SearchAndRescue Notes

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Table of Contents

List of Tables

List of Figures

Chapter 1. Adding data

1.1. Creating a new scenery

The goal: design a new scenery.

In order to present the way I use to do such a thing, I will present the job I do to create a scenery based on "La Reunion" island.

> **Note:** In order to edit SearchAndRescue scenery (`scenery/*.scn`) you could use ScnEdit. Personnaly, I prefer to directly edit the file *by hand* with a text editor.

1.1.1. Selection

The most important is to select a place to render. This place should be interresting for missions.

So, why "La Reunion"?

- It is small, so all the island could be rendered, which is interresting for the gamer: a complete environnment.
- It's an island, so there is an ocean, ie a place for lot's of future search and rescue missions in sea.
- It's a *volcano* island, whith moutains, ie another good place for lot's of future search and rescue missions.
- I like this island, and would to play on it `;-)`.

1.1.2. Scene map and terrain textures

The first information to collect is a satellite/aerial photo.

Personnaly, I search such thing with the Google (http://www.google.com/) image search engine. A suggestion made to me was to look on http://www.mapquest.com/.

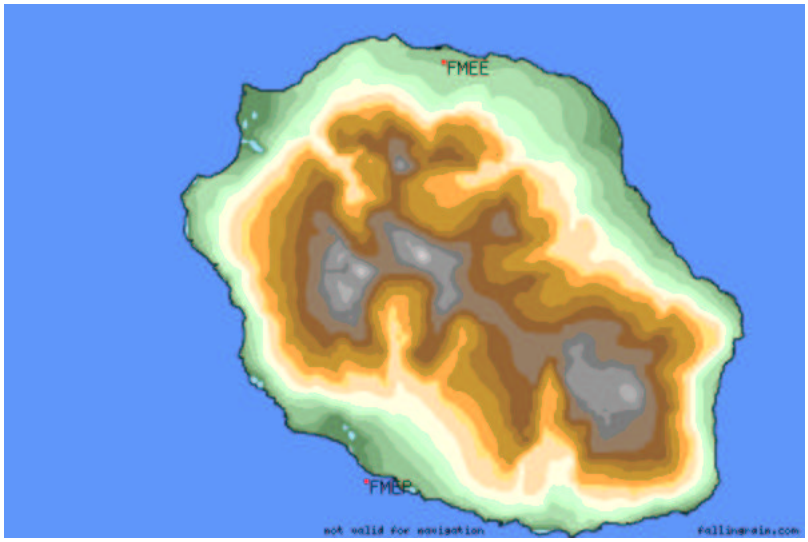
Figure 1-1. Scene map

1.1.3. Height map

In order to render the height, I decide to use an height field (normal way for such job).

Looking for a correct heightfield map is hard part of the job. After a long search on Internet, I found a web site providing data with acceptable height resolution for SearchAndRescue data: Worldwide Airport Path Finder (http://www.wapf.com/). The correponding data for La Réunion is shown in Figure 1-2.

Figure 1-2. Height map source



The height resolution is acceptable as is for a game, but an height field must be a greyscale image. We have to convert this map to a greyscale one *manually*[1]. This job must be done with the Gimp application.

1. Simplify the map.

    a. Remove the disclaimer messages in the sea ("not valid for navigation" and "fallingrain.com") and the airports location (here "FMEE" and "FMEP") with a pencil and a correct color.

    b. Select the sea with the Selection Color.

    c. Extend the selection by 1 pixel (in order to cover the black border).

    d. Replace the selection by pure black: the easy way is to invertblck/white foreground/backgroung and press **Ctrl**-**K**. .

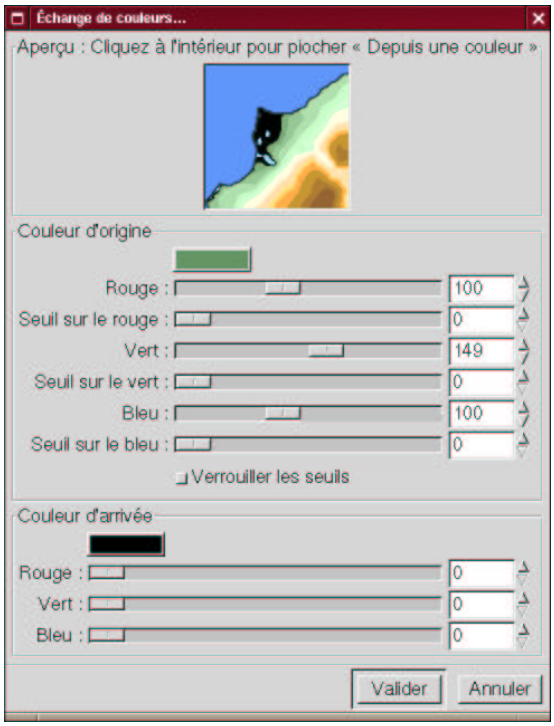
    e. Reduce the map to the strict necessary. In my case (an island) I used the menu Image⟶Transformations⟶Autodécoupage.

2. Convert each color to a grey level.

    a. Select a (foreground) color. 

    b. Open the color swap filter: Filter⟶Color⟶Palette⟶Swap two colors...

