Tutorial #2: Blue Marble

Version 1.0

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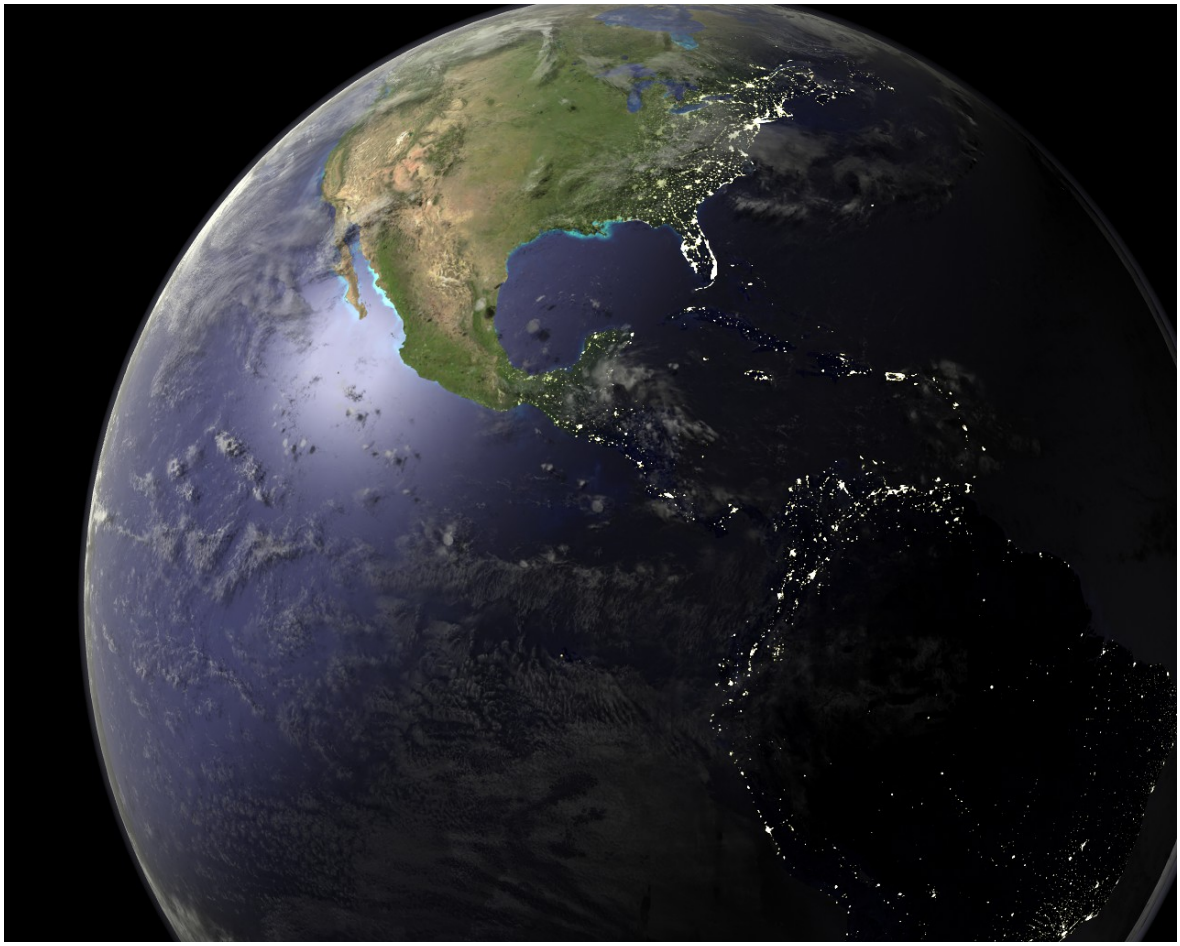
Introduction



These tutorials will show you how to use the infiniMap Pro plugin to use huge images in your LightWave3D projects.

We assume that you know the basics of LightWave3D, including navigating the user interface, basic modelling, using the surface editor, rendering etc.

Please note that a registered version of infiniMap Pro is required to complete this tutorial. However, you may load the included scenes with the unregistered version of infiniMap Pro.

This Tutorial uses imagery from the NASA Blue Marble and NASA Blue Marble Next Generation.

Blue Marble Image Credits:

NASA Goddard Space Flight Center
Image by Reto Stöckli (land surface, shallow water, clouds). Enhancements by Robert Simmon (ocean color, compositing, 3D globes, animation).

