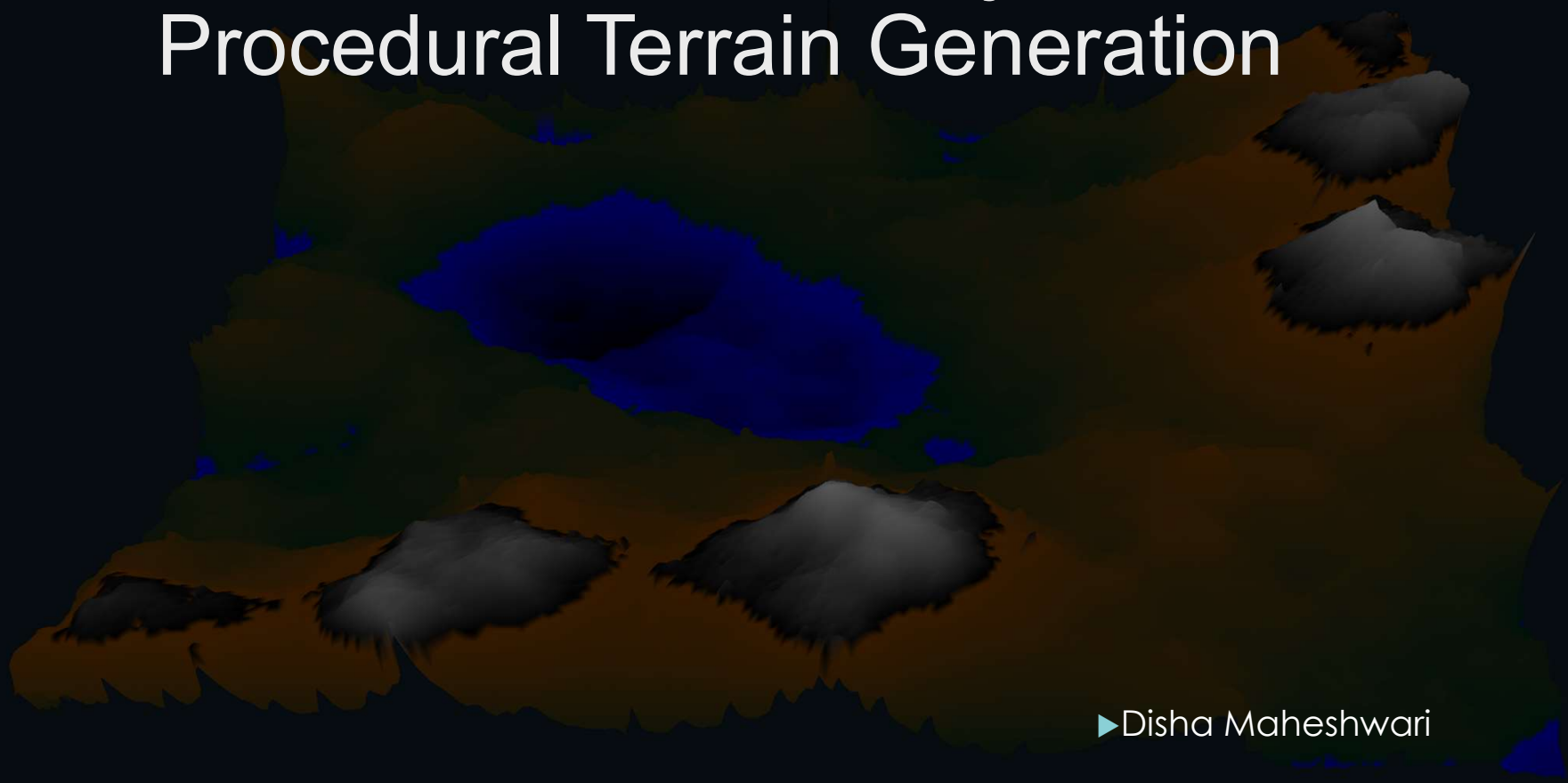
CS 334: Final Project
Procedural Terrain Generation



▶Disha Maheshwari

Main Technical Components
User Controls

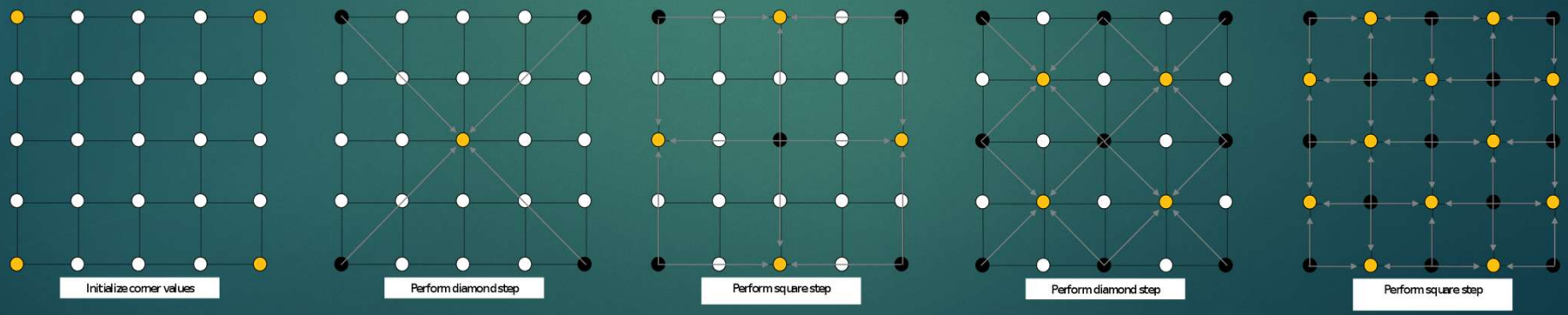
- Terrain Type: Text File
  - Mountain
  - Plain
  - Beach
- Terrain texture: Text File
  - Rugged (Rough)
  - Smooth
- Mesh View Mode: Key Controls
  - Wireframe
  - Solid fill
- Color choice for terrain view: Text File
  - Actual Color (Original)
  - Grey Scale
  - Red / Blue / Green Scale
- Rotation and movement for terrain view: Key Controls
  - Up
  - Down
  - Right
  - Left
  - Zoom In
  - Zoom Out
  - Mouse movement control

Main Technical Components
Implementation Details

- Software tools used:
  - OpenGL (C / C++)
  - glfw, glad, glsl libraries
- Graphic Pipeline Implemented:
  - Vertex generation -> Coordinate Transformation -> Vertex Shading -> Fragment Shading

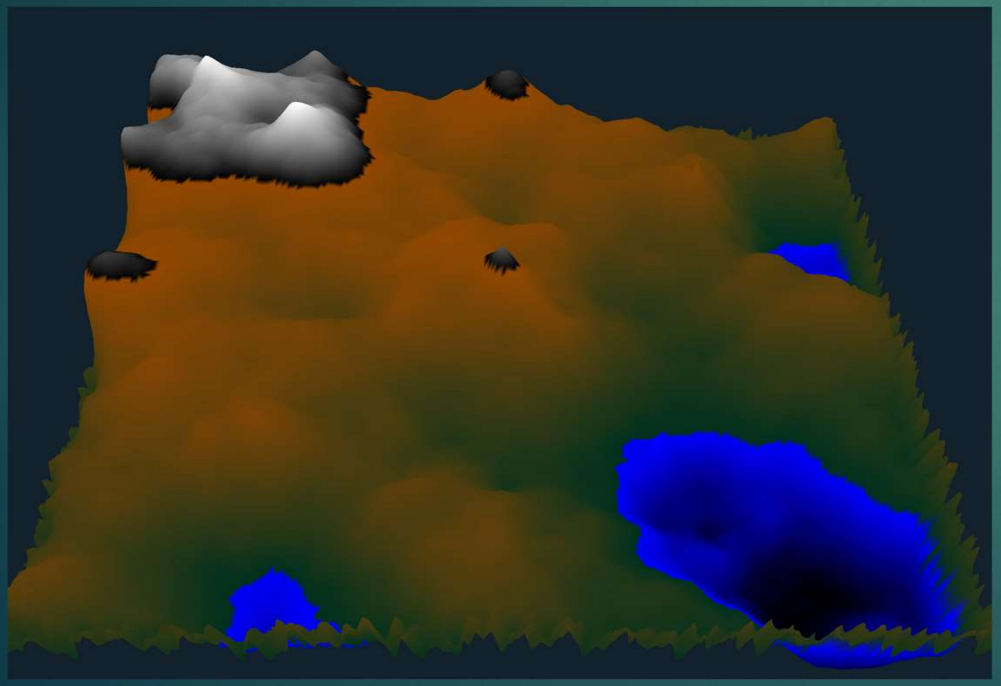
Main Technical Components
Algorithm Used

- **Diamond Square Algorithm**
  - The diamond-square algorithm begins with a two-dimensional square array of width and height $2^n + 1$.
  - The four corner points of the array must first be set to initial values. The diamond and square steps are then performed alternately until all array values have been set.

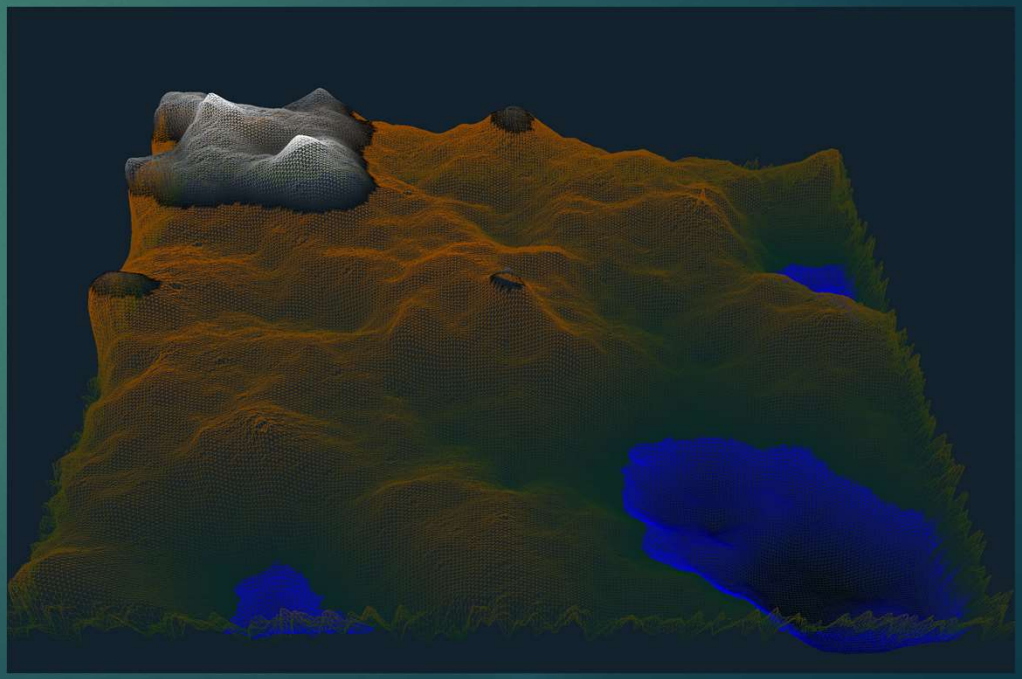


Demo

- Rugged Mountainous Terrain (Solid Fill)

