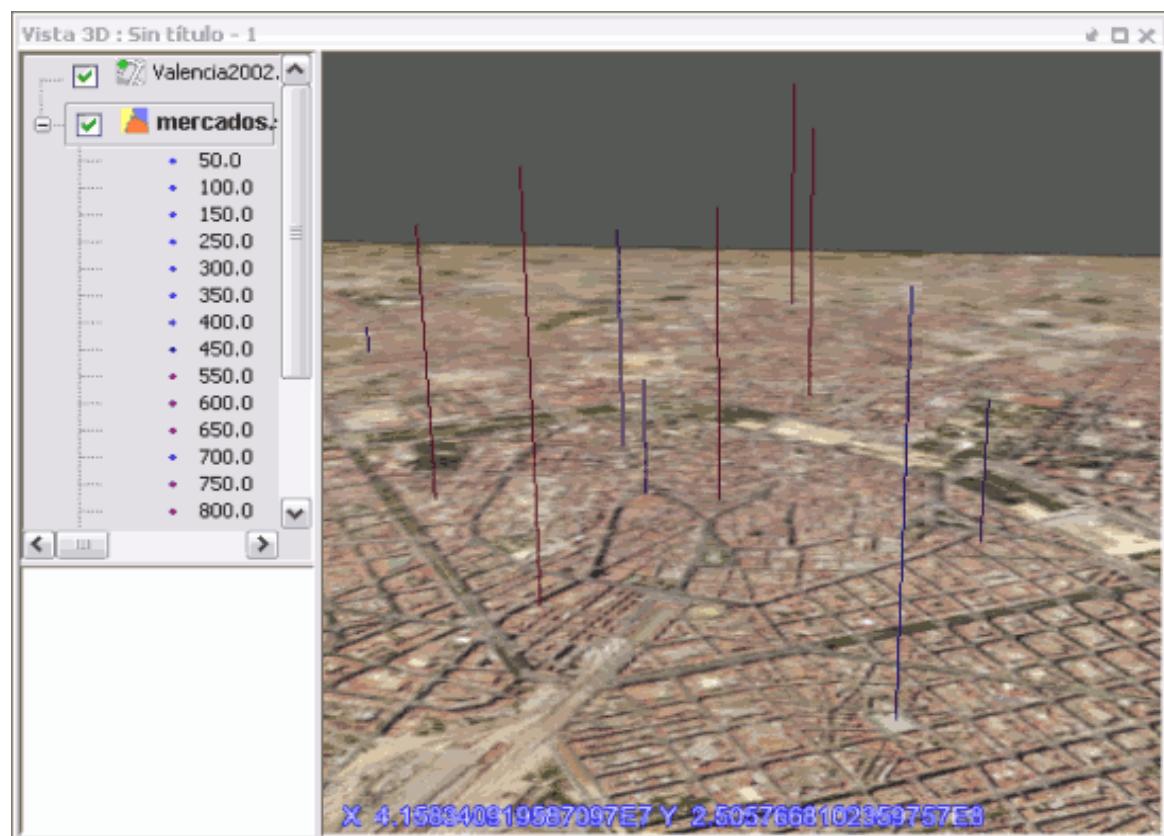
Choose the field on which you want to extrude and the extrusion level you want to apply. Click on the button to add all and accept.



Extruding polygons.



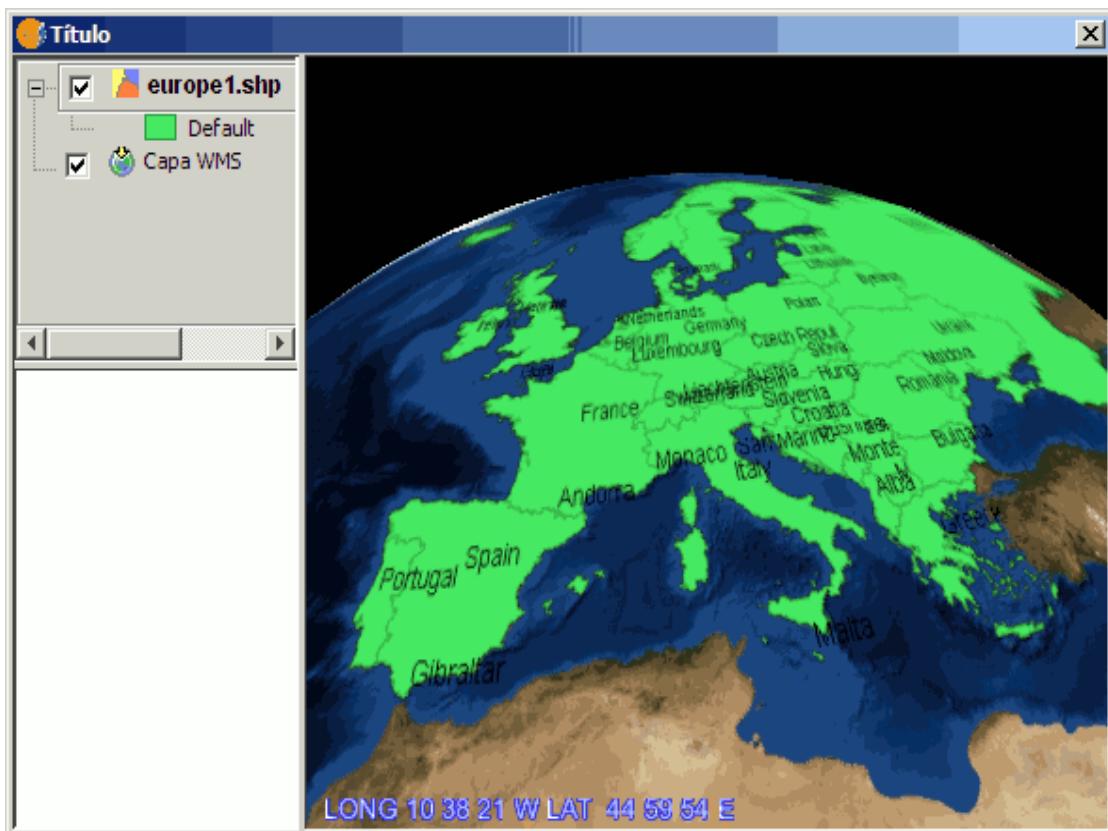
Extruding lines.



