

WebGL - 3D Terrain Generator

CMSC 161 - Final Project

2nd Semester - A.Y. 2023-2024

By:

Adoptante, Angelica Nicolette U.

Borja, John Maui S.

Malazarte, Elijah Gabriel S.

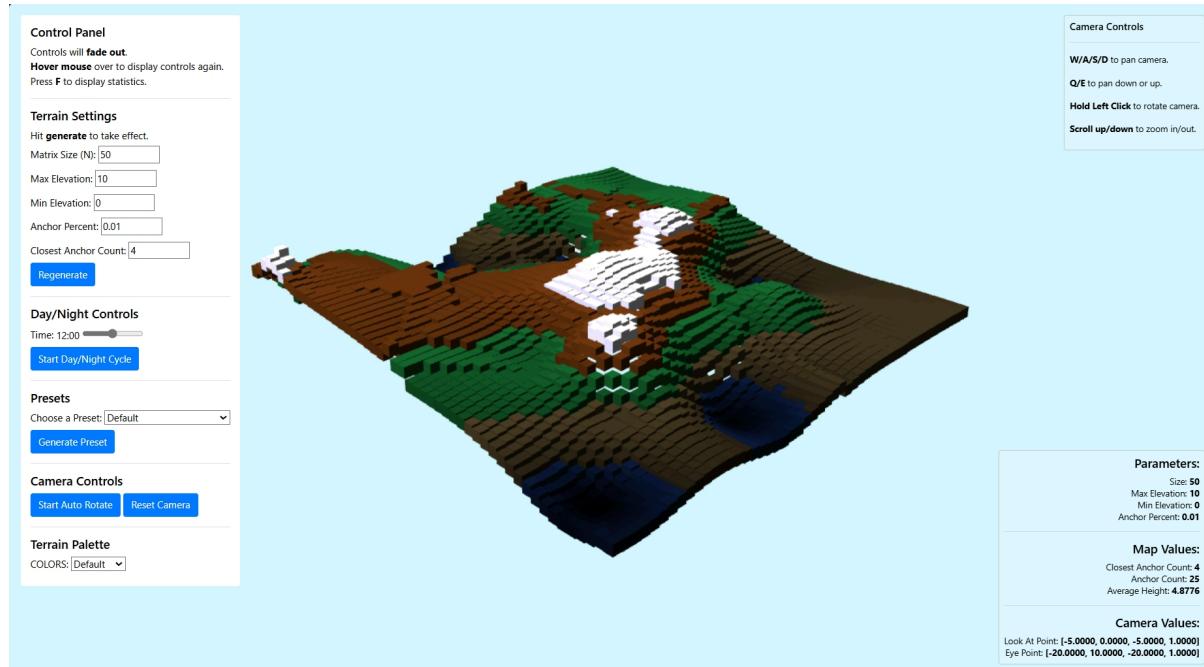
Ramillano, Aron Resty B.

Section B1L

INTRODUCTION

This 3D Terrain Generation web application generates a 3D terrain using WebGL, HTML 5.0, and JavaScript for the course CMSC 161 - Interactive Computer Graphics. The application utilized a basic cube mesh as building blocks for an $n \times n$ plane. The application uses a Random Number Generator (RNG) system to assign heights to the cubes, giving the generated terrain varied elevations.

USAGE



A. Parts

- Main Viewport - contains the generated terrain.
- Control Panel - contains the settings and app features. This panel will fade out and can be brought back by hovering over the area of the control panel.
- Instructions Panel - displays the movement controls.
- Statistics Panel - displays relevant values for all calculations of the camera, and the map. Press **F** to view or dismiss.

B. Main Viewport

- Move the camera using **WASD** for forward, left, back, and right movements respectively.
- Press/hold **Q/E** to fly down and up respectively.

- c. Press and hold left click (**Mouse 1**) in the viewport to rotate the model manually.
- d. Scroll in and out to zoom in and out.
- e. In the **Control Panel**, under **Camera Controls**, there are two buttons for camera movement:
 - i. **Auto Rotate** rotates the model in a loop.
 - ii. **Reset Camera** returns the position of the camera to its initial placement.

Camera Controls

[Start Auto Rotate](#)

[Reset Camera](#)

C. Control Panel - Terrain Settings

Terrain Settings

Hit generate to take effect.