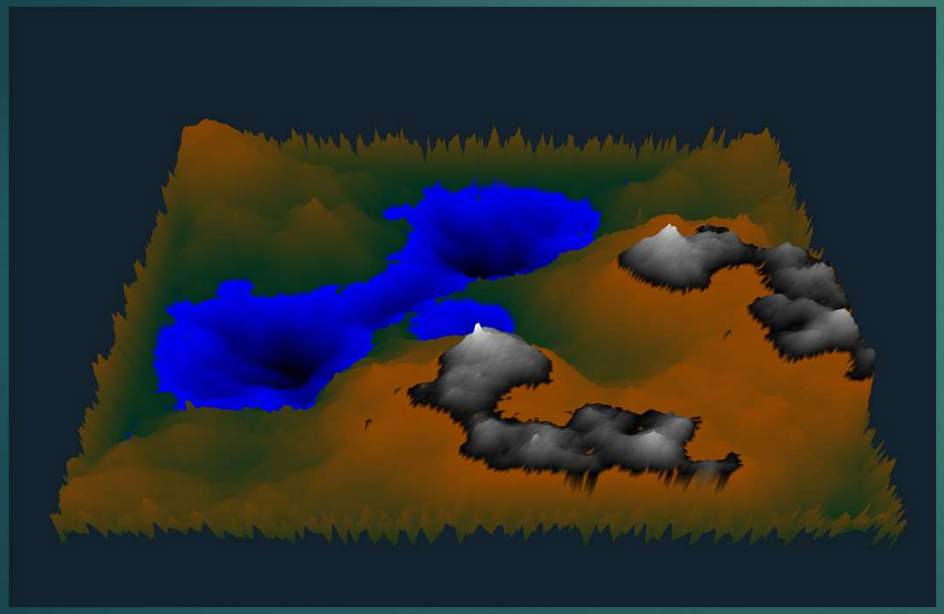


- Rugged Mountainous Terrain
  (Wireframe Mesh)

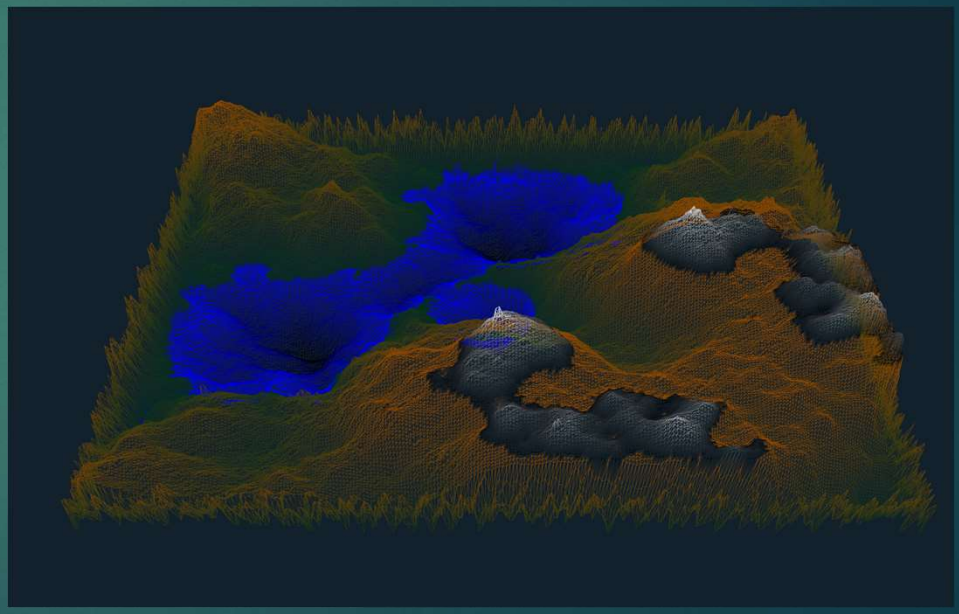


Demo

- Rugged Mountainous Terrain (Solid Fill)

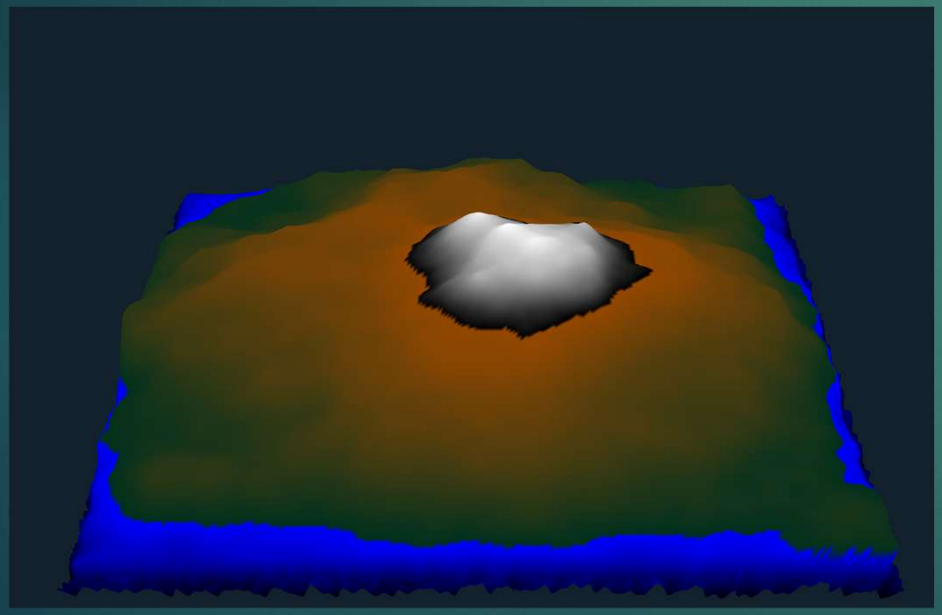


- Rugged Mountainous Terrain
  (Wireframe Mesh)

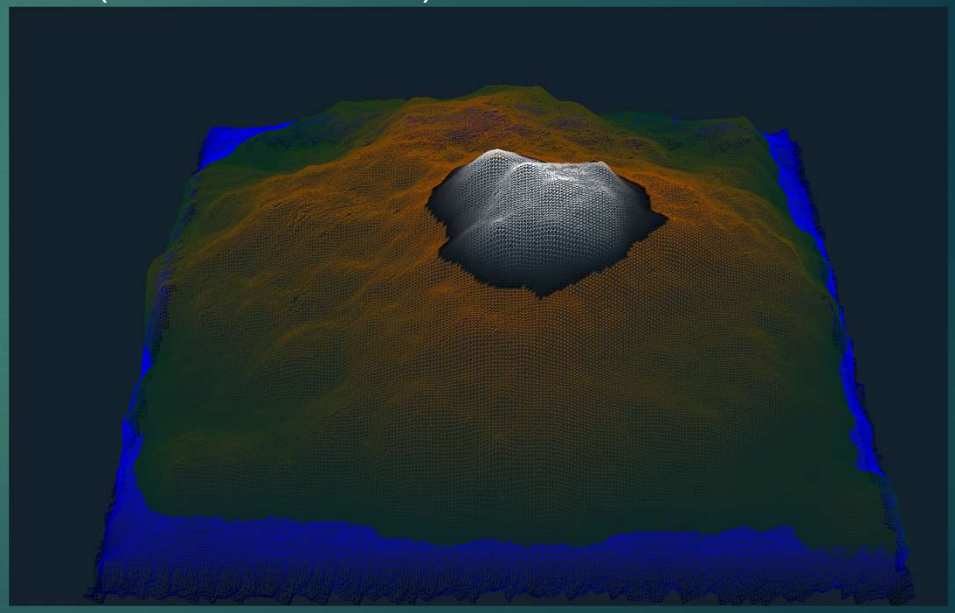


Demo

- Smooth Mountainous Terrain (Solid Fill)

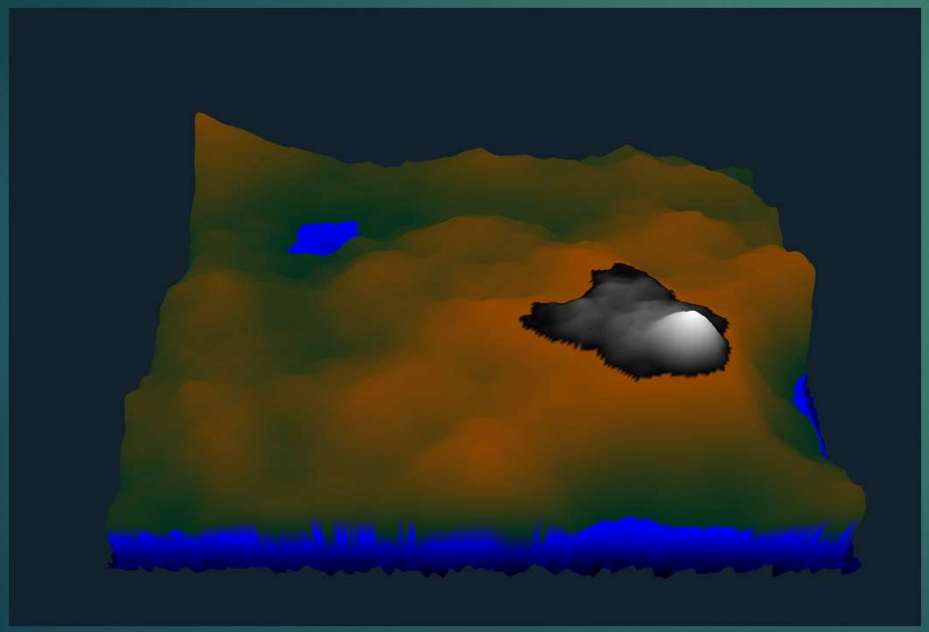


- Smooth Mountainous Terrain (Wireframe Mesh)

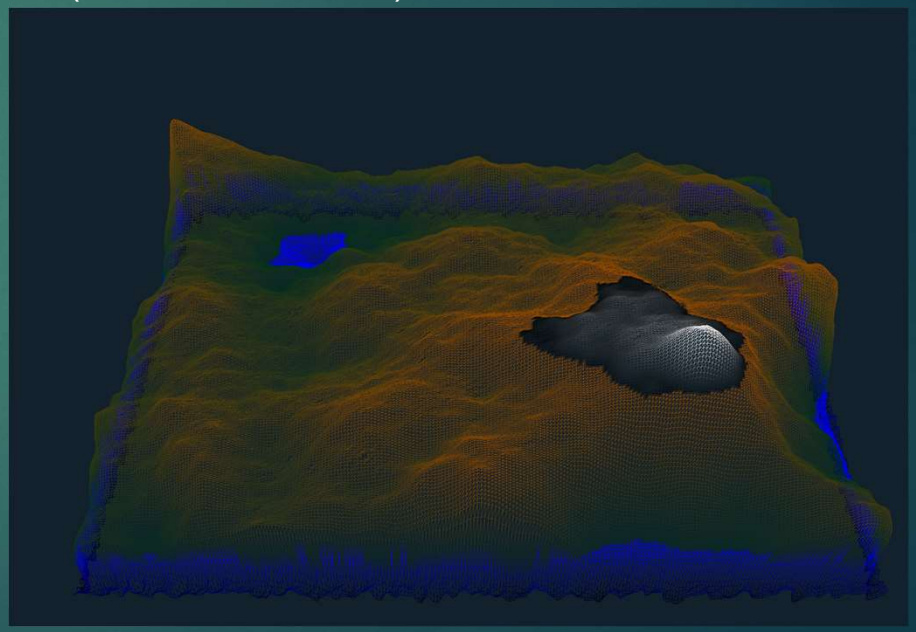


Demo

- Smooth Mountainous Terrain (Solid Fill)

