Table of Contents

The Earth extension

What does the Earth extension do?

The Earth extension simulates natural terrains. By adjusting the various parameters, you can depict a wide variety of terrains from rocky mountain ranges to desert dunes.

The Earth extension's key features are:

- 14 methods of realistic terrain generation including fractal and Fourier methods.

- 14 terrain modification tools including smooth, erosion, zero edges

- Import/Export of several image formats

- Elevation (positive or negative) paint

- Local raise/lower operation

- Add crater operation

- Local erosion

- Undo operation

The Earth extension from RAYflect plugs seamlessly into the Ray Dream Studio primitive architecture. The terrains you create with the Earth extension are treated as primitive objects, which means that you can texturize, deform, and animate them like any other 3D objects.

The Four Elements sample files contain various examples of terrains you can create with the Earth extension.

Getting started

1 Drag the Earth icon (which looks like a mountain) from the Primitives toolbar to the perspective window. Master Objects Properties dialog appears.

2 Click the **Edit** button. The Mesh File dialog appears.

3 In the Mesh File dialog, type a name into the File name field and click **OK.** The Object Properties dialog appears, displaying the Terrain tab. The Earth Terrain Editor appears.

4 Design your terrain (see "Terrain Editor.")

Four Elements: Earth parameters

There are two levels of interaction with Earth:

• Object Properties dialog: Terrain tab (to set mesh density).

• Terrain Editor (to edit your terrain).

The Mesh File

After clicking Edit in the Four Elements: Earth tab (see "Getting started"), you will see the Mesh File dialog. The dialog lets you create a Mesh file which is used internally by the Earth exten-

sion to store your terrains. Since the Earth extension needs the Mesh file to store and render your terrain, it's a good idea to save the file in the same folder as your scene.

Terrain Tab

Once you have dragged the Earth icon into your scene, you will see the Terrain tab of the Object Properties dialog.
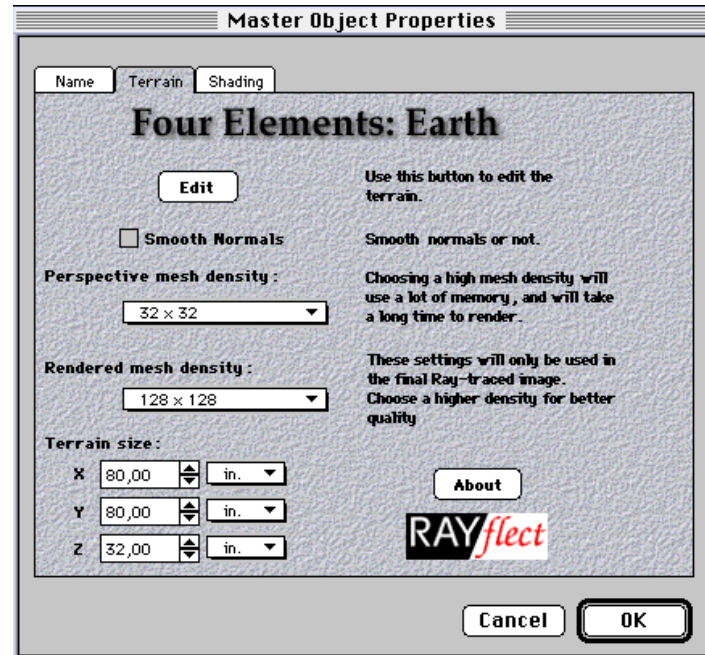
Four Elements: Earth Geometry Settings

The parameters are:

- Smooth Normals check box
- Perspective mesh density pop-up menu
- Rendered mesh density pop-up menu
- Edit button
- Terrain Size

Smooth Normals

The smooth normals checkbox controls the smoothness of your terrains. When the checkbox is enabled, your terrain will appear to have rolling hills. When disabled, your terrain will consist of rocky mountains.

Perspective mesh density

The Perspective mesh density pop-up menu lets you choose the density of the mesh that will be used when displaying terrains in the Perspective window.

The higher the density, the higher the memory usage and the longer the rendering time. You may want to select a low setting (32x32) while you work on the terrain to speed up redraw time.

Note: This setting must be lower than, or equal to the 'Rendered mesh density'.

Rendered mesh density

The Rendered mesh density pop-up menu lets you choose the size of the mesh that will be generated by the Earth extension, and stored in the mesh file. The rendered mesh density you select will determine the level of detail in the final rendered terrain.

Note: To avoid unpredictable results, you should adjust this setting before creating a terrain.

Edit button

Click the **Edit** button to launch the Terrain Editor. With the editor, you can create terrains and edit them as you wish (See "Terrain Editor").
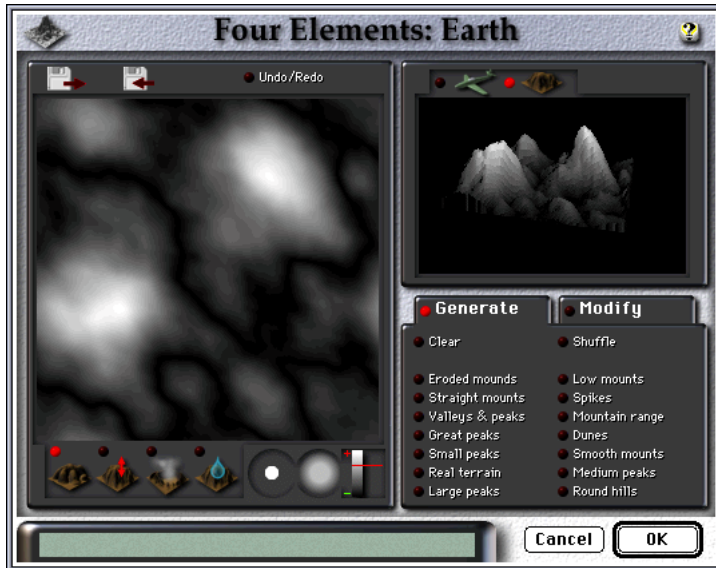
Terrain Size

The terrain size controls let you set the size of the terrain object in each of the three planes (X, Y, and Z).

Terrain Editor

The Terrain Generator contains three main parts:

- Terrain Preview.
- Drawing area.
- Generate/Modify settings.

Terrain Generator

Terrain Preview

The Terrain Preview displays a representation of the terrain that will appear in your scene. As you adjust the parameters, the preview will automatically update to display your changes.

The terrain preview has two display modes:

- Global Preview Mode
- Fly-Over Mode

Global Preview Mode

In Global Preview Mode, the terrain preview displays your terrain as a rotating 3D object.

Global Preview Mode

Fly-Over Mode

In Fly-Over Mode, the terrain preview displays your terrain as a tiled landscape which scrolls by as if you were flying through it in an airplane.

To control the direction and speed of the flight:

While clicking inside the preview:

- Drag the mouse to the left or the right to change direction.

- Drag the mouse up to increase speed or down to decrease speed.


Fly-Over Mode

Drawing area

The Drawing area allows you to create and edit your terrain in top view. Terrain altitudes are represented by gray levels. Lighter gray levels represent high altitudes, and darker gray levels represent lower altitudes. Using the Terrain tools you can paint the peaks and valleys of your terrain in this area.

