

# FRactal Terrains 3



## WELCOME

Welcome to Fractal Terrains 3 (FT3) by ProFantasy Software Ltd. FT3 enables you to use fractals, real terrain data and your own imagination to create global maps. You can export those maps for further enhancement into Campaign Cartographer 3.

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### Technical Support

Support is available from the registration area of the ProFantasy website [profantasy.com](http://profantasy.com)

# FRACTAL TERRAINS 3

## Introduction

Fractal Terrains 3 is ProFantasy's fractal world-generating program. FT3 lets you create maps using either fractal algorithms, real world data, or from scratch. FT3 includes height, climate temperature and rainfall information, all of which can be edited. You can view your maps in a variety of projections and color schemes and export any view to **CC3**. Export into JPEG, PNG, BMP, VRML, linked HTML, Spin View, and a variety of other formats. FT3 includes extensive Earth and Mars height data.

### CC3

Throughout the text, you'll see references to CC3. CC3 is ProFantasy Software's map-making software. FT3 and CC3 are designed to integrate closely. Even if you don't use CC3, you might find it useful to download the CC3 viewer from [www.profantasy.com](http://www.profantasy.com).

## Using this Manual

This Essentials Guide gives you enough to get you started, without overwhelming you with details.

Items underlined in **bold text** are referring you to the side bar for definitions and additional information.

**Toolbar** buttons, dialog box items and menu items are shown in bold text like this **World Settings** .

### Toolbars

If you cannot locate a button, it will be because the toolbar to which the button belongs is not currently shown.

In order to display a required toolbar, click the View menu and click the name of the toolbar desired. Toolbars that are currently displayed appear on the menu with a tick next to them. If no tick appears, that toolbar is currently hidden.

## The FT3 Support Files

It is worthwhile exploring your FT3 directory beyond the program executable files. You will discover examples of worlds created with the software, as well as real-world data that can be used with FT3 to produce realistic maps based on the geography of Earth and Mars.

If you register your FT at [www.profantasy.com](http://www.profantasy.com), you will get access to the Terraformer package which includes a large amount of additional support material, like new color schemes, climate textures and many cloud overlays. You might also want to check out latest version of **Wilbur**, a comprehensive fractal world generation tool. While FT3 is ideal for quick generation of worlds, shielding you somewhat from the fractal theory the software uses, Wilbur is an excellent tool for those wishing to explore this theory to even greater depth.

### Wilbur

You will find the latest version of the Wilbur software at <http://www.ridgecrest.ca.us/~jslayton/software.html>.

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## Tool Bars

FT3 uses standard Windows® floating toolbars.

Toolbar	Purpose	Buttons
World Tools	Control files, create new worlds, change color schemes and settings.	
Map Tools	Control what you see.	
Tool Palette	Select areas, switch view between climate, altitude, temperature and rainfall. Paint in new values.	
Climate Selector	When the Climate tool is active, choose which climate to paint in.	

## Information Windows

There are three additional floating windows in the FT3 interface, accessible through the View Menu, and these can be hidden, dragged, or placed within the main window just as toolbars are.



**Globe Tool** This window contains a globe which can be rotated to adjust the current world view. Click and hold on the globe, and move the cursor to rotate it. The world view will pan accordingly when you release the globe.



**Color Key** This window keys the contour colors used for the current world. There are four versions of the color key window, one for each of the information views (Altitude, Climate, Rainfall, and Temperature).



**View Properties** This window contains general information about the current world, or the portion of the world beneath the mouse cursor.

## Tool Options



The Tool Options toolbar changes its content depending on what editing tool you have selected. It lets you change the size of the size of editing selections, the strength of an applied effect and so on.

## Preferences

You can alter your interface preferences by selecting **Preferences** from the **Edit** menu. This presents the Preferences dialog box. The settings you choose here will depend partly on the speed of your PC. Change these settings and your window size until you are happy with FT3's redraw speed.



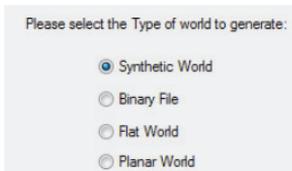
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## Your First World

Double-click FT3 on your computer's desktop. You will be presented with several windows that comprise FT3's main screen. We recommend that you do not run FT3 in a maximized window unless you have a fast PC.

## Starting a Random World

1. On the **File** menu click **New**.  
You see the **Type** dialog box.

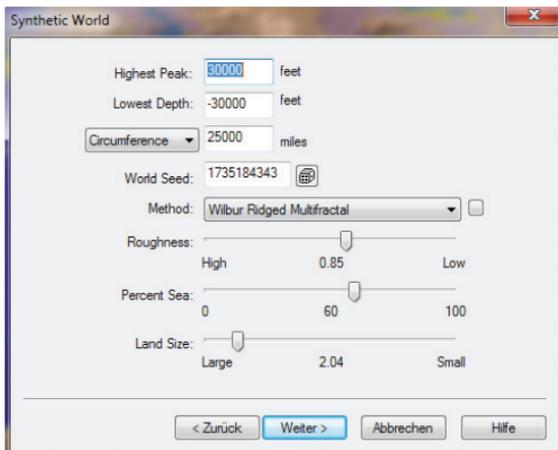


For now, we shall create a **synthetic world**.

2. Ensure that the **Synthetic World** radio button is checked, and click **Next**.

## World Settings

3. You see the **World Settings** dialog box.



### Synthetic World

- A **synthetic world** is one created by FT3's fractal functions.
- A **binary world** is one created from imported data.
- A **flat world** is a billiard ball, ready for you to edit yourself.
- A **planar world** is a synthetic world, mapped to a flat plane instead of a globe.

### World Settings

You can also access this dialog to edit the current world by clicking on the **World Settings** button and choosing the **Primary** tab.

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## Units

FT3 uses Imperial units by default, so this will be Miles.

To change FT3's units to kilometers, meters and degrees Celsius, click **World Settings** , choose the **Secondary** tab and select Metric Units.

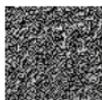
**Highest Peak** and **Lowest Depth** set the maximum and minimum altitudes for the world. Sometimes the generated world may exceed these values, but it usually keeps within these bounds.

The **Circumference** or **Diameter** (depending on the option selected from the drop list) is in current **units**.

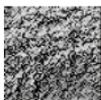
The **World Seed** is the world number to generate. It sets the random number seed for the internal generators. Click on  to randomly allocate this value.