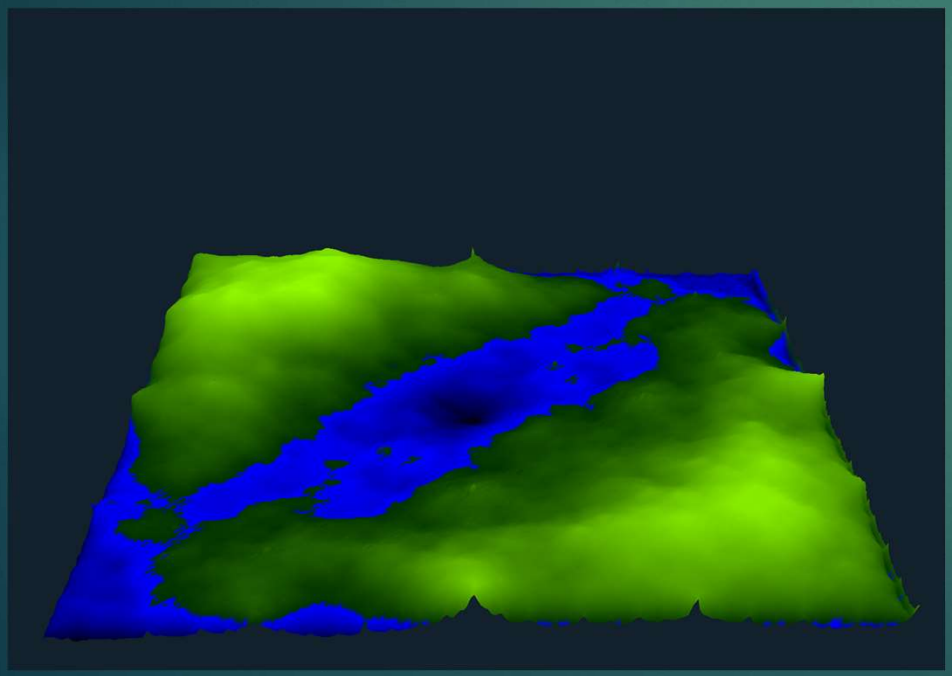


- Smooth Mountainous Terrain (Wireframe Mesh)

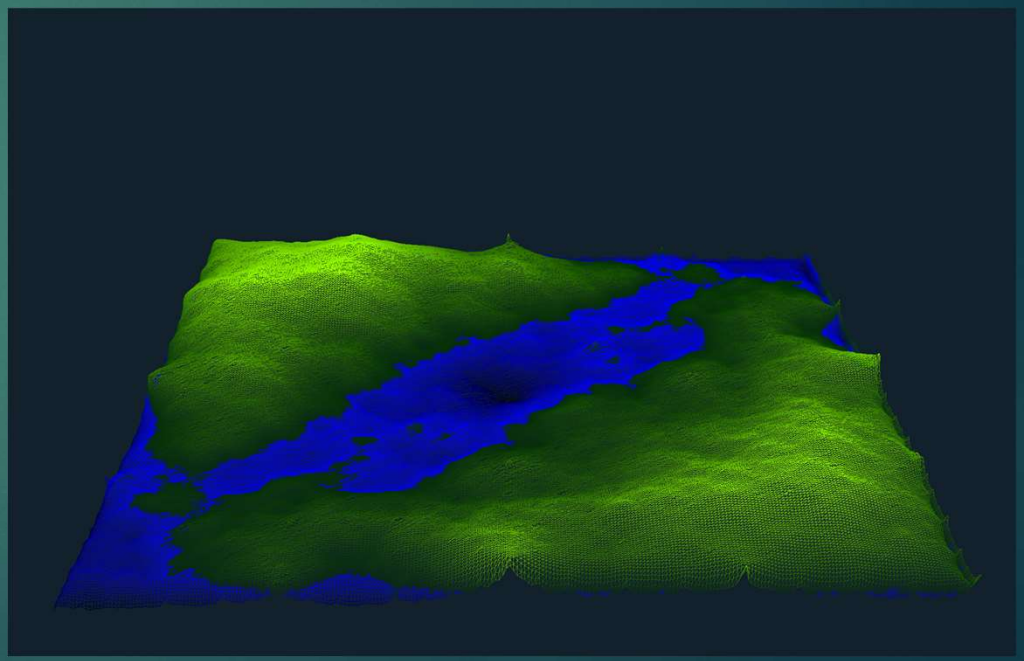


Demo

- Rugged Plains (Solid Fill)

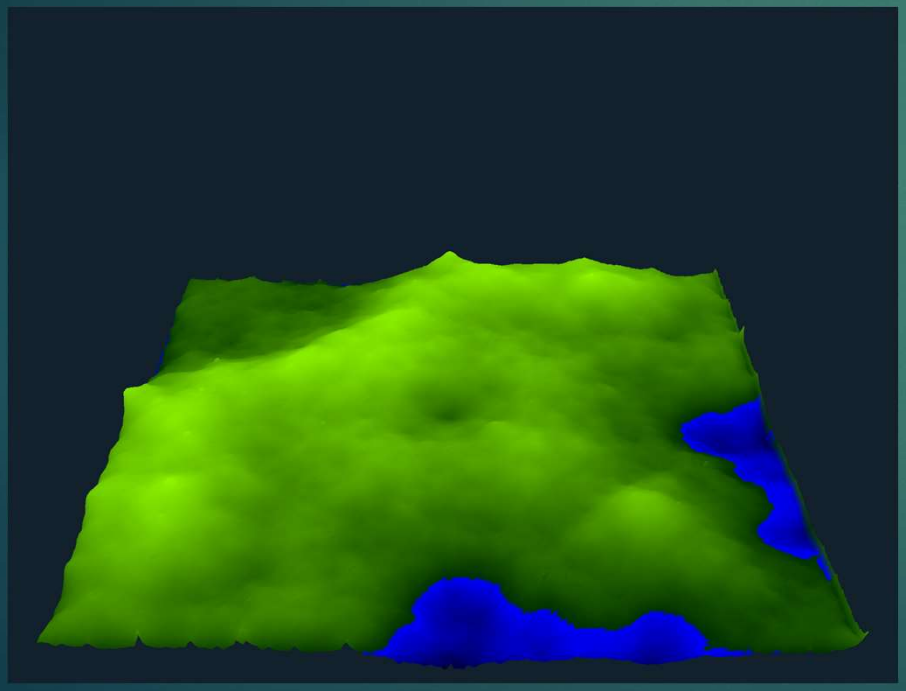


- Rugged Plains (Wireframe Mesh)

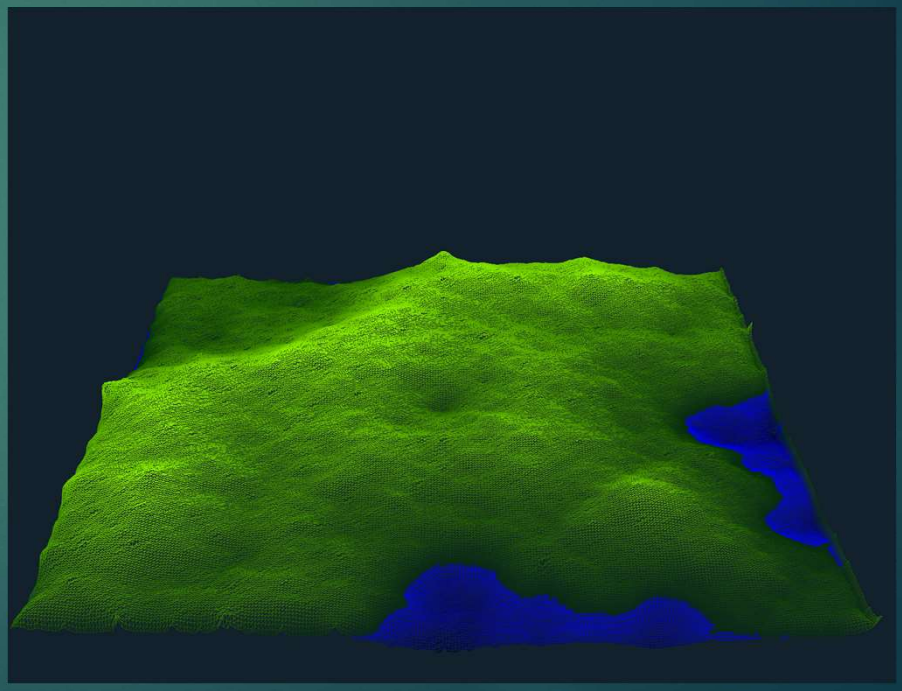


Demo

- Rugged Plains (Solid Fill)

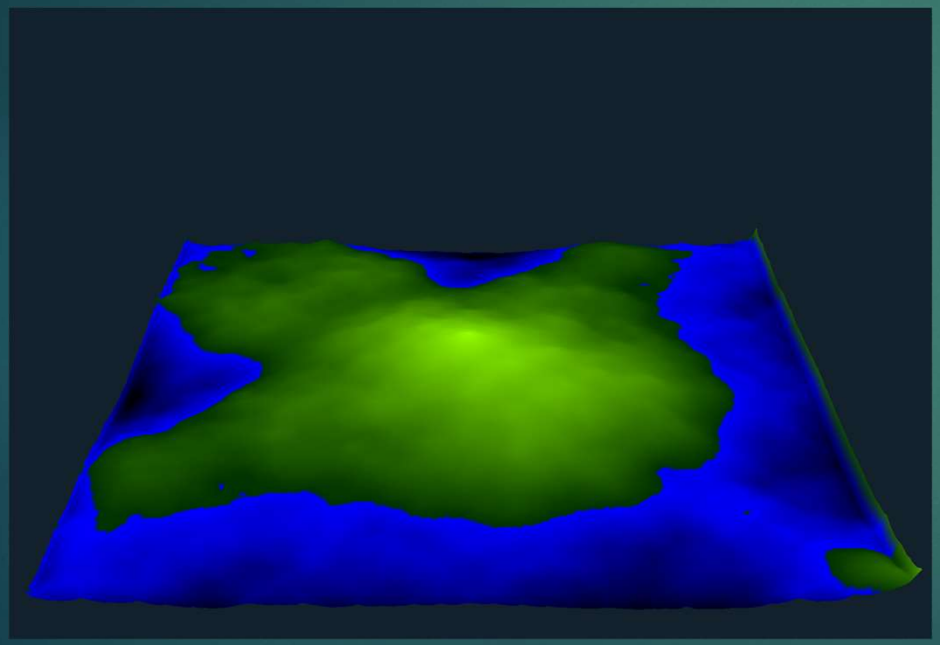


- Rugged Plains (Wireframe Mesh)