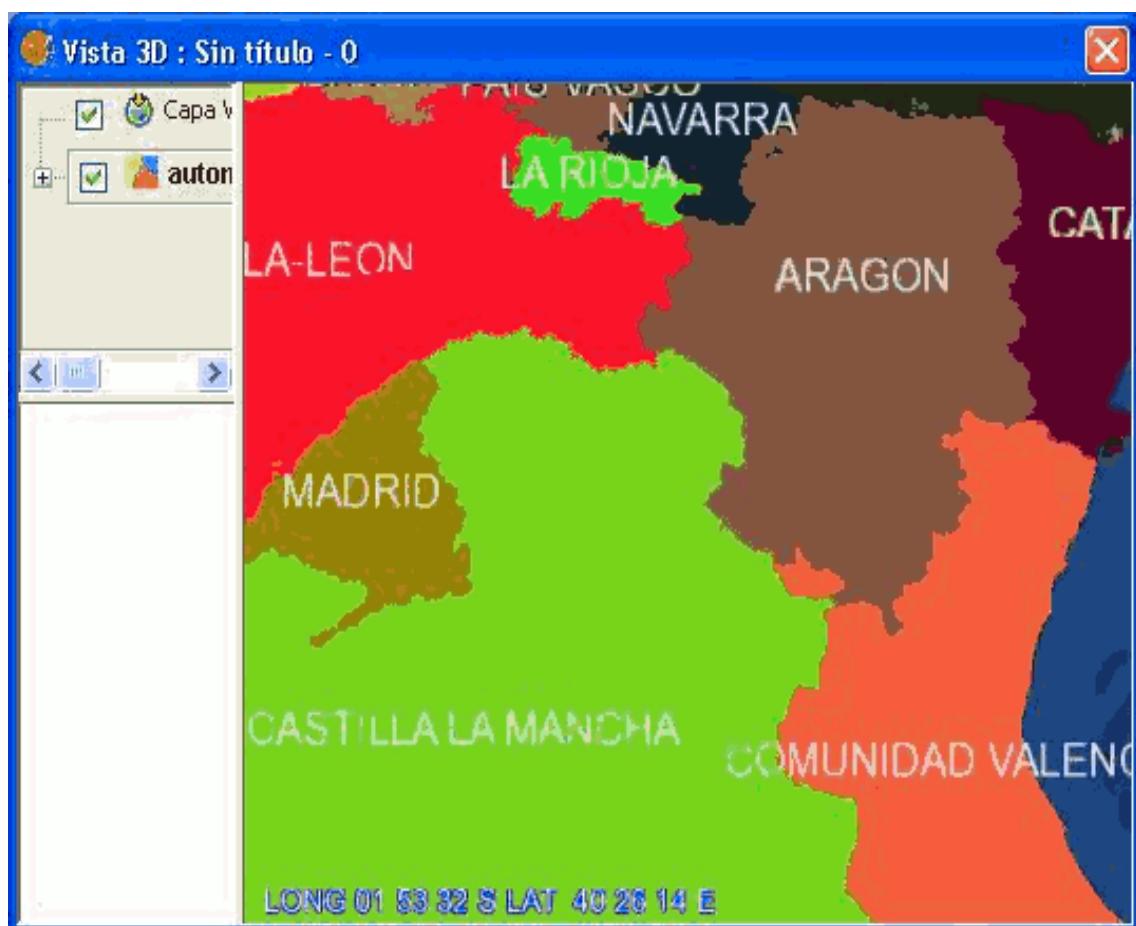
Extruding points.

Labeling

Labeling should be consistent whether the vector layer is rasterized or not. When the layer is rasterized, the labels are too. Its size and color is given by the tagging options, like in the 2D view.



On the other hand, when the vector layer is not rasterized, the labels will appear as floating text with the corresponding 3D objects for the data. Their size and color is again given by the tagging options.



Note: Only basic labeling is available in the 3D plugin.

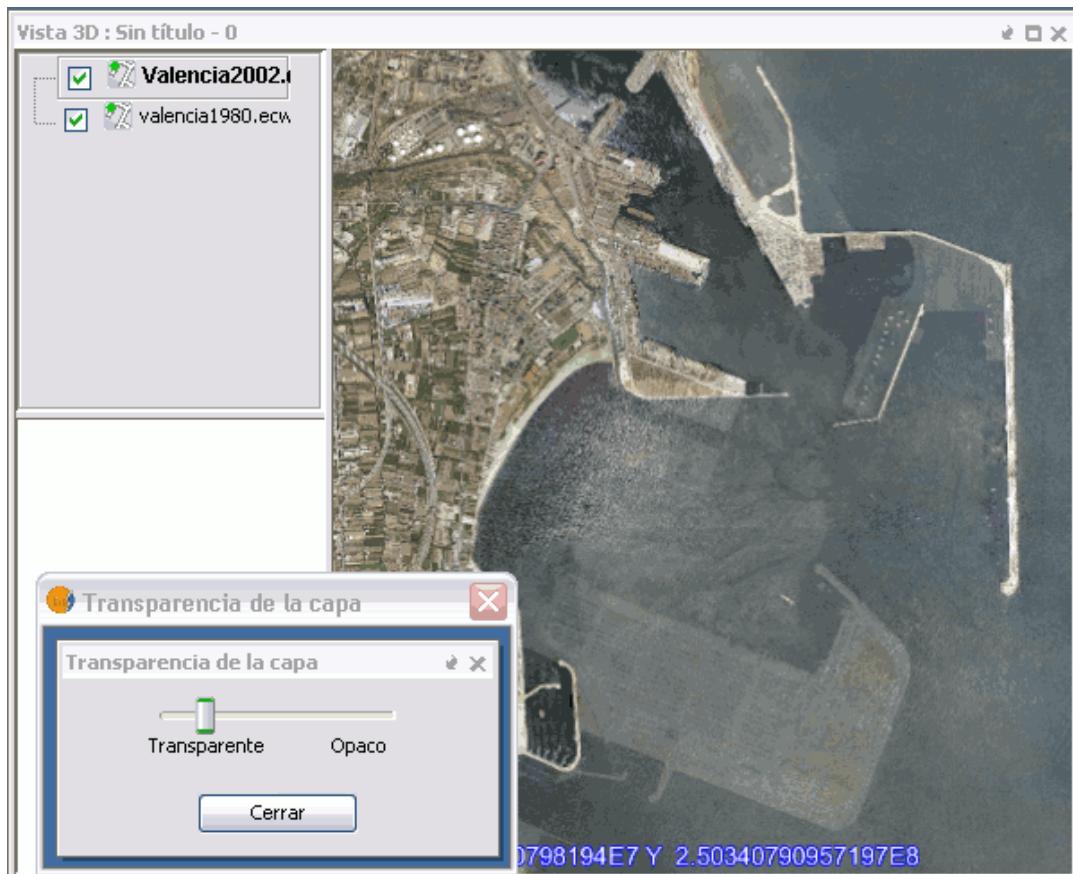


Transparency

In the context menu of the layers there is an option to change the transparency of an image layer (or rasterised vectors) interactively. This option can be activated from the toolbar and also from the Layer menu.