**Method** selects the way altitude will be computed. There are many different options available. Use the default **Wilbur Ridged Multifractal** for the time being, as it gives a good basis for a realistic-looking world. Come back later and play around with different methods to get different worlds.

**Roughness** controls the level of roughness in a surface. This value is roughly the fractal dimension of the surface. The sequence below shows how Roughness affects the surface from high (0.01) to low (1.49):



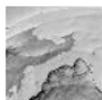
0.01



0.38



0.75



1.13



1.49

**Percent Sea** sets the rough amount of sea that will be found on the map.

**Land Size** sets the size of the land masses. The sequence below shows how the changing the setting changes the land mass size:



1.00



2.14



5.50

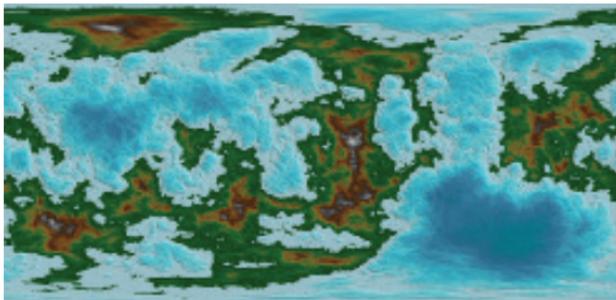


10.00

The smaller the land size setting, the more continents (or islands) you will get. A value of around 1.6 to 2.5 usually provides good results.

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- The three settings you want to concentrate on are Roughness, Percent Sea, and Land Size. Try the following values:
  - Roughness: 0.75
  - Percent Sea: 50
  - Land Size: 2.44
- Keep the other values the same.
- Click **Next** and then **Finished**. FT3 will spend a few moments calculating, and will then draw the world into the main screen.



Congratulations! You have just created your first world.

## The Next Step

If you aren't yet satisfied with the basics of the world, (proportion and size of land vs sea, height of peaks), you can edit the world settings to adjust them to your liking.

- Click **World Settings**  to adjust the parameters for your world as well as changing **Secondary**, **Temperature** and **Rainfall** settings.
- On the **World Settings** dialog choose the **Editing** tab to change the resolution used to depict your world. The higher the resolution, the more memory FT3 will need. For your first world and for exploring FT3's functions we recommend sticking with the default editing setup.
- The **Selection** tab lets you save and load different world settings you are happy with and want to

### Secondary

These settings allow you to affect the way in which the world is calculated. You may also change climate coloration, the location of the northernmost pole, axis tilt, etc.

If **Continental Shelves** are selected, the value on this line is the depth at which the shelves will be generated.

The **North Pole Position** group controls the location of the north pole. The change will not be applied to any terrain editing.

### Temperature

**Axis Tilt** affects the temperature distribution of the world.

The **Planetary Temperature Model** group controls the settings the general temperature setup of your world.

### Rainfall

**Base Value** controls the average rainfall, and **Random Amount** the variation.

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## World Coloring

If the **Blended** check boxes on the **Altitude** tab are set, FT3 will draw the contour colors so that the transition between one contour and the next flows smoothly.

While this produces a more realistic look, it can slow down world redraws.

If the land **Shaded** check box is set, FT3 will calculate and draw shaded highlights to raised terrain features.

As with blending, shading can slow down redraw times, but will produce a more realistic effect.

The sea **Shading** check box is used to tell FT3 whether to draw similar shading for sea depth contours.

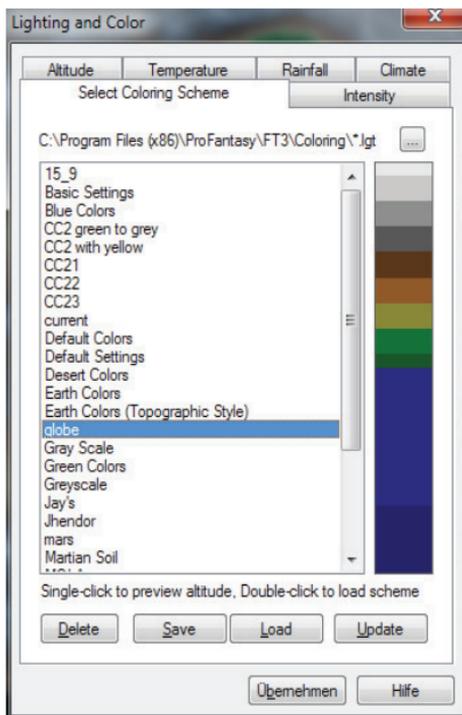
This check box will not be available if the land **Shaded** check box is not checked.

reuse at a later time. Under **Fractal Function** you can change the underlying mathematical function used to create the random world.

10. Click **Apply** to apply any changes you made in the **World Settings** to the current world.

## Color Settings

11. Click **World Coloring**  and you see the **Lighting and Color** dialog box:
12. Choose the **Select Coloring Scheme** tab.



13. Select a suitable color scheme for your altitudes and then **Load** and **Apply** to apply it to the current world.

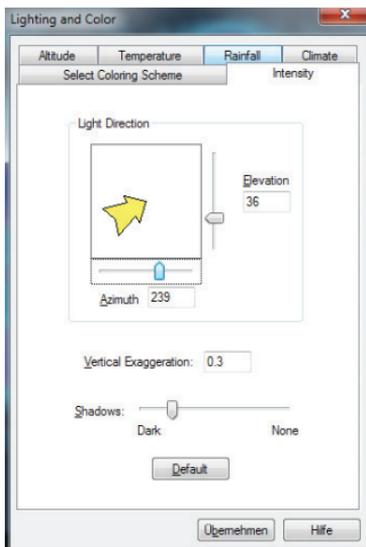
14. If you want to edit the colors of a scheme, click the **Altitude** tab.

You can change the colors used for the land height and sea depth contours by clicking on the

color boxes.

You can save your choices to a scheme for use in other worlds of your creation.

15. The **Rainfall**, **Climate** and **Temperature** colors can be changed in the same way.
16. Click the **Intensity** tab. You see the **Light direction** and **Shadow** settings:  
This is used to define how contour shading will appear for your world. You can set the vertical (Elevation) and horizontal (Azimuth) angle at which light will appear to strike your world, as well as the intensity of the shading that will be used.
17. Change the angle and click **Apply** to change the lighting of your world.