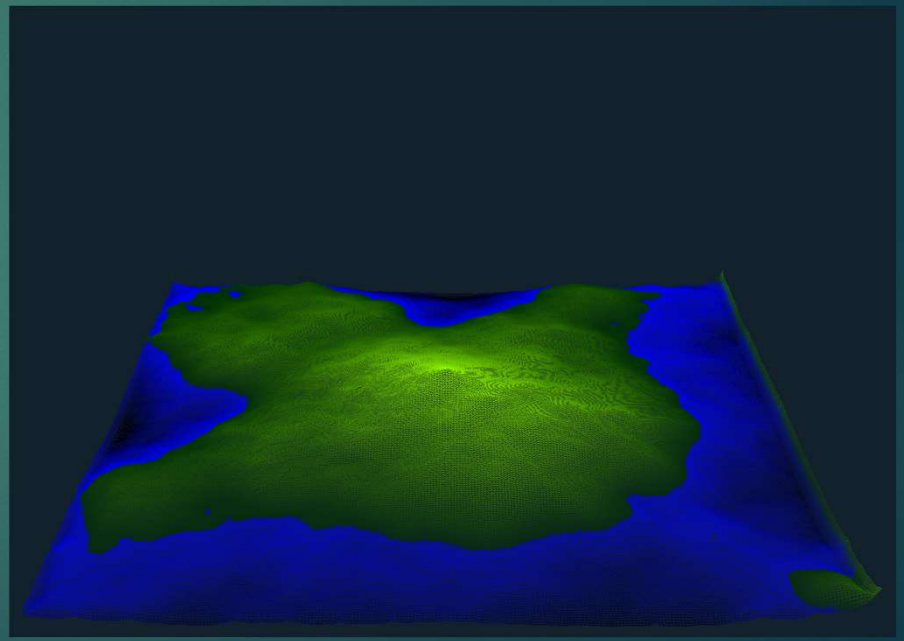


Demo

- Smooth Plains (Solid Fill)

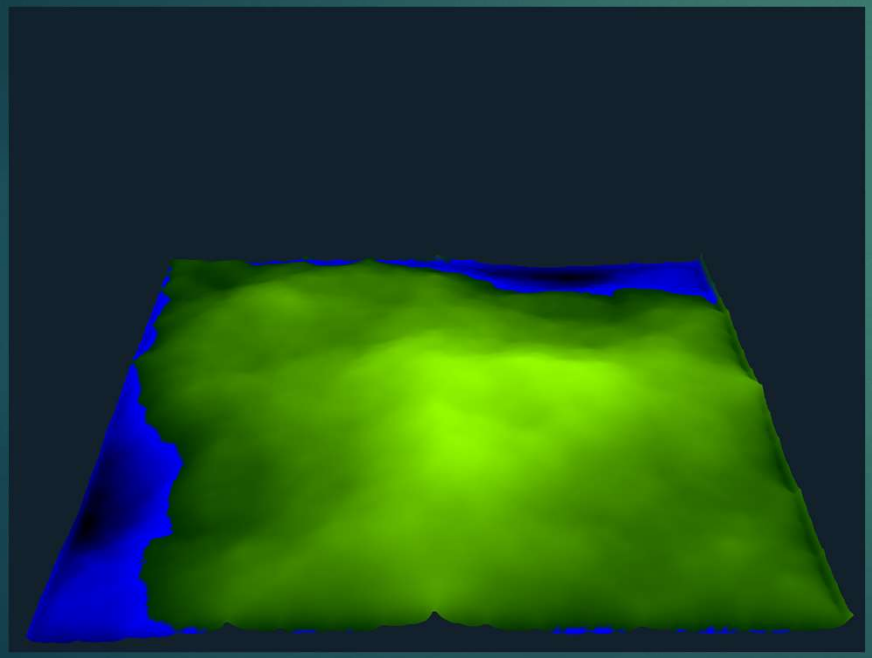


- Smooth Plains (Wireframe Mesh)

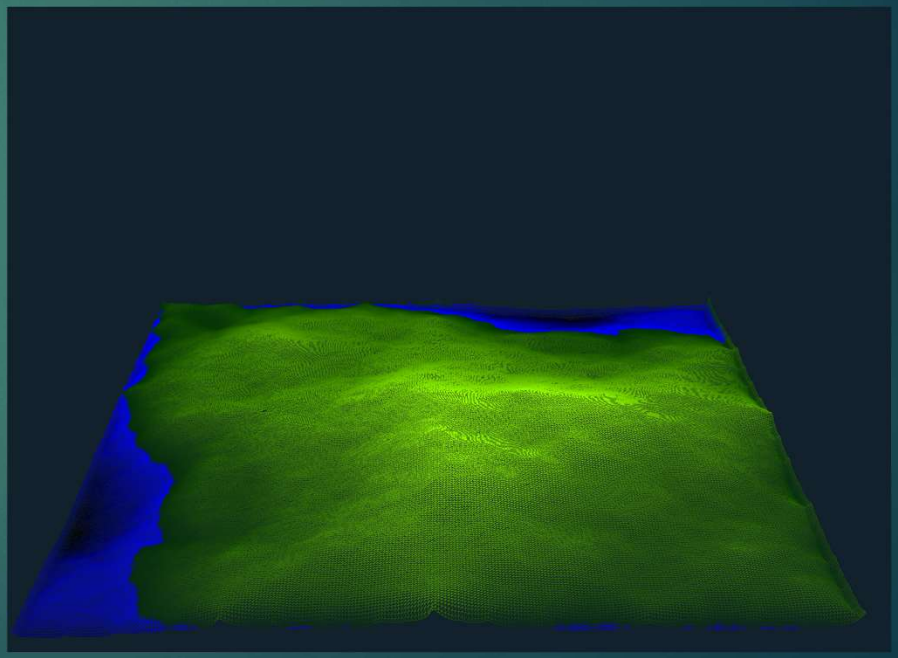


Demo

- Smooth Plains (Solid Fill)

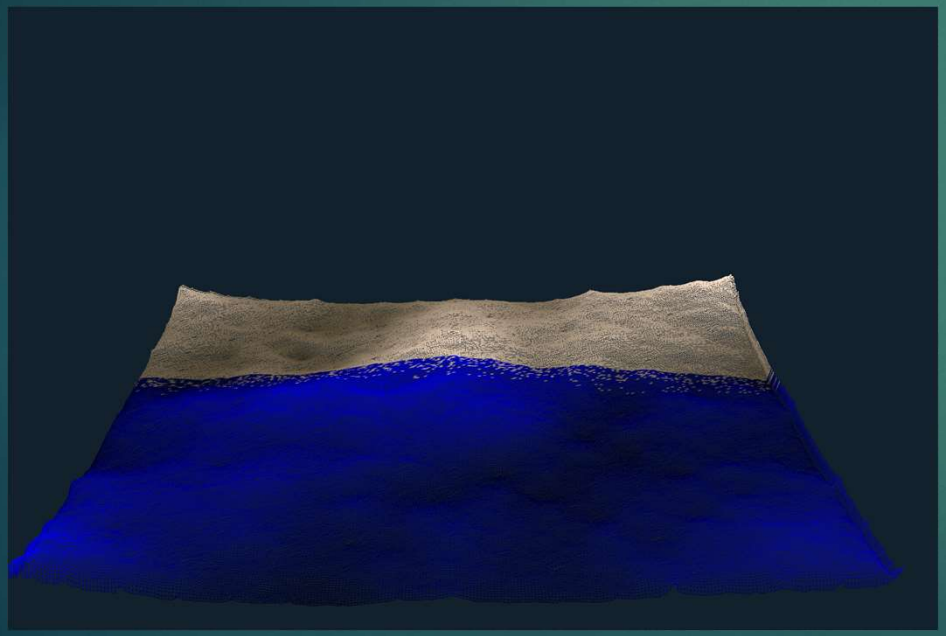


- Smooth Plains (Wireframe Mesh)

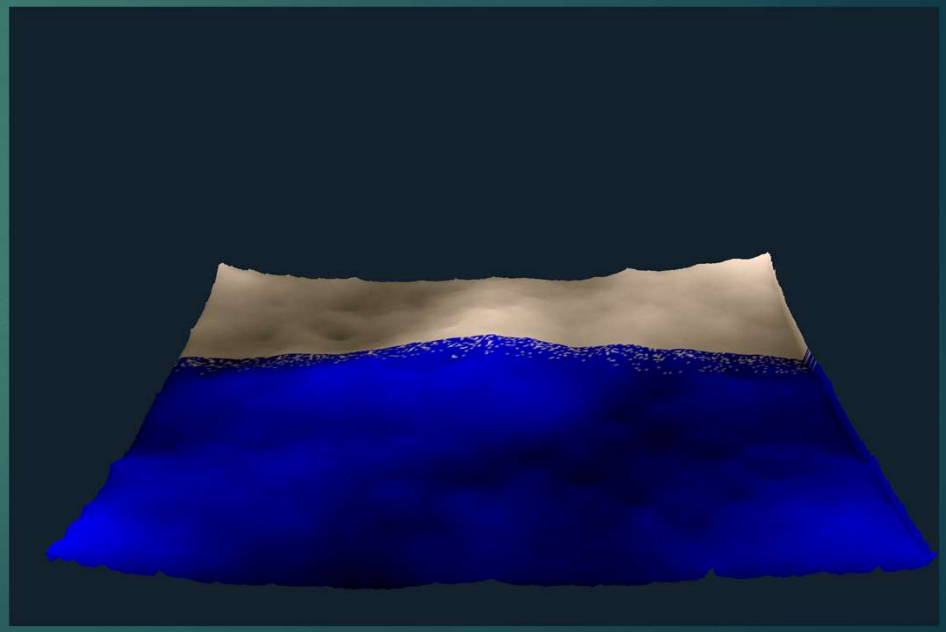


Demo

- Rugged Beach (Solid Fill)

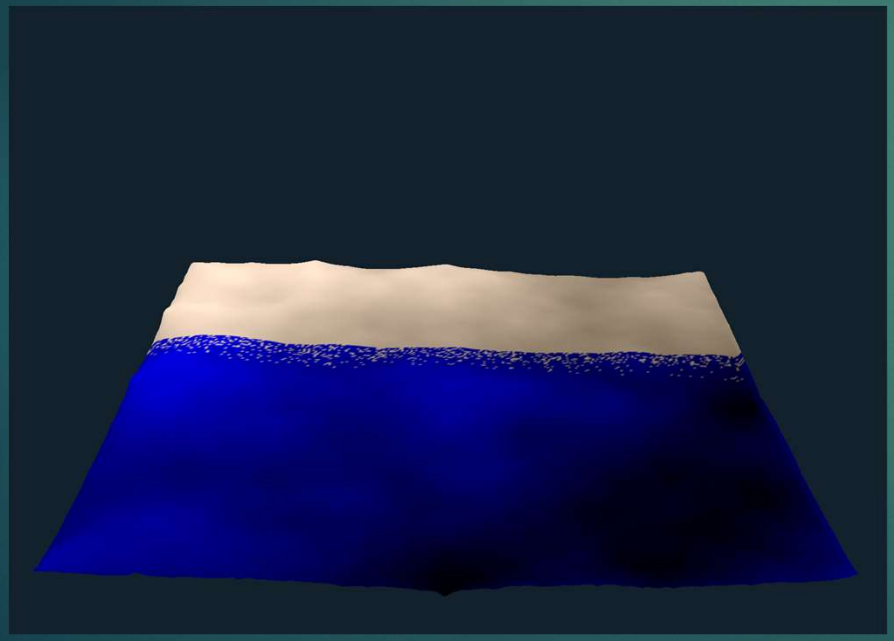


- Rugged Beach (Wireframe Mode)

