



User Manual

Version 2018

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IP Acknowledgements

This plugin uses the ECW JPEG 2000 SDK by ER Mapper, some parts of this SDK are based on 3rd party open source libraries and projects:

1) TinyXML - XML parsing for GML Geolocation Metadata

TinyXML is distributed under the zlib license. www.sourceforge.net/projects/tinyxml

2) LittleCMS - ICC Profile Management library - <http://www.littlecms.com>

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3) J2000 - <http://www.j2000.org/>

The T1 and MQ code in the ECW JPEG 2000 SDK is based in part on highly modified versions of sections from the J2000 library From the J2000 website: "The J2000 codec was written in an effort to produce the cleanest and simplest implementation possible of the JPEG-2000 standard. We have put a particular emphasis on good architecture design and code simplicity, while at the same time providing an implementation as complete and efficient as possible. The source code for the codec is freely available for anyone to study or even for use in commercial programs. We hope that our open development process and our focus on clean, straightforward code will help make the J2000 codec become a reference implementation of the JPEG-2000 standard." J2000 Copyright (c) 2001-2002, David Janssens All rights reserved. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met: 1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer. 2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution. THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS 'AS IS' AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

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5) zlib

zlib general purpose compression library

version 1.2.3, July 18th, 2005

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6) LightWrap++, a C++ wrapper for LightWave

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Introduction

Even in the age of 64-bit computing RAM is a limited resource. While it is quite common to have workstations with gigabytes of RAM, images used to texture in 3D applications have grown in size as well. In certain situations image sizes of tens or hundreds of gigabytes are quite common. Higher render resolutions for HDTV, film or print also require highly detailed, high resolution image maps for texturing.

InfiniMap is a LightWave 3D plugin that allows the user to render virtually unlimited¹ size textures within a familiar interface.

This is accomplished by only loading the parts of an image into memory that are actually visible, in the resolution needed for the final image. To determine the optimum resolution of the image need for the render, infiniMap uses a number of variables, including for example the distance of the mesh to the camera.

We have rendered animations of the earth using more than 3GB of images in video resolution using only 300MB of memory, including the memory used by LightWave 3D, in the process. We have also rendered images of tens of gigabytes using infiniMap on computers with 500MB of RAM successfully.

A smart caching system makes sure that the performance hit on render times is minimal, especially when rendering out animations. The loading of scenes with infiniMap images is much quicker than using native images.

It has been our goal to integrate infiniMap as tightly into LightWave 3D as possible and to adhere to existing standards to make using it a smooth experience. If the user interface differs from the original LightWave 3D image layers, this is due to the SDK unfortunately not allowing for a 100% accurate replacement of the user interface.

The currently supported image file formats are ECW (from ER Mapper) as well as JPEG 2000 and tiled OpenEXR images.

You can use infiniMap to create ECW, JPEG 2000² or tiled OpenEXR images using our new batch converter or one of the tools listed in the appendix of this manual.

Compatibility

InfiniMap 2018 requires LightWave 3D 2018³.

The screen shots in this manual have been taken from various versions of LightWave3D.

It currently runs with the Windows and MacOS versions of LightWave.

Please visit <http://www.infinimap.com> for more up to date information.

¹ Well, not quite, the current limit is an image size of 4,294,967,296 x 4,294,967,296 pixels.

² Currently the MacOS version does not support ECW or JPEG 2000 images.

³ Granted, the version number gives it away. ;)

Features

infiniMap has been thoroughly tested in production by us and our trusty beta testers. The main features of infinimap are:

- Full compatibility⁴ to LightWave 3D's surfacing, allowing for an easy replacement of native image texture layers with infinimap texture layers.
- Works as a procedural texture layer and as a node
- A user interface that remains as close as possible to the native image texturing interface provided by LightWave 3D, resulting in a minimal learning curve.
- Complete support for multi-threading to make full use of multi-processor, multi-core and/or hyper-threading computers.
- Low memory footprint.
- Shared image caches: Multiple instances of the same image use a shared cache, reducing the amount of memory required during rendering for scenes that re-use identical images (or single channels thereof).
- Useful tools to make working with infinimap images easier, such as an automatic OpenGL preview layer generation tool to make infinimap images visible in Layout.
- Free network render nodes.
- Unlicensed plugins can be used to load, render and save infinimap enabled scenes, there is no need to purchase a license for every copy of LightWave 3D in your facility⁵.
- ScreamerNet network rendering support, of course.
- Convert images to the ECW/JPEG 2000 and OpenEXR format from within LightWave 3D
- Replace images globally
- Simple Colour Correction for every plugin Instance
- Support for JPEG 2000 images with up to 28 bits per channel (a limitation of the JPEG 2000 standard).
- Free point upgrades, free support, free beer⁶
- A dedicated node for normal mapping
- Native support for PNG files to lower the memory requirements when converting
- Gamma support in the image converter
- Support for colour spaces

⁴ As far as the SDK allows that is, unfortunately there are still some missing hooks. Limitations are detailed in the sections describing the actual plugins.

⁵ Even though we won't complain if you do. We do offer volume pricing as well as site licenses.

⁶ O.k., we're joking about the beer...

Feature Comparison

There are two versions of infinimap available.

All versions support loading, saving and rendering scenes and objects created with any of the other versions⁷

Pro and Exr functionality is unlocked by the license file we send out after purchase.

The Pro Version is available for Windows only and support JPEG2000/ECW images in addition to EXR images.

⁷ With the exception of the MacOS version which does not support ECW/JPEG 2000 images

Setting up infiniMap

Installation

The *infiniMap.p* / *infinimap.plugin* file can be copied to any directory where you keep your plugins. We recommend using a manually created plugin directory to separate third party plugins from plugins shipped with LightWave 3D. This will simplify upgrades of LightWave 3D.

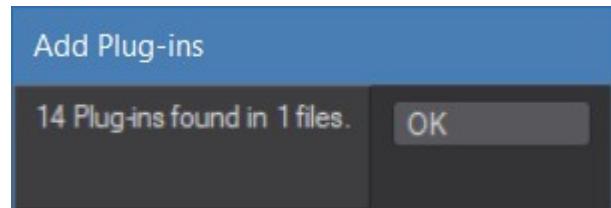
Now use the **Edit Plug-ins** panel (alt-F11) of the **Add Plugins** menu item to add the plugin file *infiniMap.p* to LightWave 3D (The OSX UB version is named *infiniMap.plugin*. LightWave will prompt you that it found 14 plugins in one file.

On Windows you can also copy it to

`%userprofile%.NewTek\LightWave\2018.0\plugins`

to allow LightWave to detect the plugin automatically.

To be able to use all features of the plugin you will need to register it with us and then activate it with the activation code we send to you.



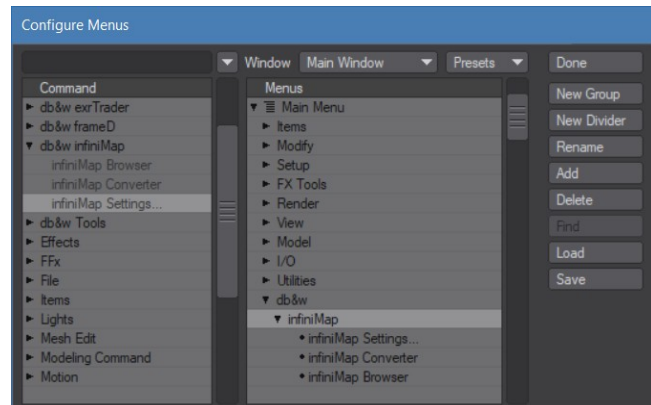
Adding the helper plugins

Three of the included plugins can be added to the Layout menus.

Use Edit->Edit Menu Layout... (alt-F10) to open the Configure Menus panel in Layout.

On the Commands list on the left there is a group called infiniMap which contains three commands to launch the infiniMap Browser, the Converter or to apply infiniMap Settings⁸ to the current Scene.

You can of course use Edit->Edit Keyboard Shortcuts... (alt-F9) to assign these commands to keyboard shortcuts.