When you are happy with the basic world settings, click **Next World**  a few times to cycle through various world layouts — this simply changes the random seed, but leaves all other settings intact.

Continue cycling through worlds until you find one that is suitable for your purposes. It's much quicker to find a random world you like than to edit one you don't.



## Navigating the World

FT3 possesses functionality allowing you to move about your world, and to zoom into and out of areas within it. It is a good idea to become familiar with these various functions, as they will be useful when you come to edit and otherwise play with your new creation.

### Moving Around Using the Globe

The small globe can be rotated to achieve the view you desire. To pan your world using the globe:

1. Move the mouse over the globe, so the cursor becomes a hand, then click (do not release). The mouse pointer will appear to “grab”.
2. Move the mouse. The globe will rotate with the mouse.
3. When the area you want to view is in the center of the globe, release the mouse button. FT3 will re-draw the world to show the new view. The “closest” point to you on the globe is now at the center of the view window.

#### Zoom Buttons

Click **Zoom In**  to change the view so that it is zoomed in by a factor of two.

Click **Zoom Out**  to change the view so that it is zoomed out by a factor of two.

Click **Zoom Extents**  to change the view so that the entire world fits within the display window.

Click **Zoom Window** , then click a point, move the mouse and click another point forming a box. The view will change to show a zoomed view of the area within that box.

### Zooming In and Out

You can also use the **Zoom buttons** to change the view on your world.

### Moving Around Using the Main Map

As well as using the Globe, you can move the current view by panning around the map. If the map window is large, this may be slow.

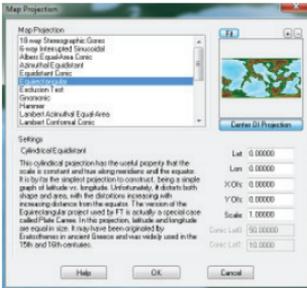
1. Click **Pan** . The mouse pointer will become a hand.
2. Click and hold the mouse button down within the world view. The mouse pointer will appear to “grab”.
3. Move the mouse through the desired pan

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distance and direction, then release the mouse button. FT3 moves the map within the view window to show you the new view area.

- Alternatively you can hold down SHIFT while using the pan tool. This rotates the world as if in Globe view, rather than simply moving the map area in the view window. This is easier to see than explain, so **Zoom Extents** then try SHIFT-panning.

## Map Projections



Displaying a 3D globe on a flat surface poses a problem. Over the years, several different methods of achieving this have been devised. Such methods produce flat-map views, or projections, of the globe. FT3 can display your world using many projection methods.

### Map Projection Dialog Box

The Map Projection dialog has three basic sets of parameters:

**Projection Center**, represented by the values Lat (latitude) and Lon (longitude), defines the central point for the projection display.

**View Offset** (represented by X Ofc and Y Ofc) defines the offset from the projection center to the center of the area of interest. View Offsets can be used to center a view to a particular latitude and longitude coordinate.

**Scale** is expressed as a zoom ratio, eg a Scale of 1 will display the entire world, 0.5 will zoom in by a factor of x2, 4 will zoom out by a factor of x1/4, and so on.

- Click **Change Projection**  . You see the **Map Projection dialog box**.
- Click one of the listed map projections. The preview of the world will change to reflect the selected projection. We recommend the Equirectangular projection as the best all-round option.

## Named Views

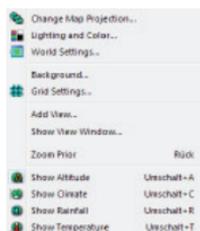
You can create named views for your world. When a named view is created, map projection, scale, and position are stored within it. Named views can be used for world navigation and to export sections of worlds.

They are especially useful for outputting consistent images of the same portions of a world using different settings and during different FT3 sessions.

- Right-click within FT3's main screen.

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## Context Menu



The Context menu provides a quick mouse shortcut to some of the more commonly used commands. You can use it, by right-clicking, instead of using the standard menu and buttons to access these commands.

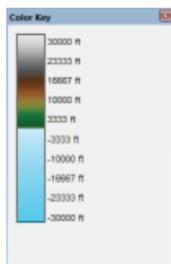
## View Management

As well as adding and showing views, you can export them.

Export As CC3 exports the currently selected named views as CC3 and/or JPEG files.

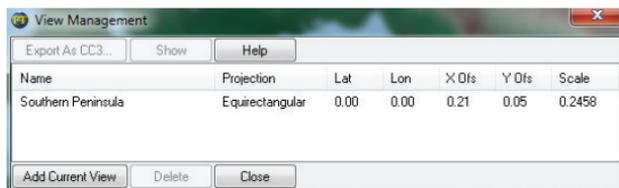
## Current Views

For each view, different colors are used to indicate the different values FT3 has calculated. The colors and their associated values are shown within the Color Key window.



You see the **Context menu**.

2. Click **Add View**.
3. Enter a name for your view, then click **OK**.  
If you intend to export saved views (see Help: *Saving and Restoring Views*), it is advisable to use legal Windows® file names.
4. Click **Show View Window** on the context menu to open the **View Management** dialog box:



5. Click one of the listed views then **Show** to use it. Multiple named views can be selected by holding down CTRL while clicking to select, and selecting names individually, or holding down SHIFT to select a range of view names.

## Viewing World Information

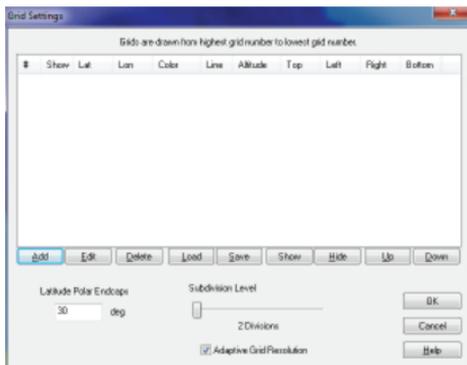
As well as altitudes, FT3 will automatically generate a world's climate, temperature, and rainfall, as well as its general geography. While these calculations are based more on theory than any "true to life" scenario, they can be edited.

1. Click **Show Altitudes**  to show your world's height contours and general geography (this is the **current view**).
2. Click **Show Climate**  to show the climate zones FT3 has calculated for your world.
3. Click **Show Temperature**  to show the temperature zones FT3 has calculated for your world.
4. Click **Show Rainfall**  to show the precipitation levels FT3 has calculated for your world.