Figure 1-3. Swap colors dialog



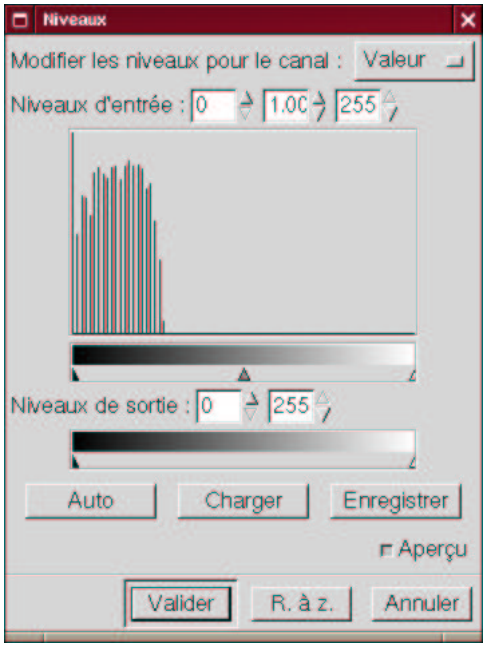
Tip: To avoid searching the dialog in the menu, it is possoble to re-call it with **Shift**-**Alt**-**F** after a first call.

c. Select a destination color where each component have the same value (ie: (0,0,0), (1,1,1), etc...). Take care that the (0,0,0) is the sea color. Select (1,1,1) for the coast, (2,2,2) for the color close to the coast and so on.

3. We have a greyscale map, but as is, the terrain is plane. We have to extend the grey level in order the sea keep a black color, but the highest point should be white (255,255,255).

a. Open the level dialog: Image→Colors→Levels...

Figure 1-4. Levels dialog

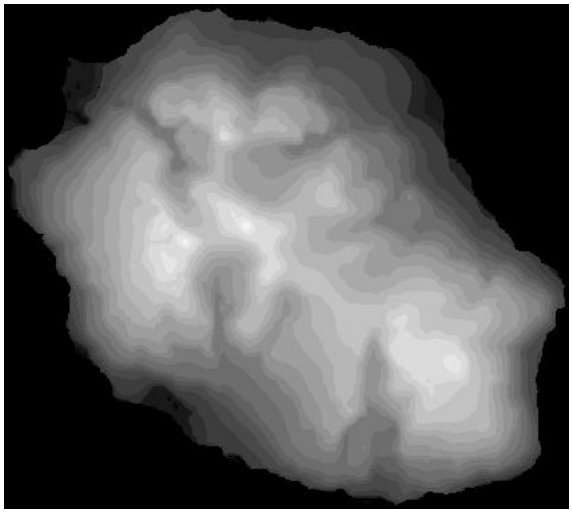


b. Set the Input levels in order that our clearest grey begin the greatest value. Personnaly, I changed the 255 to 18 (I used 18 levels of grey).

c. Apply the changes.

Ok, we now have a great height map.

Figure 1-5. First height map



If we use it on SearchAndRescue we observe that the terrain is leveled with long stages. The reason is that the map is large (420x380) but the height resolution is poor. So, the map have lots of pixels representing the same altitude which is wrong.

To correct this, we have two solutions:

- Use the Terraform application. With it, we will be able to smooth the relief.
- The second is simplier: scale down the map. Then, it is possible to use blur in order to smooth.

I chosed the second (200x200). For information, in my map, 200 pixels represent 60 km.

1.1.4. Registered location

Adding "Registered locations" seems to be a good way to learn the SearchAndRescue coordinate system. A simple location at (0,0,0) show that this position is the midle of my 0-translated island object.

Table 1-1. Locations

Name	Map coord.	Translation
Whole map	400x355 pixels	0,0
Cilaos	158x180	(-42,+3)*64800/400
St Gilles les Bains	10,126	-190,-51
Pierrefonds Airport	133,307	-67,+130=-10854,+21060

Once locations have been placed with this method, you can explore the whole map in Ctrl-**A** mode.

1.1.5. Performance

[Note that you should not use "one big object" to represent a huge area, since the way OpenGL prefers that you use smaller "tiled" objects for representing landscape. The scenery complexity increases CPU load and thus decreases performance, this is a common problem in games, and is the reason why data in most games are "approximated" and simplified.] (Tara Milana)

1.1.6. FAQ

1. What's wrong with my TGA images, I get the following message

```
Targa Library Warning:
    Filename:
/opt/game/sar/share/games/SearchAndRescue/textures/la_reunion/scene_la_reunion.tex
    Reason: Image data size 196634 less than header indicated size 196608.
```

Personnaly, I get this with Gimp 1.2.3. To correct, I used **convert** from the ImageMagick set. From Gimp, save the data in `tmp.tga` and then use the command **convert tmp.tga tga:*my_scene*.tex**.

This is the same for the heightfield image.

If you experienced better image manipulation program with TGA export, please let me know.

Notes

1. Perhaps there an automatic way to do the job, but I don't know it.

Chapter 2. Ideas

3D objects with multiples textures. The goal is to make some object from heightfield with more precise cities, road, rivers...

Tool to simplify the altitude search.

sar_find_alt [-relative | -gps | -lon_lat] *file*.scn x y

First release could simply return the z coordinate of all intersection with objects.