Blue Marble: Next Generation was produced by Reto Stöckli, NASA Earth Observatory (NASA Goddard Space Flight Center).

http://earthobservatory.nasa.gov/

Globe Tutorial

In this tutorial we will create a globe of the earth using material from the NASA Blue Marble Project. Steps covered include the creation of JPEG2000 compressed images and more advanced options of infiniMap Pro.

A registered version of infiniMap Pro is required for this Tutorial.

Obtaining the Images

We are going to use the following images in this tutorial.

All of these images have been obtained from the BlueMarble Website at **http://earthobservatory.nasa.gov/Newsroom/BlueMarble/BlueMarble_2002.html** .

We are using imagery from the slightly older BlueMarble 2002. We have included highly compressed versions of the images with this tutorial, feel free to replace them with your own images or different ones.

Credits:

Blue Marble Credits:

NASA Goddard Space Flight Center
Image by Reto Stöckli (land surface, shallow water, clouds). Enhancements by Robert Simmon (ocean color, compositing, 3D globes, animation).

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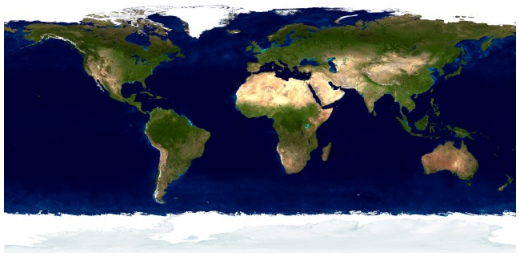
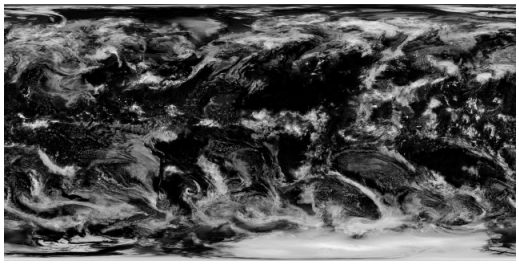
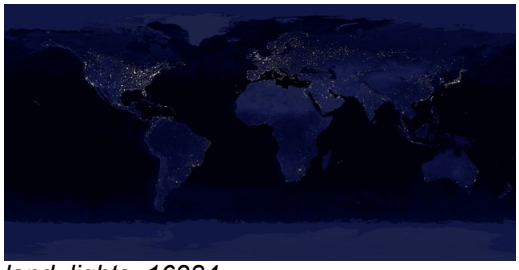


land_ocean_ice_8192



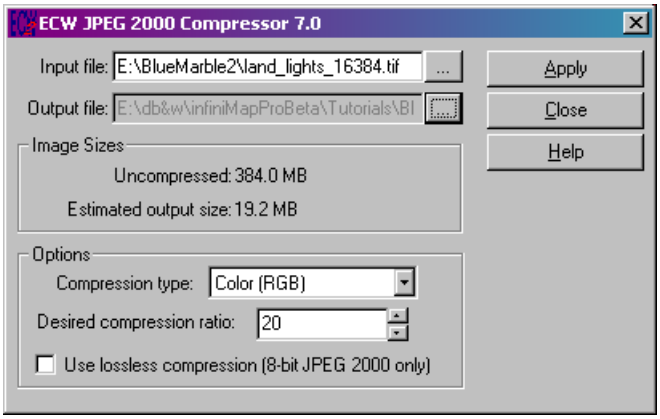
cloud_combined_8192



land_lights_16384

Preparing the Images

Since the images have a raw size of less than 500MB, we can simply use the free ECW/JPEG2000 compressor from ERMapper (available at **www.ermapper.com**) to compress the images.



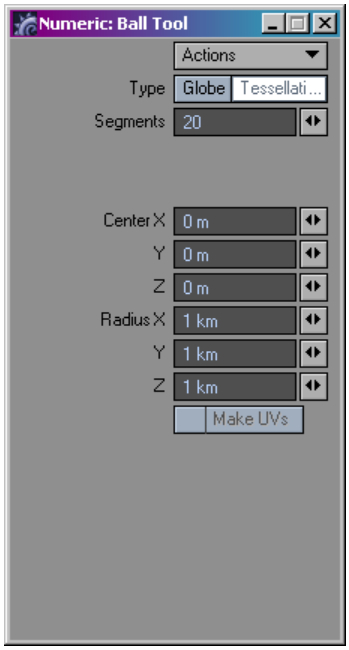
Simply select each of the downloaded TIFs as an input file, use the same file name with either the .ecw or .jp2 extensions as an output file, choose your compression ratio and press **Apply**.