Matrix Size (N):

Max Elevation:

Min Elevation:

Anchor Percent:

Closest Anchor Count:

[Regenerate](#)

- a. **Matrix Size** dictates the nxn size of the map to be generated. The default is 50.
- b. **Max Elevation** dictates the maximum elevation, 10 being the default. Higher elevations may result in surreal terrains.
- c. **Min Elevation** dictates the minimum elevation possible, 0 being the default.
- d. **Anchor Percent** dictates how many of the cubes will act as points to use for height estimation.

- e. **Closest Anchor Count** dictates how many of the nearest anchors will be used for interpolating a cube's height.
- f. **Press regenerate** to regenerate the terrain using the settings provided. Higher values may take longer to generate.

D. Control Panel - Day/Night Controls

Day/Night Controls

Time: 12:11 

Start Day/Night Cycle

Day/Night Controls

Time: 12:34 

Stop Day/Night Cycle

- a. Slider displays the current time and can be dragged left or right to adjust the sun's position.
- b. Pressing the Start Day/Night Cycle button will animate the movement of the sun.

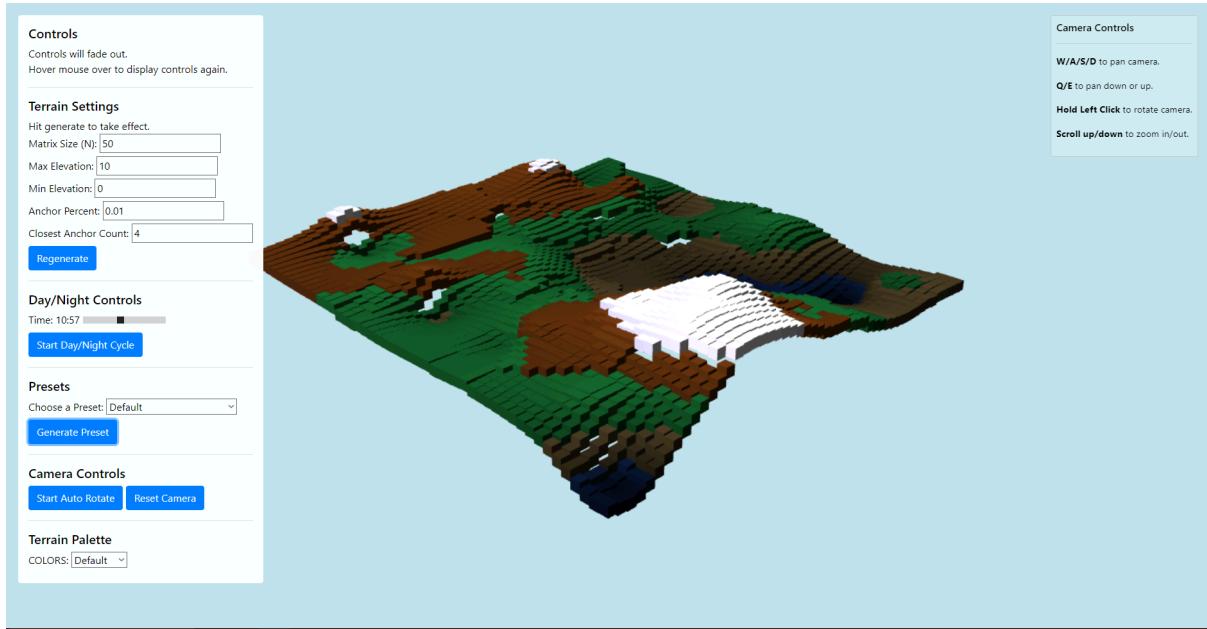
E. Control Panel - Presets

Presets

Choose a Preset:

Generate Preset

- a. Presets are pre-determined values for the terrain settings above. Choosing a preset changes the values in the terrain settings field.
- b. Press generate preset to enact the changes, or modify the values first and press regenerate instead.
- c. There are a few presets, such as:



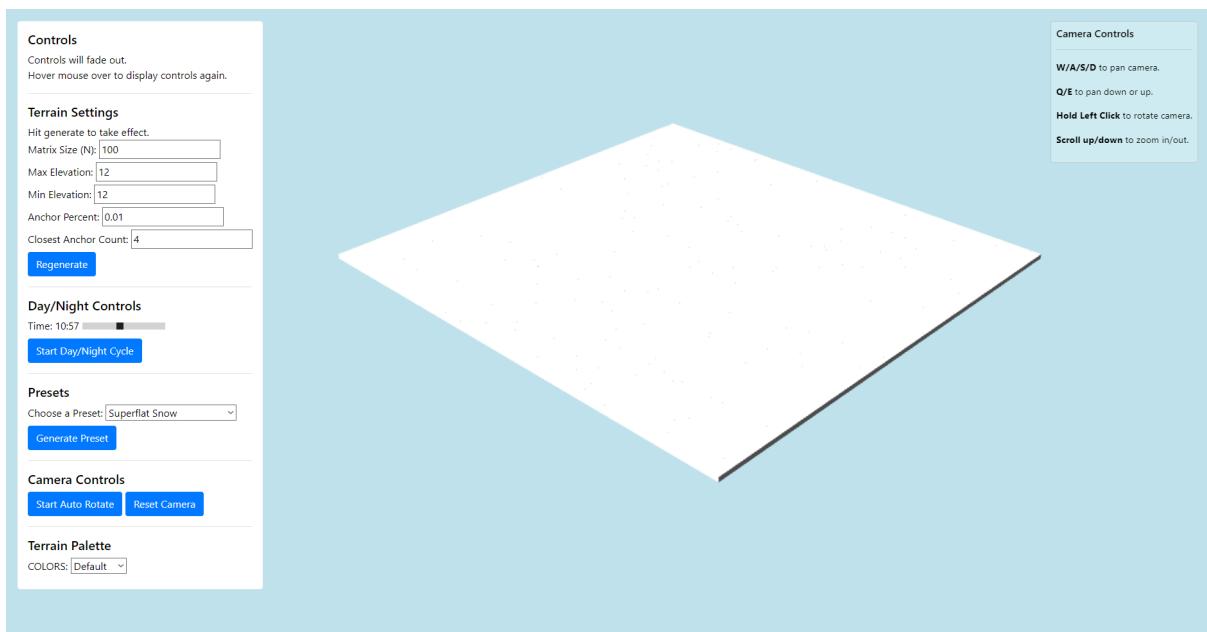
i. Default - the default values, size 50,



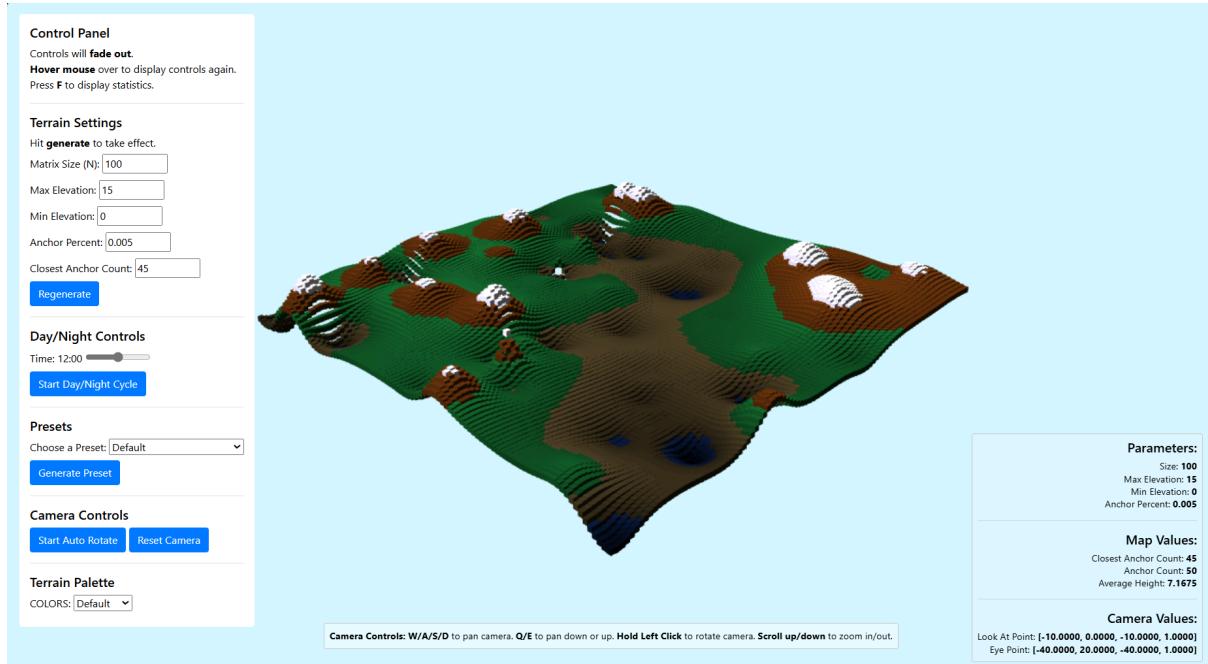
ii. Bigger - the matrix size will be set to 100,



iii. Recommended Maximum - matrix size set to 200,



iv. Superflat Snow - elevation difference of 0, size of 100, and at an elevation where everything is just the snow block.