## Adding a Grid

FT3 has the capability of adding **gridlines** to your map. Since grids are based upon longitude and latitude, the manner in which a grid is displayed will depend upon the current projection used.

1. Click **Grid Settings** .  
You will see the **Grid Settings** dialog box:



2. Click **Add** to create a new grid in the list.
3. Check **Enable Grid** in the Grid settings dialog that comes up.
4. Click the **Color** of the grid then choose a color and click OK.
5. Change the **Longitude** and **Latitude Spacing** values for the grid. It is normal to set larger grids as multiples of any underlying grids. Try 30 for the main grid. Click **Ok**.
6. **Add** any secondary grids in the same manner, try a 10° grid in a lighter color.
7. Move the **Subdivision Level** slider bar so that the setting reads **2 Divisions**.
8. **Latitude Polar Endcaps** defines the area where the horizontal grid will not be shown near the poles. This is useful for projections where the converging lines would otherwise obscure too much of the map. Leave it as it is and click **OK**.

## Gridlines

You can define any number of separate grids. This is useful for example when you wish to depict minor and major grids (eg a dark grid line every 15 degrees, and a light grid line every 5 degrees).

## The View Properties window

This window contains general information about the current world, or the portion of the world beneath the mouse cursor. It gives you an idea of maximum and minimum values on the world, as well as assisting in choosing suitable areas to export.

## Distance Measurement

You can also measure linear distances across the world. Click **Distance**  and then click both ends of the linear distance you wish to measure. FT3 will report the measurement.

## Editing your World

FT3 does not stop once your world has been created. Perhaps the mountains are too high, the seas too deep, or there is something else that you wish you could change to make your world just so. To this end, FT3 provides a number of **editing tools** that can be used to tweak your world.

### The Editing Tools

FT3 possesses eleven editing tools, all of which are available via the Tool Palette. Each tool affects a painted area. You can change the **size** of the current tool. Press **SHIFT** and click to perform a global change.

1. So that you see the results of your editing, we recommend you choose a suitable **Show...** button first (eg **Show Climate** when you use Warmer and Colder).
2. Click the button representing the editing function you wish to use.
3. Move the mouse to the region you wish to edit within your world.
4. Click and hold the mouse button down.
5. Move the mouse across the area you wish to edit. Your edit will be “painted” onto the world as you move the cursor. Since FT3 needs to calculate edits in order to apply them, it is a good idea to move the mouse slowly to ensure that the edit is applied to the whole region desired.
6. Once you have painted all of the desired area, release the mouse button.

Editing tools only affect the current selection. If you haven't selected any particular region of your map, then the tool will affect any area it touches. For more on selection, see *Selection Functions* on page 16.

### Editing Tools

**Raise**  and **Lower**  affect the altitude.

**Raise Prescale Offset**  and **Lower Prescale Offset**  are advanced editing functions for greater precision in editing continental shelves and will not be discussed here.

**Rougher**  and **Smoother**  increase and decrease the height variation.

**Wetter**  and **Drier**  affect the level of rainfall.

**Warmer**  and **Colder**  affect the temperature.

**Water level**  causes a brushed area to be represented as water, as long as its height is lower than the current brush setting.

## Changing the Editing Tools

### Values

Note that the editing tools may have no discernible effect when using low tool settings values at high zoom levels.

You can set the extent to which edits are applied in the **Tool Options** window (at the bottom of the screen by default). It will rename itself to Paintbrush Options when an editing tool is selected and show the current size, strength (**Value**) and type of the selected editing tool. The values you enter can be saved as presets for future use.

## Climate Painting

**Paint Climate**  is used to change the climate settings for an area painted. To use this tool, you must first select the type of climate you wish to paint from the **Climate Selector** toolbar. Fifteen climate types are available.

### Selection by Shape

**Select Rectangle** 

**Select Ellipse** 

Click to place the first corner, move the mouse, then click again to place the opposite corner.

**Select Freehand** 

to manually draw a selection mask. Click to start the selection, draw the required selection by moving the mouse, click to complete.

**Select Polygon** 

Click to start the selection, then click to place further points as desired. To complete the selection, either triple-click (effectively clicking once to place the final point, then double-clicking in the same location to complete), or press ENTER.

## Selection Functions

FT3 provides a number of selection tools which can be used to mask portions of a world. When a selection mask is applied, all edits will only affect currently selected portions of a world. Global edits will be applied to all areas within the selection, and areas outside the selection will remain untouched.

## Basic Selection Functions

Four basic functions are accessed from the **Select** menu. These are:

- **All** selects the entire world.
- **Deselect** deselects all current selections.
- **Reselect** restores the last selection after a **Deselect**.
- **Inverse** inverts the current selection, so that everything currently selected is now de-selected, and vice versa.

## Selection Tools

Four tools are provided which allow selection by shape. These tools can be found in the **Select** menu and on the

## Tools toolbar.

These selection tools can also be used to add to or subtract from the current selection. Holding down **SHIFT** when completing the selection will add the area to the current selection, and holding down **CTRL** will remove the area drawn from the current selection.

## Range Selection Functions

The Select menu provides four **range selection** functions that are used to select portions of the world that conform to given parameters. These tools prompt for the range or climate type required via a dialog box.

## Selection Mask Modification

The current selection mask can be further modified.

**Binarize** will “harden” the selection, so that each pixel is either fully selected or fully deselected.

**Feather** will “soften” the selection mask, blurring it around the edges. You will be prompted to enter the amount by which the selection is to be smoothed. Feathered selections can have partially-selected pixels.

**Modify >> Border** will create a strip of selection along the current selection’s border. You will be prompted for the width of this strip.

**Modify >> Expand** will increase the size of the current selection by one pixel in all directions.

**Modify >> Distance** converts the selection into distances from the edge of the selection.

**Modify >> Contract** will decrease the size of the current selection by one pixel in all directions.

## Selection Mask Files

You can save selections for use in the future as a selection mask file.

**Save Selection** will save the current selection as a

### Range Selection

**Altitude Range** selects by altitude, in feet (or meters).

**Temperature Range** selects by temperature, in °F (or °C).

**Rainfall Range** selects by rainfall, in inches per year (or cm).

Selecting by **Climate Range** always replaces the current selection. This opens a dialog box which lists all of the climates FT3 recognizes. Check boxes to the left of the listed climates to include them in the selection.