Icon on the toolbar.



Example of extension of transparency and results.

When the tool is activated, a dialog appears with a scroll bar that lets you change the layer transparency interactively. It must be said that the interactive transparency tool has its impact over the transparency display of raster layers.

Specific Properties

Raster type layers and layers of remote services have specific properties that are active in the context menu. In the 3D view these menu options can be used to open the same windows of properties displayed in the layers of normal view.

Layer refresh

From the context menu of the layer the display cache can be manually refreshed. This may be necessary for:

- Reflect changes that have occurred in the code (for example, if it has been edited)
- Regenerate a cache that somehow got corrupted
- In rasterized vector layers that are loaded from a project file, to generate the visualization cache with the legend stored in the project rather than with the legend cached (which may have changed since the project was saved)
- Force a visual refresh of the layer that does not happen automatically.

Zoom to layer

This command works the same as in the normal view. The 3D view will change to show the full extent of the layer. In the spherical view, for very extensive layers it will display the full planetary globe.

Copy, cut and paste layers

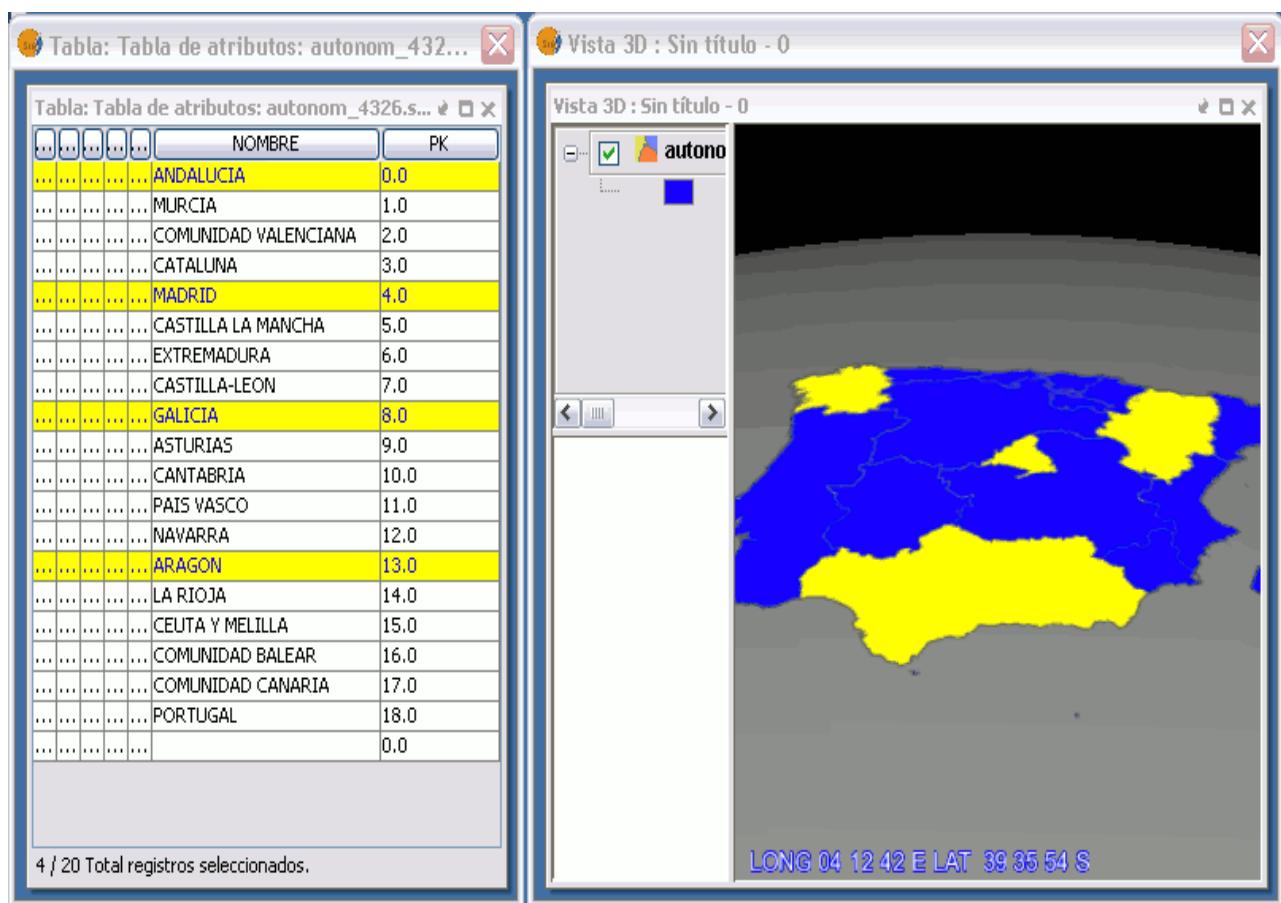
With the context menu sections of a 3D view can be cut or copy and paste into another normal view or 3D view. Conversely, sections can also be cut or copy from a normal view to be pasted in the 3D view.

When a layer is pasted from a 2D to 3D, the user will be able to choose the same options (elevation or image, rasterization of vectors) that if the layer were added directly from the data source.

Working with tables

As in the 2D views, the tool 'View Table of Attributes' is available for vector layers on the toolbar and in the Layer menu. When using this tool it will show the attribute table of the active layer and will be possible to perform all the tasks, as sort fields, etc..

Records can be selected in the table manually, apply filters, etc.. The tool 'Zoom to Selected' can be used as in 2D to quickly find the records selected in the view. Also the tool 'Delete Selection' works as in normal view.