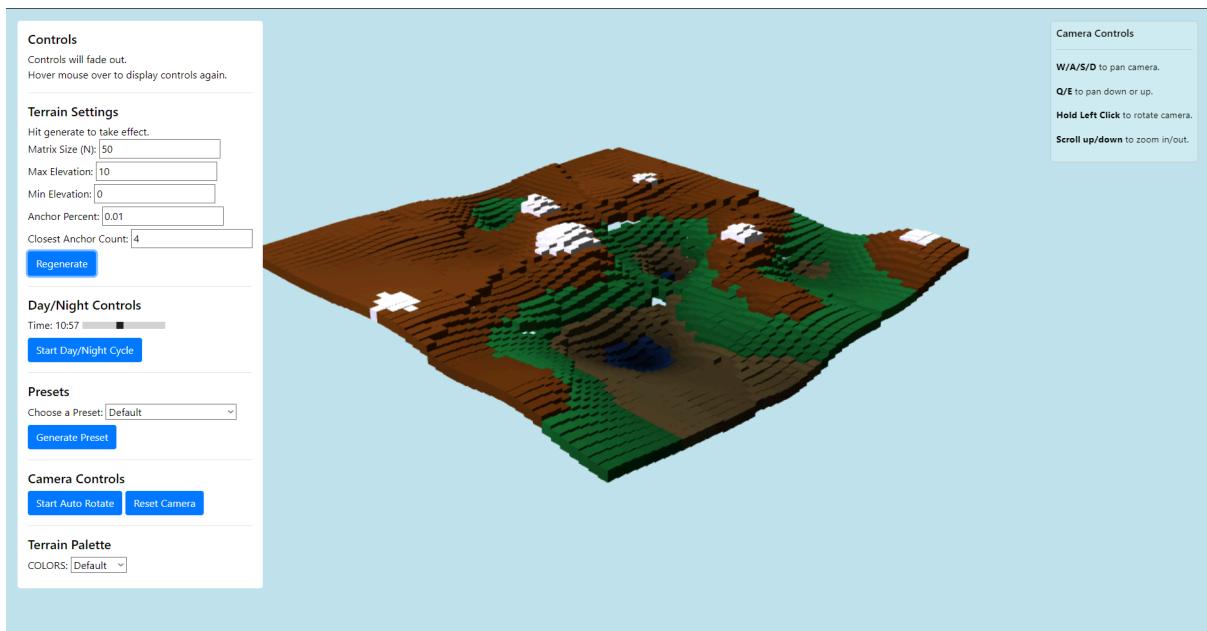
- v. High Compression - Size: 100; Max Elev: 15; Anchor Percent: 0.005; Closest Anchor Count: 45 (or at least 1-10 values below max anchor count). This produces a compression of the heights, particularly in the middle where we can see less differentiation, and more peaks