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## Mound

**Min (ft):** is the value that will be applied to the edge of the selection, in feet (or meters).

**Max (ft):** is the value that will be applied to the center of the selection, in feet (or meters).

If **Replace Offset** is checked, the current values of the selection will be replaced by the Mound function. If unchecked, the Mound function will add to the current values.

**Gamma** indicates the linearity of the mound's slope. A value of 1.0 will produce a mound with fairly shallow-sloping sides. Values less than 1.0 will provide flatter tops and steeper sides. Values greater than 1.0 will produce shallower sides and more pointed center ridges.

## Highest Flow

Due to the way the process is defined, a river will stop flowing when it hits water, so a small lake can absorb the entire output of a large river. In that case, it's best to fill in the small lake and rerun the rivers tool.

bitmap file.

**Load Selection** will prompt for the selection mask file to use, and will then apply that to the current world.

## Mounds

The **Tools >> Actions >> Mound** function takes parameters you provide, then adjusts the altitude values within a selection accordingly. It is useful for creating mountains, plateaus, etc.

The **Moundtain** tool is similar to **Mound**, but uses a very different algorithm to achieve its effect. This tool creates a mound, shrinks the selection, creates another mound, and continues until the selection is completely used. Use of this tool will destroy your current selection.

The **Profiled Mound** tool is again similar to **Mound**, but it has additional options, primarily the ability to specify a profile on the mound rather than a simple operation.

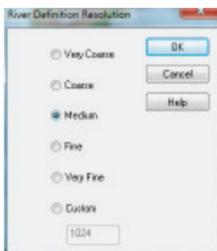
## Adding Rivers

The **Find Rivers** tool in FT3 computes the directions and amounts of water flow in the world and then places rivers over the areas of **highest flow**. Once a set of rivers has been computed, these rivers will be stored internally as vectors.

The vector river overlay may be shown and hidden by toggling the **Tools >> Rivers >> Show River Overlay** option. It may be removed entirely by using **Clear River Overlay**.

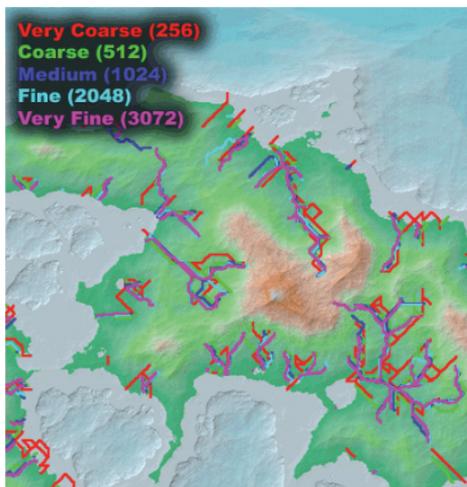
## Calculation Resolution

Although FT3 can calculate your world altitudes to a very high resolution, it cannot run rivers at those same resolutions due to space and time constraints. The **River Definition Resolution** dialog allows you to select the desired output resolution of the rivers.



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Rivers will run slightly differently depending on the chosen resolution. The image below shows an example of this difference for each of the default resolutions:



## Vector Rivers

After the initial computations, the system will display the window below to let you finalize the river settings:



If you have a slower computer or very limited memory resources then the river process can take a very long time. Pressing **Cancel** on the progress dialog will stop the attempts to route rivers. Stopping the computation will reduce the number of river segments computed. Reduce the computation resolution and try again.

### River Settings

The **River Length** slider controls the length of rivers appearing on the map.

The **Color** block controls the color of the inserted rivers.

The **Potential River Flow** checkbox controls whether to use FT3's rainfall model to compute river flow (if unchecked) or whether to use a constant rainfall at every world point (if checked).

Potential river flow can give longer or shorter rivers in various parts of the world depending on local rainfall conditions.

The **Keep River Image Overlay** checkbox indicates if the onscreen image overlay shown in this stage will be kept as part of the world. The raster image overlay will be discarded and only vector information will be kept if this box is unchecked.

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## Flat Worlds

If you want to manually draw land patterns, rather than allowing FT3 to randomly generate them for you, you can create a new world that possesses a flat, featureless terrain.

Using a flat world as a starting point, you can then use the editing tools to paint terrain features as you wish.

To start a new flat world:

1. On the **File** menu, click **New**.  
You see the Select World Type dialog box.
2. Check the **Flat World** radio button then click **Next**.

You see the **Synthetic World dialog box**.

3. Set desired options, particularly the **Circumference** and expected maximum heights and depths.



Steps 3 is

performed in exactly the same way as for synthetic worlds. See the chapter *Your First World*.

4. From the Synthetic World dialog, click **Next**.  
FT3 shows a note on creating flat worlds.
5. Click **Finish** to generate the world.  
FT3 displays the flat world. The altitude is 0 feet (sea level) all over, and therefore normally shown blue.
6. On the **Tools** menu, click **Global Set >> Altitude**, type 100 and press **OK**. FT3 **raises the height** all over the globe, and will therefore now appear plain green.

The world may now be edited as you see fit using FT3's editing tools.

### Synthetic World dialog Box

Flat worlds use the same underlying setup as do synthetic worlds.

### Raise the Height

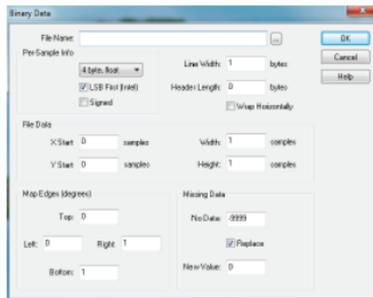
Because of the way the raise and lower tools work, it's better to start with a raised surface and use the lower tools to make seas than vice versa.

## Worlds from Real World Data

As well as being able to create worlds from scratch, FT3 has the ability to **import binary data** files that define sections of terrain. You will find examples of such files, from the GTOPO30 real-world data sets, that you can import into FT3 to produce maps based on planetary data.

### Creating a World

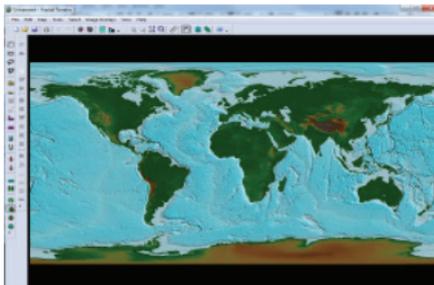
1. Click **New**.  
You see the **Select World Type** dialog box.
2. Pick the **Binary File** radio button, then click **Next**.
3. Click **Choose Elevation File**.  
You see the Binary Data dialog box.