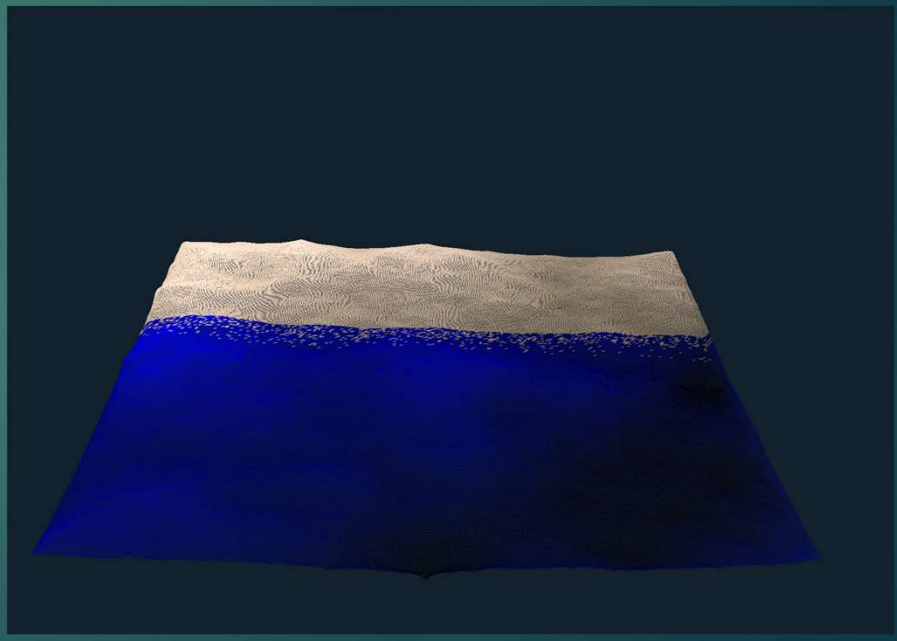


Demo

- Smooth Beach (Solid Fill)

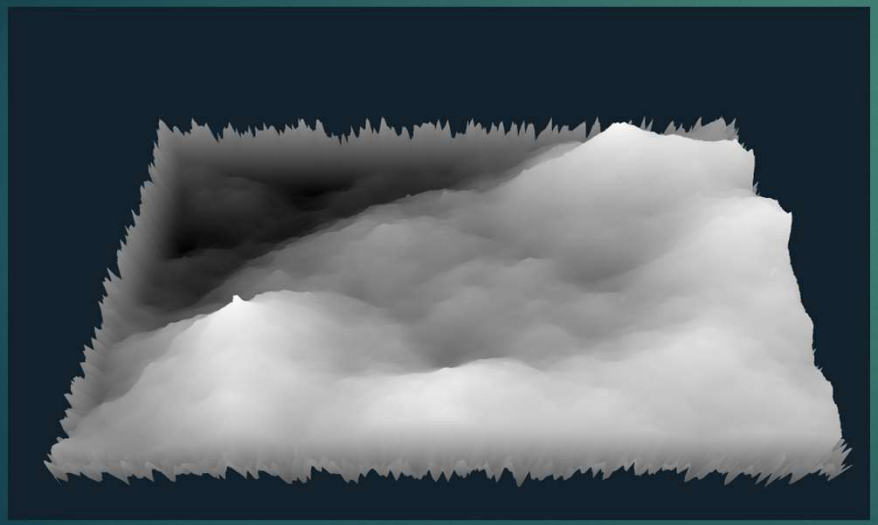


- Smooth Beach (Wireframe Mode)

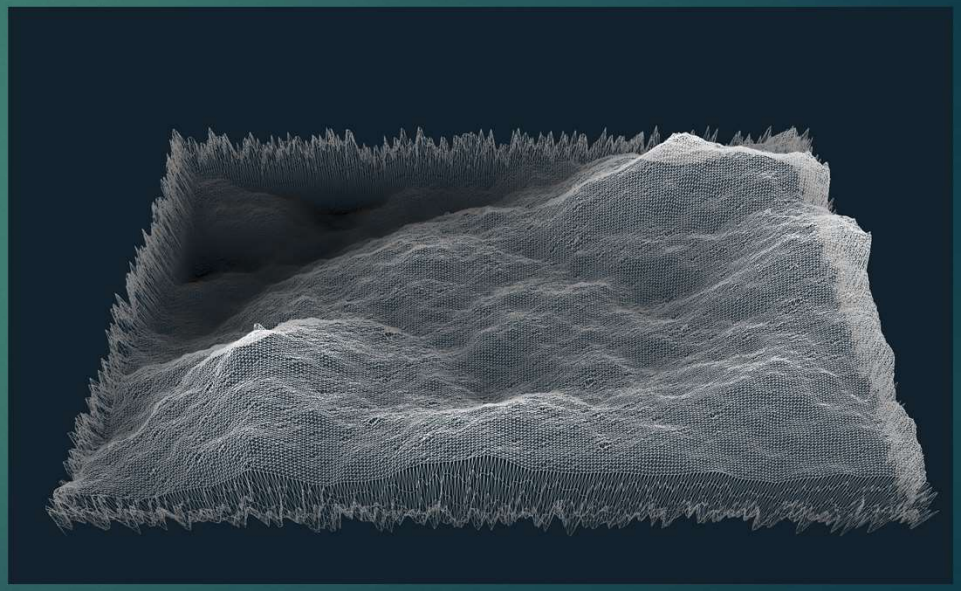


Demo

- Grey Scale Rugged Mountain (Solid Fill)

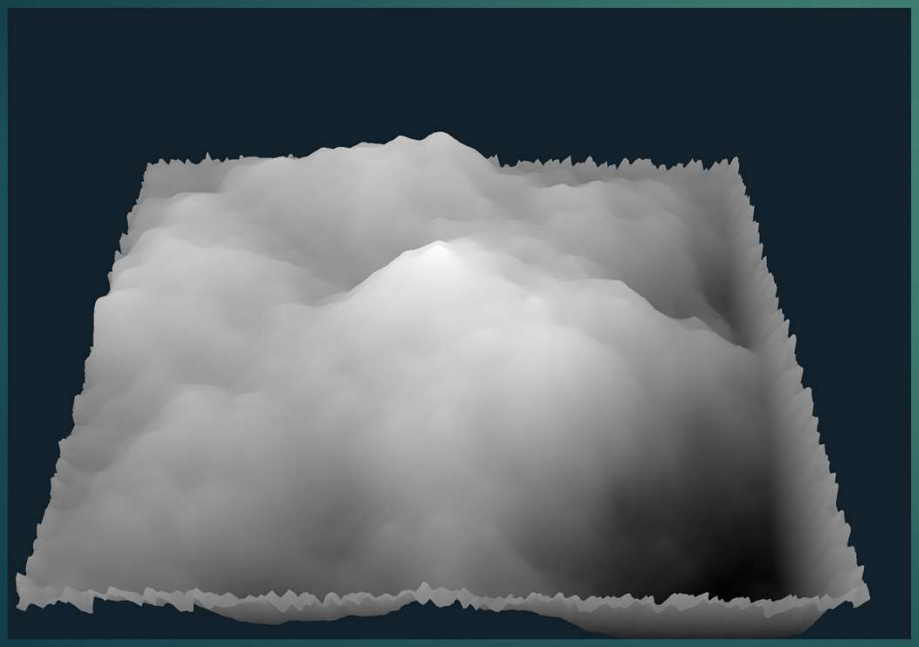


- Grey Scale Rugged Mountain (Wireframe Mode)

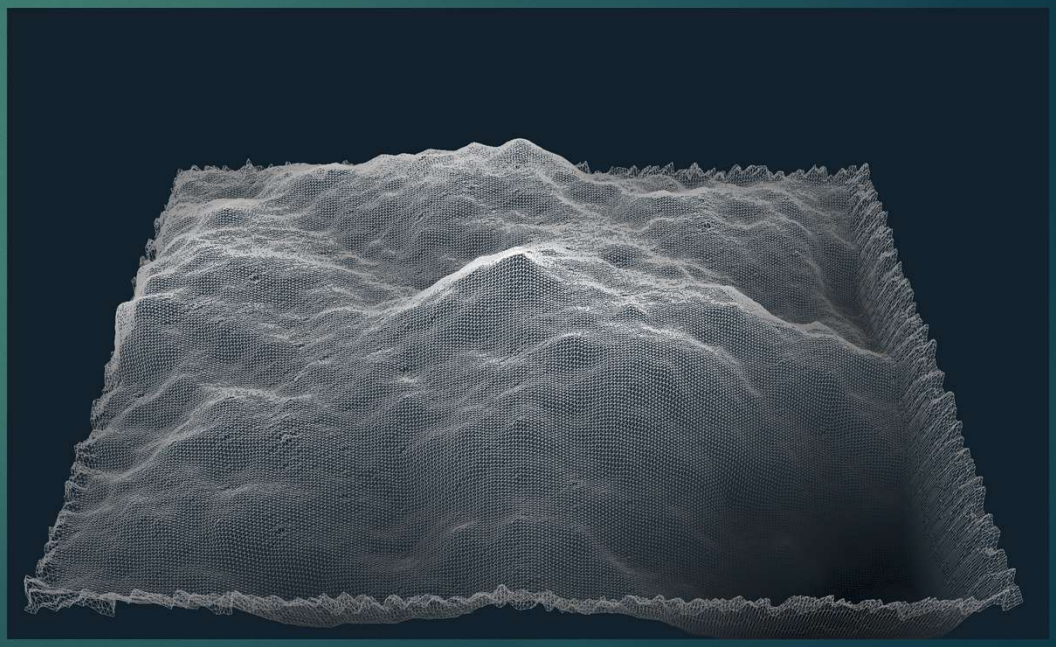


Demo

- Rugged Mountain (Solid Fill)