We have found that ECW files decompress and load much quicker, resulting in faster infiniMap Pro renders. However, JPEG 2000 compressed images have a higher image quality when decompressed and can be created by a variety of third party tools.

Modelling

Well, for a globe this is pretty much the easiest step.

We are going to create three spheres, one for the actual surface of the earth, one for the clouds and a third one for the atmosphere. We won't work to scale in this case, even though you're free to do so (the radius of the earth is roughly 6380 Km at the equator).



To at least give the globe a bit of a sense of scale, I've decided to make give it a radius of one Km.

So, prepare a fresh content directory (or use the one containing the tutorial files) and open up Modeler. Make sure that Modeler points to the right content directory.

Press '**shift-O**' (**Create->Primitives->Ball**) to create a new sphere and use the following settings:

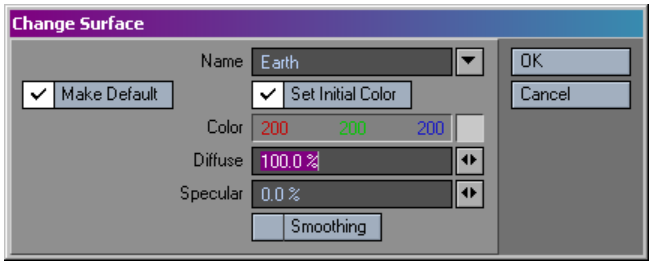
Type: Tessellation

Segments: 20 /since we want a nice and smooth ball)

Center: X,Y,Z: 0 m

Radius: X, Y, Z: 1km each.

Just to be on the safe side, apply a new surface to the sphere right away, press '**q**' to open the **Change Surface** window and enter "*Earth*" as the surface name.

