

RandomParadox 0.9.0 Documentation

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March 2025

1 Introduction

A tool to randomly generate scenarios for multiple games.

Currently implemented modules:

- Hearts of iron IV (Scenario and MapTool (Generation, Loading, Cutting, Scaling))
- Europa Universalis IV !!CURRENT MODS CRASH ON STARTUP!! (MapTool (Generation, Loading, Cutting, Scaling))
- Victoria 3 !!CURRENT MODS MAY CRASH ON STARTUP!! (Partial Maptool, experimental)

1.1 General Functionality

- Fully random maps with fully random continents, climate, provinces, regions, countries and more
- Generating random terrain and climate from simple input continents
- Generating from detailed input terrain, such as pre-drawn hills, valleys, mountainous areas etc
- Generating from detailed input climate, such as pre-drawn deserts, jungles, boreal areas etc
- Provinces/Region generation, either fully random, or respecting given borders
- Generation of mod files for multiple games, creating loadable mods
- cutting and scaling of regions from the base game
- So much more...

1.2 Some general reminders

- You need to drag in images of the correct resolution
- Keep in mind that you can almost always first have something generated **and find this in the Maps folder next to the executable**, then modify it with your favourite editor, and then drag it in again. This can make your life a lot easier if you want to prepare certain inputs, such as climate, provinces, states or countries (and more)
- It can happen that the tool crashes
- If the tool no longer works like expected, you can click the **reload config** button in the first tab to reset it to the initial configuration

To avoid error reports that are due to incorrect configuration, please read the documentation carefully.

2 GUI

2.1 Overview

The GUI consists of a log window, generic settings and buttons, and tabs. The start window will look like this:

At the top, you can see the log messages, keep an eye on them in case of errors. They will only update after calculations are done, so check the console window that opens with the GUI for live updates.

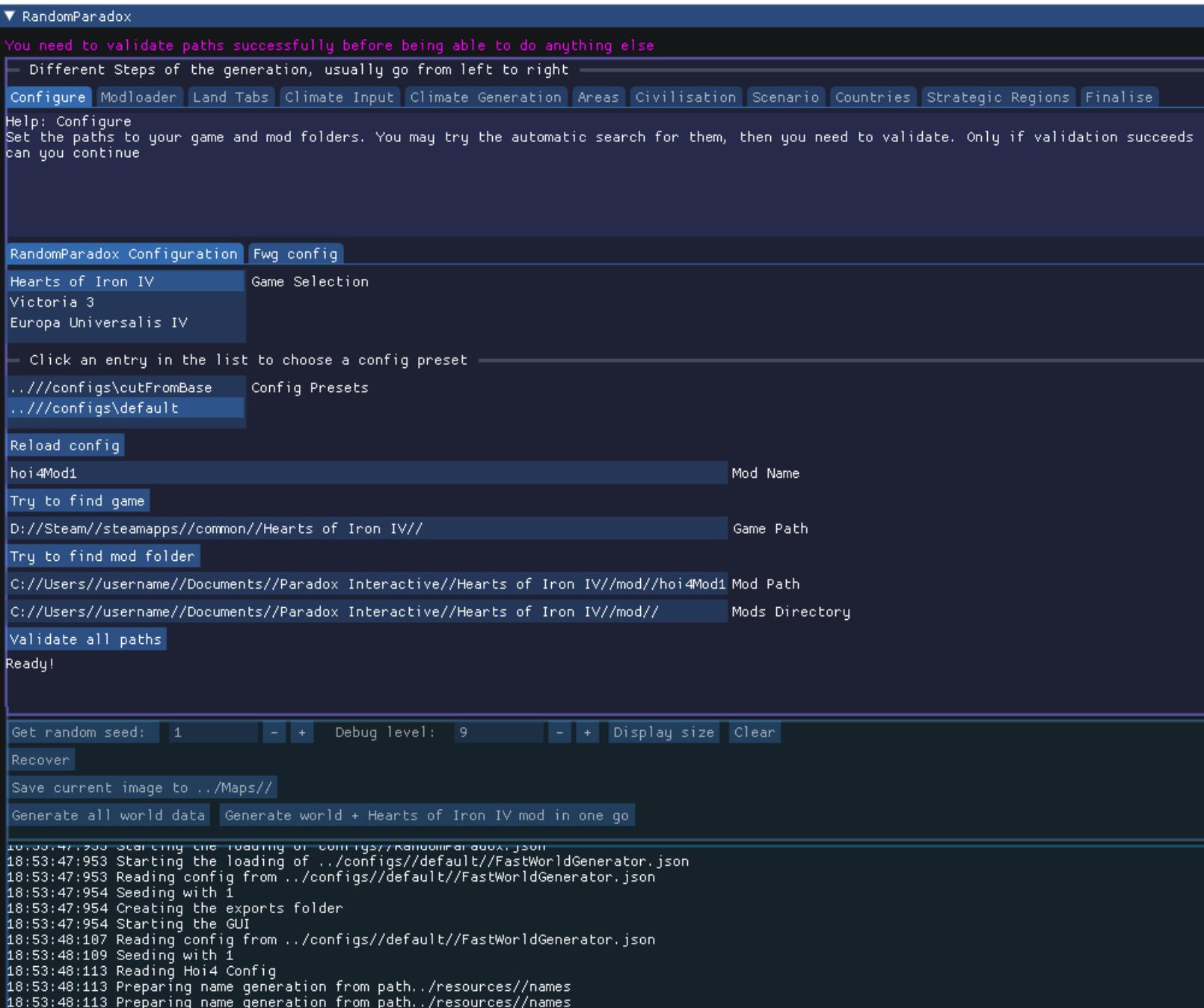


Figure 1: Overview tab

2.2 Configure

In the configure tab, you can set multiple values, and have some automatically set, if possible. First of all, you can select the game you want to generate for, and select a config preset from the list.

There are two config presets:

- **default**: This preset is meant for the mixture of generating and loading maps, you basically go through all the tabs one by one and generate and load, and configure all the desired settings in one tab
- **cutFromBase**: This is meant to cut an area from the base game files. This works for Hearts of Iron IV. Go into the heightmap tab, there you find coordinates you can set, and define an area of the map you want to cut out, and potentially scale to another resolution. For a detailed explanation, see the advanced documentation.

You can try to find the game via the **Try to find game** button, and try to find the mod via the **Try to find mod folder** button. You can also set the mod name.

Before you can proceed, you will have to successfully validate paths by clicking **Validate all paths**. If it is successful, the other tabs will become clickable.