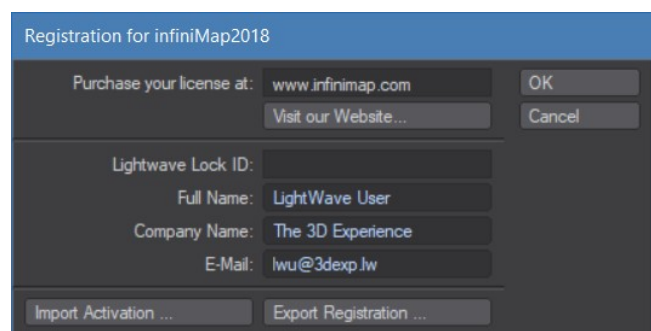
Registration

Once you've installed the plugin, open any object and either apply the infiniMap procedural texture, the shader, or either of the nodes to the surface. The interface controls will be disabled except for a button asking you to register.

You may also launch the Converter or the infiniMap Browser.

Clicking on the button will open the Registration panel as shown on the left. Enter your full name, company name (if applicable) and e-mail address. Export the registration and attach it to an e-mail to registration@infinimap.com. We will mail you an activation code within 24 hours after payment is received, depending on the time difference.

You can now import the keyfile and press OK to complete the licensing process.



⁸ Currently the infiniMap Settings only limit the maximum amount of memory used to cache ECW / JPEG 2000 images. It has no effect if you use OpenEXR images.

The registration file is stored in the same directory where the plugin resides. If you use multiple licenses of LightWave 3D from a single network share, the registration manager will only append/edit licenses locked to the dongle installed on the host machine. It will manage multiple licenses allowing for a single registration file on your network share.

Included Plugins

infiniMap is actually a suite of plugins for LightWave 3D. Currently it consists of the following plugins:

- infiniMap Texture Layer
- infiniMap Shader
- infiniMap Node
- infiniMap Extended Node
- infiniMap Browser
- infiniMap Converter
- InfiniMap Settings

Reference

Originally Posted by **Exper**

"Parameter 1: use it to change the value of Parameter 1".

Common User Interface Elements

Both the procedural and the shader use many common elements in their user interface⁹.

The common user interface elements used by both plugins, from top to bottom, are:

- Projection
 - Planar, Cylindrical, Spherical, Cubic, Front, UV (not available in the texture layer).
- Depending on the type of projection, these additional controls may also be visible
 - Fixed, Time, Reference Camera (Front projection)
 - UV Map (UV projection, not available in the texture layer)
- Image
 - Image selection
 - Layer selection
 - Channel selection
 - Image Colour Space
 - Image Preview Area
- Options
- Texture Quality
- LoD Blending
- UV Tiles, UV Tiling and UV Offset to modify the projection.
- Editing (colour correction)

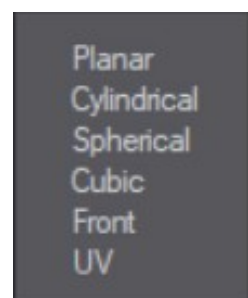
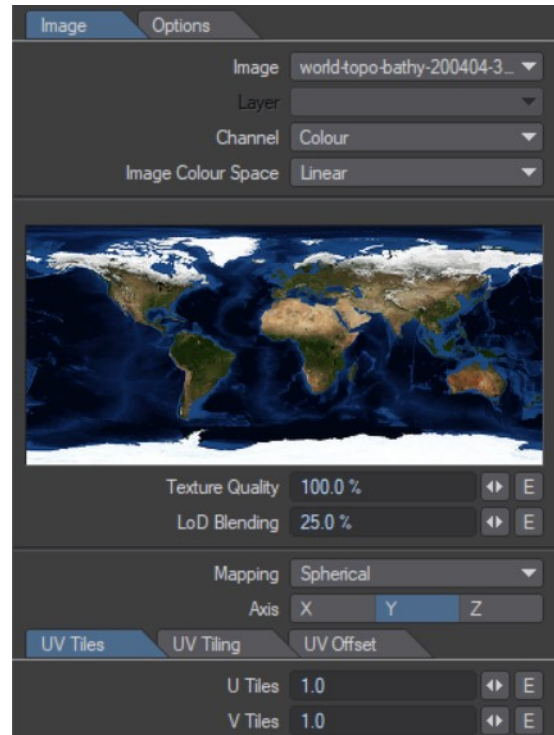
These are explained in more detail in the following sections.

Projection Types

infiniMap supports all projection types that LightWave3D provides to normal image maps. Unfortunately, due to limitations within the SDK, UV mapping is only supported by the infiniMap shader and nodes.

The projection types are:

- Planar projection
- Cylindrical projection
- Spherical Projection
- Cubic Projection
- Front Projection (also known as Camera projection)
- UV Map (not available in the procedural texture)



⁹ Actually, to a large extent they are based on the same source code as well.

Each one of these behaves exactly like the matching image projection type in LightWave 3D. infinimap also supports all the options, such as the UV tiling amounts and UV wrapping modes etc.

Please refer to your LightWave 3D documentation for more information on the projection types.

Image Selection

This pop-up menu works just like the image selector in the image texture layer provided by LightWave.

You can use it to select any of the currently loaded infinimap images or load a new one.

If you attempt to load an image that can't be used natively by infinimap, but can be converted using the Converter, infinimap will open the Converter for you. You can then change the settings, convert the image and the result will be loaded into infinimap.

Loaded images actually do not use any memory until a render process is started, this can be a VPR or a final render.

infinimap keeps track of the usage of the images. If no plugin actually uses one of the images in this list, the image is automatically removed from the list.¹⁰

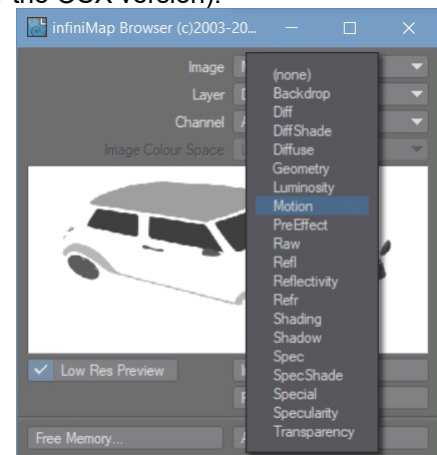
infinimap EXR will not allow you to pick a ECW/JPEG 2000 image, but you can still load, save and render objects that use ECW / JPEG 2000 images (except for the OSX version).

Layer Selection

OpenEXR can store multiple layers in a single image file.

If the selected image contains more than one layer you may pick one of them using the Layer Selection.

The Extended Node even allows accessing multiple layers at once.



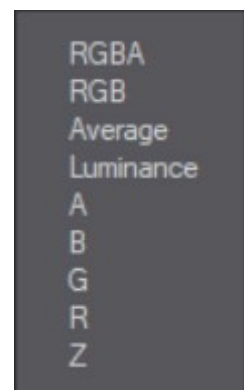
Channel Selection

Unlike LightWave 3D, infinimap allows you to specify which channel of an image you wish to use for texturing. In some instances it may be useful to just apply the red channel as a bump map for example. This feature also allows you to just use the alpha channel of a RGBA image to mask out other textures for example.

The channel selector has to do a bit of guessing as to how to interpret the bands/channels stored in an image file. If there are 3 bands, it assumes them to be RGB in that order, if there are four it assumes that the fourth band is the alpha channel. Single channels are always available as luminance / grey scale values.

Images with three or more channels, such as RGB images, will also be able to output two additional “pseudo” channels that infinimap can generate on the fly. These are:

- **Average** – Just the average of the Red, Green and Blue Channel



¹⁰ As always, there is an exception to the rule: Procedural texture layers, when copied using the 'Copy' button, still hold on to the infinimap image they use. So you may notice an image being in the list that you're sure isn't being used, because you copied an infinimap procedural texture layer that uses this image. No worries, next time you 'Copy' a texture layer, or restart LightWave 3D, it will be gone.

- **Luminance** – The Red, Green and Blue Channel balanced to produce the perceptual Luminance based on the SMPTE standard.

Image Colour Space

This control allows you to select the colour space that the image has been stored in. It will affect colour channels only.

The Image Colour Space setting is not per plug-in but stored per image.

Image Preview Area

If you have an image loaded, the image preview area will display a small thumbnail of the image.

If you have no image loaded, the image preview area will display the infiniMap logo as well as the version number of infiniMap.

The Image preview area is colour corrected using the display colour space.

Note: Due to a glitch in the LightWave 3D SDK, in Modeler the image preview area is not available for the procedural texture.