Terrain Generator Drawing Area

Terrain Tool Bar
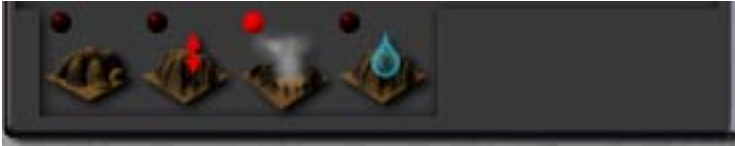
Terrain Tool Bar

The Terrain Tool Bar let you choose between the four following tools:

- Elevation Paint tool
- Local Raise/Lower tool
- Add Crater tool
- Local Erosion tool

Elevation Paint tool

The Elevation Paint tool acts just like a regular paint brush. As you paint brushstrokes, the Earth extension creates mountain ranges and displays them in the preview area.
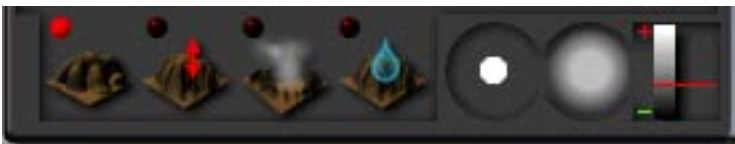
Elevation Paint tool

When the Elevation Paint tool is active, you can adjust the brush using the following controls, arranged from left to right:

- Brush Size—drag to the right to increase the brush size or drag to the left to decrease the brush size

- Brush Softness—drag to the left to increase the softness or drag to the right to decrease the softness

- Brush Color —drag the slider to adjust the brightness of the paint color

Local Raise/Lower Tool

The Local Raise/Lower tool increases or decreases the height of mountains as you brush over them.

When the Local Raise/Lower tool is active, the Brush Size controls appear to the right of the Terrain tools. Drag left to decrease the Brush Size, or right to increase it.

To increase/decrease the height of an area:

1 Click the desired area.

2 Drag up to increase the height, or drag down to decrease the height.

Local Raise/Lower tool

Add Crater Tool

The Add Crater tool adds indentations in you terrain.

To create a crater:

1 Click in the drawing area.

2 Drag away from the point you clicked increase the size of the crater, or towards the point to decrease the size. When you release the mouse button, the crater is created.

Local Erosion Tool

The Local Erosion tool simulates the effects of water erosion. You can think of erosion as pouring water over a mountain, where the edges are washed away leaving a sharper peak and deeper valleys. Each time you click the tool over an area it is eroded more.

To erode an area:

1 Click the area you want to erode.

2 Continue clicking over the area until you achieve the desired effect.

Generate/Modify Tools

The Generate/Modify Tools let you create preset terrains and edit existing terrains. Unlike the Terrain tools, these tools affect your entire image.

Generate Tools

You can use the Generate tools to quickly create a terrain which you can customize using the Modify tools. There are two general tools:

• Clear—Erases everything in the drawing area

• Shuffle—Changes random generator for generated terrains.

Caution: When you generate a terrain, it will replace any terrain you may have created using the Elevation Paint tool.

Generate tools

There are 14 Generate tools:

• Eroded Mounds •Straight mounts

• Valleys and peaks •Great peaks

- Small peaks
- Large peaks
- Spikes
- Dunes
- Medium peaks

- •Real terrain
- •Low mounts
- •Mountain range
- •Smooth mounts
- •Round hills

To use a Generate tool

Click the tool you want to use. A terrain is generated, replacing the current terrain.

Tip: To generate a randomly different terrain using the same Generate tool, click the Shuffle button, then click the Generate tool again.

Modify Tools

You can use the Modify tools to customize terrains you have drawn or generated. When you apply a tool, the effect will be applied to the entire terrain.

There are 14 modify tools:

- Smooth—Smooths the terrain
- Smooth More—Applies a higher level of smoothing
- Add noise—Creates a rockier terrain
- Normalize—Equalizes the altitudes. Use Normalize, when you want to reduce the difference between the highest and lowest point in your terrain
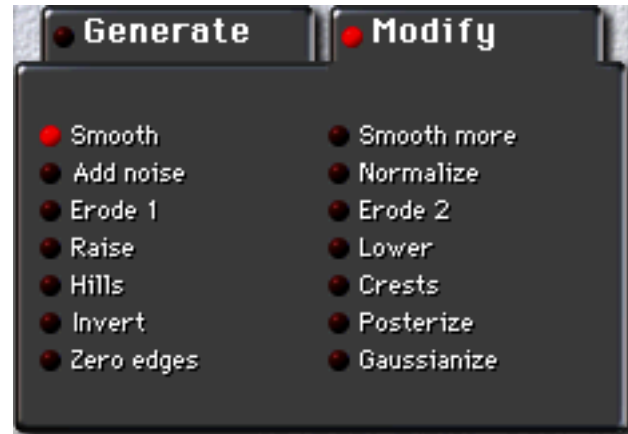
Modify tools

- Erode 1—Applies physically based erosion (this is a time consuming effect)
- Erode 2—Applies a different kind of erosion which creates more crests
- Raise—Increases altitudes
- Lower—Decreases altitudes
- Hills—Creates hills
- Crests—Creates mountain ranges with sharp peaks
- Invert—Inverts altitudes
- Posterize—Creates plateaus
- Zero edges—Removes terrain edges (use to create islands)

• Gaussianize—Smooths the edges of your terrain

To use a Modify tool:

Click the tool you want to use. The effect is applied to the entire terrain.

Tip: To intensify the effect, click the tool again.

Undoing Operations

You can undo or redo the last operation by clicking the Undo/ Redo tool.

Importing/Exporting files

You can import images into the Earth extension to use as height maps. It's best to import a grayscale image. However, if you import a full color image, the Earth extension will convert the image to shades of gray and use the gray values to generate a terrain.

The Earth extension lets you import/export any image type supported by Ray Dream Studio. You can also export your terrains as a grayscale image.

On Macintosh, you can export as:

• Photoshop 2.5   • Photoshop 2.0

• PICT   • TIFF

• EPS   • JPEG

On Windows, you can export as:

• Photoshop 2.5   • TIFF

• TGA   • JPEG

• BMP

Rendering Earth Terrains

After you're satisfied with the Four Elements: Earth extension settings, click **OK**.

If you used a Rendered mesh density less than 256x256, your terrain will immediately appear in the perspective window.

If you used a Rendered mesh density greater than 256x256, the Earth extension must recreate your terrain at the larger resolution. To ensure that the larger terrain appears exactly the same as the terrain you created at 256x256, the Earth extension stores all the settings you've used and reapplies them to the new larger terrain. In some cases, the recreation process may take some time-- about 5 to 10 minutes, depending on the final size and complexity of your terrain. A progress indicator appears while the terrain is being recreated.

Important: The special renderer used by the Earth extension to render terrains will not work properly if you scale your terrain using the bounding box controls (i.e. by changing the shape of the bounding box). Use the X,Y and Z controls on the Terrain tab of the Master Properties window to scale your terrains.

Using Terrains

Terrains generated by the Earth extension are exactly the same as other Studio primitives, so you can apply shaders and deformers to them just as you would to any 3D object.

Terrains generated by the Earth extension have a dimension of 80 in. x 80 in. x 32 in. You can change their size by using the Numerical dialog or by resizing them directly in the perspective window.