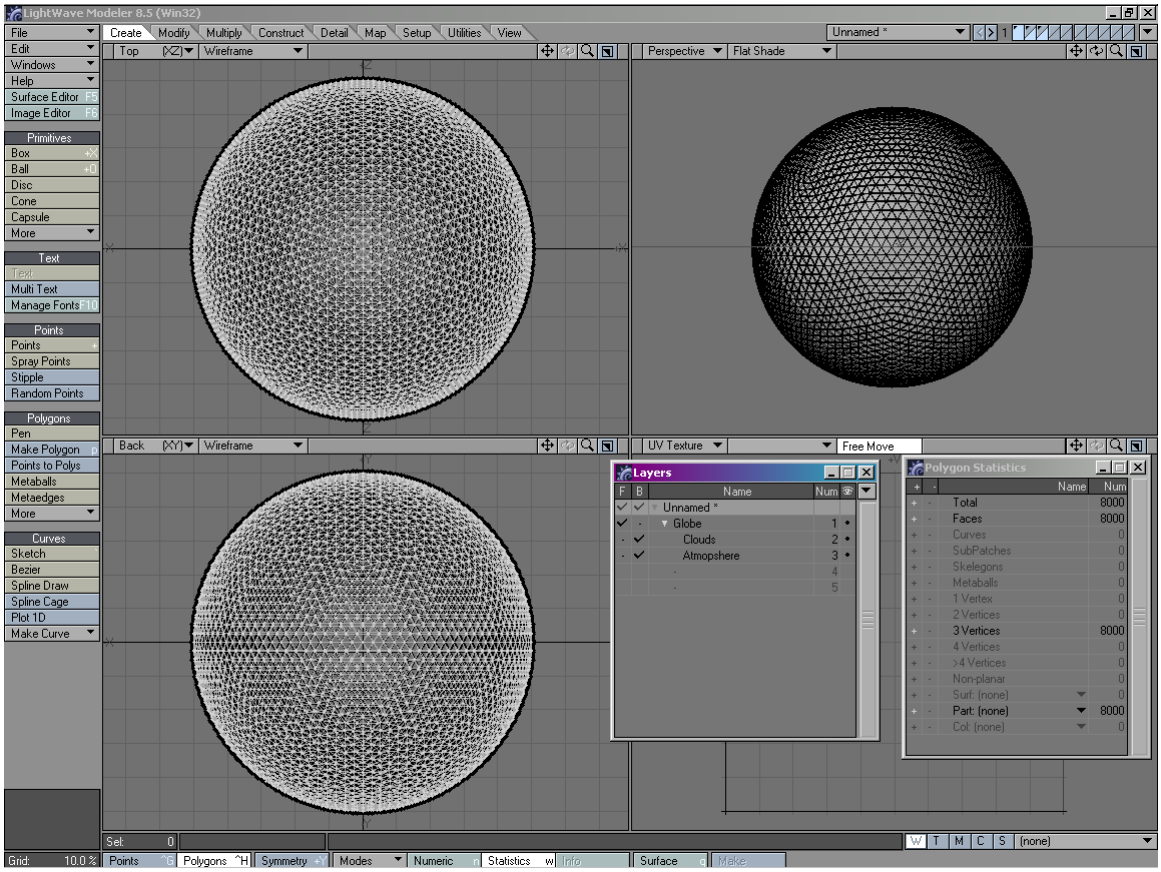


Wasn't too hard now, was it?

O.k., let's create a second layer, create a new sphere in the second layer with all settings identical to the previous sphere except for a radius of 1.01 km along each axis and name the surface "*Clouds*".

Create a third layer and and a third sphere, again using the same settings but a radius of 1.02 km and a surface name of "*Atmosphere*". Since we will use this third sphere for the blueish glow around the globe, we will need to flip all polygons. So, quickly select the Flip or press '**f**' on your keyboard to do that.

Well, that's all for the modelling. You should make sure your layers have proper names and you might want to put them into a small hierarchy, i.e. parent both the clouds and the atmosphere to the main globe.

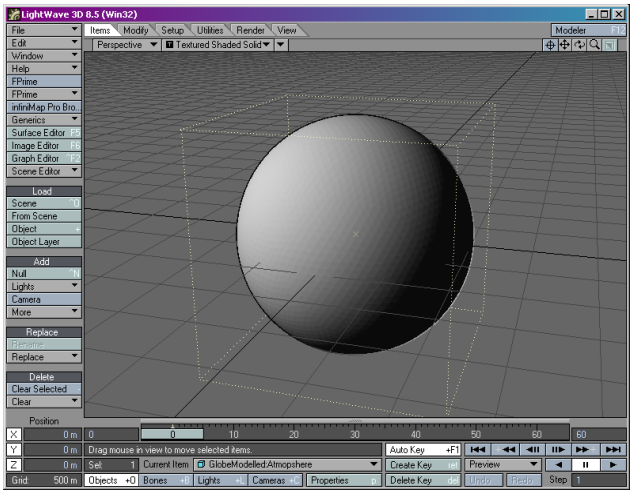


Now save the object and give it a meaningful name, like, erm, *Globe.lwo*. That's it for Modeler.

The object file *GlobeModelled.lwo* in the Archive included with this tutorial is the result of the modelling operation.

Setting up the Scene in Layout

Open up Layout, make sure your content directory is set correctly and load the *Globe.lwo* object into an empty scene.

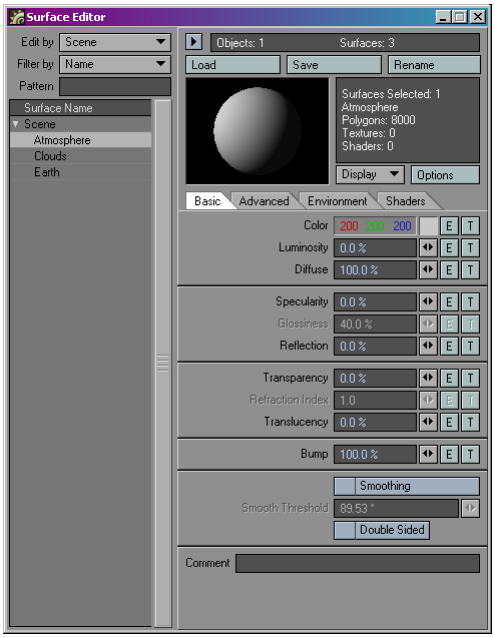


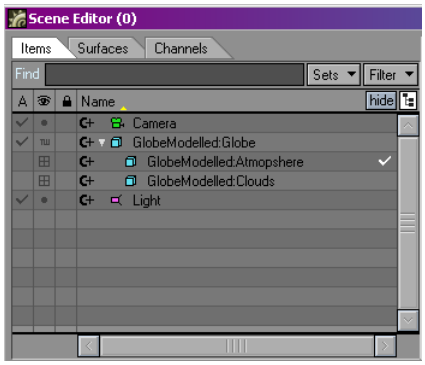
We will do all of our surfacing in Layout, so let's press F5 to open the surface editor (or use the menu).