Options

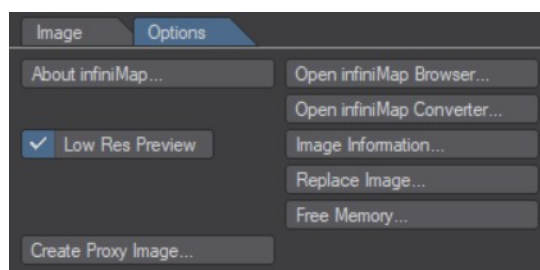
If you select the Options tab you will be able to access some bonus functionality of infiniMap.

The options visible depend on the plugin type, some options may not always be available.

Also, some options may only be visible if an image is actually selected in the Image Selector.

The Options are available in the procedural texture and the shader.

In the procedural interface some of the option names had to be shortened due to space constraints.



About infiniMap... / About infiniMap...

This displays a panel with the credits for infiniMap, as well as the version number and the date the plugin was created.

The version information is quite handy when you require support and check for updates.

As an additional note, we would once again like to thank our trusty beta testers for their patience and support.

The “About infiniMap” panel will also display the total amount of memory used by all images handled by infiniMap. This is especially handy if you're working with FPrime.

It will also display the maximum amount of memory that the libraries used to handle JPEG 2000 and ECW images **may** use to speed up access to the image files on disk. This value is adapted to your actual RAM usage. The more available memory you have, the more memory **may** be used and vice versa.

Please note: this is a maximum value, and infiniMap is likely to actually use a lot less than that.



Open infinimap Browser... / infinimap Browser...

This is a quick way to access the infinimap Browser from within the Shader or the Procedural Texture plugin.

Open infinimap Converter... / infinimap Converter...

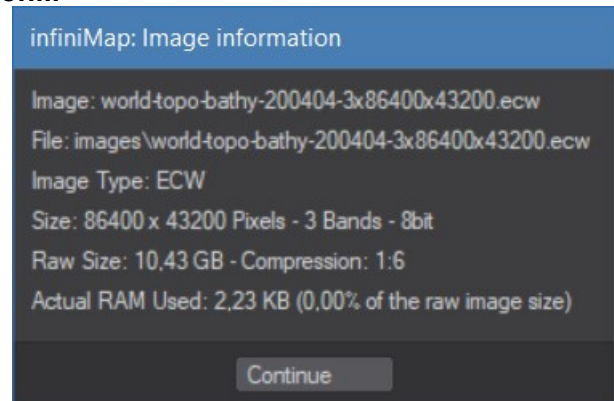
This is a quick way to access the infinimap Converter from within the Shader or the Procedural Texture plugin.

Show Image Information... / Image Information...

If the user interface displays a preview image, this option displays more verbose information about the loaded image.

This information includes:

- The file name and full path of the image
- The image format (currently only ECW, JPEG 2000 or OpenEXR)
- The width and height of the image in pixels, as well as the number of bands (or channels) included in the file
- The theoretical raw size of the image if it was uncompressed as well as the compression factor of the file.¹¹
- The amount of RAM/memory currently used by the image. Please note, since images may be used multiple times, the memory is only used once per image.



Replace Image...

This option allows you to globally replace the currently visible image. A file requester will open to allow you to select a new infinimap image.

Update/Create GL Layer... / Update GL Layer...

Currently LightWave 3D cannot display infinimap applied images in the OpenGL preview. We have included an automated way to create what we call OpenGL Preview Layers, that reflect the state of infinimap using standard LightWave 3D texture functions. These preview layers are only visible in the OpenGL view ports and are hidden during renders.

OpenGL Preview layers are not visible if GLSL is turned on in the OpenGL options of LightWave 3D.

This menu item allows you to create a preview layer, or, if you have already done so, updates the parameters of the preview layer to those of the current instance of infinimap.

infinimap identifies OpenGL preview layers by the name of the image file used by the LightWave 3D image texture. If it contains the name of the base infinimap image (without the file name extension in both cases) it will assume that the layer is an OpenGL preview layer.

As an example:

Assuming your infinimap image is BlueMarble.jp2, infinimap will accept *Proxy_BlueMarble.tga* or *BlueMarble_myProxy.bmp* as a valid name for the proxy image, but not *My_Blue_Marble_Proxy.tga*.

¹¹ Please note, the raw image size does not signify how much memory infinimap will actually use during a render.

Please note: For the creation of an OpenGL proxy layer to work in the shader, you will have to manually activate the texture layers of the surface (just click once on the [T] button next to the base colour of the Surface). Unfortunately infinimap can not automatically do this yet due to limitations of the LightWave SDK.

Creating an OpenGL Preview Layer

If no preview layer exists, infinimap will display the Create OpenGL Preview Layer panel allowing you to create a preview layer as well as a preview image.

Proxy Width Proxy Height

Defines the size of the final image used by the OpenGL proxy layer. These sizes match the texture size options available in LightWave 3D.

Size Presets

These are some common presets for OpenGL preview textures.

File Format

This is the file format used to save the file to disk.

Proxy File Name

Allows you to change the name of the preview image file. Make sure that it contains the name of the infinimap image as stated further above. Currently you will also have to type in the correct file name extension manually (this makes no difference to LightWave 3D however).

Use Loaded Image

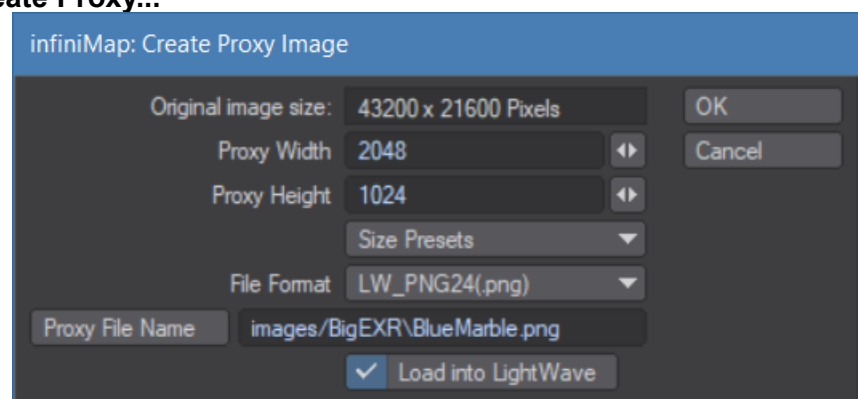
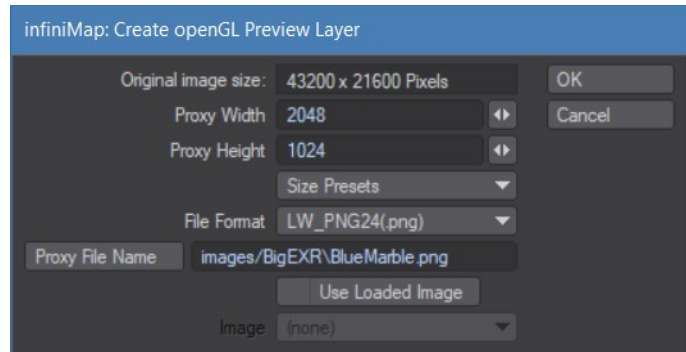
If you activate this button, instead of creating a new image file you can use an existing image file that has been loaded into LightWave 3D.

Image

This item allows you to pick a loaded image to use as a preview image instead. Please note that the same naming rules apply for the image file for infinimap to recognize the OpenGL preview layer.

Create Proxy Image... / Create Proxy...

Sometimes you just wish to create a small version of the currently loaded infinimap image, or create a proxy layer manually.



Create OpenGL Proxy Image allows you to do that without actually creating an OpenGL proxy layer within LightWave 3D. The user interface controls have the same functionality as in the **Update/Create OpenGL Preview Layer** panel.

Copy Settings from...

This control is only available in the texture layer plugin. It allows you to copy the applicable settings of a LightWave 3D image layer to the current infinimap layer.

It will optionally also convert and load the image texture used by the original image layer.

This option should help to transition LightWave 3D texture layers quickly to infinimap layers.

Low Res Preview / Low Preview

Previews rendered with infinimap can take a while to start because infinimap needs to read the disk based image files for each rendering process.

This includes rendering the preview sphere in the Surface Editor and VIPER.

To speed up preview renders, you can turn on the Lores Preview option (which is active by default). It basically reduces the Texture Quality setting by a fixed amount, which in turn means infinimap doesn't need to read as much data from disk for every preview render.