RAYflect has created a number of shaders you can use with the Earth extension. These shaders are contained in a shader file named Earth.sha, which was placed in your Ray Dream shaders folder when you installed Four Elements. To access the shaders, you need to add this file to your Shaders Browser (see your Ray Dream Studio User Guide for instructions).

The Snow shader extension

What does the Snow shader do?

The Snow shader extension simulates real world snow. When the snow shader is applied to a terrain it creates a snow effect according to the slopes of the surfaces in your terrain. You can choose to apply snow to positive slopes such as mountains, or to negative slopes such as valleys.

For best results, the Snow shader should be used in conjunction with the mix or multiple (*) operators.

Getting started

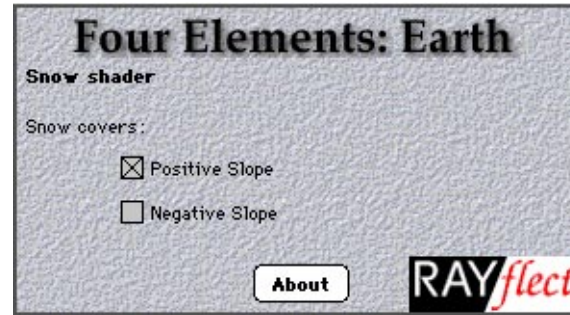**To apply the Four Elements:Snow extension to an object:**

1 Open the Shader Editor.

2 Choose the **Components menu**>**Global Mix**.

3 In the Global Mix shader tree, click the *drop function here* area.

4 Select **Components menu**>**Four Elements Shaders**> **Snow**.

Snow parameters

The parameters for the Snow shaders are:

* Positive Slope check box.

* Negative Slope check box.

Four Elements: Earth Snow parameters

When the Positive Slope checkbox is enabled, snow will appear on surfaces with positive slopes (for instance a mountain slope).When the Negative Slope checkbox is enabled, snow will appear on surfaces with negative slopes (for example, the bottom of a sphere).

If you want snow to appear on all sloped surfaces, enable both checkboxes. Snow will not appear on vertical surfaces regardless of which box is enabled.

Note: The Snow shader affects the entire object.

The Plane primitive extension

What does Plane primitive do?

The Plane primitive creates a flat primitive object that you can use with the Four Elements: Water shaders, to create seas or oceans.

Getting started

To create a plane primitive object:

1 Create a new scene.

2 Drag the Plane icon from the toolbar into the perspective window, or the Hierarchy/Timeline window.

3 Click **OK**.

Using the Plane primitive

Once you have created a plane primitive you can change its size using the Numerical dialog, or by dragging one of its handles in the perspective window. By default, the size of the Plane is 4 in x 4 in. wide.

To create a body of water, apply a Water extension shader to the plane primitive object. See "To apply the Wave shader:" for more detailed instructions on creating bodies of water.

The Wind extension

What does the Wind extension do?

The Wind extension simulates the interaction between light and the earth's atmosphere. Based on a physical model of a real atmosphere, Wind creates a realistic surrounding for objects in your Ray Dream Studio scene. You can create the following types of effects with the Wind extension:

- haze

- fog

- multi-layered clouds

- light scattering through the clouds

- real moon with phases

- color shifting of the sun

- light scattering through the atmosphere

- weather control (cloud coverage, cloud texture, cloud altitude, cloud thickness, haze and fog)

- real rainbows (depending on the sun position)

- sun and moon geometric distortion near the horizon.
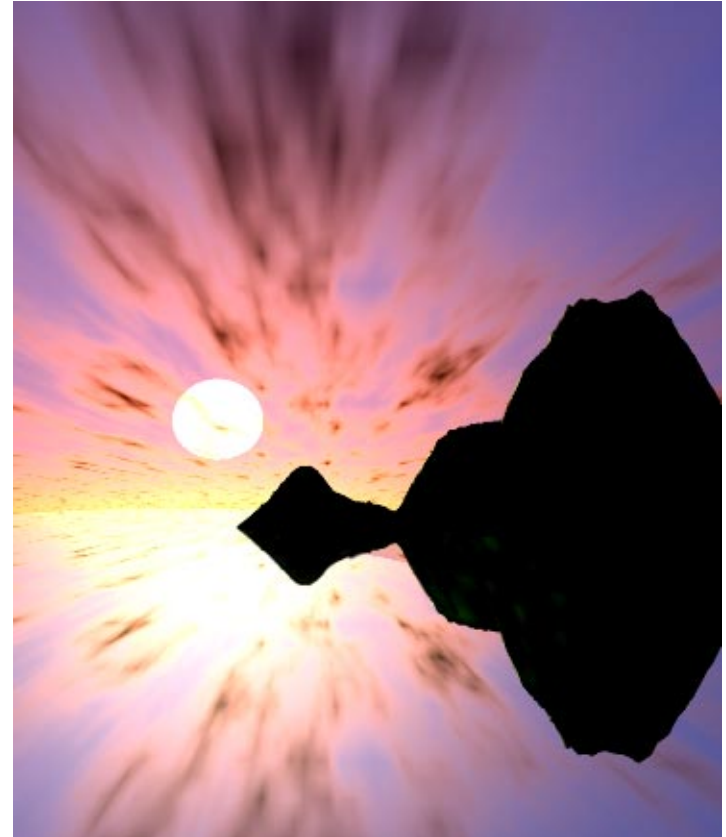
In Ray Dream Studio, each effect can be animated. Just by dragging the sun, you will be able to create a photorealistic sunset. The Wind extension handles everything for you, including the reddening of the sun as it approaches the horizon, moving clouds, darkening skies and scattering light through the clouds. You can even modify the atmosphere parameters to render alien planets.

Don't miss the Four Elements sample files which contain various examples like sunset, sunrise, chilly morning, heavy storm on planet Venus and more!

Getting started

To apply the Four Elements:Wind extension to a document:

1 Choose **Render menu>Current Scene Settings>Effects tab.**

2 Click the popup menu for Atmosphere and select Wind.

3 Click plus (+) next to Atmosphere to display controls.

**4** Click the **Edit** button or choose a preset from the popup menu.

Four Elements: Wind parameters

There are two levels of interaction with Wind:

• Easy Settings (to get a fast result)

• Atmosphere Editor (to control every effect).

Easy Settings

After choosing **Four Elements: Wind** in the Atmosphere popup menu (see "Four Elements: Wind parameters"), you will see the preset dialog of the Wind extension:
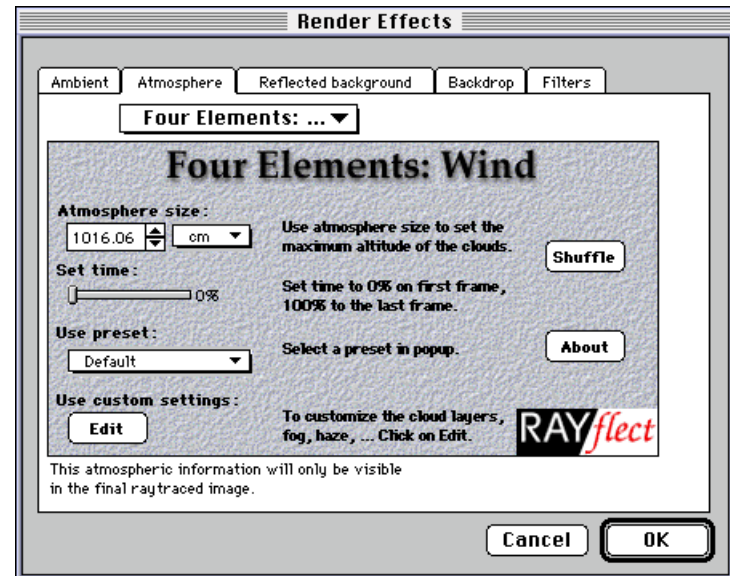
Four Elements:Wind Easy Settings

The parameters are:

- Atmosphere Size
- Set Time
- Preset menu
- Edit button
- Shuffle button.