As a first step, let's turn on **Smoothing** for all three surfaces.

We will surface the globe itself first, then do the clouds and finally add the atmosphere.

Since we're concentrating on the globe for a start, let's open the **Scene Editor** and disable both the clouds and the atmosphere objects.





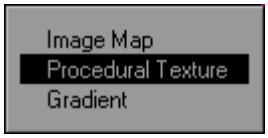
Untick the checkmarks in front of the Atmosphere and Clouds object and set both their visibilies to **Front Wireframe**. This will later on allow us to judge the texturing of the globe better in Layout.

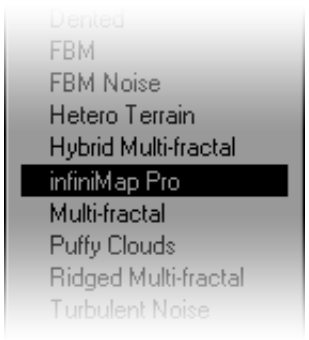
You may close the **Scene Editor** now.

Back to the surface editor.

Adding the first infiniMap image

Select the Earth Surface and click on the **[T]** button behind the colour input to open up the **Texture Editor** for the Earth Color channel.

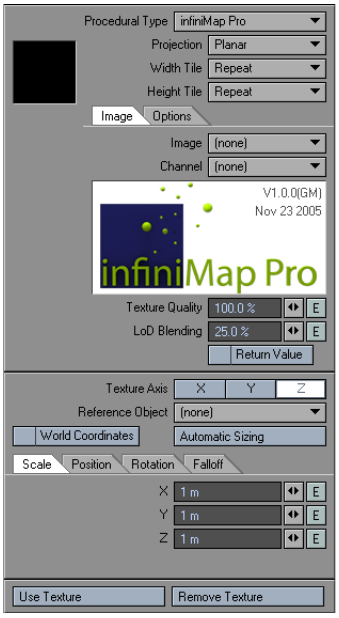




LightWave 3D automatically adds a default image layer as the first layer to a new texture. Let's change the type to **Procedural Texture** so we can apply infiniMap.

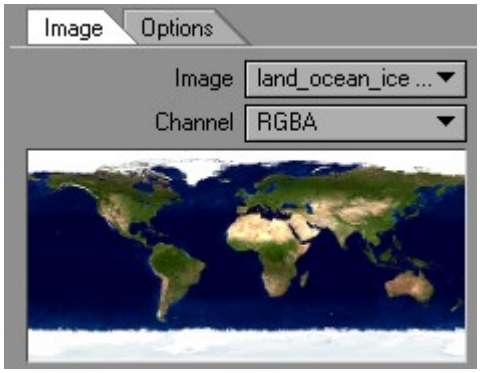
After you changed the type you may select **infiniMap Pro** from the **Procedural Type** Pop-Up.

The infiniMap Pro user interface will now be visible on the right hand side of the **Texture Editor**.



To load the base colour image for our globe, use the **Image** Pop-Up control in the infiniMap Pro user interface and select **Load Image...** . In the file requester select ***land_ocean_ice_8192.jp2*** image and press o.k.

InfiniMap Pro will now load a small part of the image to create a preview. Once done you should see the preview in the preview area of infiniMap Pro.



So, let's set the infiniMap Pro options to spherically project this image onto our globe. Use the following settings:

Projection: Spherical

Channel: RGB

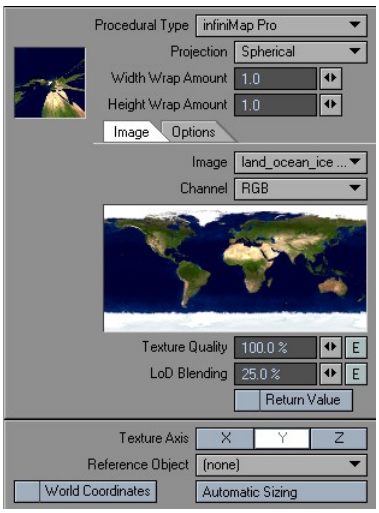
Texture Axis: Y

All other settings should be left at their default for the time being.

Now would be a good time for a first test render, to see how infiniMap behaves.

Move the camera a bit closer to the globe and press **F9** to render the current image.

... rendering... done.



“Oh, strange.” I hear you say, “the texture is all blurry on my rendered image”.