4. Click **...** to select the **required file** from a file dialog box. Select the file *ETOPO5.bin* in the *Terrain Data* folder.

FT3 automatically finds the header file for the data and prompts you whether to use it. Click **Yes**. The header file sets the remaining values in the dialog box.

5. Press **OK** to return to the Binary Data wizard.
6. Click **Next** and then **Finished** to start the world generation.  
FT3 displays the map in the main window.



### Import Binary Data

Note that the binary file used must be present for as long as you intend to use the world file. FT3 does not import the binary data into its own format, but rather uses the binary file for reference.

Moving or deleting the binary file after saving a world created with it will result in the world file being unusable. This can be avoided by using the Burn In To Surface function, which is further detailed below.

### Required File

The real-world data that comes with FT3 is found in the Terrain Data directory under your FT3 program folder.

**ETOPO5** is low-resolution altitude data of the whole world.

**Mola2x2a** is altitude data of Mars.

**USTOPO30** is hi-resolution altitude data of the United States only.

**GOTOPO30** is hi-resolution data of the complete Earth globe.

The GOTOPO30 data set is too large to be distributed in an unzipped format. Unzip it to a location of your choice before using it.

## Burn In to Surface

### FT3's Native Format

As a side effect, the **Burn In to Surface** function removes the contribution of the fractal basis function, resulting in a smoother map. This makes the function useful for worlds that do not use binary files.

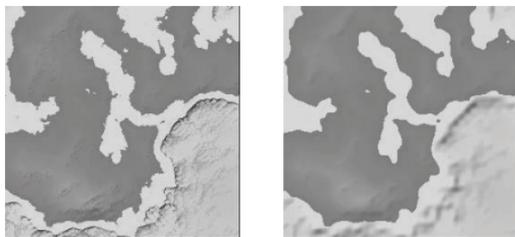
Burned files are much bigger than raw, unedited FT3 files.

This function takes the current world information, and includes the data directly in the current FT3 drawing. This removes FT3's reliance on binary data files; in effect, the binary data is converted into **FT3's native format**.

Once the **Burn In to Surface** function has been used, it cannot be undone.

To use the **Burn In to Surface** function, select **Burn In to Surface** from the **Tools >> Actions** menu.

The images below show what can happen with the burn operation at differing editing resolutions.



Notice how the fine details are lost at small resolution (on the right).

## Exporting and Importing

Once you have edited your world so that everything matches your desires, you may wish to **export** it to an image file, a CC3 file, a series of image or CC3 files, or even to a Virtual Reality Modeling Language model.

### File Formats

The **BMP**, **JPEG**, **PNG**, **Wilbur** (MDR) and **RAW** formats all save the current view (not the whole map) as either a color map or as a height field readable by Wilbur. These formats have limits on the size of an image that can be saved.

The **Special MDR** format, on the other hand, has no limit on the size of the output image and always outputs its information using a simple Equirectangular projection. This format is very useful when exporting a high resolution image from FT3 to use as a binary image within FT3 or as an input file within Wilbur.

All these file formats are available from the **File >> Save As** dialog.

### Exporting to Campaign Cartographer 3

CC3 is a powerful cartography tool that can be used to further enhance and manipulate your world.

Before you can use it, you must first export the world to one or more CC3 map files (FCW). You can do so via the **Save Campaign Cartographer 3 File** option in the **File** menu, via the **Export As CC3** function of the **View Window**, or as multiple, hyperlinked files from **File >> Export Worlds >> Multiple Files**.

Whenever you export **views** from FT3 to CC3, you need to choose a setting for export, or create one of your own. See the FT3 help files for more information in creating and editing your own CC3 export settings.

To export the current view in the main window to CC3...

### Export

FT3's native file format is FTW. You should always save your world in FT3's own format, especially if you intend to use FT3 to further edit and refine it. FT3 also supports:

- Bitmap image format (BMP)
- JPEG image format (JPG)
- PNG image format (PNG) in color and 16-bit greyscale variations.
- Wilbur format (MDR)
- Special MDR (MDR)
- Raw data binary format (RAW).

### Views

All CC3 export functions save the current view of the map, not the world whole.

Thus, to produce a CC3 map covering a small area of your world, just zoom into the area required. To ensure that the same view can be exported during different FT3 sessions, use the **Named View** features available from the **View Window** in the **View** menu.

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1. Click **File >> Save Campaign Cartographer File...**  
The available export settings files will appear in the list.
2. Choose an export setting — **Basic 100 Contours** is a good one to start with.
3. Click **Export World**.
4. Save the file to a location of your choice and open it in **Campaign Cartographer 3**.

## Exporting to Multiple CC3 Files

### Settings

**Generate HTML** creates HTML files linked to the JPEG files (if any).

The **Map Levels** option is used to determine the number of image sets that will be created.

**Files Wide:** The number of files used to depict the world's horizontal axis at this level.

**Files High:** The number of files used to depict the world's vertical axis at this level.

**Percentage Overlap:** The extent to which each file of a given level overlaps with those adjacent to it.

**Image Resolution** lets you specify the width (in pixels) of the generated jpg files.

**FCW Links** puts links on any generated HTML pages to the matching CC3 files.

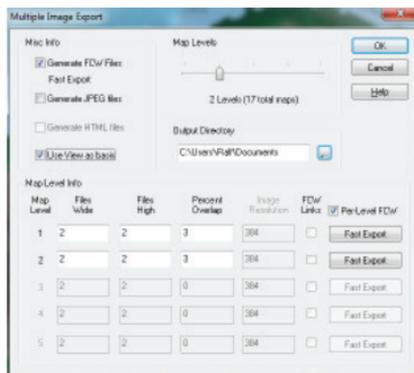
Activating **Per-level FCW** lets you specify the CC3 export settings separately for each level.

FT3 can output your world to several CC3 files, each comprising a smaller, tiled section of the map. It is often useful to do this, since attempting to depict a detailed world map within a single CC3 drawing can result in an unmanageably huge file.

The **Map Level Info** settings determine how the world will be divided into multiple files. Each map level set will comprise a number of files that tile together to form the whole world. For example, if two map levels are chosen, you will have two separate sets of CC3 (or JPEG) files, each slicing up the world map into a number of tiles at a different scale.