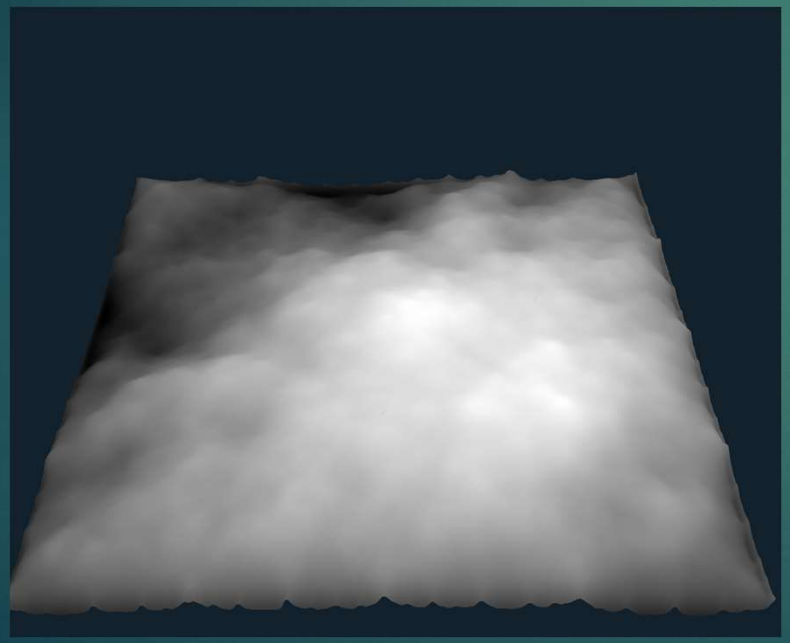


- Rugged Mountain (Wireframe Mode)

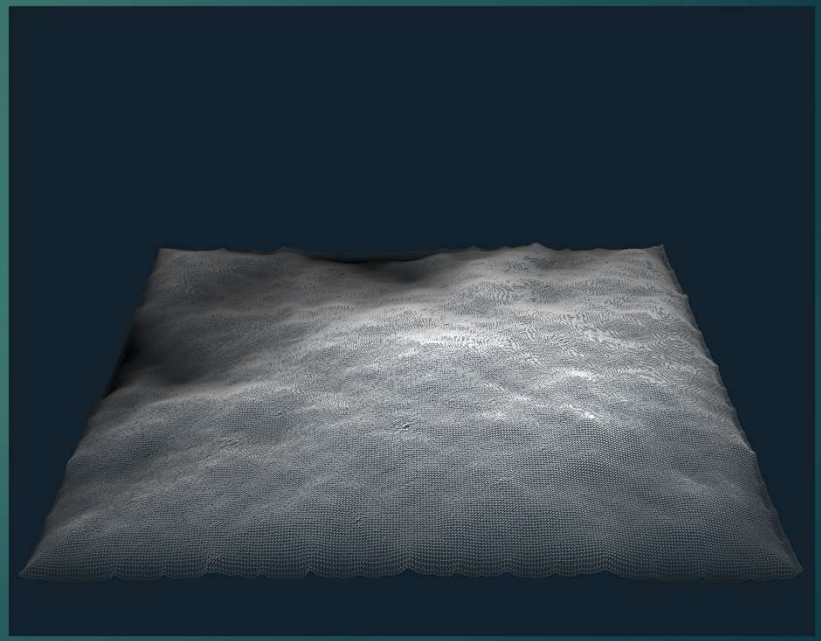


Demo

- Grey Scale Rugged Plains (Solid Fill)

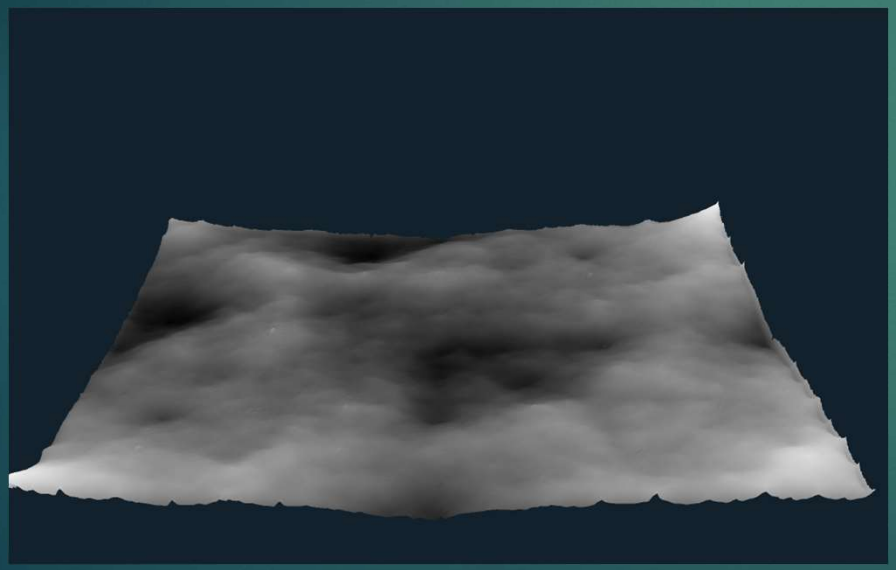


- Grey Scale Rugged Plains (Wireframe Mode)

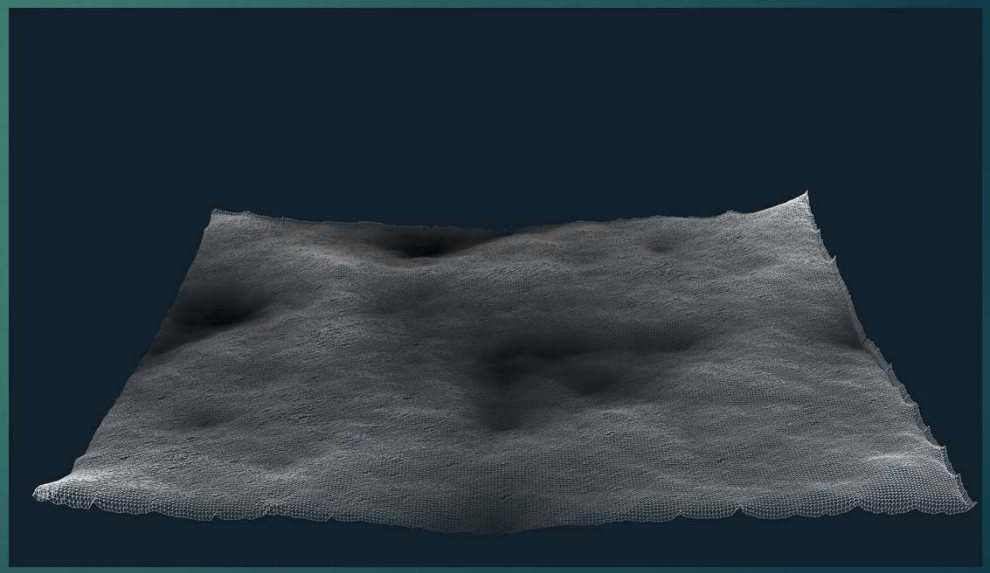


Demo

- Grey Scale Rugged Beach (Solid Fill)

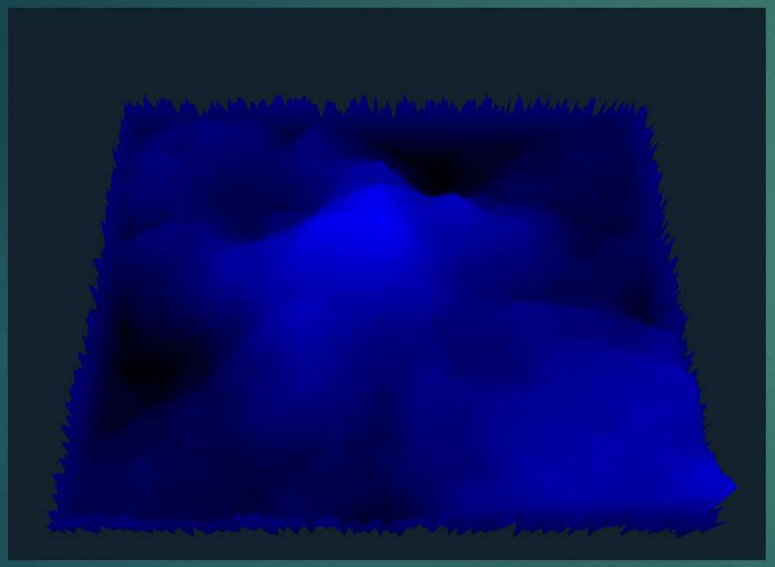


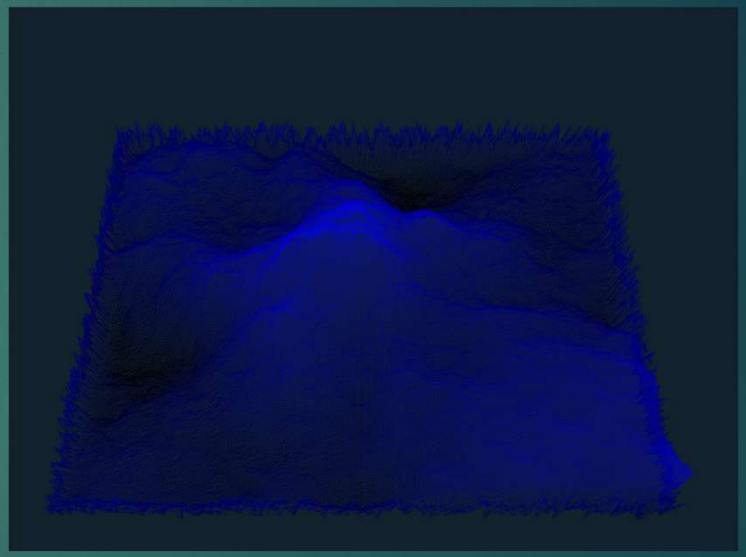
- Grey Scale Rugged Beach (Wireframe Mode)