Atmosphere Size

The Atmosphere Size defines the overall size of the Four Elements: Wind atmosphere. This value is used to scale the atmosphere in every direction. For example, if you set the Atmosphere Size to 200", the haze, fog and cloud layers altitudes can be set from 0" (the ground) to 200". Generally, you should set the Atmosphere Size to a value greater than the overall size of your scene.

For special effects, you can set an Atmosphere Size that is smaller than your scene. When you do this your cloud layers will appear below the highest object in your scene, simulating the effect of an airplane or mountain going through the clouds.

The atmosphere always starts at altitude zero (z=0). Every object below z=0 will be invisible.

Important: The camera must be at an altitude greater than zero. If your camera is below zero, you will see the atmosphere from below the ground which leads to interesting but unpredictable results!

Set Time

To animate the clouds in Ray Dream Studio, you must define when the clouds start to move and when they stop. Typically, you will set the time to 0% at the first frame of your animation and 100% at the last frame.

Preset menu

Use the Preset menu to select the kind of atmosphere you want. The extension will automatically set all the parameters for you!

Edit button

Click the **Edit** button to launch the Atmosphere Editor. In the editor, you can see a preview of the current atmosphere and customize it as you wish (see "Atmosphere Editor").

Shuffle button

The Shuffle button randomizes the clouds. Click this button to reset the random shape of the clouds.

Atmosphere Editor

To customize and preview your atmosphere, click the **Edit** button, (see "Easy Settings".) This will launch the Atmosphere Editor.

The Atmosphere Editor contains six main parts:

- Dynamic Preview
- Sky Editor
- Sun Editor

• Moon Editor

• Layer Manager

• Layer Editor.
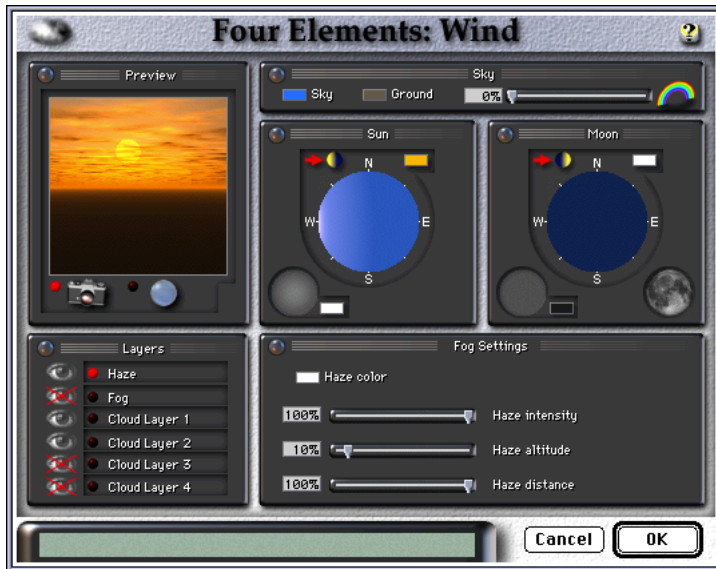
Four Elements: Wind Atmosphere Editor

Dynamic Preview

The Dynamic Preview renders the atmosphere based on the current settings. Each time you modify a parameter, the preview updates to show the result. What you see in the Dynamic Preview is exactly what you will get in your scene.

The Dynamic Preview has two display modes:

• Standard Camera Mode

• Fish-Eye Camera Mode.

Standard Camera Mode

The Standard Camera Mode gives you a view of the atmosphere using a conical camera looking to the West. This camera is equivalent to the Studio Front view.

Standard Camera Mode

The Standard Camera Mode only renders a small area of the atmosphere but it is perfect to set up a sunrise or a sunset.

To simulate Standard Camera Mode in your final rendering:

1 Set the rendering camera to Front position

2 In the Camera Palette, set the lens type to Conical

3 Raise the camera (Z=8 in).

Fish-Eye Camera Mode

Fish-Eye Camera Mode

The Fish-Eye Camera Mode renders the whole atmosphere as viewed from the ground through a fisheye lens. You can use this mode to preview the entire sky, not just the western horizon.

Sky Editor

Sky Editor

The Sky Editor lets you change the color of the sky and the ground. You can also add or remove the rainbows.

To set the sky color:

1 Click the color Swatch labeled Sky.

2 Drag the pointer over the desired color and release the mouse button.

Changing the ground color is just like changing the sky color.

To set the ground color:

1 Click the color swatch labeled Ground.

2 Drag the pointer over the desired color and release the mouse button.

Rainbow Slider

The Rainbow slider lets you set the intensity of the rainbow in your atmosphere. The rainbow intensity by default is 0% (invisible). By dragging the Rainbow slider up to 100% you can change the intensity of the rainbow.

The rainbow rendering is made of two parts: the primary rainbow and the secondary rainbow. The intensity of the primary rainbow is about ten times greater that the intensity of the secondary one. By adjusting the intensity setting you can make the secondary and primary rainbows appear or disappear.

Note: The Wind extension rainbow reacts just like a real one. To be able to see a rainbow, you must carefully move the sun behind the camera.

Sun Editor

The Sun Editor lets you change the position, color, halo color and size of the sun.

Sun Editor

The virtual trackball at the center of the Sun editor lets you set the position of the sun.

To set the sun's position:

1 Click anywhere on the trackball and drag in the direction you want to move the sun.

2 When the sun is in the desired position, release the mouse button. The sun's position and sky color are updated automatically.

The Four Elements: Wind extension uses the convention illustrated below to map geographic directions to the Ray Dream Studio perspective window:
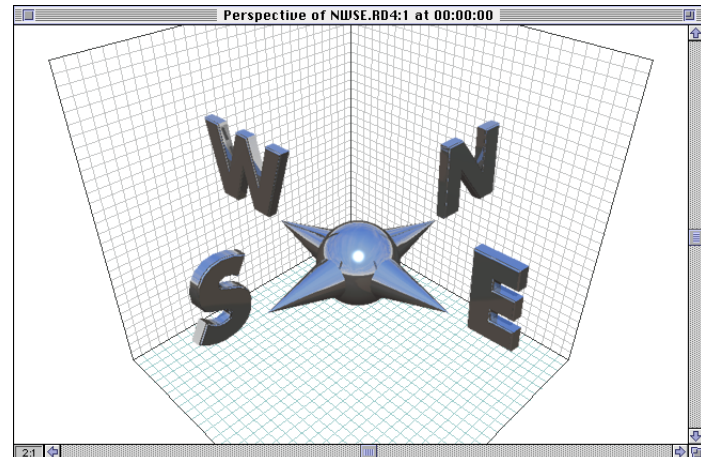
Four Elements:Wind positioning convention

To be able to predict where the sun is going to appear, keep the convention in mind.