Final LightWave 3D renders are not affected by this setting at all. We recommend you leave Lores Preview on to maximize interactivity while surfacing. For fine details, or FPrime renders it should be turned off.

This menu items toggles low resolution previews for all instances of infinimap in the current scene.

Free Memory...

infinimap tries to manage memory as intelligently as possible, however there may be cases where this doesn't work as expected. If you work with FPrime extensively and preview on a single frame, but toggle the "Low Res FPrime" option a lot, or move the camera about, infinimap may use more memory than it really needs to.

Normally it re-evaluates its memory usage when you change to a different frame but you can also use the "Free Memory..." option to tell infinimap to release all memory.

Registration...

This item opens up the license manager used during the installation. Once the plugin is activated you will not need to enter the license manager again, but we do provide this option to allow you to check the registration.

Texture Quality

Texture Quality defines the resolution of the image texture when applied on the final render. While infinimap tries to estimate the needed quality depending on a variety of factors, such as the size of the final render or the distance to the camera, this may produce inaccurate results in some cases. This settings allows you to tweak the resolution, and thus the sharpness of the image texture.

The higher the value, the more detailed the image texture will be (within the limits of the image resolution). infinimap will also use more memory during rendering.

A lower value will blur the image texture more, but also lowers the memory usage.

In most cases the default value of 100% is appropriate, but you might want to tweak it after checking your final render or your memory usage.

LoD Blending

When rendering, infiniMap creates a number of level of details (LoD), small parts of the image texture at different resolutions. These are applied to the surface depending on the Texture Quality setting and other factors such as the distance to the camera.

To smooth transitions from one level of detail (or image resolution) to another, infiniMap blends the level of details. LoD Blending specifies over what range this blending happens.

The higher the value, the more memory will be used, although the memory hit is not as significant as changing the Texture Quality.

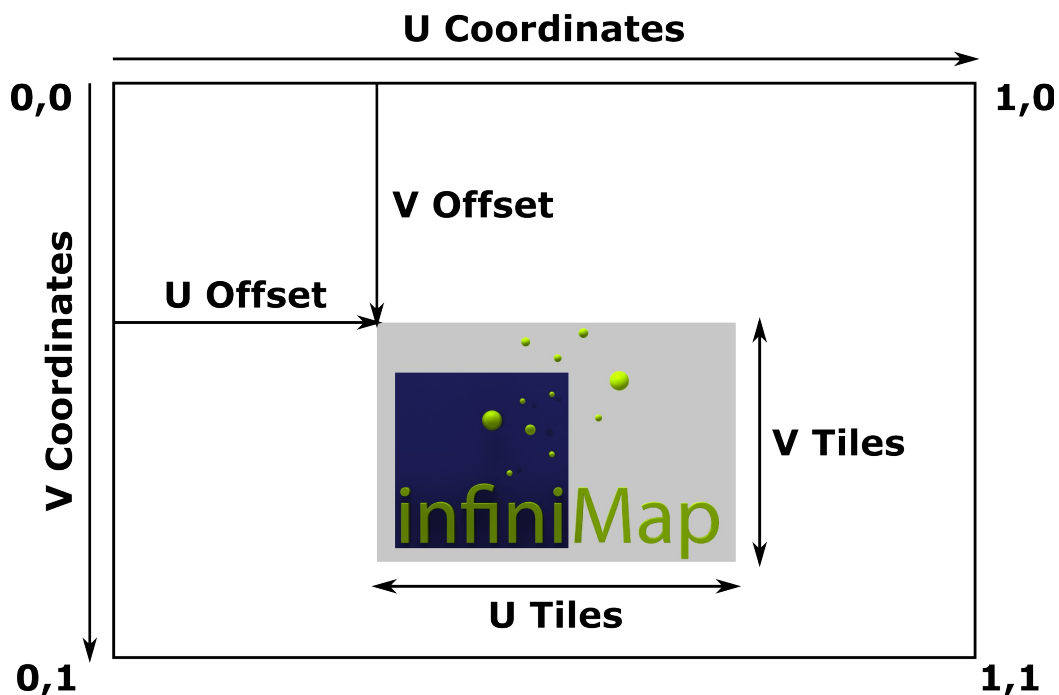
We recommend the default setting. If you can clearly see the different resolutions switch (this tends to be visible in animations, especially with a low LoD Blending setting) you should increase this value.

The useful range of LoD Blending values is between 0% and 100%.

UV Modification

The UV modifiers allow you to change the UV coordinates before the image is applied to the surface.

These UV coordinates can either be created implicitly by the projection type (such as planar or spherical) or explicitly defined by a UV map if the UV Map projection type is used.

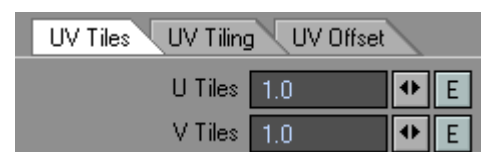


This diagram illustrates the relationship of the UV Offset and UV Tiles options in relation to the UV texture coordinate space.

UV Tiles

U and V tiles defines how many times the image is projected into the final UV space that ranges from 0 to 1.

A lower value means that the image will be smaller, a bigger value enlarges it. At a value of 1.0 the image will fit exactly into the UV space.



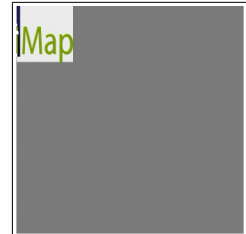
UV Tiling

The Tiling options define what happens with the image once it is repeated in UV space.

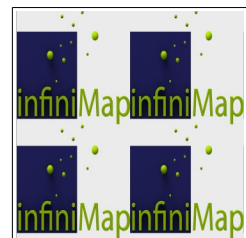
The sample images have been created with a planar map, using UV tiles of 2.0 respectively and an offset of -0.25 on U for the Reset and Wrap tiling option.



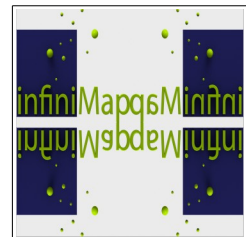
Reset The image is not repeated at all, outside of it's placement in UV space the image is not applied at all and the background colour will show through.



Repeat The image is repeated.



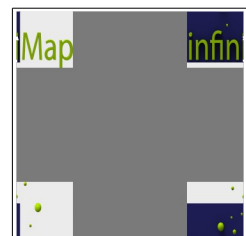
Mirror The image is mirrored and repeated



Edge The edge pixels of the image are repeated



Wrap The image is not repeated at all just like the Reset mode, but it will wrap around the UV coordinates.



UV Offset

The UV Offset allows you to position the image in UV space. The value is in relation to the original UV space and does not change if the UV Tiles changes.

Editing (Colour Correction)

The Editing options allow for simple, on the fly colour correction that is applied to the infinimap image while rendering.

The settings are similar to the ones supplied by LightWave 3D in the images panel.

Brightness

Changes the brightness of the image. At 100% the image is not changed, values below that make it darker, values above 100% brighten the image.

Contrast

This setting changes the contrast of the image. 100% is no change, anything below that lowers the contrast, anything higher (yep, you guessed it) raises the contrast.

Hue

The Hue setting changes the Hue of the image, basically cycling the colours through the colour spectrum. It is measured in degrees. 0° is the default. A setting of 360° degree is a full circle and the same as 0°.

Saturation

This changes the saturation of the image. 100% is the default value, at 0% the image will be greyscale only.

Gamma

This allows you to add gamma to your image.

To “degamma” (i.e. remove the gamma of an image) you can type in $1 / \text{gamma}$ – where gamma is the gamma of the image you’d like to neutralize. (i.e. If your image has a baked in gamma of 2.2, you can type in $1 / 2.2$ which results in 0.4545 to remove the gamma and linearize the image).