Demo

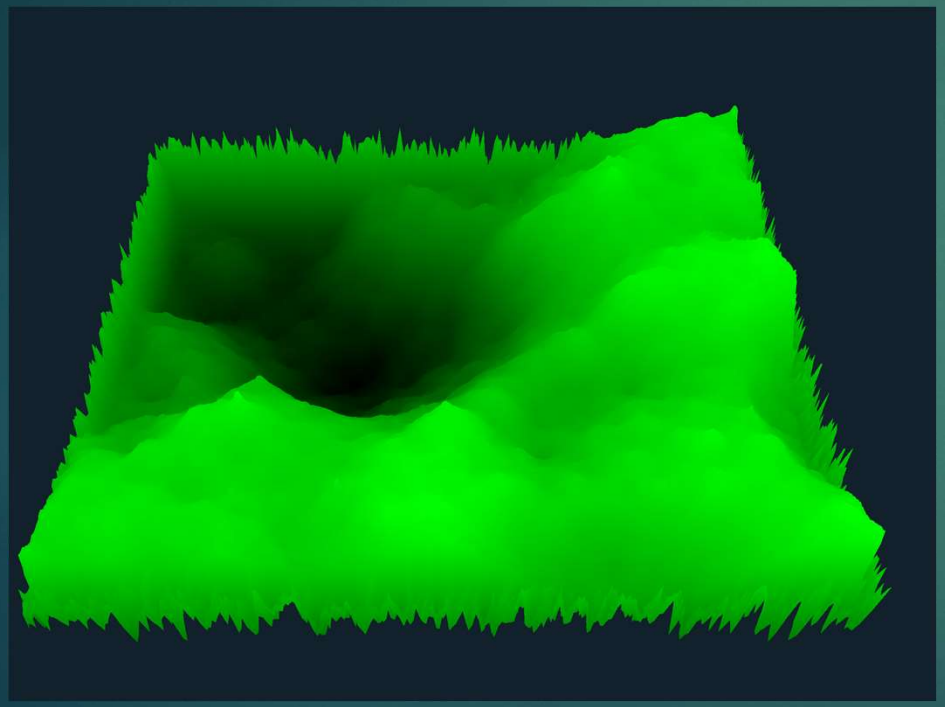
Blue Scale Rugged Mountainous Terrain

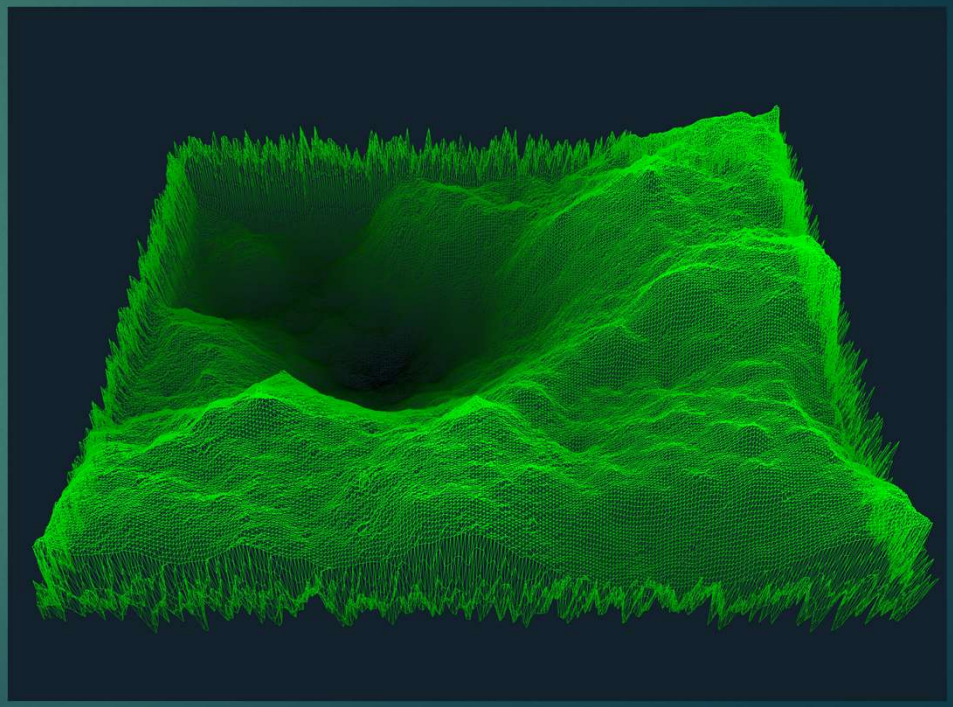




Demo

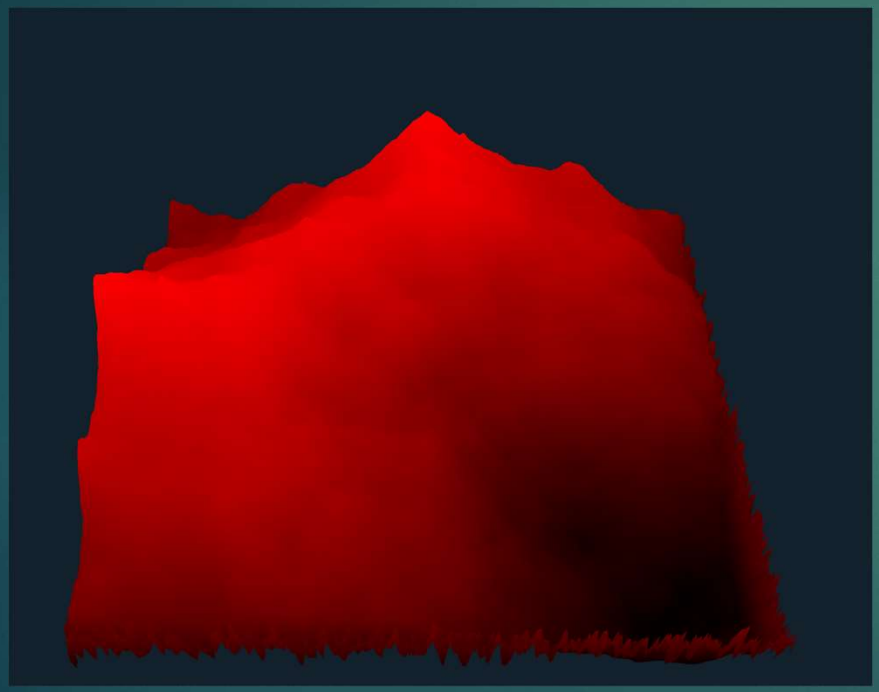
Green Scale Rugged Mountainous Terrain

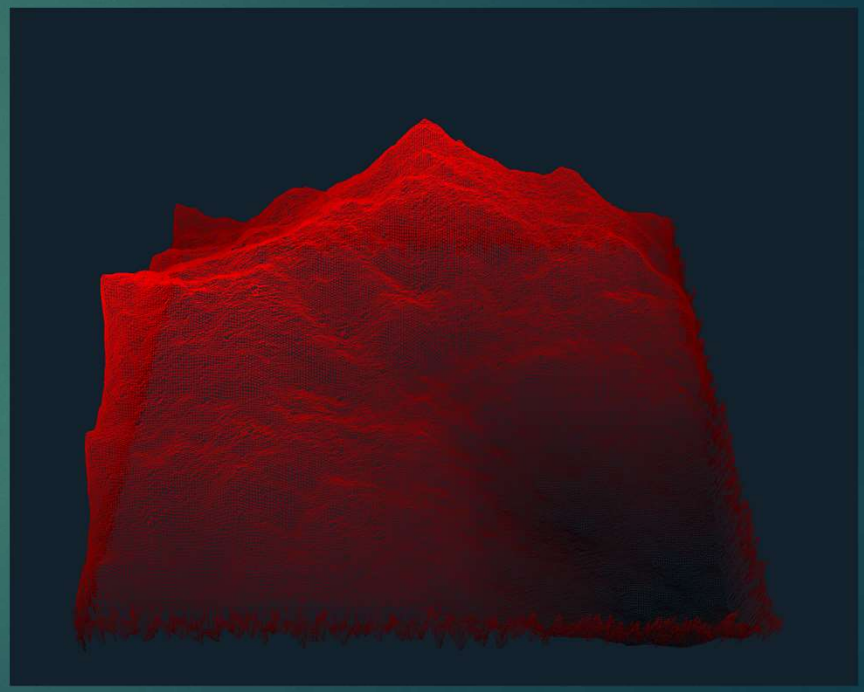




Demo

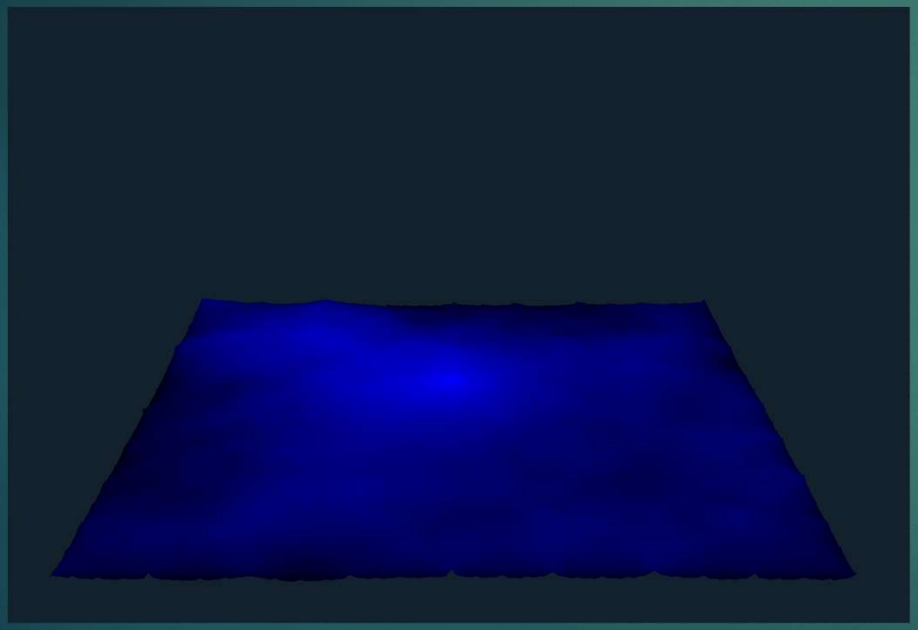
Red Scale Rugged Mountainous Terrain

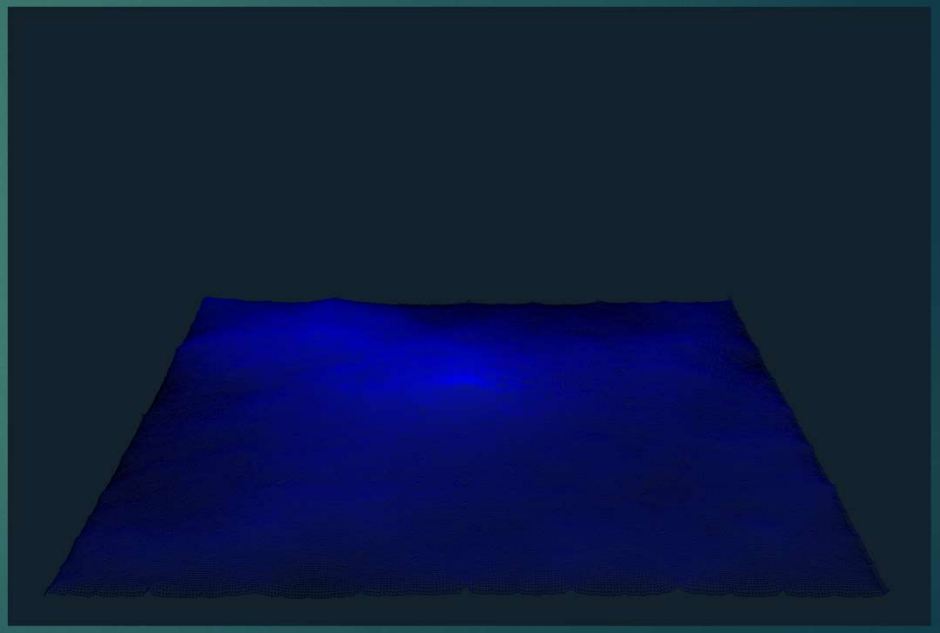




Demo

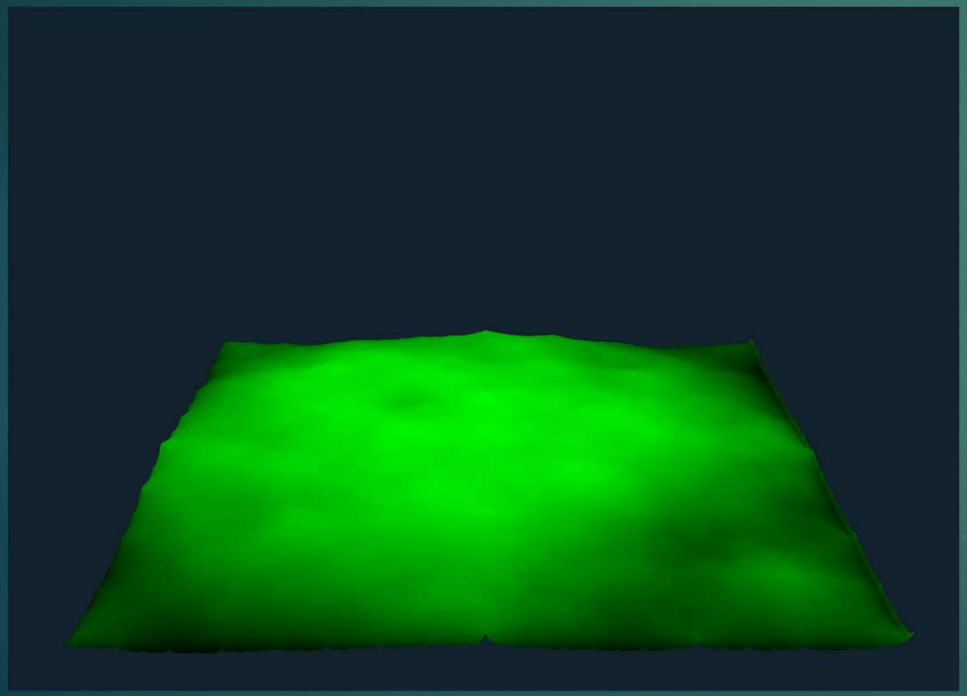