2.3 Land Input

This tab gives the option to input either a simple image for a fully automatic heightmap generation from that input, or enabling the **Classify Land Input** option, dragging in an image and setting which input colour is supposed to be more or less mountainous.

2.3.1 Heightmap Generation from Simple Input

Instead of generating a land mass from a heightmap, you may also derive a heightmap from a given land mass. For this, drag in an image. The tool will then automatically try to derive what land is and what is an ocean. If in doubt, try to stick to the colours which are otherwise generated, dark blue or black is considered water.

2.3.2 Heightmap Generation from Complex Input

This extends the Simple Input case. By checking the **Classify Land Input** box, you enable this feature. Now, when dragging in an image, you can afterwards analyse an image and label every single colour to a land type.

Make sure you have a good image without washed up borders, e.g.

don't draw an image with a brush, but use a pencil. You might otherwise get far too many colours to label, this would be tedious.

In this tab, you ONLY label the input, then proceed to the heightmap tab for the generation. Always click **Analyse** after labeling terrain, only then is it applied for the heightmap generation!

2.4 Heightmap

Here, you can generate a heightmap or load one by dragging in an image. You can also skip this step if you have a terrain map that you want to input, you can do this in the **Land Input** tab.

When generating an image, you have a large amount of settings available and can also manipulate settings for individual layers of the heightmap.

- **SeaLevel:** The target sealevel. The heightmap will be adjusted to match this, please note that for the different games these values are hardcoded, only change if you know what you are doing.
- **LandPercentage:** The target share of land
- **Height Adjustments:** Negative numbers lower the heightmap, positive numbers increase it
- **Landlayer** coastal distance factor: When land layers are applied to the generated heightmap, they keep a distance to the coast, from which on they decrease, to avoid mountains directly at the coasts. The higher, the larger the distance
- **Maximum lake size factor:** Determines which seabodies will be classified as lakes, e.g. the larger this is, the larger bodies of water can be before detected as lakes.
- **Maximum land height:** Determines the maximum height of the heightmap on land. Must be larger than sealevel. If equal to sealevel + 1, the map will be completely flat.

2.4.1 Land Generation from a Heightmap

This simple case is done when you simply want to derive a landmass from the heightmap. For this, simply set **landPercentage**, which decides how much land will exist. Then simply click **Generate land classification from heightmap** and observe the result.

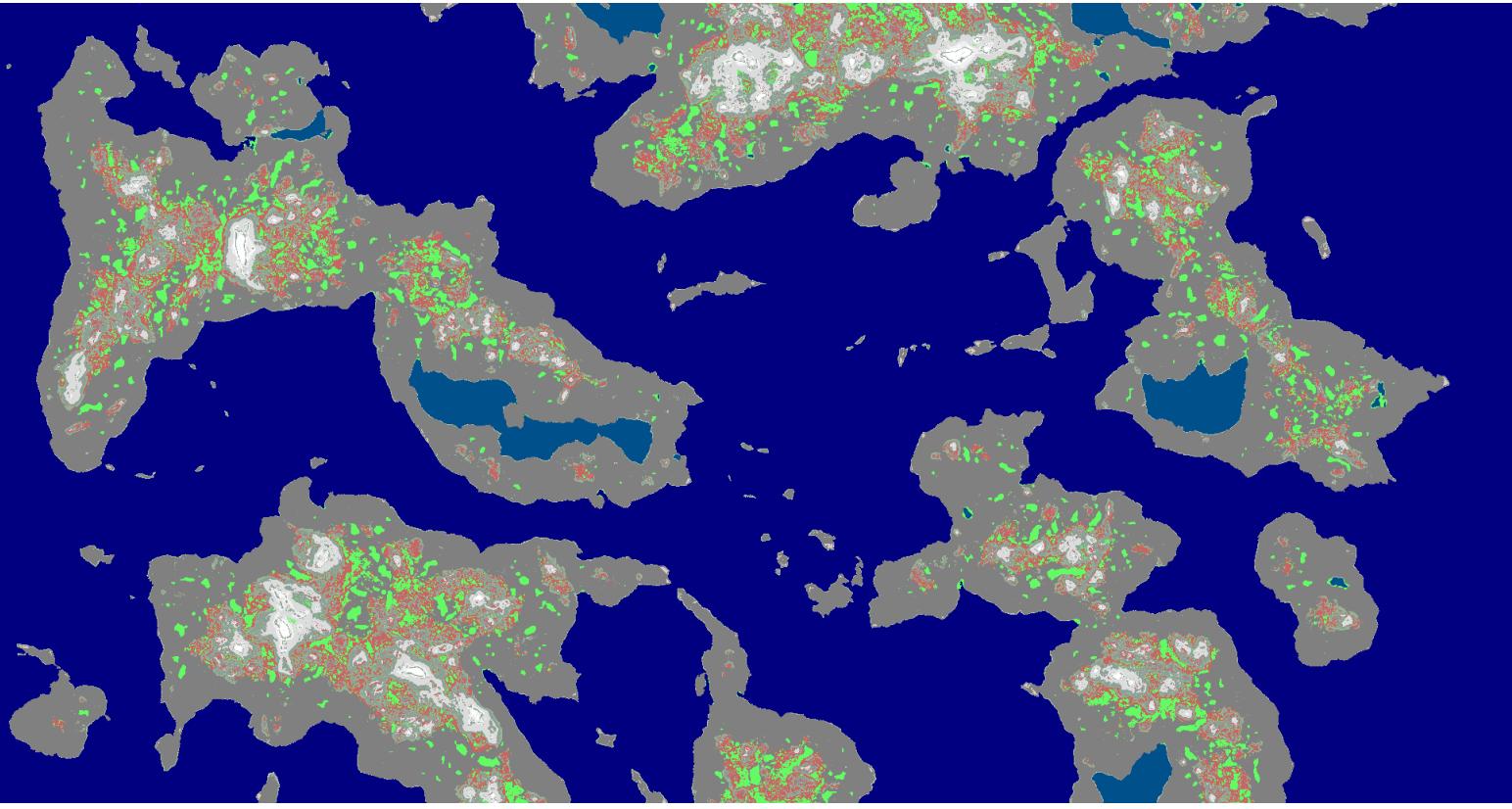


Figure 2: A land shape, generated from a heightmap

2.4.2 Individual layer settings

Heightmaps are generated from multiple combined layers. To edit these layers, check the "Layer Edit" box. **Please note that this is pretty advanced and not necessary to edit in most cases!** Each layer has different properties:

- **type:** the fractal type that is used
- **landLayer:** if this layer will be applied only to land after the basic continent shape has already been determined
- **fractalFrequency:** the higher, the smaller the fractals
- **fractalOctaves:** affects ruggedness
- **fractalGain:** how rugged the generation is

- **seed:** individual seed for a layer, if 0, it is automatically determined based on the base seed
- **widthEdge:** from when on terrain height falls towards the east/west edges of the map
- **heightEdge:** from when on terrain height falls towards the north/-south edges of the map
- **weight:** how much this single layer is weighted relative to the other layers
- **maxHeight:** what the total maximum height present in this layer can be. Should be between 1 and 255
- **minHeight:** what the total maximum height present in this layer can be. Should be between 1 and 255, and smaller maxHeight
- **tanFactor:** how quickly land height increases. Can produce really rugged layers, specifically good for e.g. mountain ranges. Range between 0.00 and 0.26

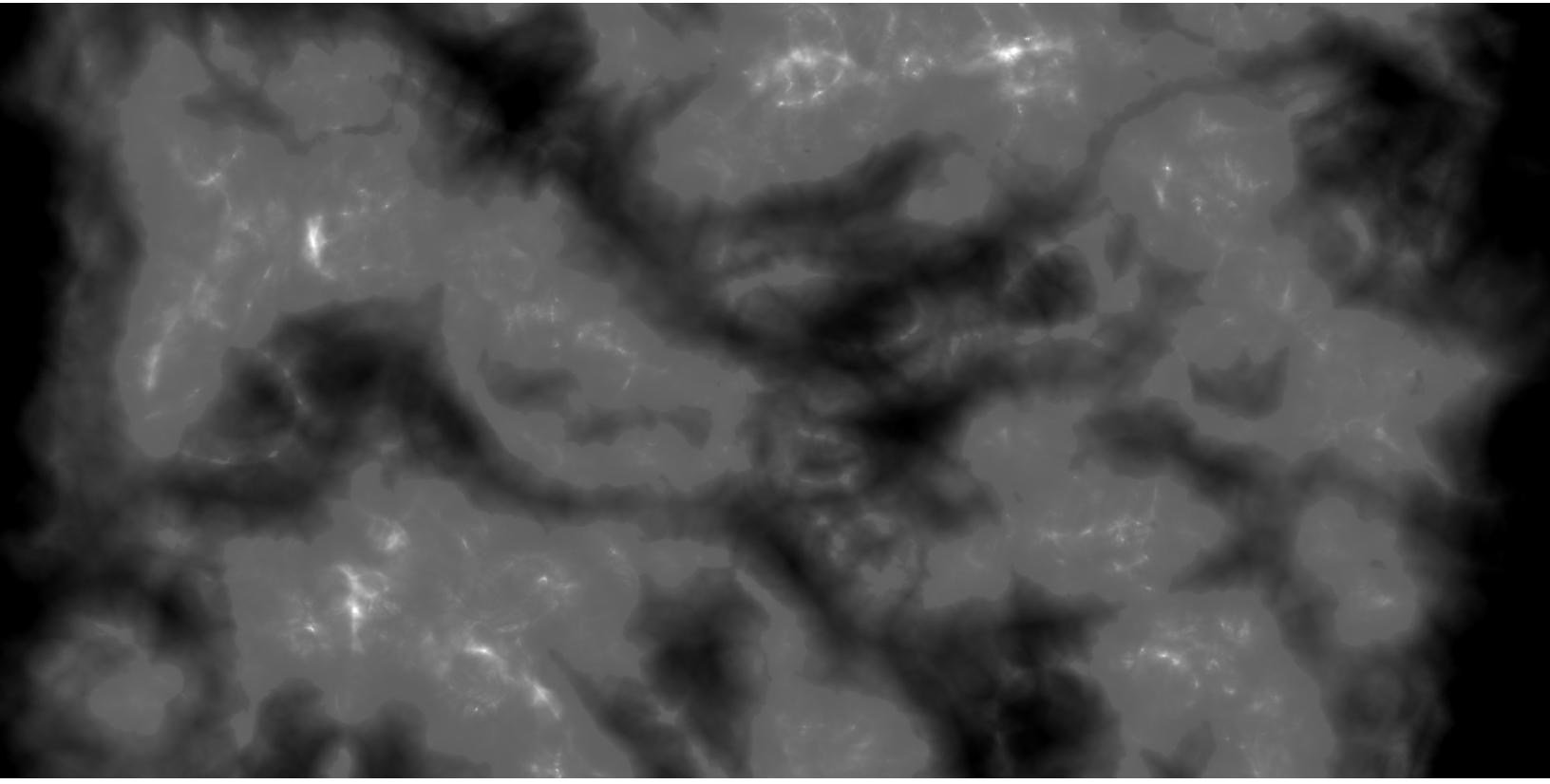


Figure 3: Heightmap Generation or Input

2.4.3 Heightmap generation from classified land input

Here is the explanation of how input works. Your input defines the overall distinction between land and water, and then the different types affect how much elevation will be randomly generated. This is done via land layers and sea layers. You can edit these layers if you extend the layer editing. Furthermore, each type has a modifier for average altitude, overlaid over a noisemap that is built from the land layers in the heightmap layer config. This means, that the higher the input factor, the more likely you will actually see this terrain at this location. These modifiers are relative to each other and can be modified. Any elevation generation will be normalised to the range 0-maximumLandHeight.

See figure 4 and 5 for an example.