To export your world to several CC3 files:

1. Select **File menu >> Export World >> Multiple Files**.
2. Check the **Generate FCW Files** option and select a setting from list of available ones.
3. Choose suitable **settings** for the other controls.
4. To choose a location for the output files, click the



directory selection button .

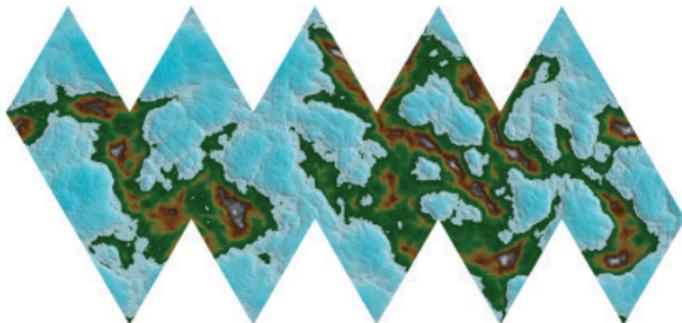
The files will have a filename consisting of a letter and a number. The letter refers to the map level (the overview map will be "A", level one will be "B", and so on). The number refers to the row and column of the map's tile.

## Exporting an Icosahedral Projection

Icosahedral projections are commonly used to depict worlds within science fiction roleplaying games such as Traveller®. Basically, an icosahedral projection takes the form of a flat-view exploded 20-sided shape.

To save your world as an icosahedral projection:

1. Select **File >> Export World >> Icosahedral**.  
You will see the icosahedral **Save As** dialog box.
2. Change the **Width** value if desired. The higher the **Width** setting, the larger the output file will be.
3. Click the **Background Color** button.  
Choose the color you wish to use for the output file's background and click on **OK**.
4. Type a name for the file in the **File Name** box.
5. Select the desired **file format** from the drop-list.
6. Click **Save**.  
FT3 creates the **icosahedral** image file.



### File Format

Bitmap, JPEG and PNG formats are available for icosahedral export.

### Icosahedral

This icosahedral projection is a simple linear transformation of an equirectangular map.

### Cosmographer 3

Cosmographer 3 is the science-fiction add-on to CC3 and this export is set up to facilitate further work within that environment.

## Exporting to a Cosmographer Template

This export function creates an icosahedral projection

PNG bitmap and embeds it in a **Cosmographer 3** template.

1. Select **File >> Export World >> Cosmographer Template**.  
You will see the matching **Save As** dialog box.
2. Change the **Width** value if desired. The higher the **Width** setting, the larger the bitmap output will be.
3. Click **Background Color** button.  
Choose the color you wish to use for the output file's background and click on **OK**.
4. Type a name for the file in the **File Name** box.
5. Click **Save**.  
FT3 creates the icosahedral PNG image, the FCW file, and embeds the former into the latter.

## Exporting a Spin View

A spin view is a series of image files that depict the globe over a period of rotation. These files may be then combined in a third party application to form a rotating globe animation.

### Export Parameters

**Size:** The size of each frame in pixels.

**# Frames:** The number of images that will be created. If used for animation, the higher this value is the smoother the resultant animation will be.

**Latitude:** The degree of latitude that will form the center point of the rotational view.

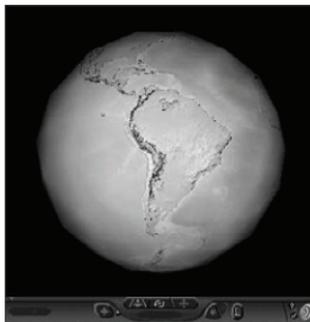
**Appear to be Shaded:** Check this box if you wish the world to appear shaded.

1. Select **File >> Export World >> Spin View Image Sequence**.  
You will see the **Save Spin View Sequence Files** dialog box.
2. Set up the **export parameters** as desired.
3. Type a name for the file in the **File Name** box.
4. Select the desired file format from the drop-list. Bitmap, PNG and JPEG formats are available for spin view export.
5. Click **Save**.  
FT3 creates the spin view image files. Each file will consist of the selected filename, plus a numerical suffix indicating where in the rotational sequence the file occurs.

## Exporting to VRML

VRML (Virtual Reality Modeling Language) is a modeling language that can be used to depict interactive 3D objects and environments. To use a VRML file, you will need a viewer capable of understanding the language (there are many such viewers available, including plug-ins for Internet browsers).

1. Select **File >> Export World >> VRML**.
2. Set the desired width for the output file.
3. Type a name for the file in the **File Name** box.
4. Click **Save**.  
FT3 creates the VRML file. To view the file, open it with a VRML viewer.



## Exporting to Google Earth (KMZ)

KMZ is the file format used by **Google Earth®**. Exporting to it creates a file that you can view in Google Earth®, enabling that program's powerful display features and its ability to add locations, landmarks, overlays and so on.

1. Select **File >> Export World >> KMZ File...**. The **Save As** dialog comes up.
2. Specify the output **Width** (in pixels), a **World Name** and a short **World Description**.
3. Save the file by clicking **Ok**.
4. Start up Google Earth® and load the KMZ file in there.

### Google Earth®

Google Earth® is a free-to-use software available for download at [www.google.com/earth](http://www.google.com/earth).

It is mainly a viewer for Earth satellite imagery, maps and lots of additional data, but can also be used to overlay custom images over the globe.

## Exporting to Bryce2 and Bryce3D

FT3 does not directly support map exports to Bryce2 or Bryce3D formats. However, Wilbur does. It is therefore possible to export a map from FT3 to Wilbur (use MDR), and then use Wilbur to export the results to Bryce.

## Importing Images and Creating Overlays

### Parameters

**Visible** indicates if the overlay can be seen.

**Name** is the name of the overlay shown in the **Image Overlay** window.

The **Show** drop-down list indicates what parts of the overlay should be shown.

The options are **Always**, which always shows all parts of the overlay; **Land**, which shows only the portions of the overlay above water level; **Sea**, which shows the overlay only below water level; and the two **Altitude Range** options which allow you to set specific ranges on the map in the settings below.

The **Opacity slider** controls the transparency of the overlay.

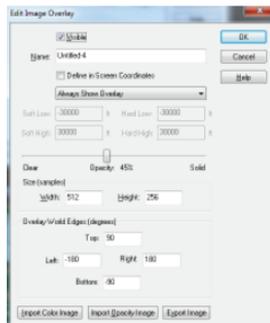
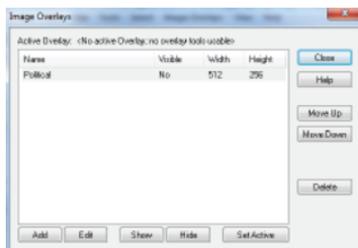
The **Size** group (**Width** and **Height**) controls the editing resolution of the overlay, which is the fineness of the details allowed.