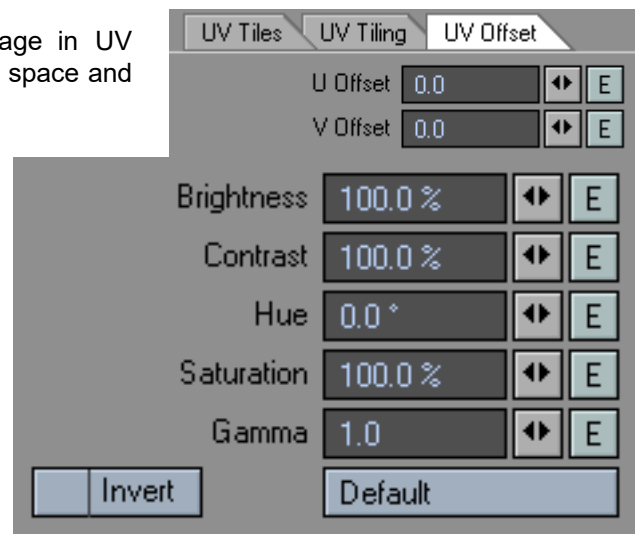
Normally you should use the colour space settings for images in a linear work-flow instead.

Invert

Invert inverts the colours of the image.

Default

This resets the values to their default settings. Enveloped values can unfortunately not be reset due to SDK limitations.



infiniMap Procedural Texture

The procedural component of infiniMap is probably the plugin you will spend the most time using.

Except for some special cases we recommend using the Procedural Texture instead of the shader. A few reasons are:

- The procedural texture is more versatile than the shader and can be used on any surface channel
- Unlike the shader the procedural texture is compatible with FPrime
- Procedurals seem to be faster when rendering compared to shaders.

Unfortunately the SDK provided with the current releases for LightWave 3D doesn't allow procedural textures to access UV Maps.

There are also limitations to the accuracy of the Texture Quality setting. As long as the Scale of the texture is correct and the textured object itself has not been scaled within Layout, the Quality Setting will be correct¹².

A change of the size of the object in Layout will need a readjustment of the Texture Quality setting. The Quality has to be set to roughly the square of the scale factor of the mesh multiplied by 100 to get the percentage. For example, if the object has been scaled to <5.0, 5.0, 5.0> the Texture Quality should be 2500% (5 x 5 x 100).

As a rule of thumb, do not scale an object in Layout that has the infiniMap texture layer applied to its surface.

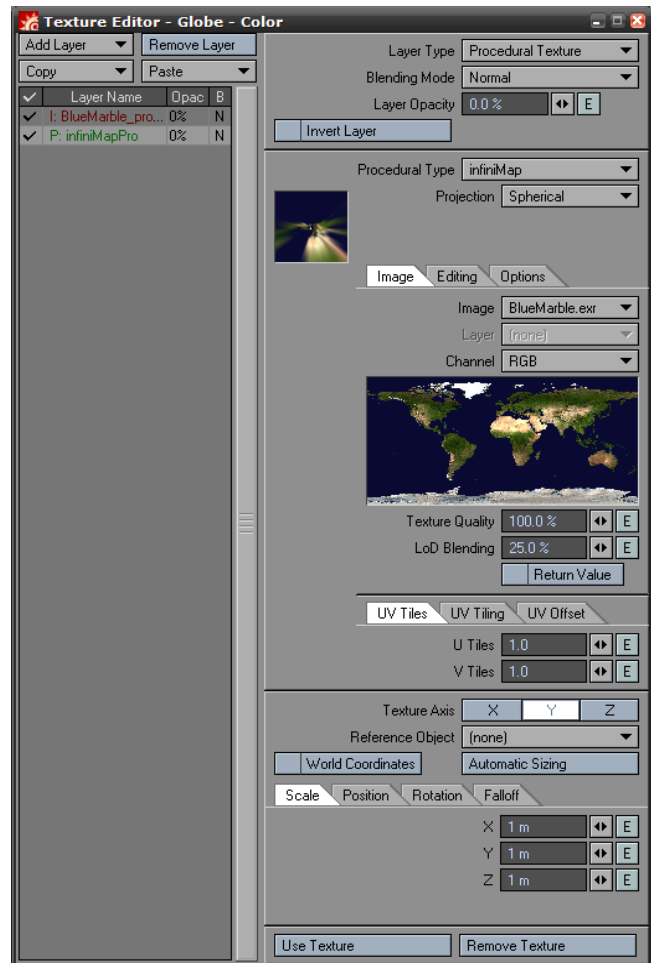
Return Value

This option is only available on the procedural texture if the texture is applied to a colour texture layer (i.e. The texture layers that modify the colour of a surface).

It basically sends the image data differently to LightWave so the result can be used as the source value in a gradient. You should not have to activate it unless the infiniMap layer does not behave as expected in conjunction with other layers.

If you activate "Return Value" you will be able to enter a colour or percentage (depending on the texture layer type), just as you can with any other procedural texture.

Please note that toggling "Return Value" does not immediately update the user interface. You will need to select another layer and then select infiniMap again for the user interface change to show.



¹² Well, at least very close. Unfortunately the plugin can only estimate the optimum settings.

infiniMap Node

The infinimap Node provides the same image mapping functionality as the shader, including support for UV maps.

All relevant inputs are exposed and evaluated once per shaded spot, allowing for a fine control of the parameters.

The outputs are derived from the selected Layer and Channel.

Colour

This output applies the Opacity and the Blending mode to merge the infinimap image on top of the Bg Colour.

If the infinimap image contains an alpha channel, this will be applied while merging it onto the Bg Colour. (Similar to how image editing applications merge a layer with transparencies on top of other layers).

This behaviour is identical to the LightWave 3D image node.

RGB

This output makes that raw RGB values of the image available.

Unlike the Colour output, no blending is being done.

Alpha

This output provides the raw Alpha channel of the loaded image, if one exists in the infinimap image.

Normal

This output is the normal to be shaded by LightWave 3D.

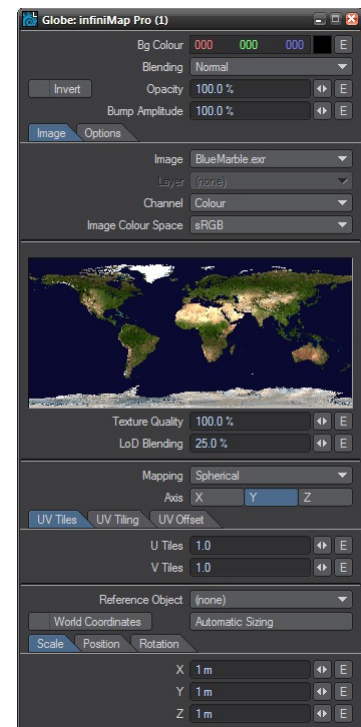
It is derived from the original surface normal being modified by the image as a bump map. Basically it is the Bump output subtracted from the original surface normal.

The Bump Amplitude affects this output.

Bump

This is the change of the surface normal when interpreting the infinimap image as a bump map.

This is affected by the Bump Amplitude.



infiniMap Extended Node

The infiniMap Extended Node is designed for images that contain more than one layer (only OpenEXR images currently support layers).

The extended node works like the normal infiniMap Node with the exception of not allowing the image to be blended onto a background colour.

If an image contains more than one layer (Currently only OpenEXR images support layers) it can output all layers at once.

Instead of using multiple nodes to extract layered data from a single image, one can thus use only this node to extract all layers (provided that they all use the same projection).

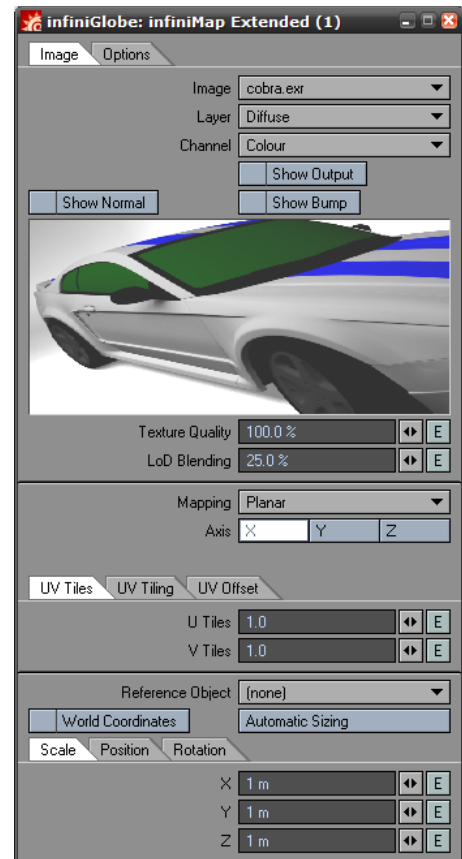
The number of outputs and their names depend on the loaded image.

By default it exposes all Layers as well as the Bump/Normal output for the first layer.