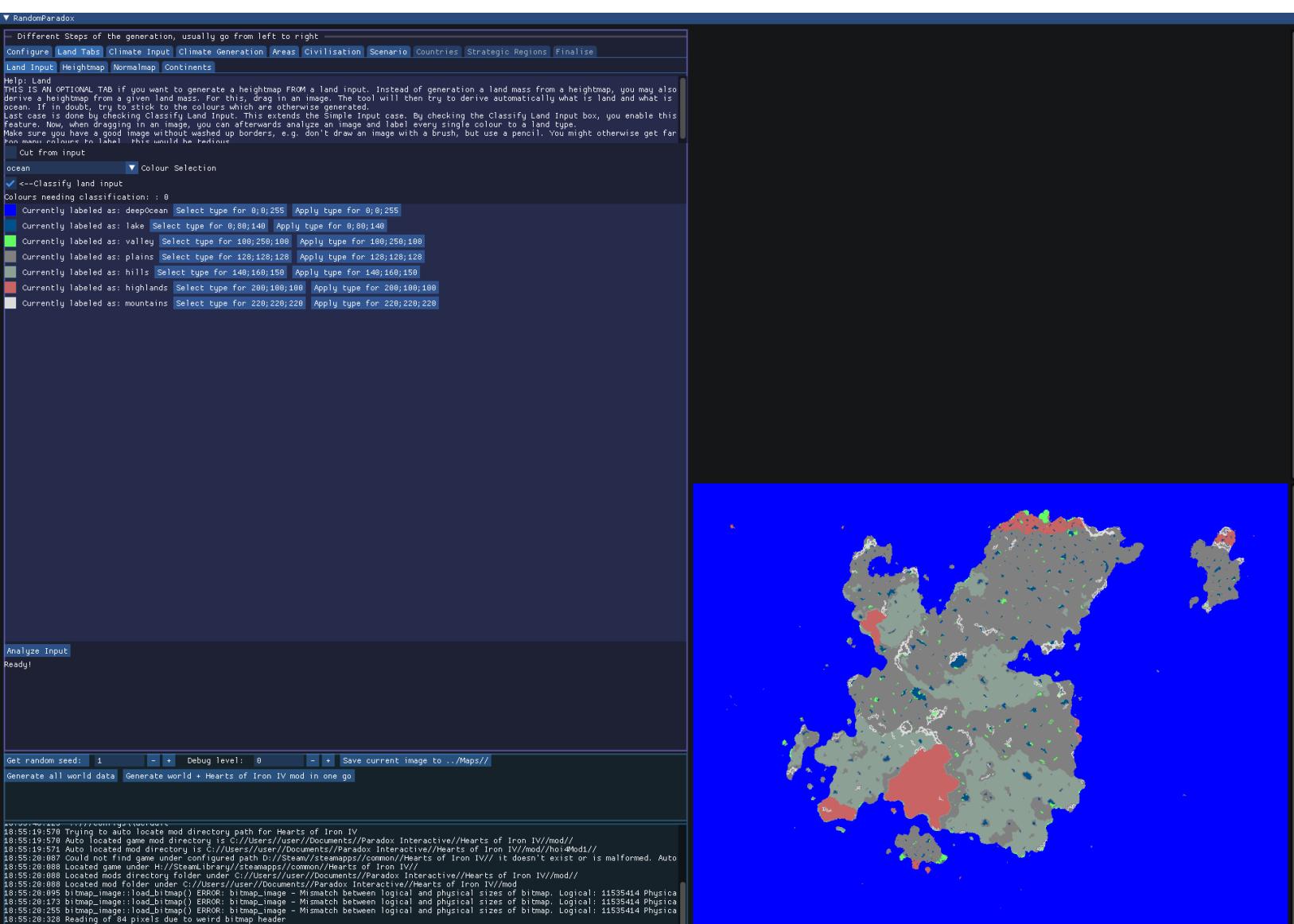


Figure 4: The dragged in input while labelling the colours.

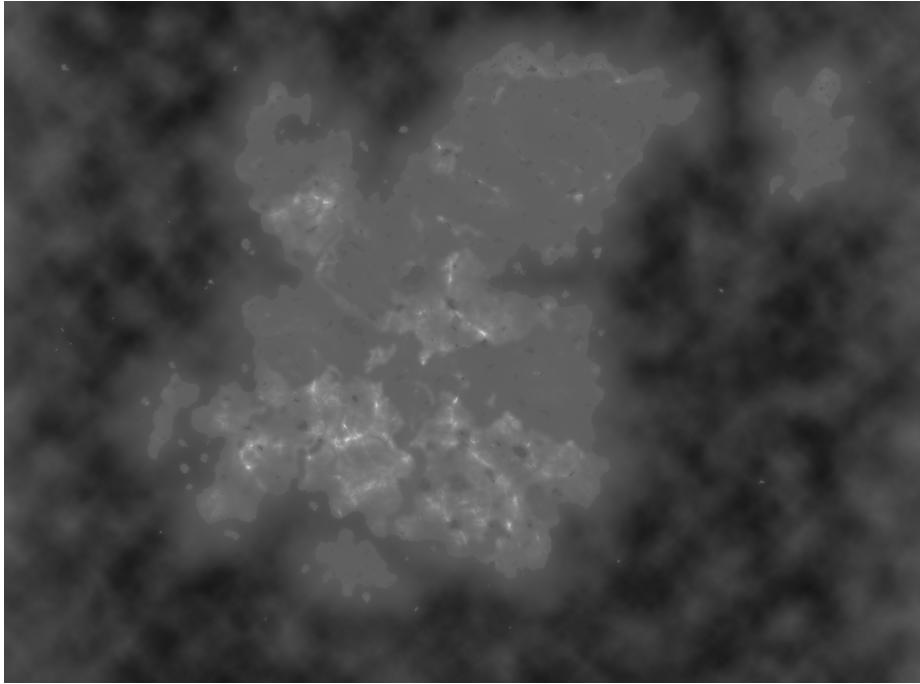


Figure 5: The resulting heightmap after labelling. Here you can clearly see the areas which were designated as mountains, hills, valley, or plains.

2.5 Normalmap

You can generate a normal map in this tab. Modifying the **SobelFactor** makes the land bumpier or smoother. For an example see figure 6.

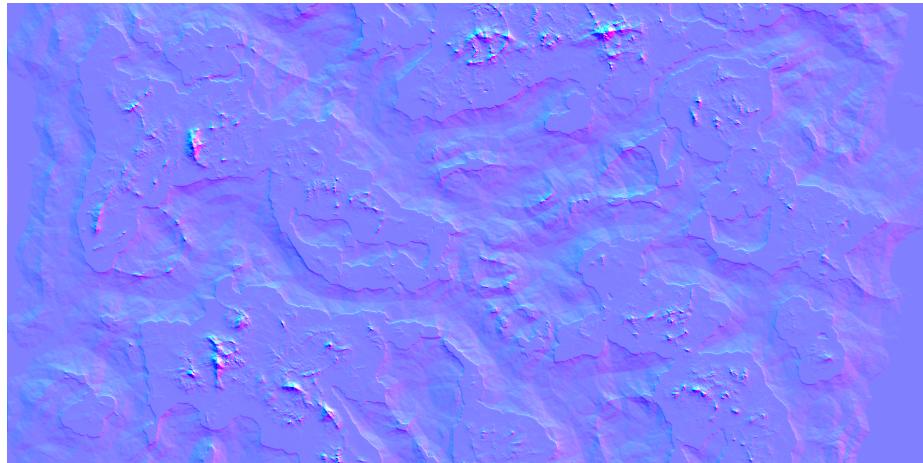


Figure 6: Generated Normal Map

2.6 Continents

This shows an overview of the continents that were detected. You can also input a map of continents yourself, black $\text{rgb}(0,0,0)$ is water.. This influences provinces and states. For an example see figure 7.