Yes, absolutely right. This is one of the major differences between LightWave 3D native image texturing and infiniMap, and I think this is a good place to actually explain this in more detail.

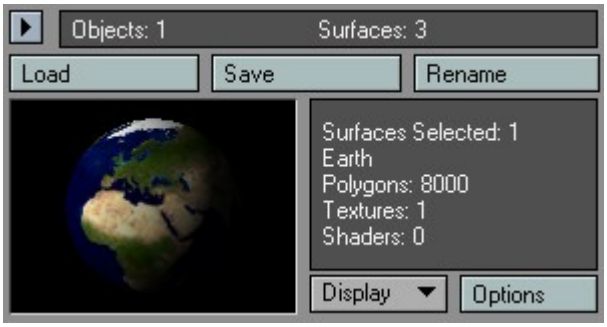
Unlike LightWave3D, infiniMap has to find out what part of the image to use, and also the size of the area of the part of the image being rendered. This is a requirement for the smart memory management used by infiniMap.

As a prerequisite for that to work, infiniMap needs to know the size of object that the image is being projected on. So, as a rule of thumb:

All infiniMap Pro texture layers should be sized correctly!

Fortunately this is easy in LightWave3D, just click on '**Automatic Sizing**' and LightWave will adapt the texture size.

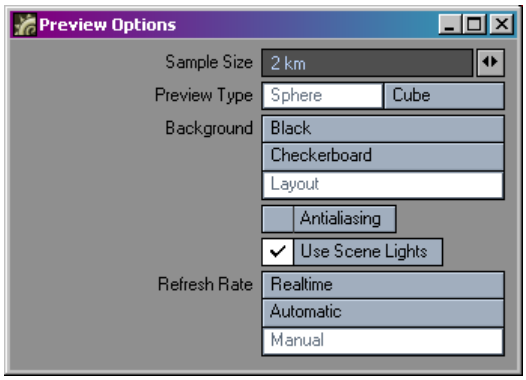
... so why is LightWave3D so sluggish now?



Unfortunately, LightWave 3D doesn't pass all the required information to infiniMap Pro at all times. So, when infiniMap Pro is queried by LightWave for the image data to render the Preview Sphere for the surface editor, infiniMap Pro gets very little information about it. Basically it now renders the Preview Sphere at too high a resolution. Fortunately this can be solved easily.

Adapt the preview Sample Size to the size of your largest infiniMap Pro object!

In this case, set the Preview Sphere **Sample Size** to 2km and you're done.



To further speed up surface editing, set the **Refresh Rate** in the **Preview Options** to '**Manual**'.

Please do excuse me for being so bold[1] about these issues, but these can severely affect performance when you need it most: when you tweak your surfaces. So, to repeat myself:

Change the size of your infiniMap Pro texture layer to adapt to the object for an optimal render quality.

Adjust the size of the Preview Sphere in the Surface Editor for easier surface editing.

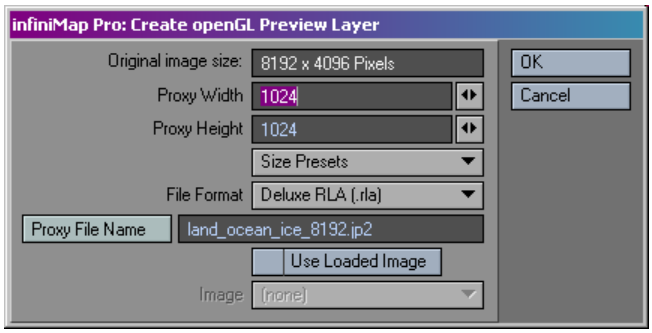
1 No pun intended... honestly!

Now that I have this off my chest, let's do a quick **F9** preview render. It should look something like this:

Creating an openGL preview layer

Since we're taking a tour of infiniMap Pro, let's create an openGL preview texture for the globe. This will help us later on to navigate within Layout.

Click on the **Options** tab above the **Image** preview. Now click on '**Update GL Layer**'[2], you will see the following panel:



The **Proxy Width** and **Height** are by default set to the highest openGL image resolution supported by LightWave 3D, so we will leave them at their default.

Change the **File Format** to '**LW_TGA24(.TGA)**' and change the **Proxy File Name** to 'proxy_land_ocean_ice_8192.tga'.