Information tool

Like many of the tools available to the 2D, the information tool has been adapted to be used in the 3D plugin and it works just like in the version for 2D views. To access from the toolbar press the button:

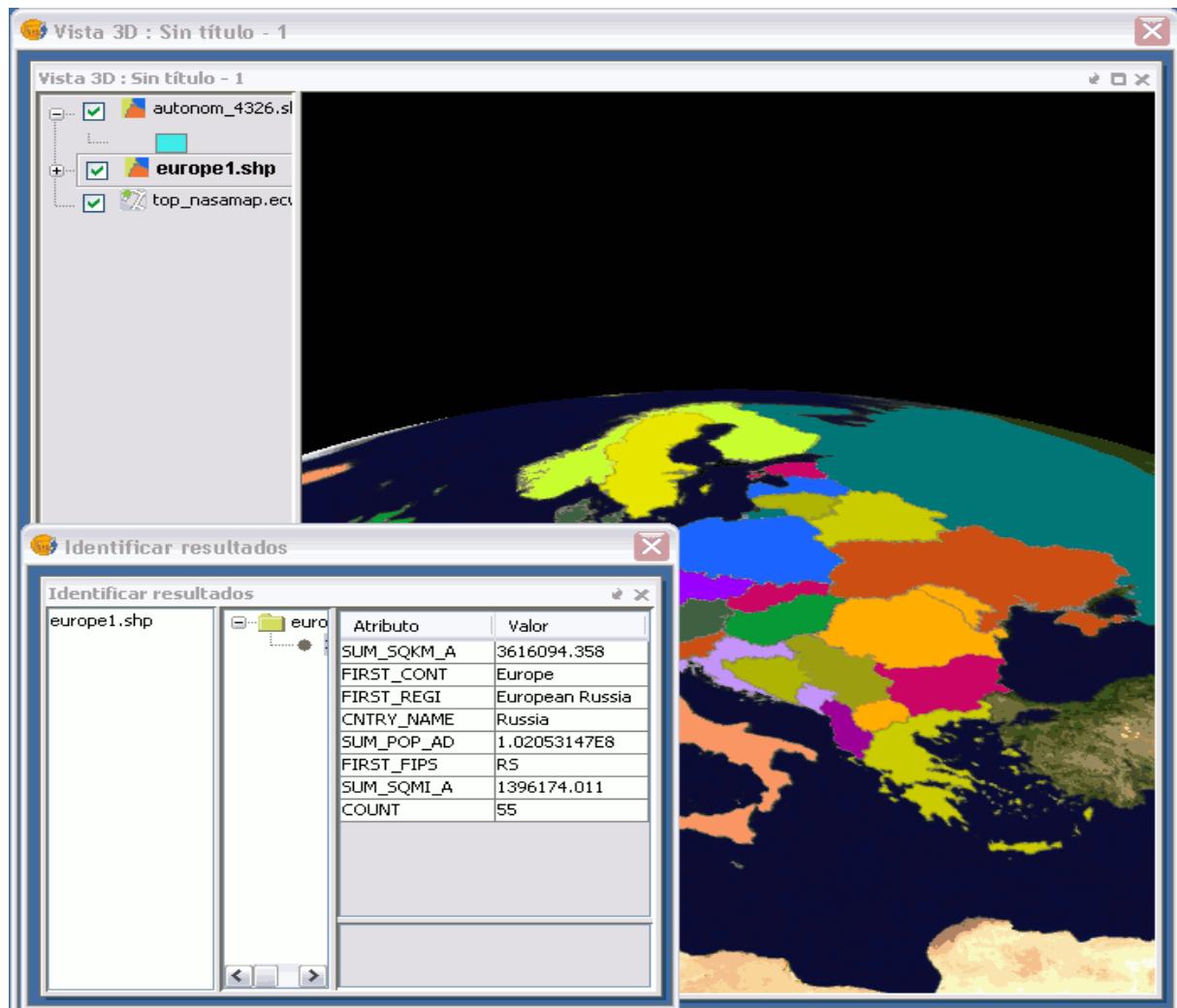


Information button.

or from the bar menu "View / Search / Information".

To obtain information about each of the elements of the map the "Information Tool" is used.

When you click on any element with this tool, gvSIG shows, in a dialog box, the attributes of that element. For that to function the layer in which the feature you want to identify has to be activated in the TOC