Figure 7: Generated Continent Map

2.7 Climate Input

An optional tab, in case you want to specify climate types instead of generating them. To do this, drag in an image of climate zones, and label them accordingly with the given climate types that match best. The tool will then derive the rest from these zones, such as province density, see 8.

Important note: There is also another way to input data for climate generation, by inputting data into the temperature and humidity subtabs in the Climate tab, see 2.8.1 and 2.8.2.

This is the specification of climates:

Name	Humidity	Temp	Altitude	Habitability	Tree Factor	Colour (RGB)	Tree Type	Arability
tropicsrainforest	1.0	0.93	0.0	0.2	0.36	29-45-10	TROPICALMOIST	0.5
tropicsmonsoon	0.9	0.9	0.0	0.6	0.54	35-55-15	TROPICALMOIST	0.6
tropicssavanna	0.7	0.8	0.0	0.7	0.32	40-60-20	TROPICALDRY	0.7
desert	0.1	0.9	0.0	0.0	0.0	165-142-99	NONE	0.0
colddesert	0.1	0.5	0.0	0.05	0.04	140-120-80	NONE	0.0
hotsemiarid	0.2	0.7	0.0	0.3	0.24	71-70-40	SPARSE	0.6
coldsemiarid	0.2	0.4	0.0	0.3	0.16	60-59-35	SPARSE	0.6
temperatehot	0.45	0.7	0.0	0.7	0.24	67-69-24	TEMPERATEMIXED	0.9
temperatewarm	0.45	0.6	0.0	0.7	0.36	57-69-24	TEMPERATEMIXED	1.0
temperatecold	0.5	0.5	0.0	0.6	0.56	47-69-41	TEMPERATENEEDLE	0.8
continentalhot	0.4	0.6	0.0	0.5	0.4	50-69-30	TEMPERATEMIXED	0.9
continentalwarm	0.4	0.5	0.0	0.6	0.49	55-69-35	TEMPERATENEEDLE	1.0
continentalcold	0.4	0.4	0.0	0.5	0.72	60-69-41	BOREAL	0.7
polararctic	0.4	0.1	0.0	0.05	0.0	120-120-80	NONE	0.1
snow	0.0	0.1	0.2	0.0	0.0	240-240-240	NONE	0.0
rock	0.0	0.8	0.0	0.0	0.0	160-160-160	NONE	0.0
water	0.1	0.0	0.0	0.0	0.0	79-102-142	NONE	0.0

Table 1: Biome data including humidity, temperature, altitude, habitability, tree factor, RGB colour, tree type, and arability. They define how climates are chosen from the different values, and what they define if loaded and labeled.

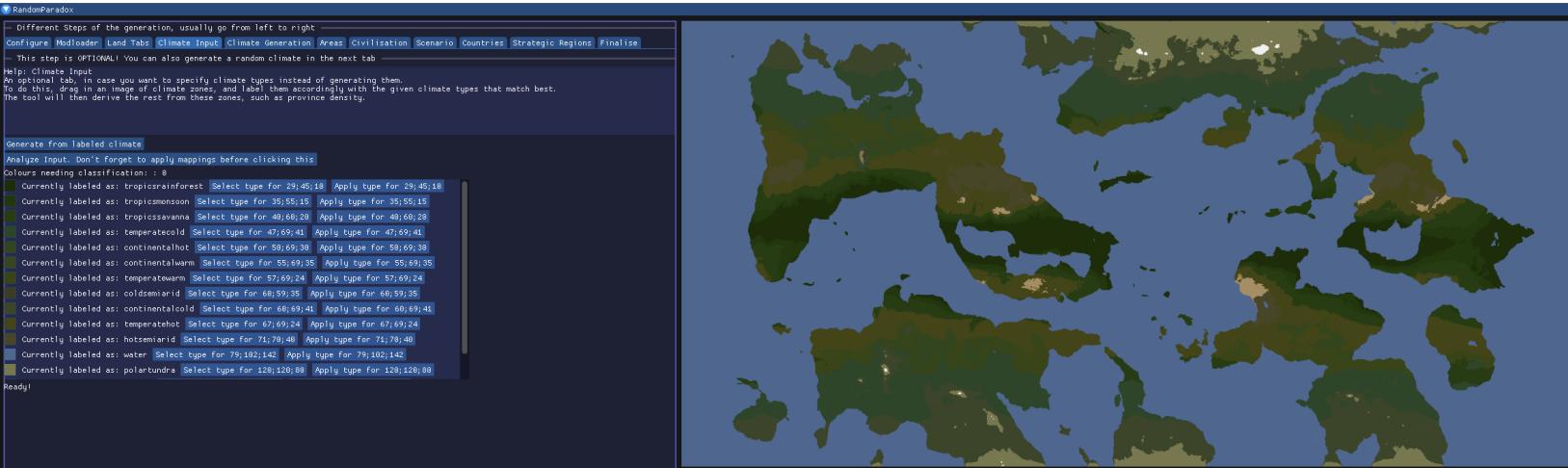


Figure 8: This shows the tab with climate input, and the labelling functionality.

2.8 Climate Generation

This Tab has multiple sub tabs. However, you can automatically generate everything by clicking **Generate Climate Automatically**. The factors to modify are:

- **Base humidity:** How humid the overall world is. The lower, the drier.
- **Base temperature:** How hot the overall world is. The lower, the more ice. The higher, the more jungle/desert
- **Fantasy Climate Frequency Modifier:** The higher this is, the smaller each random area is
- **Fantasy Climate:** This creates completely random climate, which follows no real world rules
- **River effect range multiplier:** How wide the effect of rivers on humidity and therefore climate is
- **River humidity multiplier:** How strong the effect of rivers on humidity and therefore climate is
- **River amount multiplier:** Affects how many rivers there are
- **Latitude high:** The upper bound of the latitude. 2.0=90 degrees north (North pole). Equator at 1.0

- **Latitude low:** The lower bound of the latitude. 0.0=90 degrees south (south pole). Equator at 1.0

For an example, see figure 9.