By selecting the different layers/channels in the user interface and changing the settings of **Show Output**, **Show Normal** and **Show Bump** one can change which channels are actually exposed.

The extended node does not support colour spaces at this moment in time. However, our free db&w Tools (available at <http://tools.db-w.com>) include a colour space conversion node.

To create an image that can be used with the Extended node we recommend using ProEXR for Photoshop® to export a layered OpenEXR image. This will then be converted by infiniMap into a tiled OpenEXR image, maintaining the layers.



infiniMap Normal Mapper Node

The Normal Mapper Node has been designed for image maps that contain normals.

Normal maps basically store a direction vector. That's three components, X,Y and Z, each ranging from -1 to 1.

They are used to bend the surface normal when shading, resulting in a relief like change of the shading that is very similar to the effects of a bump map¹³.

Type of Normal Map

There are two types of normal maps supported by this node. This setting changes the way that the normals stored in the image are applied to the current surface when rendering.

Object Space

Object space normals are normals stored in relation to the object. These are rarely used.

The advantage of an object space normal map is the fact that it does not require a projection. The downside is that it is a lot harder to evaluate on deformed meshes.

Basically, the XYZ components of the normal map relate to the XYZ coordinates of the mesh itself.

Tangent Space

Tangent space normals are the most common type of normal maps. These store the normal in relation to the current spot that is being shaded.

Tangent space normals require a mapping projection (commonly using a UV map) but handle deformations of the mesh well and are easy to evaluate.

In this case the XYZ components in the normal map are in relation to a (temporary) XYZ coordinate system that is valid for the currently shaded spot only. Z is equivalent to the original surface normal, X and Y are orthogonal to it.

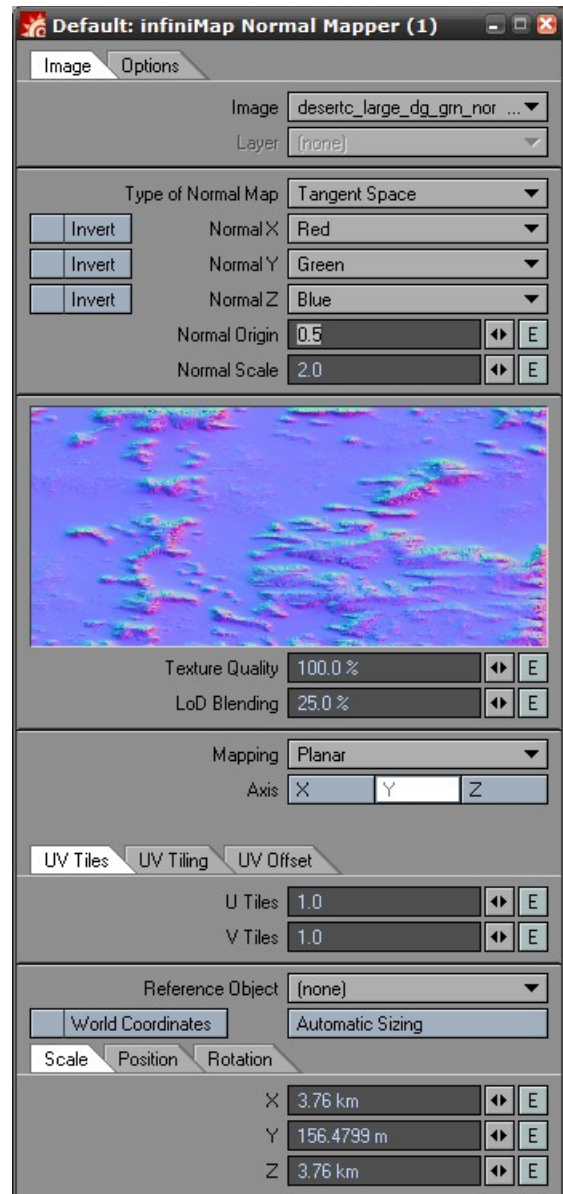
The other two components are derived from the mapping projection.

Normal X, Normal Y, Normal Z

These controls allow you to assign any of the channels present in the current infiniMap image to be used as X, Y or Z. You can also selectively invert the directions on a per channel basis.

Normal Origin, Normal Scale

Since most image formats don't handle negative numbers, those values are stored in a range from 0 to 1 (or 0 to 255 in 8-bit pixel terms).



¹³ A bump map is more or less a simplified variant of a normal map. When rendering, normals are derived from the bump map.

In this case 0.5 (or 128) corresponds to 0, anything lower is negative and anything above positive.

Some applications also store normal maps using a file format that supports negative numbers (such as OpenEXR), in this case a -1 in the normal map is a -1 in the file.

To cater for those, we've added the **Normal Origin** and **Normal Scale** options to bring what is stored in the image into the range from -1.0 to 1.0

For a normal map stored in the range 0..1, the default settings bring the values into the -1..1 range.

Basically: $\text{value} = (\text{pixel} - \text{Normal Origin}) * \text{Normal Scale}$

For a proper float image with negative values, the settings would be 0 for the **Normal Origin** and 1 for the **Normal Scale**.

infiniMap Browser

The infinimap Browser is a small generic plugin that you can keep open while you work in Layout. It allows you to have a quick glance at all infinimap images currently in use by the scene.

You can permanently keep this window open while working.

It also displays some of the options available in the shader, texture layer or nodes Options tab, allowing you, for example, to quickly change the quality settings for FPrime renders.

These options are explained in more detail in the Common User Interface Elements section.



infiniMap Converter

The Converter will convert any image that LightWave can load using plugins¹⁴ into an ECW/JPEG 2000 image, ready to be used within infinimap.

Due to licensing restrictions the Converter is limited to a maximum source image size of 500MB¹⁵ when converting to ECW / JPEG 2000 images. InfiniMap Pro can read much larger images created in other applications though.

Converting to OpenEXR images is not limited in size.

This converter panel will show up when you attempt to load an image that is not native to infinimap into one of the infinimap plugins.

Licensed users also have access to a standalone plugin batch converter, covered in the next chapter.

Depending on the context of the conversion and the license of infinimap, some of the controls may be missing.

The conversion settings are stored between sessions in the content directory (this allows for content/project specific conversion settings).

Here is a short description of the controls:

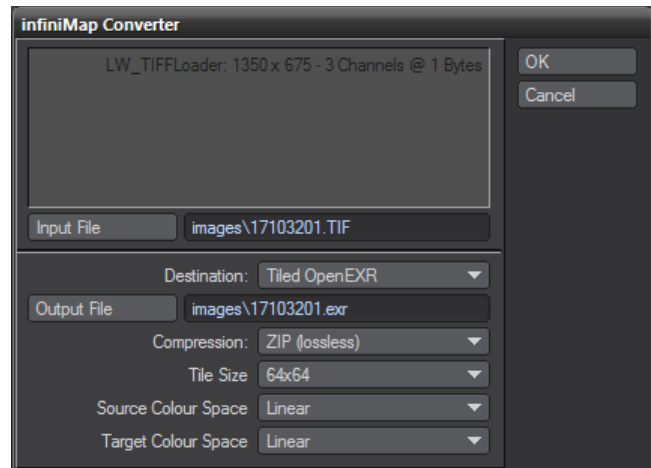


Image Information

This area just displays some information about the source image, mainly the channels used (as returned by LightWave)

Source

The converter can use two different types of source images.

From File

You can load an image from a file. This can be a ECW, JPEG 2000 or OpenEXR image. The converter also supports loading any type of image that LightWave 3D provides a plugin for (this doesn't include Targa, FLX and IFF, which are native to LightWave 3D).

PNG images that are not interlaced are also loaded and converted natively by infinimap, reducing the memory usage tremendously compared to using the native LightWave 3D PNG loader plugin.

If you load an image that uses the LightWave 3D plugins, infinimap will need to create a temporary file first. This file can be rather huge (it is uncompressed) and stored in the default temporary directory of the computer. The file is deleted after conversion.

The conversion itself will use as little memory as possible, converting one scanline after the other. This conversion process is multi-threaded.

If you pick an OpenEXR source image file, all layers and channels will be preserved.