Now Press **OK** ... and wait a little bit. infiniMap Pro will keep you updated on the processing with messages displayed in the status bar area of Layout.

infiniMap Pro will create a scaled down version of the land_ocean_ice_8192 image, save it as a .TGA file, load it into LightWave3D and apply it to a new texture layer created by infiniMap Pro. The preview texture layer will have its opacity set to 0% and will thus only be visible in Layout but not during the final render.

You should now see the proxy image mapped onto your earth globe. If not, press '**d**' and check your display options, make sure that '**OpenGL Textures**' is activated and set the size to '1024x1024'.

As a side note, if you change any settings in this infiniMap Pro texture layer you can press '**Update GL Layer**' again. InfiniMap Pro will recognize the existing preview layer and only update the settings instead of create a new one.

Try it now, select the '**Planar**' projection in infiniMap Pro, press "**Update GL Layer**" and have a look at your globe in Layout. Try the other projection types as well.

Set the projection back to '**Spherical**' to move on with the tutorial.

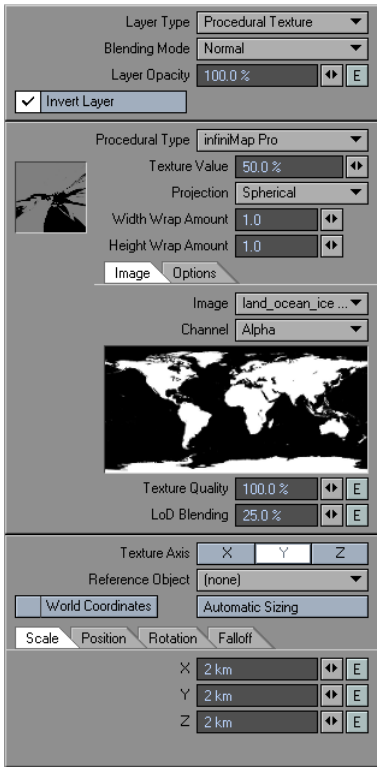
2 Actually this option should have been called **Update/Create openGL Layer**, but there wasn't enough space :(

Applying the other layers for the earth

Let's move on with surfacing the earth. I will quickly run through the settings for the layers since we have the hardest part behind us now.

First of all, Specularity. We only want specular highlights on the areas of the globe covered by water.

Add a texture to **Specularity** (the **[T]** button...) and replace the first layer with an infiniMap layer. In the **Image** pop-up select the already loaded ***land_ocean_ice_8192.jp2*** image. If you look at the **Channel** pop-up, you will notice that infiniMap Pro offers you a variety of channels present in that image[3], one of the being the **Alpha** channel. Select the **Alpha** channel.



Fortunately, the creators of the BlueMarble image stored the land coverage data in the alpha channel. The settings for this layer are:

Texture Value: 50%

Projection: Spherical

Channel: Alpha

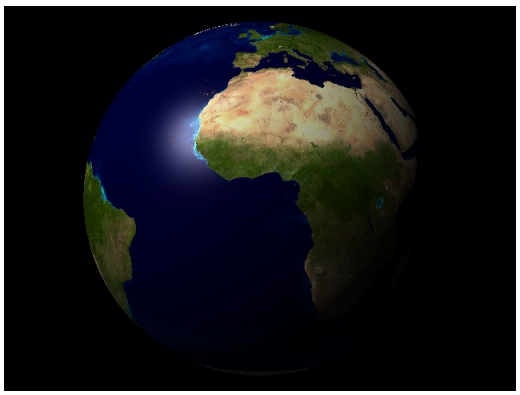
Texture Axis: Y

...and don't forget to press **Automatic Sizing**.

If you do a quick render now you'll notice that the land area now has a specularity, but the water doesn't. A quick click on the **Invert Layer** button at the top the Texture Editor fixes that.

Since we want to reflect the cloud layer later on, let's copy this texture layer, open the **Texture Editor** for Reflectivity and **Paste** the layer using **Replace All Layers**.

Change the **Texture Value** to 15% to make the reflections more subtle.

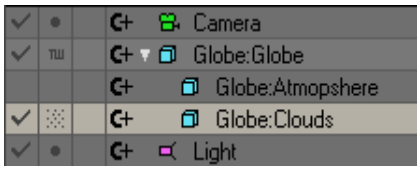


Now let's do a quick **F9** test-render to see how far we got:

Great, now let's move on to the clouds.