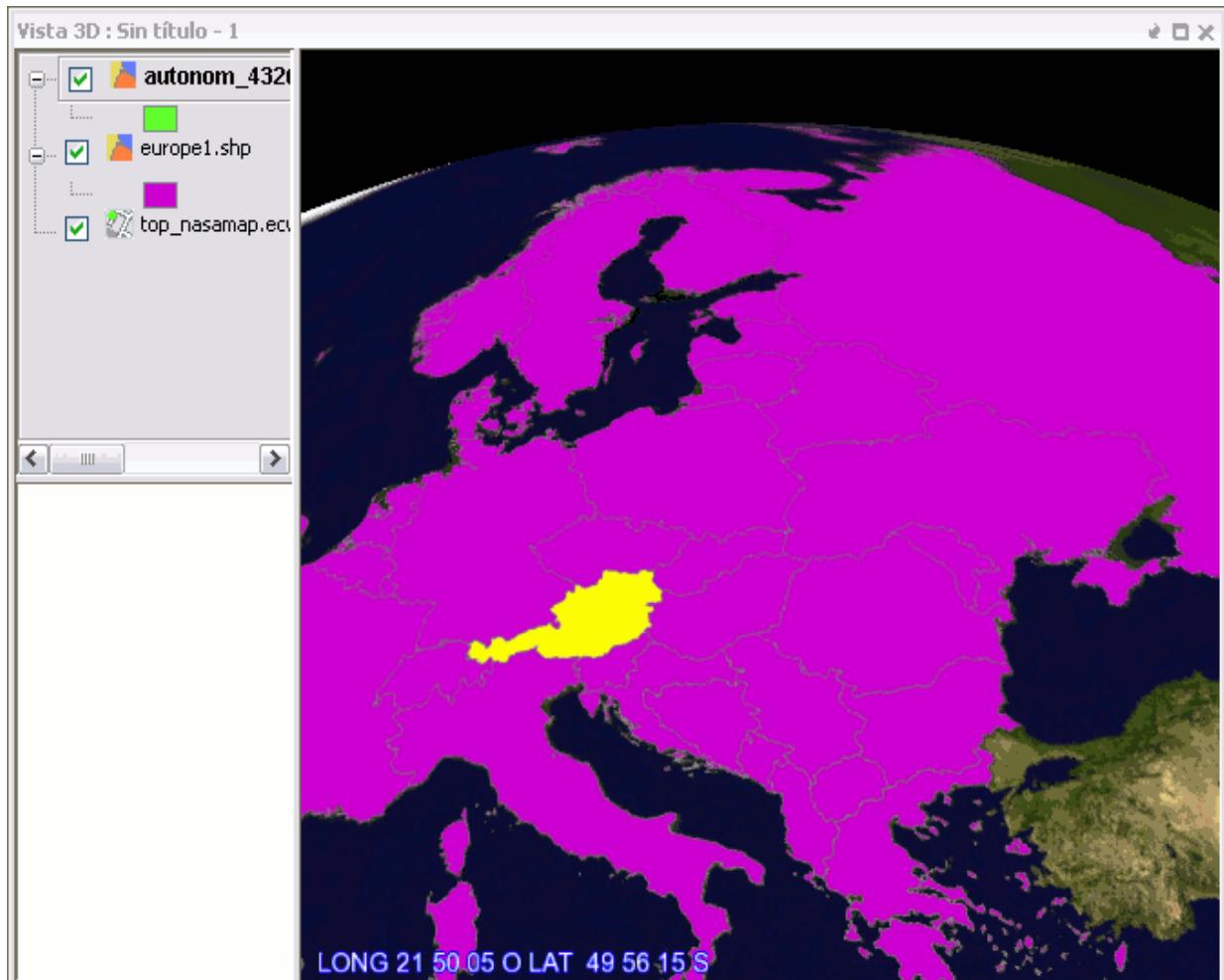


Tool selection in view

The selection tool in view has been adapted to be used in the 3D view. It works for raster layers as well as for those that are not.



Selection options.



Selected area in yellow.

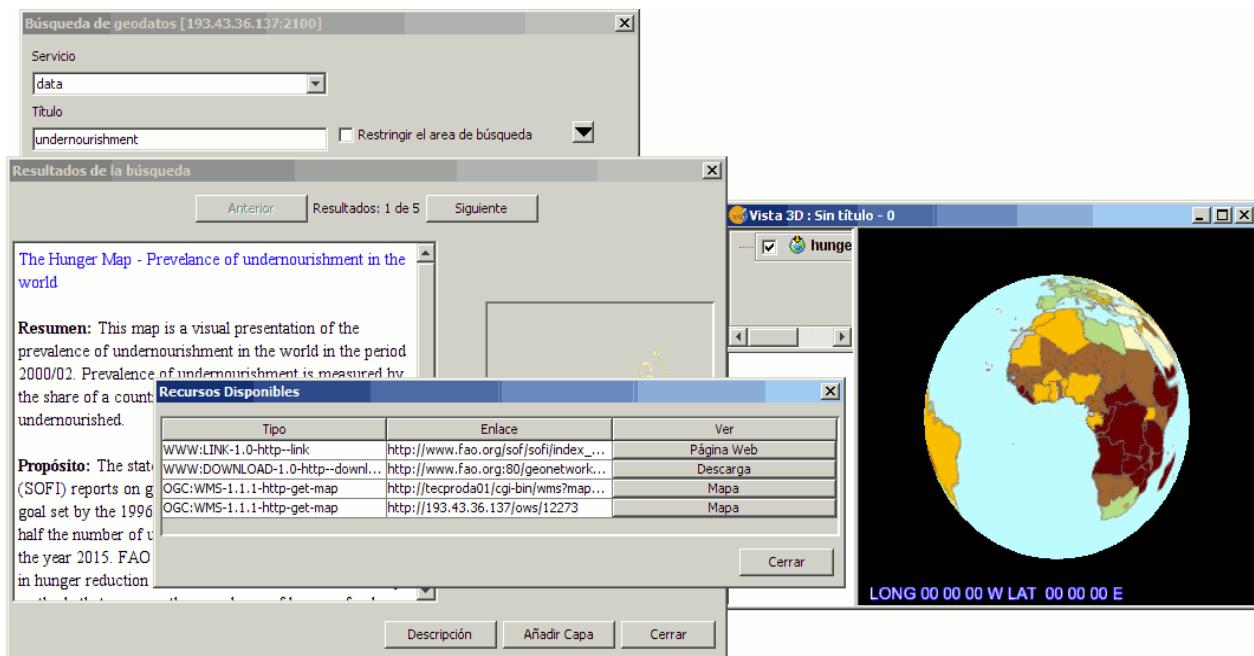
Remote search services

Introduction

The search tools for the geodata remote catalogue and search for place names have been activated and adapted to operate in the 3D view.

Search in the geodata catalogue

This tool appears when the 3D view is activated. It works the same way as in the 2D view, allowing search by keyword, displaying a panel with the results and allowing the user add the layer if it is defined in the catalogue. The following figure summarizes the steps taken to add a remote WMS layer from the list of FAO.