F. Terrain Palette

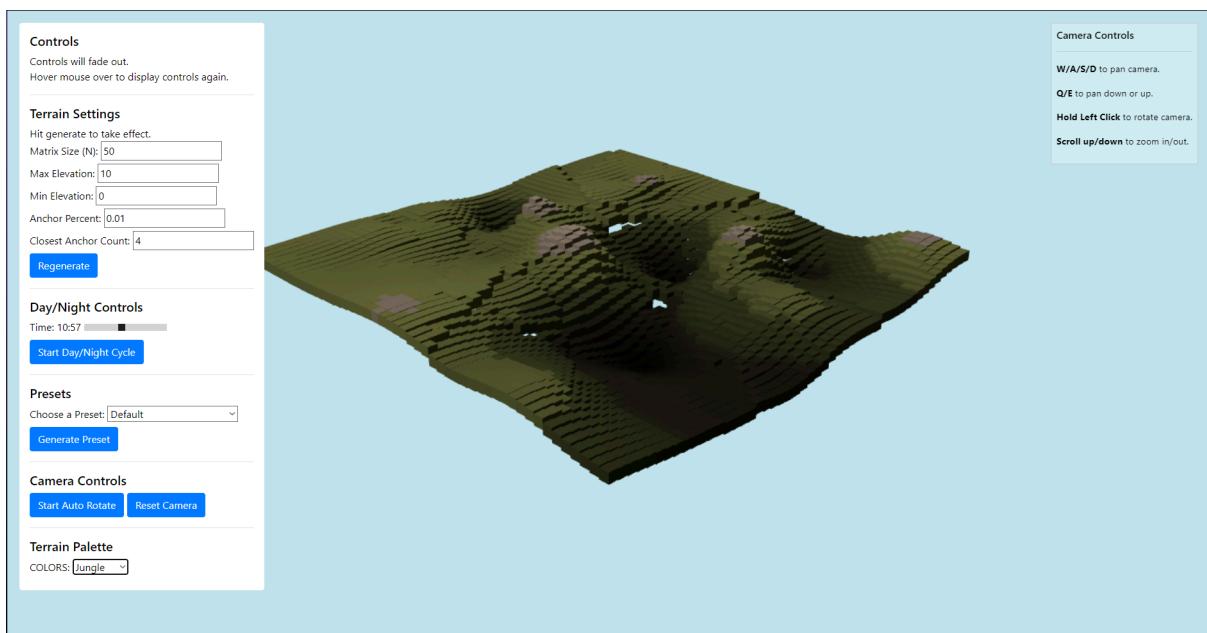
Terrain Palette

COLORS: Default ▾

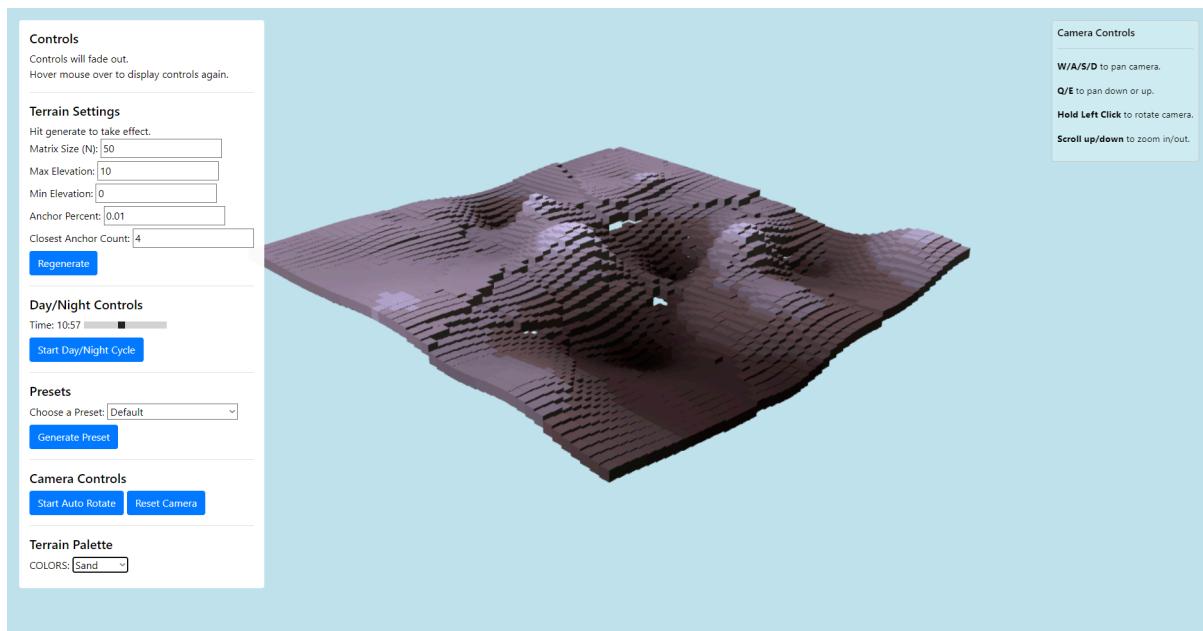
- Changes the color palette used by the generator. Takes effect immediately, no need to regenerate/generate.
- Currently has:



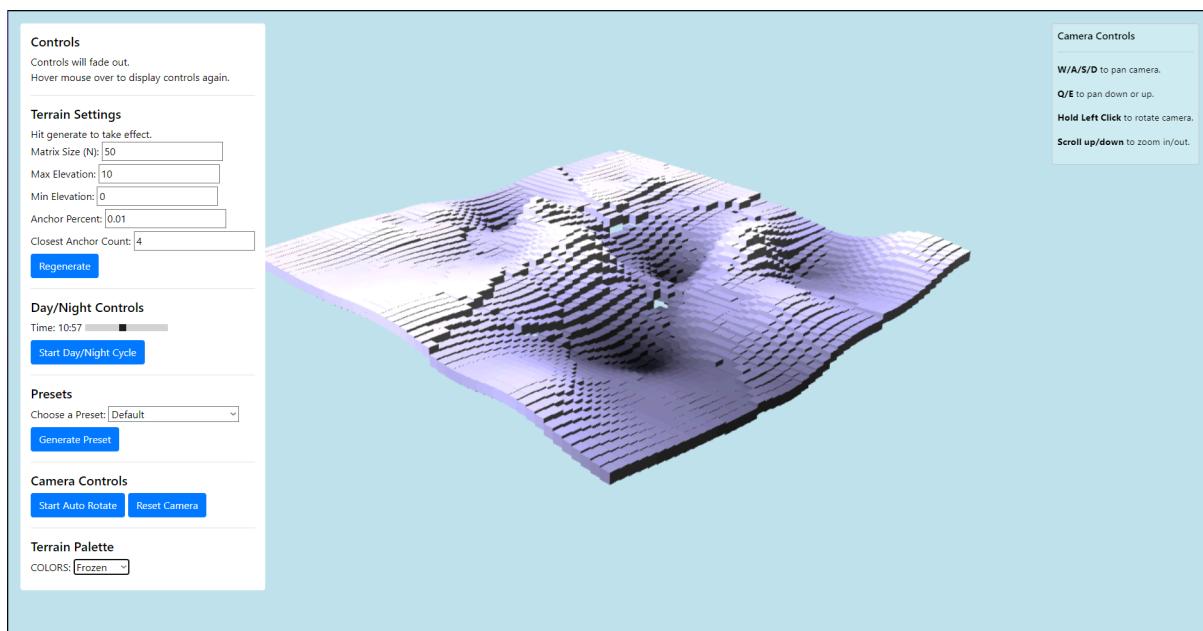
i. Default



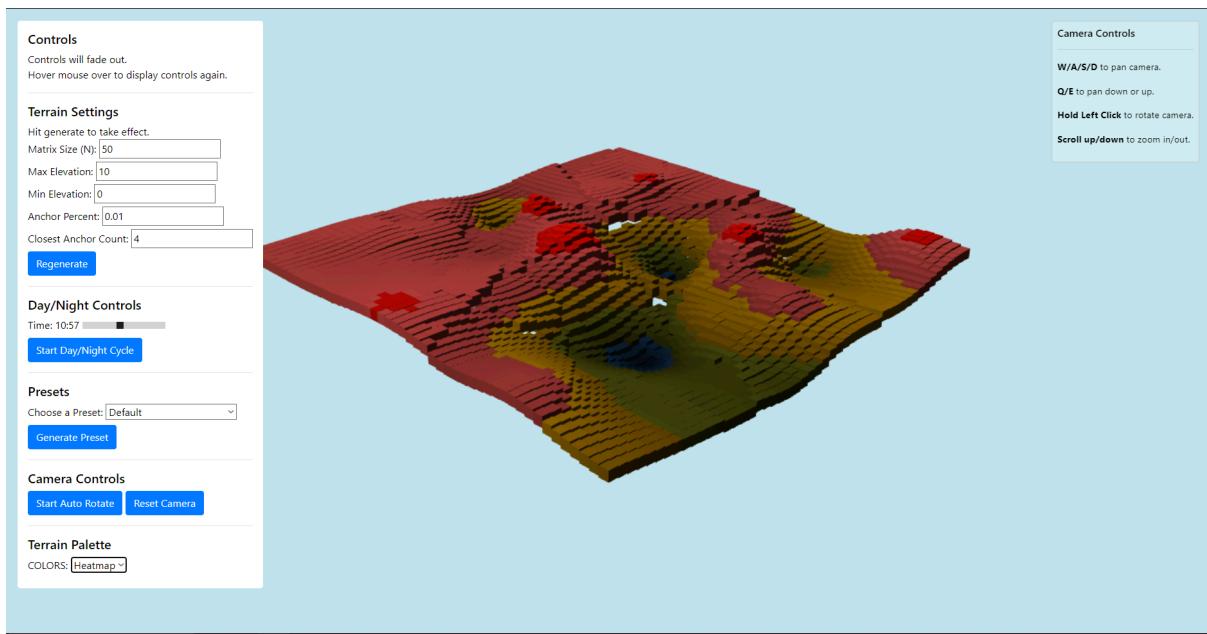
ii. Jungle



iii. Sand



iv. Frozen



V. Heatmap