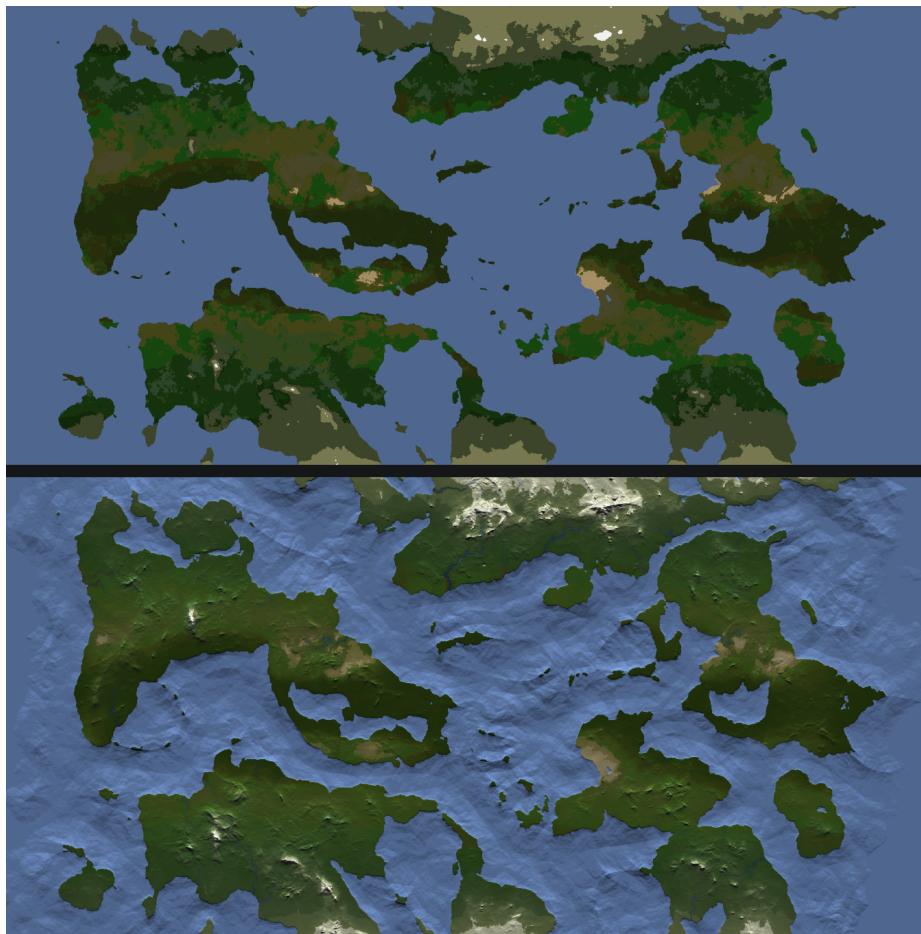


Figure 9: Generated Climate Map

2.8.1 Temperature tab

Temperature is a major factor for climate generation. If you don't want to handle climate zones in detail, you can simply drop in a temperature map and generate climate classification based on it.

2.8.2 Humidity tab

Humidity is a major factor for climate generation. If you don't want to handle climate zones in detail, you can simply drop in a humidity map and generate climate classification based on it.

2.8.3 Rivers

You can modify a factor on how many rivers you want. Rivers also affect climate generation, see the factors listed above in the climate overview. Rivers can be loaded, here is the list of colour inputs and their meaning:

- River Colour: 0, 0, 255
- River Start: 0, 255, 0
- Tributary Start: 0, 128, 0
- River End: 255, 100, 0

For Hearts of Iron IV, you may also load a river map with the default colours from the vanilla rivers.bmp. However, **every single river needs a river start pixel!** E.g. loading the vanilla Hoi4 map will only load parts of the rivers, if no river start pixels are added!

2.8.4 Climate

You can either generate a climate map or drop it in. When dropping in a climate map, you need to make sure it uses compatible colours, that the generator uses itself. Therefore, it might often be best to first have it generated automatically, then modify it, then load it again.

However, you can also use the Land Input/Generation tab to input a map that has incompatible colours and label them there. Go back to section 2.3.2 for an explanation.

2.8.5 Trees

Here you can create a tree map. This will later be used by the games to determine graphical tree coverage. You can increase density of trees in different zones with the density factors listed here.



Figure 10: Visualisation of Tree Coverage on climate map

2.9 Density

This tab shows the density for provinces, which is derived from the climate zones. You can also drag in this image to set density yourself.

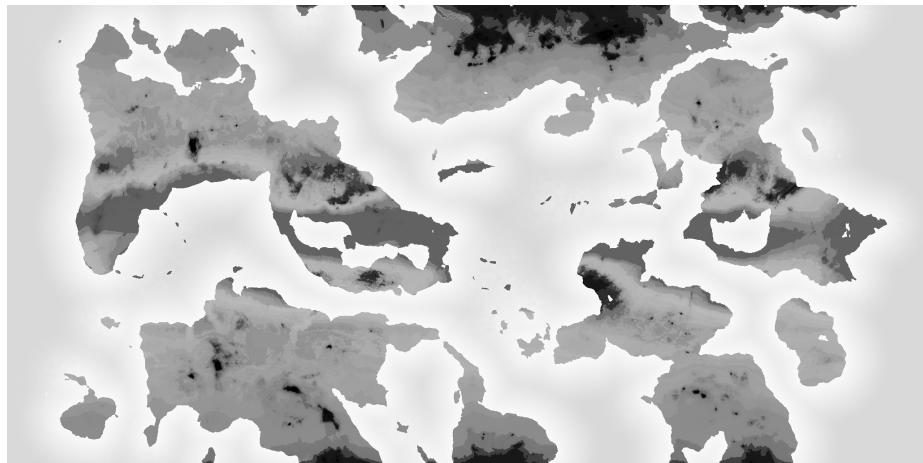


Figure 11: Generated Density Map

2.10 Segments

Segments define the areas, in which provinces are generated. This tab allows generating and loading them.