Blue Scale Rugged Beach

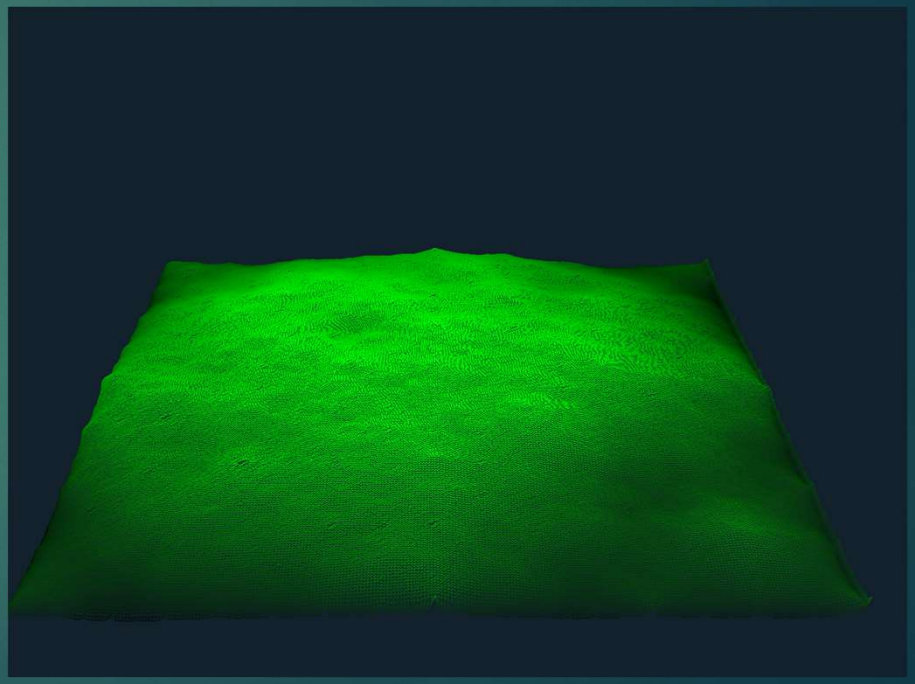




Demo

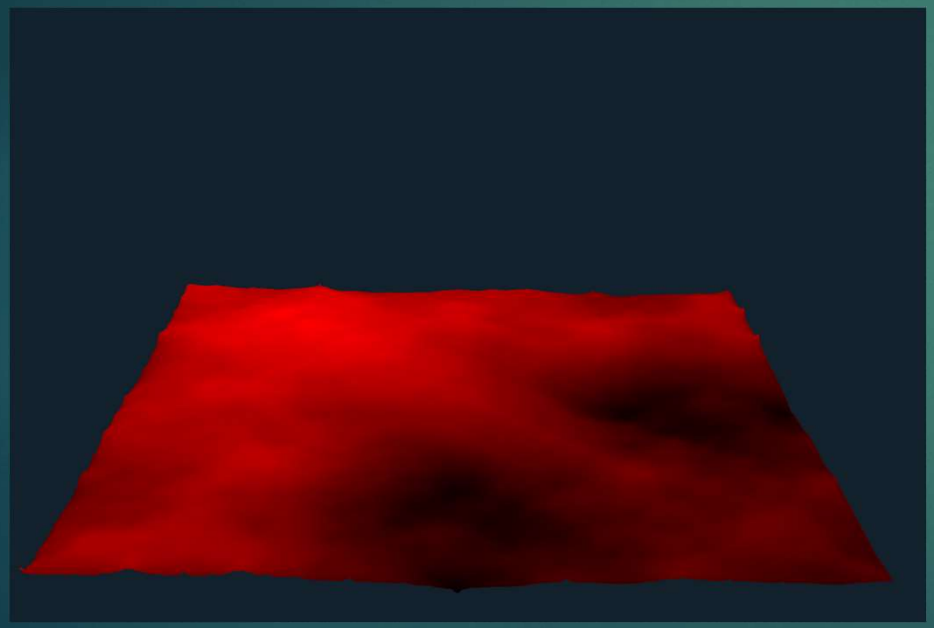
Green Scale Rugged Beach

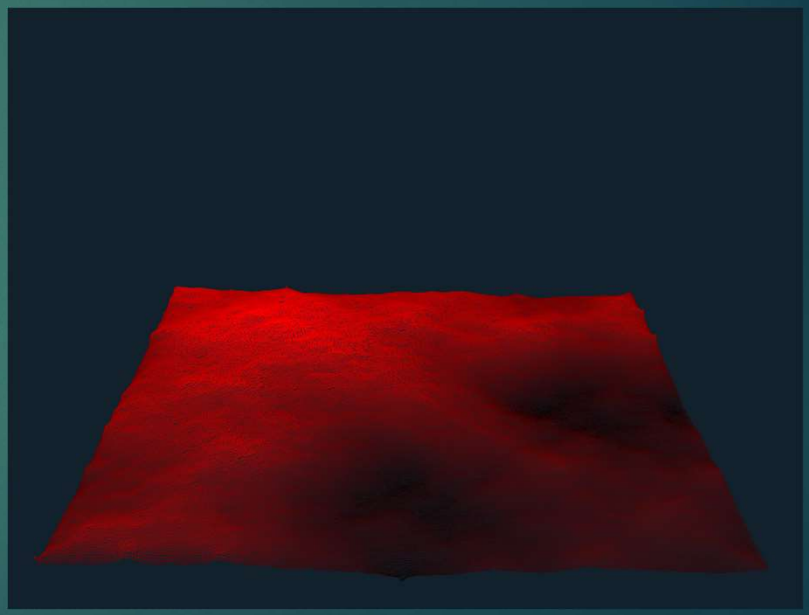




Demo

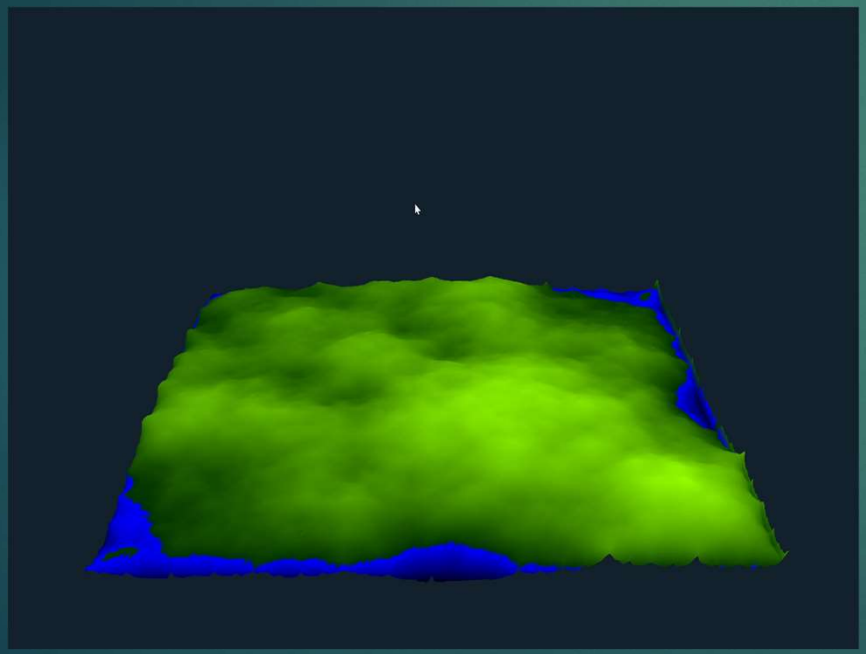
Red Scale Rugged Beach

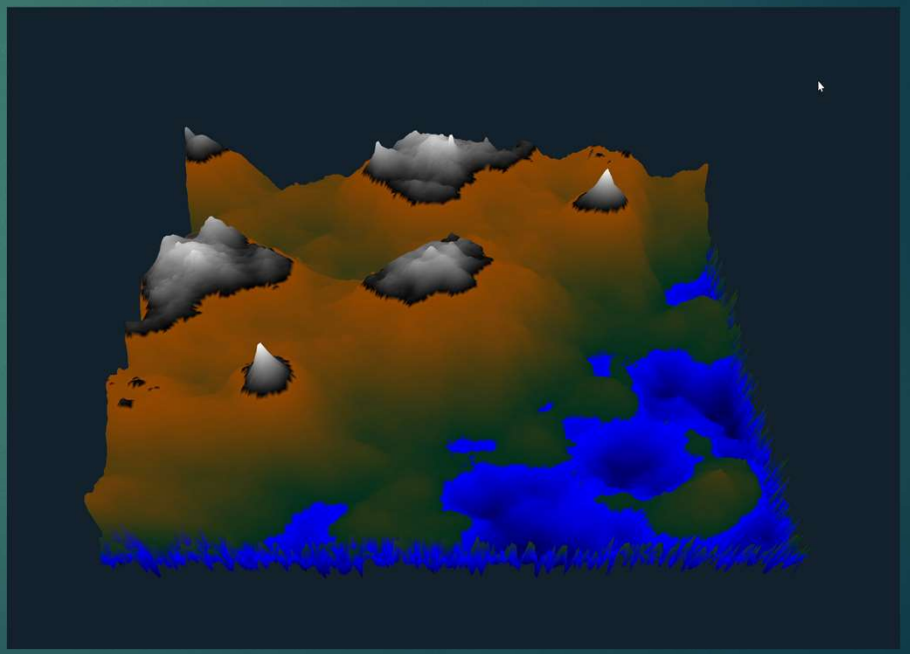




Demo

- Key and Mouse Controls





With More Time

- Customize terrain layout: specify where mountains, valleys or plains are laid out