Tip: If you want to see the sun in the Dynamic Preview drag it to the West.

To switch between day and night:

Click the Day/Night toggle switch in the upper left corner of the editor.

The toggle switch moves the sun from one side of the Earth to the other. When the Day/Night toggle switch is set to Night, the Sun will not be visible in the atmosphere (since it is on the other side of the Earth) and the sky will darken.

To set the sun's color:

1 Click the color swatch in the upper right corner of the editor.

2 Drag the pointer over the desired color and release the mouse button.

Use the Halo control at the bottom of the Sun editor to adjust the size of the sun's halo.

To adjust the size of the sun's halo:

Click on the Halo control and drag to the right to increase the size of the halo, or drag to the left to decrease its size.

To select a color for the sun's halo:

1 Click the color swatch to the right of the Halo control.

2 Drag the pointer over the desired color and release the mouse button.

Moon Editor

The Moon Editor lets you change the position, color, phase, halo color, and size of the moon.


Moon Editor

The virtual track ball at the center of the Moon editor lets you set the position of the moon.

To set the moon's position:

1 Click anywhere on the trackball and drag in the direction you want to move the moon.

When the moon is in the desired position, release the mouse button. The moon's position and sky color are updated automatically.

The Four Elements: Wind extension uses the convention illustrated below to map geographic directions to the Ray Dream Studio perspective window:
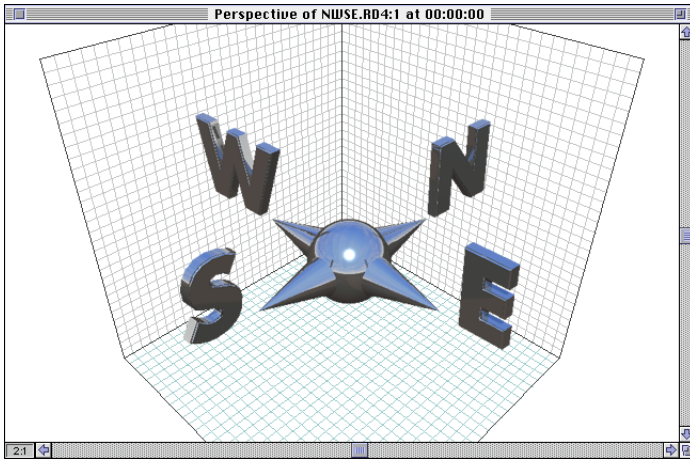
Four Elements:Wind positioning convention

To be able to predict where the moon is going to appear, keep the orientation of the directions in mind.

Tip: If you want to see the moon in the Dynamic Preview drag it to the West.

To switch between day and night:

Click the Day/Night toggle switch in the upper left corner of the editor.

The toggle switch moves the moon from one side of the Earth to the other.

To set the moon's color:

1 Click the color swatch in the upper right corner of the Moon editor.

2 Drag the pointer over the desired color and release the mouse button.

Use the Halo control at the bottom of the Moon editor to adjust the size of the moon's halo.

To adjust the size of the moon's halo:

Click on the Halo control and drag to the right to increase the size of the halo, or drag to the left to decrease its size.

To select a color for the moon's halo:

1 Click the color swatch to the right of the Halo control.

2 Drag the pointer over the desired color and release the mouse button.

To change the moon's tilt and phase:

Click the Moon Phase selector at the bottom right corner of the editor and drag it in the direction you want to tilt the moon.

Layer Manager

The Layer Manager lets you edit the layers in your atmosphere and display or hide them.

Layer Manager

To display or hide a layer:

Click the eye in front of the layer. When the layer is hidden, there will be a red cross over the eye.

To edit a layer:

Click the red button to the right of the eye. The settings for this layer are displayed in the Layer Editor to the right (see "Layer Editor").

Note: When you edit a layer, you need to display it to see the result in the dynamic preview.

Layer Editor

The Layer Editor lets you edit the various types of layers you can add to an atmosphere. Its appearance varies, depending on which layer is selected for editing.

There are three kinds of layers:

- Haze layer
- Fog layer
- Cloud layer.

Haze Layer Editor

Haze is a light fog that appears due to the humidity found in the atmosphere.
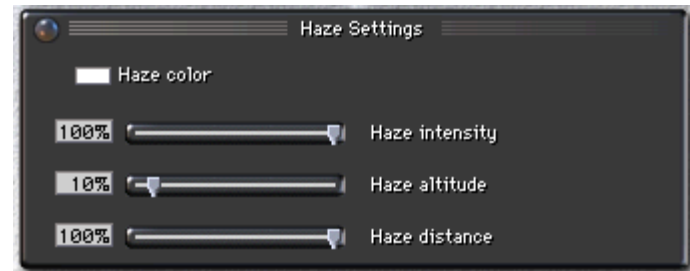
Haze Layer Editor

To edit the haze color:

◀ Click the color swatch in the upper left corner of the Layer editor.

2 Drag the pointer over the desired color and release the mouse button

Use the **Intensity** slider to change the intensity of the haze.

The haze starts at altitude 0 (the ground) and increases to the height you set with the **Altitude** slider. The haze begins to be visible at the distance given by the **Distance** slider.

The **Distance** and **Altitude** sliders use percentages. They are based on the Atmosphere Size (see "Atmosphere Size"). For example, if you set the Atmosphere Size to 200", the haze layer altitude can be set from 0" (0%) to 200 " (100%.)

Fog Layer Editor

The Fog Layer editor lets you set the color, intensity, altitude and distance of fog in your atmosphere.

To edit the fog color:

1 Click the color swatch in the upper left corner of the Layer editor.

2 Drag the pointer over the desired color and release the mouse button.

Use the **Intensity** slider to change the intensity of the fog.

The **Start** and **End** sliders define the altitudes where the fog starts and stops. The fog begins to be visible at the distance given by the **Distance** slider.

Fog Layer Editor

The **Distance**, **Start** and **End** sliders use percentages based on the Atmosphere Size (see "Atmosphere Size"). For example, if you set the Atmosphere Size to 200", the fog layer altitudes can be set from 0" (0%) to 200" (100%.)

Cloud Layer Editor

Your atmosphere can have up to four layers of clouds. The Cloud Layer editor lets you set the color, size, altitude, and density for each cloud layer. When adjusting these settings you should keep in mind how the cloud layers you use will interact. You can see this interaction in the Dynamic Preview.

To edit the cloud color:

1 Click the Cloud color swatch.

2 Drag the pointer over the desired color and release the mouse button.

The Cloud Layer editor provides six graphic cloud controls for adjusting the density and altitude of clouds in the layer.
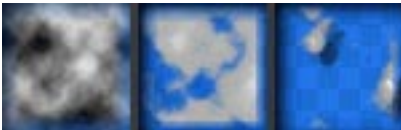
Cloud Layer Editor

To adjust the setting of a cloud control:

Click inside the square and drag left or right to adjust the setting. The control dynamically displays the result of your adjustment.

The first row of cloud controls can be used to set the cloud's contrast, thickness and coverage. Together these settings determine the quality of the weather.