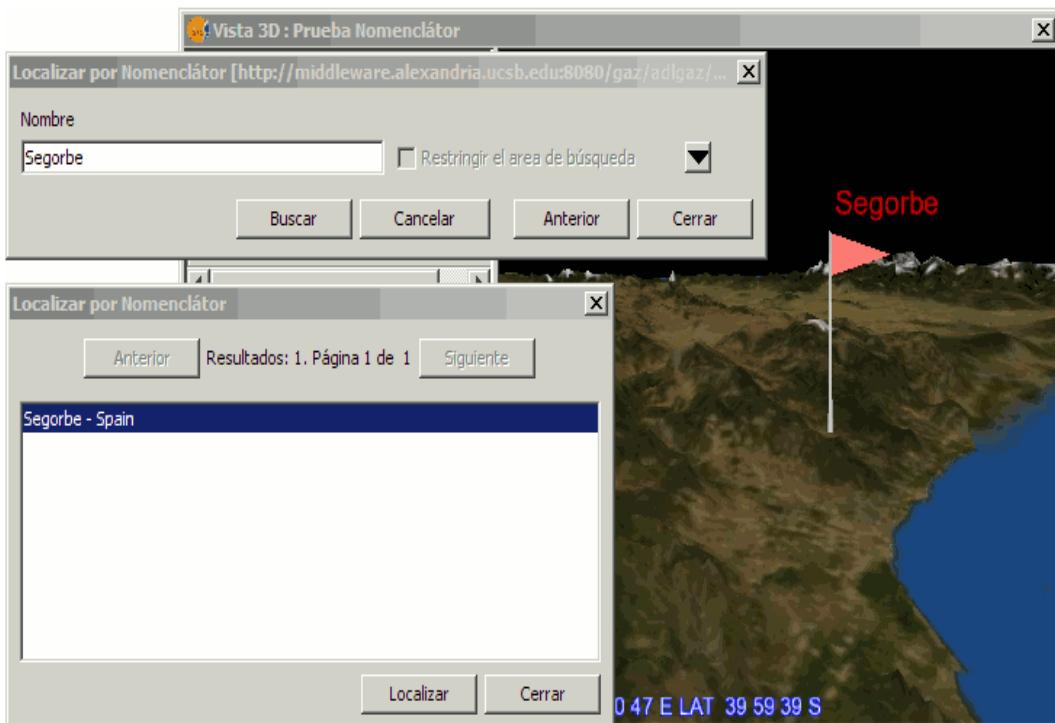


Similarly you can add layers WCS and WFS, to which the coordinate system of the layer will be assigned, as long it is supported by the service. Note that on adding a layer WFS, the user will be prompted whether or not to rasterize the layer, as occurs when adding any vector layer.

Added improvement in the 3D plugin is that when you press the button to add a WMS service as a layer from catalogue search, it will open the properties window of the remote service WMS, which will allow you to select properties such as style, format and reference coordinate system. This last step is important so that the layer will display properly in 3D.

Search Placenames

The search tool for placenames also appears when the 3D view is activated and works similarly as in the normal view. In the three-dimensional case, as the user press the button 'Locate' a flag is added to the view that indicates the coordinates of the name searched, along with a textbox displaying the name.



Attribution-ShareAlike 3.0 Unported



CREATIVE COMMONS CORPORATION IS NOT A LAW FIRM AND DOES NOT PROVIDE LEGAL SERVICES. DISTRIBUTION OF THIS LICENSE DOES NOT CREATE AN ATTORNEY-CLIENT RELATIONSHIP. CREATIVE COMMONS PROVIDES THIS INFORMATION ON AN "AS-IS" BASIS. CREATIVE COMMONS MAKES NO WARRANTIES REGARDING THE INFORMATION PROVIDED, AND DISCLAIMS LIABILITY FOR DAMAGES RESULTING FROM ITS USE.

License

THE WORK (AS DEFINED BELOW) IS PROVIDED UNDER THE TERMS OF THIS CREATIVE COMMONS PUBLIC LICENSE ("CCPL" OR "LICENSE"). THE WORK IS PROTECTED BY COPYRIGHT AND/OR OTHER APPLICABLE LAW. ANY USE OF THE WORK OTHER THAN AS AUTHORIZED UNDER THIS LICENSE OR COPYRIGHT LAW IS PROHIBITED.

BY EXERCISING ANY RIGHTS TO THE WORK PROVIDED HERE, YOU ACCEPT AND AGREE TO BE BOUND BY THE TERMS OF THIS LICENSE. TO THE EXTENT THIS LICENSE MAY BE CONSIDERED TO BE A CONTRACT, THE LICENSOR GRANTS YOU THE RIGHTS CONTAINED HERE IN CONSIDERATION OF YOUR ACCEPTANCE OF SUCH TERMS AND CONDITIONS.

1. Definitions

- a. **"Adaptation"** means a work based upon the Work, or upon the Work and other pre-existing works, such as a translation, adaptation, derivative work, arrangement of music or other alterations of a literary or artistic work, or phonogram or performance and includes cinematographic adaptations or any other form in which the Work may be recast, transformed, or adapted including in any form recognizably derived from the original, except that a work that constitutes a Collection will not be considered an Adaptation for the purpose of this License. For the avoidance of doubt, where the Work is a musical work, performance or phonogram, the synchronization of the Work in timed-relation with a moving image ("synching") will be considered an Adaptation for the purpose of this License.
- b. **"Collection"** means a collection of literary or artistic works, such as encyclopedias and anthologies, or performances, phonograms or broadcasts, or other works or subject matter other than works listed in Section 1(f) below, which, by reason of the selection and arrangement of their contents, constitute intellectual creations, in which the Work is included in its entirety in unmodified form along with one or more other contributions, each constituting separate and independent works in themselves, which together are assembled into a collective whole. A work that constitutes a Collection will not be considered an Adaptation (as defined below) for the purposes of this License.
- c. **"Creative Commons Compatible License"** means a license that is listed at <http://creativecommons.org/compatiblelicenses> that has been approved by Creative Commons as being essentially equivalent to this License, including, at a minimum, because that license: (i) contains terms that have the same purpose, meaning and effect as the License Elements of this License; and, (ii) explicitly permits the relicensing of adaptations of works made available under that license under this License or a Creative Commons jurisdiction license with the same License Elements as this License.
- d. **"Distribute"** means to make available to the public the original and copies of the Work or Adaptation, as appropriate, through sale or other transfer of ownership.
- e. **"License Elements"** means the following high-level license attributes as selected by Licensor and indicated in the title of this License: Attribution, ShareAlike.