The **Overlay World Edges** group controls where on the world the overlay is placed.

FT3 supports an arbitrary number of image overlays that can be used to show information and external images. Basic drawing tools are provided to draw information directly on these overlays in FT3, but the more common usage is to import external bitmap files to show in FT3. As the overlays support transparency, lots of different things can be overlaid on the FT3 world.

To add an image overlay in FT3:

1. Select **Image Overlays >> Show Overlay Window**. The **Image Overlay** window comes up.
2. Click **Add** to add a new overlay and bring up the **Edit Image Overlay** window.
3. Choose suitable **parameters** for your overlay.
4. To import a color image or opacity map, click one of the two Import buttons at the bottom.



## Example Cloud Overlay

1. Use **Image Overlays>>Show Overlay Window** to show the Image Overlays window
2. Click **Add** to add a new overlay, call it **Clouds** and close it, leaving all other parameters untouched.
3. Select **Clouds** in the list and click **Set Active** to make the new overlay the active one.
4. Click **Ok** to close the **Overlay Window**.

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5. Use **Image Overlays >> Set Overlay Drawing Color** to bring up the color picker.
  6. Pick white (color 15) and click **OK**.
  7. Use **Select >> All** to select the whole world.
  8. Use **Image Overlays >> Fill Selection With Drawing Color** to fill the overlay with solid white.
  9. Use **Image Overlays>>Show Overlay Window** to show the Image Overlays window again.
  10. Double-click the overlay in the Image Overlays window to bring up the **Edit Image Overlays** dialog.
  11. Click **Import Opacity Image** and load the *clouds.jpg* image from FT3's *Example* folder.  
This bitmap will be converted to grayscale and resized to fit the image before being used as the transparency channel of the overlay.
  12. Click **OK** to accept the new transparency data.
- You now have a beautiful cloud overlay on your world.

## Further Reading

The Essentials Guide cannot cover all the possibilities that Fractal Terrains has to offer, the variety of advanced features is just too large. But there are quite a number of other resources available:

- Check out the pdf document **FT Pro Details** in the *Documentation* folder of the FT3 program directory. It has a detailed section on creating new map projections and writing scripts in FT3, among other things.
- See Joe Slayton's extensive tutorial on world-creation in Fractal Terrains:  
<http://www.ridgenet.net/~jslayton/CGTutorial/>
- Follow Joseph Sweeney's video tutorial on using Fractal Terrains in conjunction with CC3:  
<http://www.youtube.com/watch?v=aJ1LlxnrEIA>
- Make sure to register FT3 at [www.profantasy.com](http://www.profantasy.com) and download the **Terraformer** package for FT3.

### Terraformer

Created by Fractal Terrains expert Bill Roach, the Terraformer package has loads of useful files for your FT3, such as new color schemes, climate textures and cloud overlays.

Be sure to read the Terraformer User Manual included in the zip file.

## Bibliography

Some books that also can help in the understanding of map projections are:

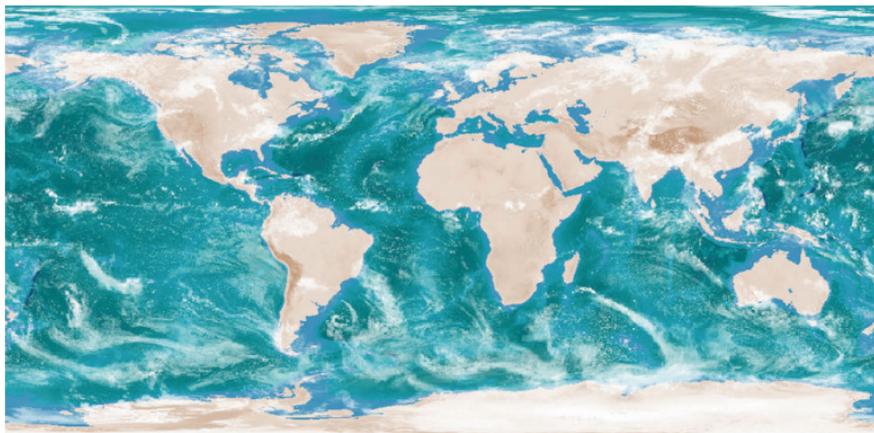
- **An Album of Map Projections** (Snyder and Voxland; US Geologic Survey Professional Paper 1453)
- **Map Projections — A Reference Manual** (Bugayevskiy and Snyder; ISBN 07484 0304 3)
- **Flattening the Earth** (Snyder; ISBN 0-226-76747-7)

The Album is out of print, but the others are readily available.

## FT3 Examples



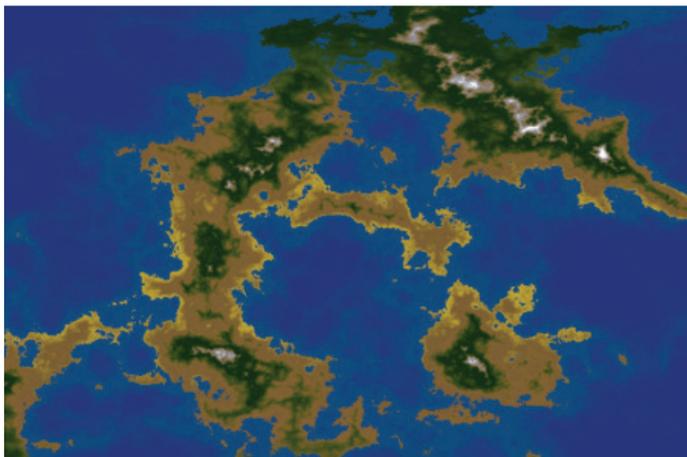
This is a snapshot of a spin view export of a synthetic world with textured climate shader and cloud overlay.



This is equirectangular projection view of real-world satellite data (GTOPO30) with a high-contrast color-scheme and a cloud overlay.

# RACTAL TERRAINS 3

This screenshot shows a single continent from a high-roughness synthetic world, displayed with the Gaia shader.



FT3 calculates river flows along the world's altitude gradients.

The encircled island was added manually with the **Raise** tool.