Controls for contrast, thickness and coverage

Starting from the left, the first cloud control sets the clouds' contrast.

The next control lets you set the cloud thickness from almost transparent clouds to thick clouds in a heavy storm.

Tip: The cloud thickness setting is the most important of the six settings because it controls how dense the clouds are and this affects how light interacts with them. Like in the real world, thin clouds scatter light and thick clouds absorb light. To create beautiful sunsets drag the sun near the horizon and add several layers of thin clouds. You will get an awesome result! To see an example, use the "Warm Sunrise" preset.

The last cloud control determines the cloud coverage. Use this control to choose between a blue sky and completely overcast sky.

The next row of cloud controls are used to change geometry of the cloud layer.

Controls for rotation, size and altitude

The first control lets you rotate the clouds. Rotation affects not only the appearance of clouds, but the direction they will move in an animation as well (see "Cloud Animation Sliders.")

The second control is used to change the size of the clouds in the layer.

The third control lets you adjust the altitude of the cloud layer.

Note: By default, Cloud Layers are arranged with Layer1 set to the lowest altitude and Layer 4 at the highest.

Cloud Animation Sliders

The two sliders on the right let you control the animation of the cloud layer. The first one sets the speed of the clouds. If you do not want the clouds to move, set the slider to 0%.

The second slider is used to control the transformation of the clouds over time. At 0% the shape of the clouds remains the same.

Rendering Wind

After you're satisfied with the Four Elements: Wind extension settings, click **OK**. Render the image with the RDI Ray Tracer as usual. You will soon see the atmosphere surrounding your objects.

Animating Wind

Using Ray Dream Studio, you can easily use the Wind extension in your animations.

To use Four Elements:Wind in an animation:

1 Create your animation as usual.

2 With the current time bar at time 0:00:00, apply the Wind extension by selecting **Render**>**Effects** and selecting Four Elements Wind from the popup menu on the Atmosphere tab.

3 Edit the Four Elements:Wind parameters.

4 Set the Set Time slider to 0%

5 Jump to the end of your animation.

6 Set the **Set Time** slider to 100%.

7 Render your animation as usual.

You can also animate the various Wind parameters over the course of an animation. To do this, apply different parameters to different Key frames. For example, you could make the sky seem to become overcast over time. To create this effect you would set the Wind parameters in the first frame to create a clear day, and then create a key frame and adjust the Cloud density parameters to create a cloudy day. When animated, the sky will appear to become overcast. You can animate any of the Wind parameters in this way.

The Sun extension

What does the Sun light do?

The Wind extension simulates the interaction between light and the earth atmosphere. But the sun, which appears in the Wind extension, is not a light source—it does not light up the scene.

To simulate sunlight, we have added a Sun Light source which works only when the Wind extension is applied to your scene. This light source is linked to the sun found in the Wind extension so when you move the sun, the Sun Light source follows it.

Getting started

To apply the Four Elements:Sun extension to a document:

1 First, apply the Four Elements:Wind extension (see "Getting started") to your scene.

2 In the Wind extension, move the sun around. When you are satisfied with the settings, click **OK**.

3 Double click the current light source or add a new light source.

4 When the light source dialog appears, choose **Sun Light** from the **Lights** popup menu.

5 Click **OK**.

Sun parameters

The parameters for the Sun Light source, color, position, etc., are automatically provided by the Wind extension.
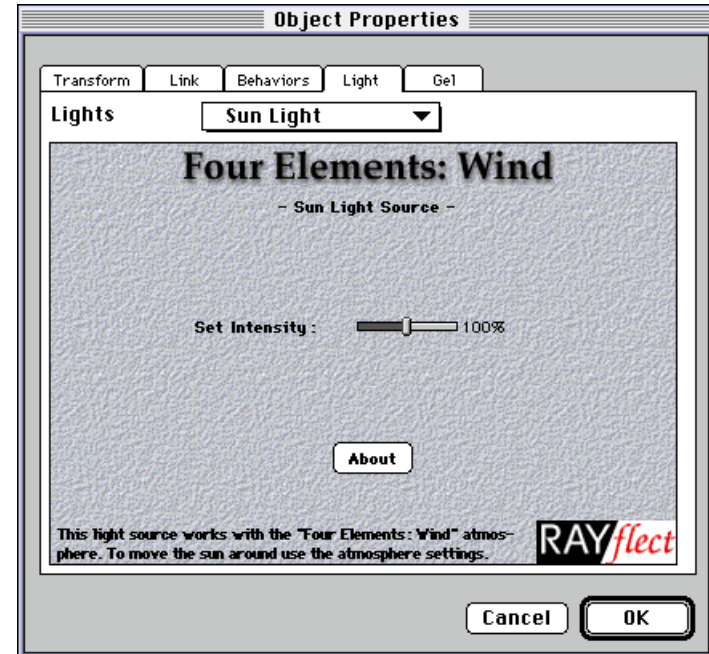
Four Elements:Wind Sun Light Source

The only parameter you can set is the overall light source intensity.

To set light source intensity:

1 Drag the Intensity slider to the right to increase the sun's intensity and to the left to decrease it.

2 Click OK

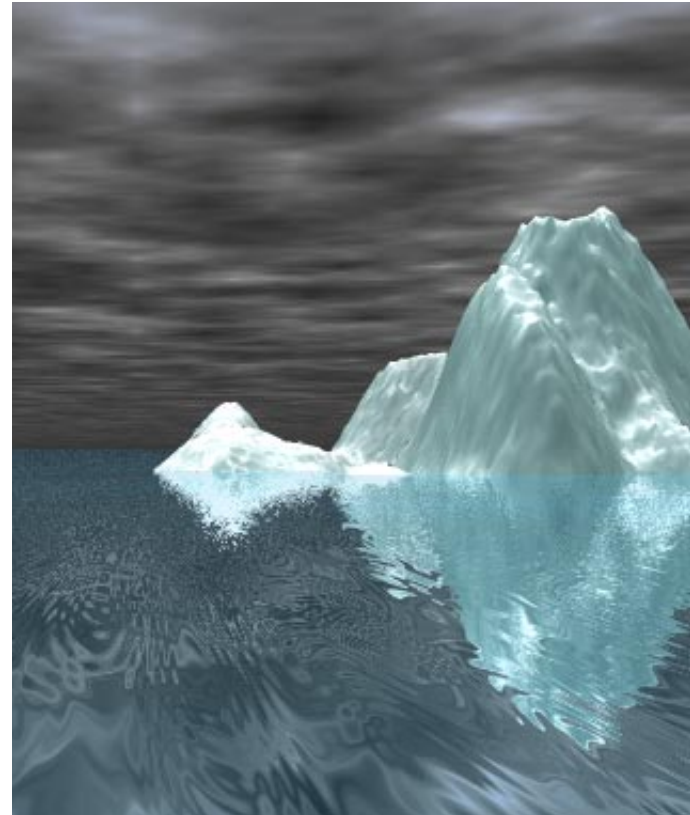# The Wave shader extension

What does the Wave extension do?

The Wave shader extension simulates water environments such as oceans and lakes. By adjusting the parameters of up to three different waves you can simulate a wide range of wave effects from a calm sea to a turbulent ocean.