- f. "**Licensor**" means the individual, individuals, entity or entities that offer(s) the Work under the terms of this License.
- g. "**Original Author**" means, in the case of a literary or artistic work, the individual, individuals, entity or entities who created the Work or if no individual or entity can be identified, the publisher; and in addition (i) in the case of a performance the actors, singers, musicians, dancers, and other persons who act, sing, deliver, declaim, play in, interpret or otherwise perform literary or artistic works or expressions of folklore; (ii) in the case of a phonogram the producer being the person or legal entity who first fixes the sounds of a performance or other sounds; and, (iii) in the case of broadcasts, the organization that transmits the broadcast.
- h. "**Work**" means the literary and/or artistic work offered under the terms of this License including without limitation any production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression including digital form, such as a book, pamphlet and other writing; a lecture, address, sermon or other work of the same nature; a dramatic or dramatico-musical work; a choreographic work or entertainment in dumb show; a musical composition with or without words; a cinematographic work to which are assimilated works expressed by a process analogous to cinematography; a work of drawing, painting, architecture, sculpture, engraving or lithography; a photographic work to which are assimilated works expressed by a process analogous to photography; a work of applied art; an illustration, map, plan, sketch or three-dimensional work relative to geography, topography, architecture or science; a performance; a broadcast; a phonogram; a compilation of data to the extent it is protected as a copyrightable work; or a work performed by a variety or circus performer to the extent it is not otherwise considered a literary or artistic work.
- i. "**You**" means an individual or entity exercising rights under this License who has not previously violated the terms of this License with respect to the Work, or who has received express permission from the Licensor to exercise rights under this License despite a previous violation.
- j. "**Publicly Perform**" means to perform public recitations of the Work and to communicate to the public those public recitations, by any means or process, including by wire or wireless means or public digital performances; to make available to the public Works in such a way that members of the public may access these Works from a place and at a place individually chosen by them; to perform the Work to the public by any means or process and the communication to the public of the performances of the Work, including by public digital performance; to broadcast and rebroadcast the Work by any means including signs, sounds or images.
- k. "**Reproduce**" means to make copies of the Work by any means including without limitation by sound or visual recordings and the right of fixation and reproducing fixations of the Work, including storage of a protected performance or phonogram in digital form or other electronic medium.

2. Fair Dealing Rights. Nothing in this License is intended to reduce, limit, or restrict any uses free from copyright or rights arising from limitations or exceptions that are provided for in connection with the copyright protection under copyright law or other applicable laws.

3. License Grant. Subject to the terms and conditions of this License, Licensor hereby grants You a worldwide, royalty-free, non-exclusive, perpetual (for the duration of the applicable copyright) license to exercise the rights in the Work as stated below:

- a. to Reproduce the Work, to incorporate the Work into one or more Collections, and to Reproduce the Work as incorporated in the Collections;
- b. to create and Reproduce Adaptations provided that any such Adaptation, including any translation in any medium, takes reasonable steps to clearly label, demarcate or otherwise identify that changes were made to the original Work. For example, a translation could be marked "The original work was translated from English to Spanish," or a modification could indicate "The original work has been modified.";
- c. to Distribute and Publicly Perform the Work including as incorporated in Collections; and,
- d. to Distribute and Publicly Perform Adaptations.
- e. For the avoidance of doubt:
 - i. **Non-waivable Compulsory License Schemes.** In those jurisdictions in which the right to collect royalties through any statutory or compulsory licensing scheme cannot be waived, the Licensor reserves the exclusive right to collect such royalties for any exercise by You of the rights granted under this License;
 - ii. **Waivable Compulsory License Schemes.** In those jurisdictions in which the right to collect royalties through any statutory or compulsory licensing scheme can be waived, the Licensor waives the exclusive right to collect such royalties for any exercise by You of the rights granted under this License; and,
 - iii. **Voluntary License Schemes.** The Licensor waives the right to collect royalties, whether individually or, in the event that the Licensor is a member of a collecting society that administers voluntary licensing schemes, via that society, from any exercise by You of the rights granted under this License.

The above rights may be exercised in all media and formats whether now known or hereafter devised. The above rights include the right to make such modifications as are technically necessary to exercise the rights in other media and formats. Subject to Section 8(f), all rights not expressly granted by Licensor are hereby reserved.

4. Restrictions. The license granted in Section 3 above is expressly made subject to and limited by the following restrictions:

- a. You may Distribute or Publicly Perform the Work only under the terms of this License. You must include a copy of, or the Uniform Resource Identifier (URI) for, this License with every copy of the Work You Distribute or Publicly Perform. You may not offer or impose any terms on the Work that restrict the terms of this License or the ability of the recipient of the Work to exercise the rights granted to that recipient under the terms of the License. You may not sublicense the Work. You must keep intact all notices that refer to this License and to the disclaimer of warranties with every copy of the Work You Distribute or Publicly Perform. When You Distribute or Publicly Perform the Work, You may not impose any effective technological measures on the Work that restrict the ability of a recipient of the Work from You to exercise the rights granted to that recipient under the terms of the License. This Section 4(a) applies to the Work as incorporated in a Collection, but this does not require the Collection apart from the Work itself to be made subject to the terms of this License. If You create a Collection, upon notice from any Licensor You must, to the extent practicable, remove from the Collection any credit as required by Section 4(c), as requested. If You create an Adaptation, upon notice from any Licensor You must, to the extent practicable, remove from the Adaptation any credit as required by Section 4(c), as requested.
- b. You may Distribute or Publicly Perform an Adaptation only under the terms of: (i) this License; (ii) a later version of this License with the same License Elements as this License; (iii) a Creative Commons jurisdiction license (either this or a later license version) that contains the same License Elements as this License (e.g., Attribution-ShareAlike 3.0 US)); (iv) a Creative Commons Compatible License. If you license the Adaptation under one of the licenses mentioned in (iv), you must comply with the terms of that license. If you license the Adaptation under the terms of any of the licenses mentioned in (i), (ii) or (iii) (the "Applicable License"), you must comply with the terms of the Applicable License generally and the following provisions: (I) You must include a copy of, or the URI for, the Applicable License with every copy of each Adaptation You Distribute or Publicly Perform; (II) You may not offer or impose any terms on the



Adaptation that restrict the terms of the Applicable License or the ability of the recipient of the Adaptation to exercise the rights granted to that recipient under the terms of the Applicable License; (III) You must keep intact all notices that refer to the Applicable License and to the disclaimer of warranties with every copy of the Work as included in the Adaptation You Distribute or Publicly Perform; (IV) when You Distribute or Publicly Perform the Adaptation, You may not impose any effective technological measures on the Adaptation that restrict the ability of a recipient of the Adaptation from You to exercise the rights granted to that recipient under the terms of the Applicable License. This Section 4(b) applies to the Adaptation as incorporated in a Collection, but this does not require the Collection apart from the Adaptation itself to be made subject to the terms of the Applicable License.