3 This is actually a feature that I wish LightWave 3D had as well. Dear NewTek, you're free to copy it :D

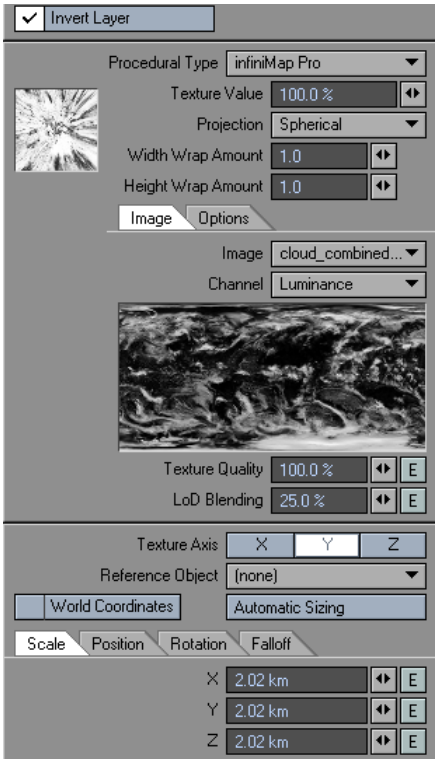
Creating the clouds



Since we just disabled the cloud sphere from rendering, open the **Scene Editor** and enable the cloud object again.

In the **Surface Editor**, activate the Clouds surface. Enable **Smoothing** for the surface as well as **Double Sided**. (We need to have **Double Sided** on, so the clouds can reflect in the ocean).

We will use the included cloud_combined_8192 image to control the transparency of the cloud sphere. This allows us to still change the colour of the clouds later on if needed.



Applying the transparency map is straightforward and the process familiar by now. Open the **Texture Editor** and apply **infiniMap Pro** as the first layer. The settings are as follows:

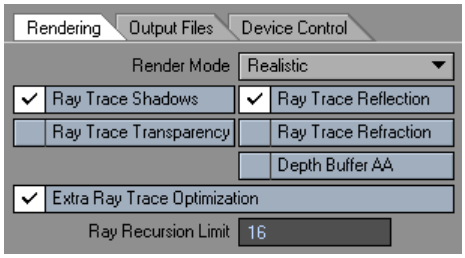
Projection: Spherical

Texture Axis: Y

Automatic Sizing clicked once.

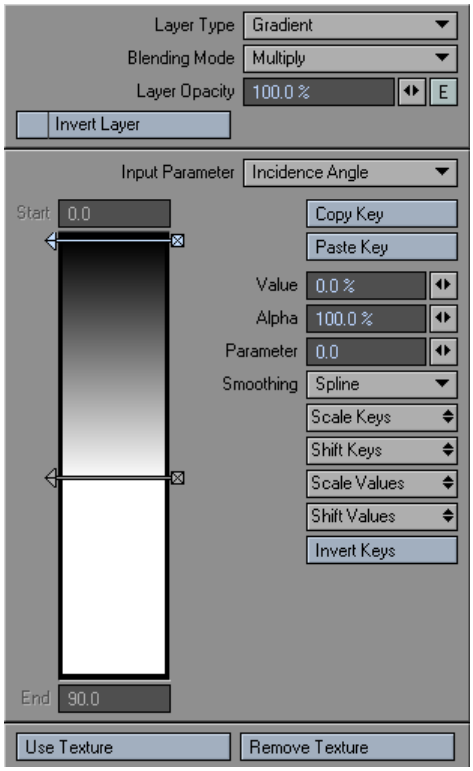
Invert Layer turned on.

Now is time for another test render. Make sure you have **Ray Trace Shadows** and **Ray Trace Reflections** turned on in your render settings.



One little gripe with the clouds. If you look at the edge of the cloud sphere you can see the edge quite well as it falls off harshly.

I'm adding a gradient to the transparency to make the falloff look nicer and to give a sense of atmosphere toward the edge of the cloud sphere.



The gradient is inserted above the infiniMap Pro layer to modify it the with the following settings:

Blending Mode: Difference

Input Parameter: Incidence Angle

First Gradient Value:
Value: 0.0%
Alpha: 100%
Parameter: 0.0

Second Gradient Value:
Value: 100%
Alpha: 100%
Parameter: 50.0

If you render a frame now you will notice that the clouds turn more solid toward the edge of the cloud sphere.

This basically sums up this tutorial.

The final globe also has a gradient that controls the transparency of the atmosphere.

We've also included a second scene for you to dissect that includes a second image map for the earth's dark side featuring city lights.

We hope you enjoyed the tutorial, if you have any questions or suggestions feel free to mail us at support@infinimap.com .