The new Wave shader extension from RAYflect plugs seamlessly into the Ray Dream Studio architecture. Although you can combine the Waves shader with other shaders in any channel, it works best when placed in the Bump channel.

In Ray Dream Studio, Waves shader can be animated. By just dragging a slider, you will be able to create animated waves.

To get an idea of the types of waves you can create, take a look at the Four Elements sample files.

Getting started

1 Open the Shader Editor.

2 Choose the Bump Channel.

3 Select **Components menu**>**Four Elements Shaders**>**Water:Waves**.

The wave controls will appear in the Shader Editor.

Wave parameters

The Wave controls are divided into four sections. The first section displays parameters that control the overall look of the shader. The remaining sections display parameters that control the look of individual waves in the shader.

The global parameters for the Wave shader are:

- Time
- Global Scale
- Compute interferences
- Perturb values

For individual waves you can set:

- Angle
- Amplitude
- Scale
- Perturbation
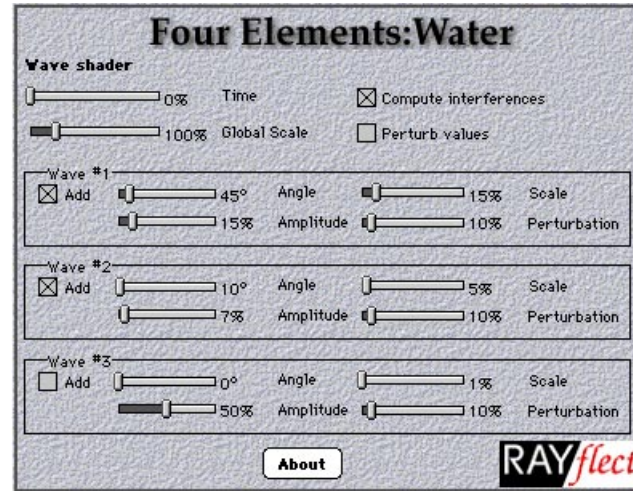
Wave parameters

Time

The Time parameter controls the appearance of the waves over time. In an animation you would set the time value to 0% in the first frame and 100% in the last frame. Since waves at 100% and 0% look exactly the same, animated waves will appear to cycle.

Global Scale

The Global Scale parameter controls the spacing of all the waves in the shader. Low Global Scale values create many small closely spaced waves while high values create fewer widely spaced waves.
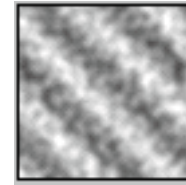
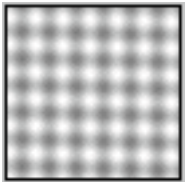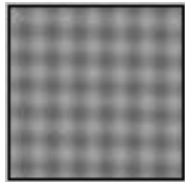Scale—50%　　　　Scale—200%
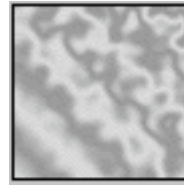
Perturbation OFF　　　Perturbation ON

Compute interferences

The Compute interferences parameter controls the interaction between waves in the shader.

When the 'Compute interferences' checkbox is enabled, waves can eliminate each other. When the checkbox is disabled the waves can only be added on top of each other.

Interferences OFF　　　Interferences ON

Perturb values

Enabling perturb values add extra depth to your waves. When the Perturb checkbox is disabled, the waves will appear flatter with less variation in color. When the checkox is enabled, the waves will appear to have more depth and color gradations.

Individual wave parameters

You can have up to three waves in your shader. Each wave has its own set of parameters. By combining different wave parameters you can create a variety of water effects.

To add a wave to the shader:

Enable the **Add** checkbox.

Angle

Angle controls the orientation of the wave.

Amplitude

Amplitude controls the height of the wave. This parameter is most effective when you apply the shader to the Bump channel.

Scale

The Scale parameter controls the frequency of ripples in individual waves.

Perturbation

Perturbation controls the distortion of the wave, higher values create more agitated waves.

Note: The Scale and Perturbation parameters are dependent on the size of the surface on which you apply the shader. Both parameters are more visible on smaller objects when you use lower values.

Perturbation is directly affected by the 'Perturb Values' parameter (see "Perturb values").

Creating a body of Water

When you're done adjusting the parameters for the Waves shader you can apply it to a plane object to create an ocean scene.

To apply the Wave shader:

1 Create a plane object (like the one provided by Four Elements: Earth extension).

2 Scale the plane to the desired size.

3 Edit the object's shader in the Shader Editor.

4 Set the color to blue.

5 Set the transparency to 30%.

6 Apply the Waves shader component to the Bump Channel, and set the parameters as desired.

Tips: The Waves shader can also be used to create a lot of different shader effects. For example:

• Denim—Mix between blue and white in the Color channel

• Sand—Mix between brown and yellow, set a high perturbation value and turn on Perturb Values.

The Ripple shader extension

What does Ripple shader do?

The Ripple extension simulates ripples in water. By adjusting the parameters of concentric waves you can simulate disturbances on the surface of a calm pool of water.

This Ripple shader extension from RAYflect plugs seamlessly into the Ray Dream Studio architecture. Although you can combine the Ripples shader with other shaders in any channel, it works best when placed in the Bump channel.

In Studio, the Ripple shader can be animated. By just dragging a slider, you will be able to create animated ripples.

To get an idea of the types of ripples you can create, take a look at the Four Elements sample files which contain various examples of ripples.

Getting started

To apply the Four Elements:Ripple extension to a document:

1 Open the Shader Editor.

2 Choose the Bump Channel

3 Select the **Components menu>Four Elements Shaders**>**Water: Ripple**.

The Ripple controls appear in the Shader Editor.
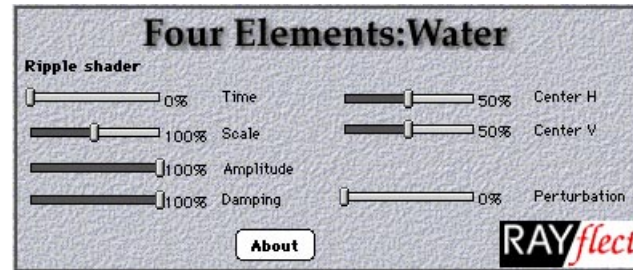
Ripple parameters

Ripple parameters

The parameters for the Ripple shaders are:

- Time
- Scale
- Amplitude
- Perturbation
- Center V (Vertical)
- Center H (Horizontal)
- Damping

Time

The Time parameter controls the appearance of the ripples over time. In an animation you would set the Time value to 0% in the first frame and 100% in the last frame.
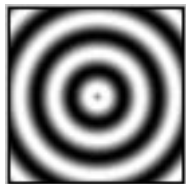
Since ripples at 100% and 0% look exactly the same, animated ripples will appear to cycle.