¹⁴ Unfortunately this excludes TGA, FLX and IFF which are both loaded natively by LightWave 3D

¹⁵ The 500MB refer to the raw, uncompressed size of the image. This can be computed using the following formula:
width * height * number of channels * depth per channel in bytes.
For example, an image that is 1920x1080 pixels large, contains 4 colour channels (i.e. Red, Green, Blue, Alpha) using 8 byte each (for 256 different shades per channel) would be:
 $1920 * 1080 * 4 * 1 = 6220800$ bytes, which is 5.9 MB (divide twice by 1024 to convert from bytes to Megabytes).
Fortunately infinimap does that math and will warn you if the 500MB limit is exceeded.

Loaded LightWave Image

You can also convert an image that is currently loaded into LightWave 3D. If you select this option you can pick one of the loaded images as a source for conversion.

Input File

Here you can select a file to use as the source image if the Source is set to **From File**.

Image

This pop-up allows you to pick an image loaded into LightWave 3D as a conversion source if the Source is set to **Loaded LightWave Image**.

Destination

infiniMap can either work with ECW / JPEG 2000 images or tiled OpenEXR images natively. Only the Pro version supports ECW / JPEG 2000.

This option allows you to select the kind of output image and will then display the relevant options.

ECW / JPEG 2000 (Pro / Le only)

The file name extension of the output file determines if this option writes out a ECW or a JPEG 2000 image.

Call your file <filename>.jp2 to convert to a JPEG 2000 image.

Call your file <filename>.ecw to convert to an ECW image.

JPEG 2000 files are a standardized, cross-vendor image format that can be read by other applications as well. It can also supports lossless compression.

ECW on the other hand is an image format developed by ERMapper and is mainly designed for geodata. The compression is always lossy. However, it is slightly faster to compress and decompress compared to JPEG 2000.

Compression Ratio 1:

This slider allows you to set the compression ratio for the converted image. A higher value will producer smaller images. Since the compression is lossy, a higher value will also display more compression artefacts. A value between 5 and 20 is a good trade off between final file size and image quality.

JPEG 2000 supports lossless compression. Set the Compression Ratio to 1:1 to compress without loss.

Tiled OpenEXR

Tiled OpenEXR images are a special flavour of OpenEXR images. Basically the image gets split up into small tiles that can be read independently of each other. The tiles are also stored in different resolutions.

OpenEXR supports multiple channels and layers per image file, as well as 32bit or 16bit float pixels (HDR).

If you select an OpenEXR image as the source for the conversion it will be converted with identical channels and layers (but tiled).

Compression

OpenEXR offers a variety of compression modes, we recommend ZIP.

- **Uncompressed**
Doesn't compress the data at all, recommended for highest speeds (if the hard drive is fast) - but also uses the most storage space.
- **RLE (lossless)**
Compresses the difference between adjacent pixels. Fast to compress and decompress, but in general only works well for images with large areas of solid colour.
- **ZIPS (lossless)**
This uses a ZIP type compression scheme to compress one scanline at a time. Slow to compress, fast to decompress and also offers a fairly high compression ratio.
- **ZIP (lossless) - default**
Just like ZIPS, except that it compresses 16 scanlines in one go. This results in a slightly better compression compared to ZIPS, but also slows down reading single scanlines from an image.
We recommend ZIP for non-grainy images (or images with little grain).
- **PIZ (lossless)**
This is a wavelet based compression scheme that has a compression ratio that is comparable to ZIP(S), but is faster to compress ... on the other hand it is slower to decompress.
PIZ is recommended for grainy images.
- **PXR24 (lossy)**
A wavelet based compression scheme similar to PIZ, 32bit float numbers are cut off to 24bit, losing 8 bits of precision.
- **B44 (lossy)**
A compression scheme designed for the real-time playback of OpenEXR images with a constant compression ratio.
- **B44A (lossy)**
Just like B44, but solid areas (such as alpha channels) have a better compression ratio.

These are explained in more detail in the *Technical Introduction to OpenEXR*, available as a PDF at www.openexr.com.¹⁶

Tile Size

This determines the size of the tiles in the tiled OpenEXR images.

Larger tiles allow the compression to be more effective, reducing the final image size. They are also slightly faster to load and decompress.

Smaller tiles allow infinimap to use memory more effectively while rendering.

We recommend a size of 32x32 or 64x64.

Source Image Colour Space / Target Image Colour Space

They allow you to convert a (non-linear) source image to linear during the conversion. This is especially useful if the destination image is a tiled OpenEXR image and you work using a linear work-flow because it saves on CPU time that would otherwise be needed to convert the image on demand during a render.

It is not recommended to store an image as linear in ECW/JPEG 2000 as a colour space conversion from anything but linear is likely to result in banding. This is because a colour space conversion changes the distribution of colour values which then might not be represented exactly in an 8-bit image format like ECW/JPEG 2000¹⁷.

¹⁶ I admit it, I didn't want to copy and paste the entire section over from the OpenEXR website. The document is highly recommended to understand the capabilities of OpenEXR.

¹⁷ At least as far as infinimap compresses them. JPEG 2000 is specified for higher bit depths but implementations using those are rare.

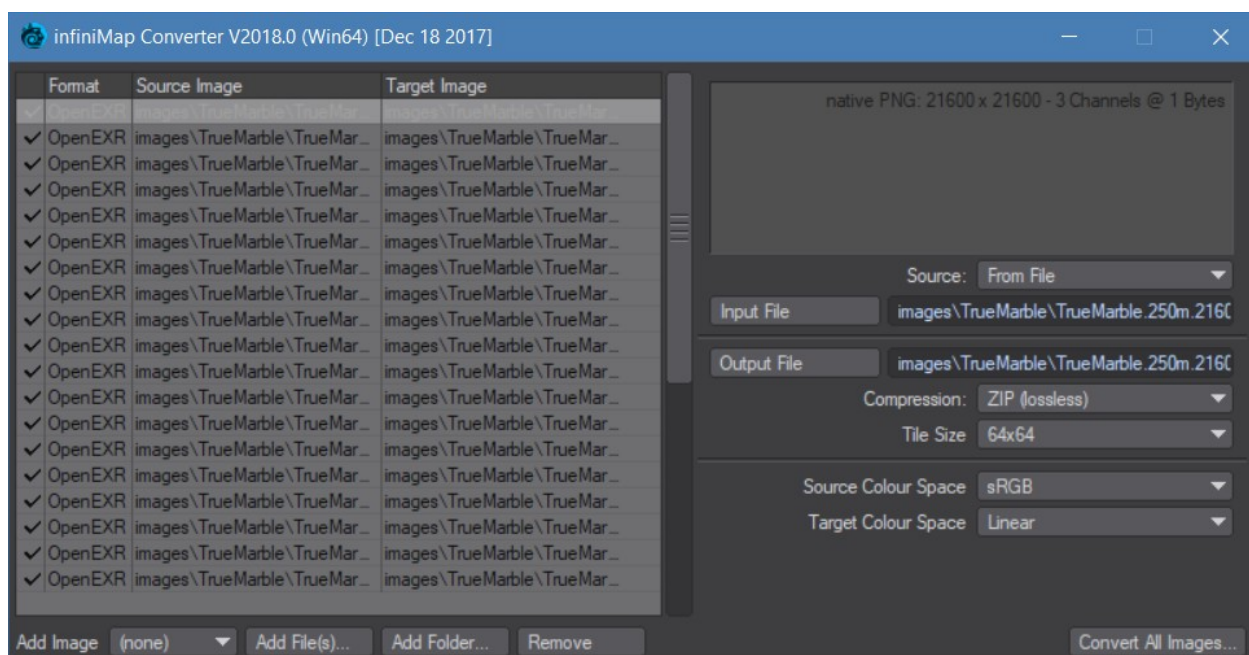
Output File

This opens a file requester allowing you to pick an output file.

Convert Image

This will finally convert the image. Depending on the image size and CPU speed this may take a couple of minutes. A progress window is displayed during the conversion, and infinimap will also display some statistics after the conversion has completed.

infiniMap Converter (standalone plugin, Batch)



The batch converter is only available for licensed versions of infiniMap (either infiniMap Exr or infiniMap Pro).

Unlicensed versions of infiniMap will display the converter as described in the previous chapter.

The left hand side of the converter shows the list of conversion tasks. The right hand side shows the conversion settings for the task selected on the left. These options are identical to the normal converter as described in the previous chapter and are described there.

The task list is stored in the content directory between sessions of the batch converter. The task list also remains if you close and restart LightWave 3D.