To generate, click the **Generate Segments** button, see 12. You may change settings:

- **Segment Cost Influence:** How much the terrain and climate influences the shape of the segments.
- **targetLandRegionAmount:** How many segments there should be on land
- **targetSeaRegionAmount:** How many segments there should be on ocean/lakes

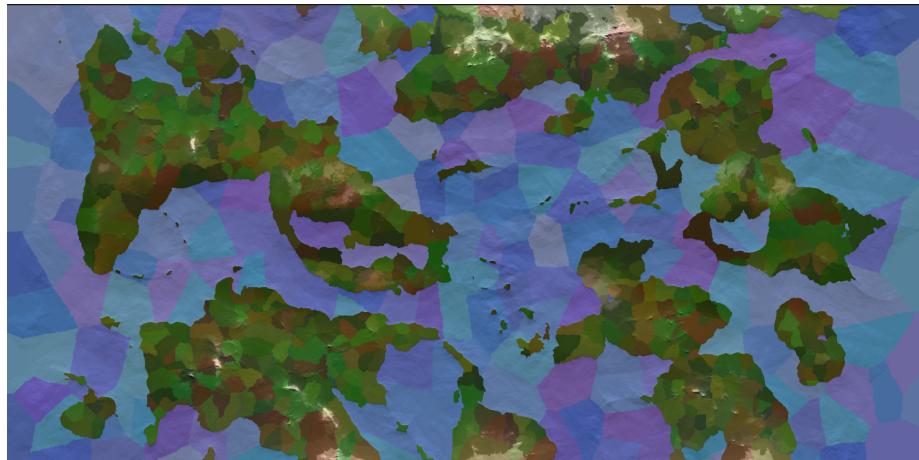


Figure 12: A visualisation of generated segments overlaid over the worldmap.

To load, you have to drag in an image, which defines areas by their colour, so you may for example drag in a state map (see 13 for an example), and provinces will be generated only inside the borders of this state map, depending on the density.

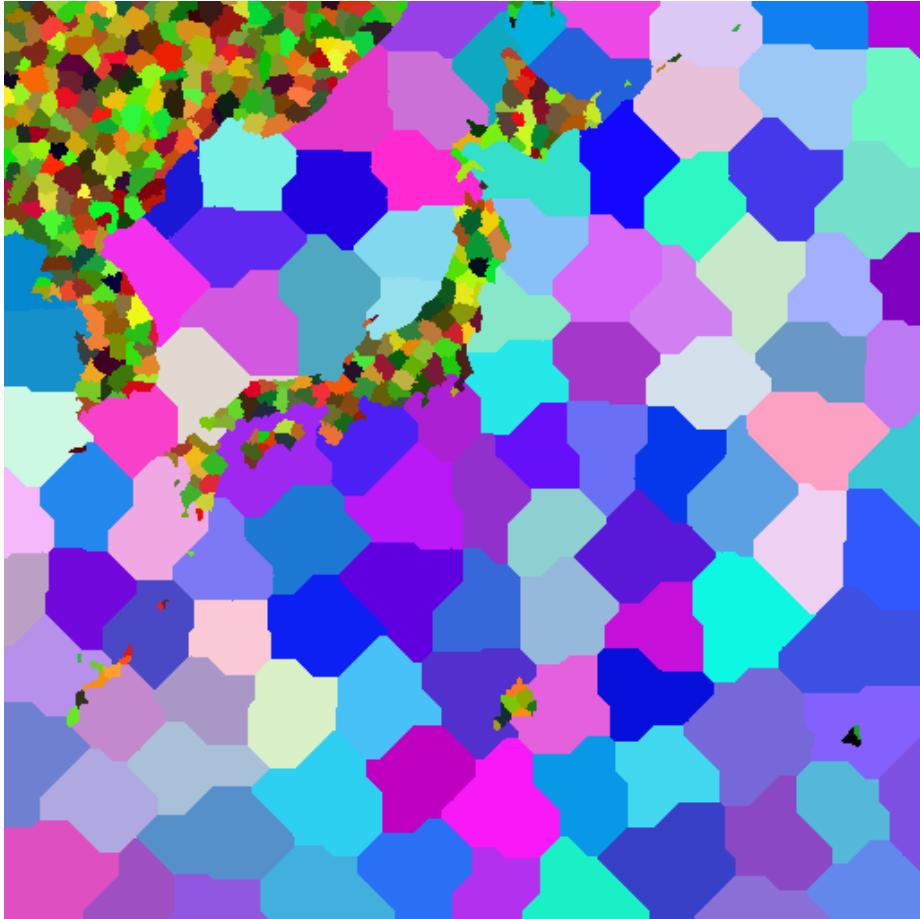


Figure 13: An example segment map to be input.

2.11 Provinces

Here you can configure province generation and generate provinces until you are happy with the result, or load a province map. Most important factors are:

- **Landprovincefactor:** The higher, the more provinces on land
- **Seaprovincefactor:** The higher, the more provinces on oceans
- **Density Effects:** The higher, the more the density map influences density and size of provinces

- **Minimum size of provinces:** The higher, the more pixels a province will have
- **Maximum amount of provinces:** An upper limit to province amount, increasing this drastically can have major effects on the generated game modules. **For Hearts of Iron IV, this upper limit should not be larger than 20000, otherwise visual bugs start to appear!**