Scale

The Scale parameter controls the spacing of the ripples in the shader. Low Scale values create fewer widely spaced ripples while high values create many small closely spaced ripples.
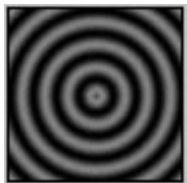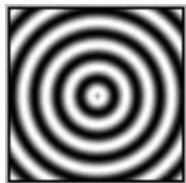

Scale—50%   Scale—200%

Amplitude

This slider controls the height of the ripples. When the shader is applied to the Bump Channel, higher Amplitude values will create a greater degree of depth.
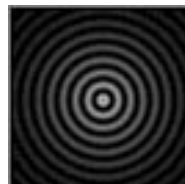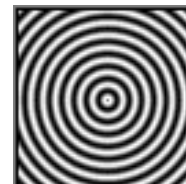

Amplitude—50%   Amplitude—100%

Damping

The Damping parameter creates a fading effect in the ripple. The higher the Damping value, the more ripples will appear to fade as they move away from the center.
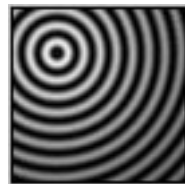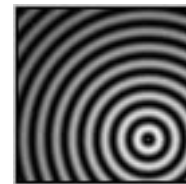

Damping—20%   Damping—0%

Center H and Center V

The Center H and Center V sliders control the horizontal and vertical position of the center of the ripples.
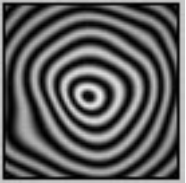

H: 25% —V: 75%   H: 75% —V: 25%

Perturbation

The Perturbation slider controls the amount of distortion in the ripple. This parameter is extremely dependent of the size of the final object. To obtain good results on small objects use very small values (2% to 9%).

Perturbation 2%   **Perturbation 7%**

Using the Ripples shader

When you're done adjusting the parameters for the Ripples shader you can apply it to a plane object to create an ocean scene.

To apply the Ripple shader:

1 Create a plane object (like the one given with the Four Element Earth).

2 Scale the object to the desired size.

3 Edit the object's shader in the Shader editor.

4 Set the color to blue.

5 Set the transparency to 30%.

6 Apply the Ripple shader component to the Bump Channel and set the parameters as desired.

To create a shader with more than one ripple effect:

• Use the + operator, to combine several Ripple components. By setting different Center V and Center H values for each ripple you can create a shader with multiple ripples.
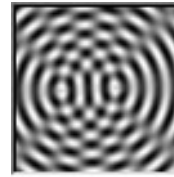
A shader with two ripples

The Fire extension

What does the Fire extension do?

The Fire extension simulates a flame. Using the various parameters, you can depict any fire effect from a steady candle flame to a turbulent wood fire.

The Fire shader extension from RAYflect plugs seamlessly into the Ray Dream Studio shader architecture. Just like every built-in shader, you can combine the new Fire shader with other shaders in any channel.

In Ray Dream Studio, the Fire shader can be animated. Just by dragging a slider, you will be able to create an animated fire.

Take a look at the Four Elements sample files to see the kinds of effects you can create with the Fire extension.
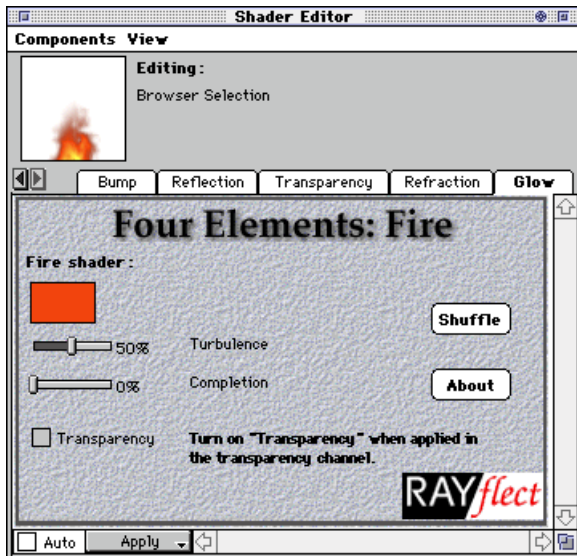
Getting started

1 Open the **Shader Editor**

2 Select the **Glow Channel**

3 Select **Components menu>Four Element Shaders>Fire**.

The Fire controls appear in the Shader Editor.

Four Elements: Fire parameters

Fire parameters

The Fire parameters are:

- Fire Color   • Turbulence
- Completion   • Shuffle
- Transparency

Fire Color

The orange default color is perfect to depict a wood fire. But, do not hesitate to use completely different colors to simulates Bengal light, fireworks.

To set fire color:

1 Click the color swatch labeled Fire shader.

2 Drag the pointer over the desired color and release the mouse button.

Turbulence slider

The Turbulence slider lets you change the turbulence of the fire. At 0%, the flame looks like a candle. If you push the slider to higher values, the fire begins to flicker like a flame in wind.

Completion slider

In order to animate the fire in Ray Dream Studio, you must define when the flame starts to move and when it stops. Typically, you set the time to 0% on the first frame of your animation and 100% on the last frame.

Note: If you're using the Fire component in multiple Shader channels, the Completion value should be the same in every channel.

Shuffle button

The Shuffle button randomizes the turbulence. Click the button to reset the random shape of the flame.

Transparency toggle button

To get a transparent fire:

1 Drag and drop the Fire Component from the Glow channel to the Transparency channel.

2 Click on the **Transparency** tab to edit the copied fire component.
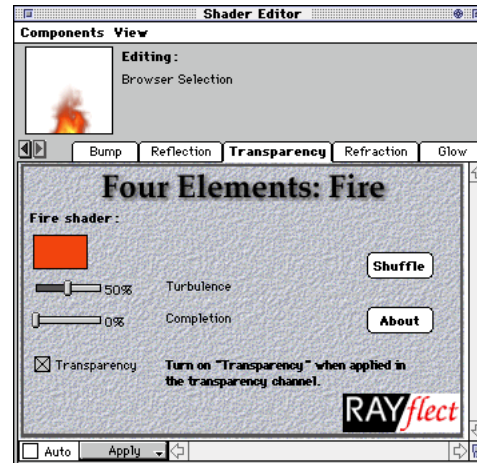
3 Turn on the Transparency toggle button.

Using the Fire shader

When you are done with the Fire shader settings (see "Four Elements: Fire parameters"), you can apply it to an object.

When you apply the shader keep in mind that a flame is very thin.

To apply the Fire shader to an object:

1 Create a simple curve made of two points in the cross-section in the Free Form Modeler.

Fire Transparency setting

2 Click **Done**. You will see a thin patch in the Perspective Window.

3 Open the Shader Editor and apply the Fire companion to the Glow and Transparency channels.

Note: To get a realistic flame you must apply the Fire component only to the Glow and Transparency channels. All other channel values must be set to zero.

4 Apply the shader to the object.

If you want to see the objects through a flame, you must copy the Fire component from the Glow channel to the Transparency channel. Do not forget to turn on the "Transparency" toggle button found in the Transparency channel (see "Four Elements: Fire parameters").

Animating Fire

If you are using Ray Dream Studio, you can easily use the Fire extension in your animations.

Using the Fire shader in an animation:

1 Create your animation as usual.

2 With the current time bar at time 0:00:00, open the Shader Editor and edit the Fire shader's parameters.

3 Set the **Completion** slider to 0%.

4 When you have finished editing the parameters, click Apply and jump to the end of your animation

5 Open the Shader Editor and set the **Completion** slider to 100%,then click Apply.

6 Render your animation as usual.

More experienced users can animate Fire extension parameters over the course of their animations. To do this, set your current time indicator to the time you want and change the turbulence value in the Fire shader. New key events will be added to the Timeline.