- c. If You Distribute, or Publicly Perform the Work or any Adaptations or Collections, You must, unless a request has been made pursuant to Section 4(a), keep intact all copyright notices for the Work and provide, reasonable to the medium or means You are utilizing: (i) the name of the Original Author (or pseudonym, if applicable) if supplied, and/or if the Original Author and/or Licensor designate another party or parties (e.g., a sponsor institute, publishing entity, journal) for attribution ("Attribution Parties") in Licensor's copyright notice, terms of service or by other reasonable means, the name of such party or parties; (ii) the title of the Work if supplied; (iii) to the extent reasonably practicable, the URI, if any, that Licensor specifies to be associated with the Work, unless such URI does not refer to the copyright notice or licensing information for the Work; and (iv) , consistent with Section 3(b), in the case of an Adaptation, a credit identifying the use of the Work in the Adaptation (e.g., "French translation of the Work by Original Author," or "Screenplay based on original Work by Original Author"). The credit required by this Section 4(c) may be implemented in any reasonable manner; provided, however, that in the case of a Adaptation or Collection, at a minimum such credit will appear, if a credit for all contributing authors of the Adaptation or Collection appears, then as part of these credits and in a manner at least as prominent as the credits for the other contributing authors. For the avoidance of doubt, You may only use the credit required by this Section for the purpose of attribution in the manner set out above and, by exercising Your rights under this License, You may not implicitly or explicitly assert or imply any connection with, sponsorship or endorsement by the Original Author, Licensor and/or Attribution Parties, as appropriate, of You or Your use of the Work, without the separate, express prior written permission of the Original Author, Licensor and/or Attribution Parties.
- d. Except as otherwise agreed in writing by the Licensor or as may be otherwise permitted by applicable law, if You Reproduce, Distribute or Publicly Perform the Work either by itself or as part of any Adaptations or Collections, You must not distort, mutilate, modify or take other derogatory action in relation to the Work which would be prejudicial to the Original Author's honor or reputation. Licensor agrees that in those jurisdictions (e.g. Japan), in which any exercise of the right granted in Section 3(b) of this License (the right to make Adaptations) would be deemed to be a distortion, mutilation, modification or other derogatory action prejudicial to the Original Author's honor and reputation, the Licensor will waive or not assert, as appropriate, this Section, to the fullest extent permitted by the applicable national law, to enable You to reasonably exercise Your right under Section 3(b) of this License (right to make Adaptations) but not otherwise.

5. Representations, Warranties and Disclaimer

UNLESS OTHERWISE MUTUALLY AGREED TO BY THE PARTIES IN WRITING, LICENSOR OFFERS THE WORK AS-IS AND MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND CONCERNING THE WORK, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF TITLE, MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT, OR THE ABSENCE OF LATENT OR OTHER DEFECTS, ACCURACY, OR THE PRESENCE OF ABSENCE OF ERRORS, WHETHER OR NOT DISCOVERABLE. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO SUCH EXCLUSION MAY NOT APPLY TO YOU.

6. Limitation on Liability. EXCEPT TO THE EXTENT REQUIRED BY APPLICABLE LAW, IN NO EVENT WILL LICENSOR BE LIABLE TO YOU ON ANY LEGAL THEORY FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES ARISING OUT OF THIS LICENSE OR THE USE OF THE WORK, EVEN IF LICENSOR HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

7. Termination

- a. This License and the rights granted hereunder will terminate automatically upon any breach by You of the terms of this License. Individuals or entities who have received Adaptations or Collections from You under this License, however, will not have their licenses terminated provided such individuals or entities remain in full compliance with those licenses. Sections 1, 2, 5, 6, 7, and 8 will survive any termination of this License.
- b. Subject to the above terms and conditions, the license granted here is perpetual (for the duration of the applicable copyright in the Work). Notwithstanding the above, Licensor reserves the right to release the Work under different license terms or to stop distributing the Work at any time; provided, however that any such election will not serve to withdraw this License (or any other license that has been, or is required to be, granted under the terms of this License), and this License will continue in full force and effect unless terminated as stated above.

8. Miscellaneous

- a. Each time You Distribute or Publicly Perform the Work or a Collection, the Licensor offers to the recipient a license to the Work on the same terms and conditions as the license granted to You under this License.
- b. Each time You Distribute or Publicly Perform an Adaptation, Licensor offers to the recipient a license to the original Work on the same terms and conditions as the license granted to You under this License.
- c. If any provision of this License is invalid or unenforceable under applicable law, it shall not affect the validity or enforceability of the remainder of the terms of this License, and without further action by the parties to this agreement, such provision shall be reformed to the minimum extent necessary to make such provision valid and enforceable.
- d. No term or provision of this License shall be deemed waived and no breach consented to unless such waiver or consent shall be in writing and signed by the party to be charged with such waiver or consent.
- e. This License constitutes the entire agreement between the parties with respect to the Work licensed here. There are no understandings, agreements or representations with respect to the Work not specified here. Licensor shall not be bound by any additional provisions that may appear in any communication from You. This License may not be modified without the mutual written agreement of the Licensor and You.
- f. The rights granted under, and the subject matter referenced, in this License were drafted utilizing the terminology of the Berne Convention for the Protection of Literary and Artistic Works (as amended on September 28, 1979), the Rome Convention of 1961, the WIPO Copyright Treaty of 1996, the WIPO Performances and Phonograms Treaty of 1996 and the Universal Copyright Convention (as revised on July 24, 1971). These rights and subject matter take effect in the relevant jurisdiction in which the License terms are sought to be enforced according to the corresponding provisions of the implementation of those treaty provisions in the applicable national law. If the standard suite of rights granted under applicable copyright law includes additional rights not granted under this License, such additional rights are deemed to be included in the License; this License is not intended to restrict the license of any rights under applicable



law.

Creative Commons Notice

Creative Commons is not a party to this License, and makes no warranty whatsoever in connection with the Work. Creative Commons will not be liable to You or any party on any legal theory for any damages whatsoever, including without limitation any general, special, incidental or consequential damages arising in connection to this license. Notwithstanding the foregoing two (2) sentences, if Creative Commons has expressly identified itself as the Licensor hereunder, it shall have all rights and obligations of Licensor.

Except for the limited purpose of indicating to the public that the Work is licensed under the CCPL, Creative Commons does not authorize the use by either party of the trademark "Creative Commons" or any related trademark or logo of Creative Commons without the prior written consent of Creative Commons. Any permitted use will be in compliance with Creative Commons' then-current trademark usage guidelines, as may be published on its website or otherwise made available upon request from time to time. For the avoidance of doubt, this trademark restriction does not form part of the License.

Creative Commons may be contacted at <http://creativecommons.org/>.