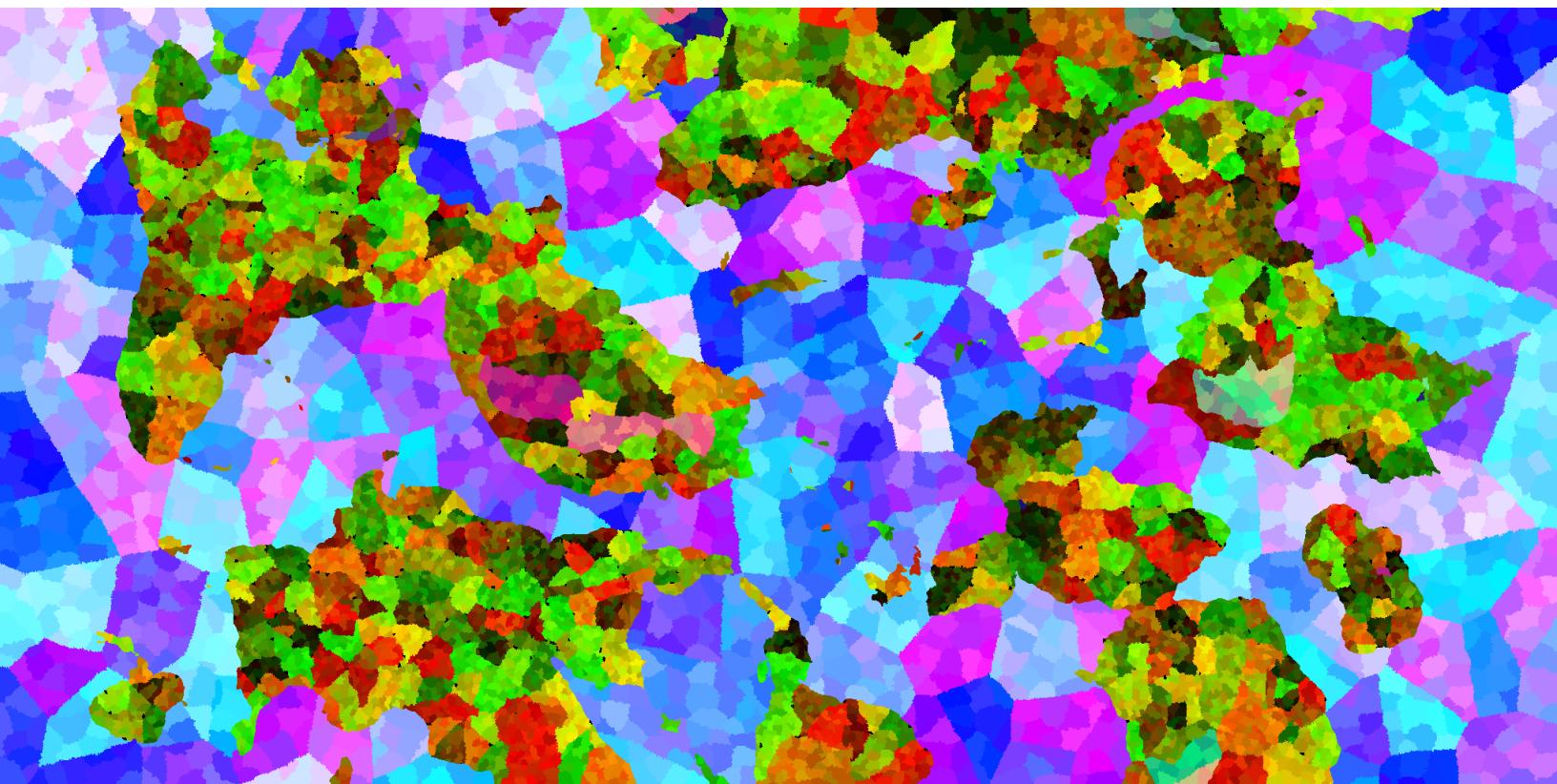


Figure 14: Generated Provinces Map

2.12 Civilisation

Here you can generate and edit the development, population and location distribution in three sub-tabs:

- **Development:** Affects industrialisation and cities.
- **Population:** Affects population amount and city size. You can draw values for single provinces here, using the brush settings at the top.

- **Locations:** This displays where cities, farms, mines and more are generated on the world.

2.12.1 Development

While the checkbox **Random Development** is checked, the Button Generate Development will randomly change the base development modifier of the continents. When turned off, you can manually set the Continent Development modifiers. Development is still modified by climate, so increasing it to 1.0 does not mean completely developed continents, but the factor can be higher than 1.0.

You can draw in this tab, either by setting values for whole continents or by enabling **Draw mode** and setting it for single provinces.

2.12.2 Population

Generate population automatically and draw in this map. You may also load a population map.

2.12.3 Locations

You can modify some parameters:

- **Amount of separate cities per region:** The higher, the more distinct cities there are.
- **Amount of separate farm areas per region:** The higher, the more distinct farms there are

2.13 Scenario

This tab allows setting of options for the selected game module. Depending on the game, different options show up. This tab contains the Remap areas button, which is important if you go back to the previous tabs and change something there. Make sure to remap then before proceeding to countries!

2.14 Countries

This tab allows configuration of the number of countries you want generated. You can also select 0. You can also input a list of countries and a country image.

2.14.1 Country Text Input

The list of countries has the format **r;g;b;tag;name;adjective**. If a country has no input mapping, a random country will be generated for it.

2.14.2 Country Image Input

You can input a country image, the states will be assigned as good as possible to match the borders of the countries. Make sure that you have unique colours for countries, so when drawing an image, **don't use a brush, use a pencil!**. You can also first generate a country map and find it in the **Maps** folder, then edit it with your favourite image editor, and then drag it in again. You can also use country input in the barriers tab.

2.14.3 Country editing

All the loaded or generated countries can be edited. See 15 for the buttons that pop up.

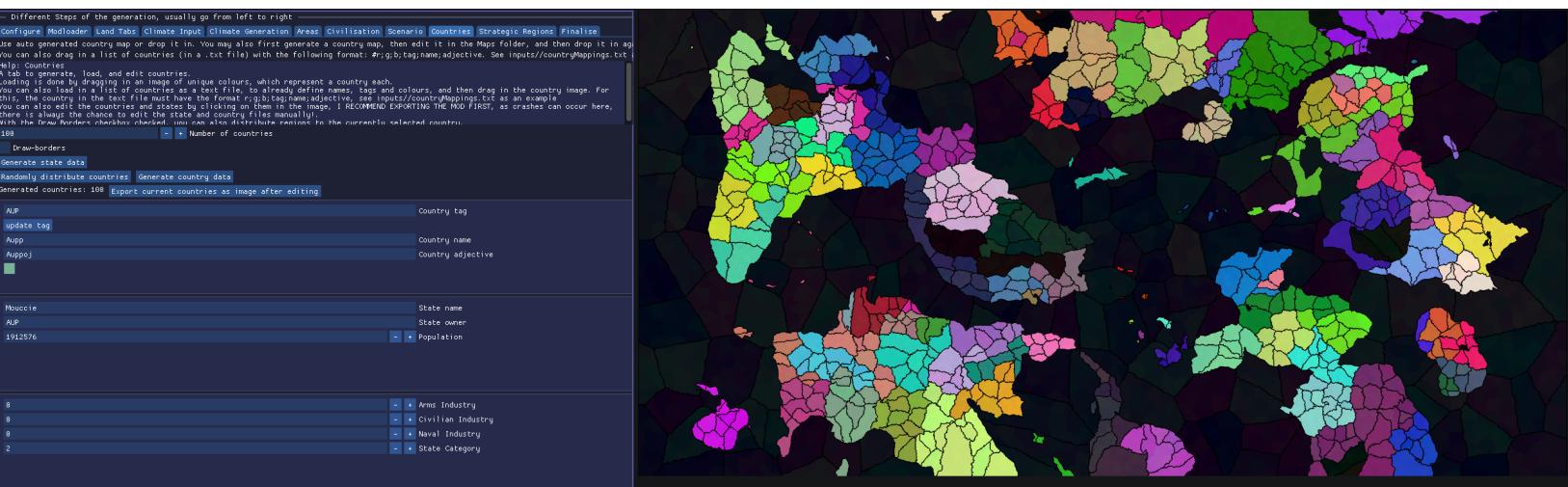


Figure 15: Generated Countries Map

2.15 Strategic regions

You can generate, load or edit strategic regions with the drawing functionality in this tab.