The buttons at the bottom of the batch converter allow you to:

Add Image

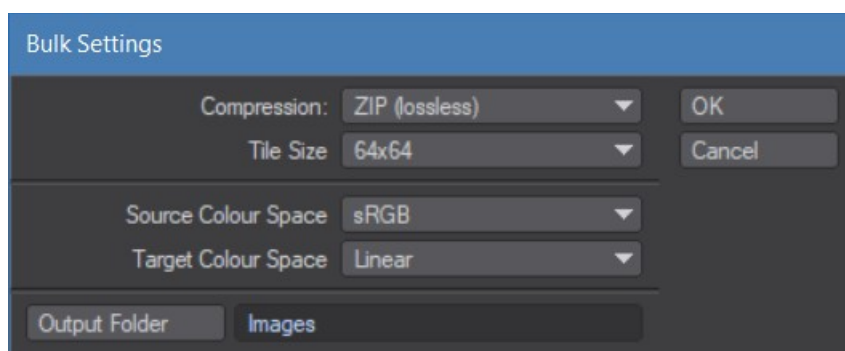
Add any image that is currently loaded into LightWave 3D as a new conversion task.

Add File(s)...

This opens a file selector to pick one or more images (using the shift or ctrl key) and adds the respective conversion tasks. If you select more than one image you will be prompted for the conversion settings to be used for all tasks.

The settings correspond to the respective settings in the converter.

If you leave the Output Folder blank, the converted images will be saved in the same directory as the selected files.



Add Folder...

This will add a complete folder of images to the task list. Other than that this option behaves just like **Add Files...**

Remove

This will remove the currently selected entry from the list of processing tasks.

Convert All Images...

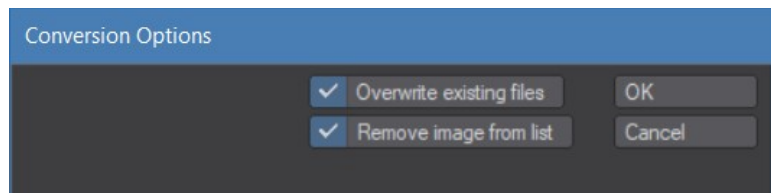
This will process all conversion tasks.

You will be prompted with a window displaying further options:

Overwrite existing files (activated by default)

This will allow the converter to overwrite existing files automatically.

If you turn this off and infinimap would overwrite an existing file you will be prompted to either allow overwriting the file or not.



Remove image from list (activated by default)

This will remove successful conversion tasks from the batch list.

Appendices

JPEG 2000 and ECW conversion tools

In addition to the Converter shipping with infiniMap there are numerous other tools to convert images to the JPEG 2000 or the ECW image file format:

- **Free ECW JPEG 2000 Compressor** by ERMMapper (www.ermapper.com)
This is one of the best compression tools out there, it is however limited to a raw image size of 500MB and only supports TIF and JPEG as source images.
ERMMapper also have a free ECW/JPEG 2000 viewer for download that is quite nice and handles huge images beautifully.
- **Photoshop® CS2** by Adobe (www.adobe.com)
Photoshop® now supports JPEG 2000 images as well, so you can save your images in JPEG 2000 from within Photoshop® CS2
- **j2k** by Fnord software (www.fnordware.com/j2k/)
A free compression/decompression library for Photoshop® and After Effects®, both Mac and Windows are supported.
- **JasPer** by Michael D. Adams (<http://www.ece.uvic.ca/~mdadams/jasper/>)
This is a free implementation of a JPEG 2000 compressor/decompressor, source code included. It allows for command line compression of images, there are some graphical front-ends available though (most notable, GeoJasPer at <http://www.dimin.net/software/utis.html>).
- **LuraWave** by LuraTech (www.luratech.com)
A commercial compressor available either as a stand-alone tool or as a Photoshop® plugin.
- **JPEG Toolbox V2** by Morgan Multimedia (www.morgan-multimedia.com)
- **JPEG 2000 / A3D Compressor** from Anything 3D (www.anything3d.com)

Most of these compression tools will choke on images that are larger than your main memory. Also TIFF images beyond 2GB are a problem for most conversion tools (since the TIFF standard is only a 32bit standard).

For large scale compression we recommend **ERMMapper** by ERMMapper (www.ermapper.com) or **Manifold® System** by manifold.net (<http://www.manifold.net>) for the budget conscious.

A full list of tools is also available in the support section at www.db-w.com

OpenEXR related tools

We recommend ProEXR (<http://www.fnordware.com/ProEXR/>), there you will also find some simple command line tools to display OpenEXR images or to extract detailed information.

Tips & Tricks

- To speed up the Surface Editor, increase the size of the preview sphere visible at the top of the Surface Editor, or set the 'Refresh Rate' to 'Manual' in the Surface Editor options.
- Our free db&w Tools (available for free at <http://tools.db-w.com>) include nodes that complement infiniMap, such as a simple colour correction node or a node to convert colour spaces.

- On OSX the number of open files per process is limited to 256 files as a default. As a result of this, infiniMap can use around 200 images per session. This limit can be increased, but requires some work in Terminal. The line:
limit maxfiles 512 1000000
needs to be added to the file “/etc/launchd.conf” (if it doesn't exist then it needs to be created) and increases the limit to 512 files. This is a plain text file. It will be active after a reboot.

Network Rendering

infiniMap is ScreamerNet compatible and allows for network renders. You can install the plugin on any render node and it will render as expected. Here are a couple of pointers to make network rendering with infiniMap a painless experience.

- Make sure infiniMap is properly installed in the plugin configuration file.
- Use content directories.
infiniMap saves and loads images in relation to the content directory if possible.
- To make maximum use of the image cache used by infiniMap, configure your render controller to render successive frames on the same render node. In Spider for example, you can configure the nodes to render any number of frames at a time, instead of distributing the frames to be rendered one at a time to the render nodes.
Other render controllers may have similar options.

Known Issues

Unfortunately some things just never work the way they should. We tried to squash every bug we encountered, however sometimes it wasn't possible due to circumstances outside of our control. LightWave 3D itself has a couple of holes within the SDK which can be troublesome at times.

Please note that newer releases of LightWave 3D or infiniMap might have solved some of these issues. Please check www.infinimap.com regularly for updates.

Here is a short list of known issues and a collection of workarounds that should make your life easier in critical situations:

- If LightWave slows down drastically if you have the Surface Editor open, try to increase the size of the preview sphere and/or change the update mode to Manual.

LScript

The following commands can be issued from LScript or as a LightWave command.

Generic_infiniMap_Browser

Opens the infiniMap Browser

Generic_infiniMap_Converter

Opens the infiniMap Converter

Glossary of Used Terms

SDK (software development kit)

Basically a set of tools and documents to allow the creation to plugins. In the case of LightWave3D the SDK provided by NewTek.

JPEG 2000

Wavelet based successor to the JPEG standard for compressed images. It allows for lossless compression, more than 8 bits per channel and has a variety of enhanced features.

ECW

an advanced wavelet based compressed image file format developed by ER Mapper. Now replaced by JPEG 2000.

OpenEXR

A HDR image format designed by ILM for post-production pipelines that has found a wide acceptance in the industry.

OpenGL preview layer

A term used by infiniMap for a texture layer within a surface that serves no other purpose but to display an approximation of an infiniMap image in the OpenGL real-time preview of LightWave3D.

Basically, it is an image layer with the opacity set to 0%, which will still display in OpenGL but not during renders.

Please note that GLSL needs to be turned off in the LightWave 3D OpenGL options for the preview layer to be visible in the viewports.

FAQ

I can't create an OpenGL proxy layer from the Shader

Unfortunately, for this to work from the shader you will have to manually activate the texture layering on the surface colour.

Click on the [T] button to the right of the surface base colour once to activate it. Now the infiniMap shader can create an OpenGL proxy layer for that surface.

I've created an OpenGL proxy layer, but I don't see it in the texture layer window (it does show in OpenGL though)

While the layer has actually been created, LightWave3D will not display the layer in the texture list until you close and re-open the texture list.

No image preview in the Modeler when working on the procedural texture

Due to a limitation imposed by LightWave 3D, the image preview is not available in the procedural texture component of infiniMap 3D when running in Modeler.

I change the preview resolution, but the Preview / VIPER doesn't update

Sometimes LightWave3D doesn't register the fact that a texture value has been changed. Switching the preview resolution is one of those cases. If it happens, please refresh the preview or VIPER manually.

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