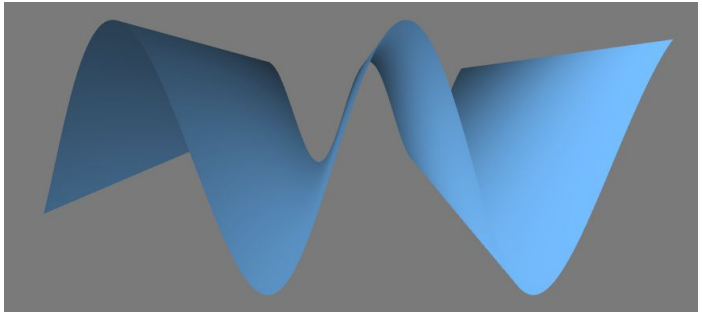
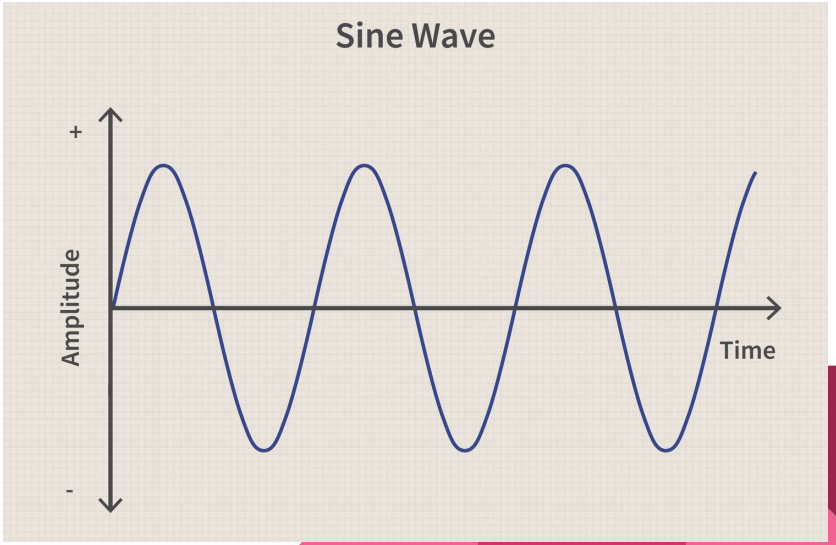
Gerstner Water Shader

https://observablehq.com/@jonji/gerstner-water-shader

Sine Wave

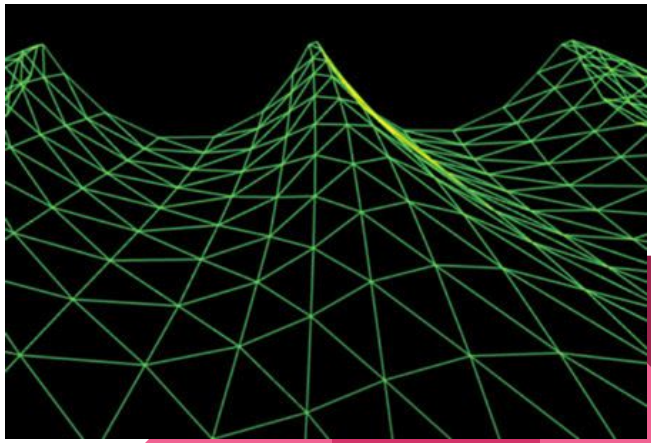


- First step was to get movement
- Uses Sine wave
- Uses:
  - Amplitude
  - Wavelength/Frequency
  - Time/Speed
  - Position



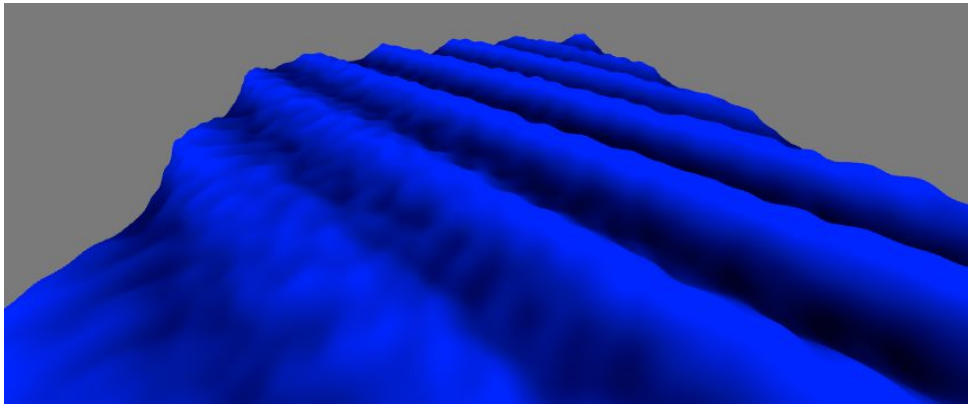
Gerstner Waves

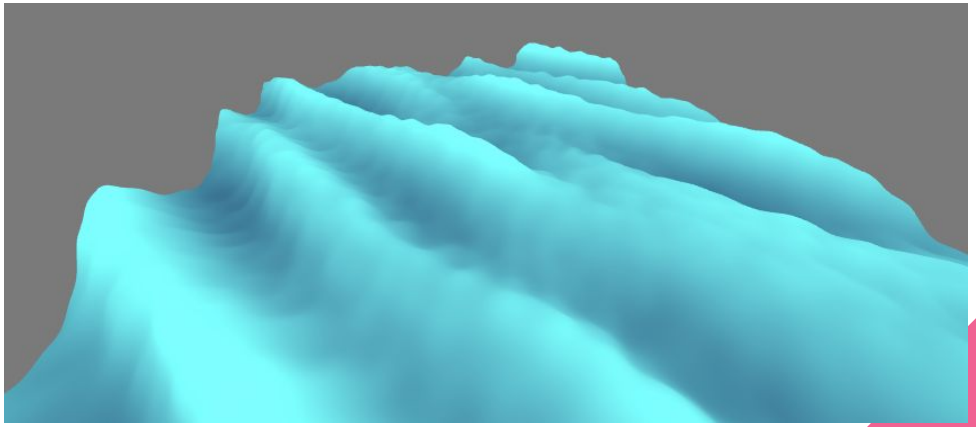
- Uses formula made to imitate oceans
- Uses sine and cosine
- Same idea as before, but waves are more circular and steep
- Uses same variables as before
- Added noise to surface



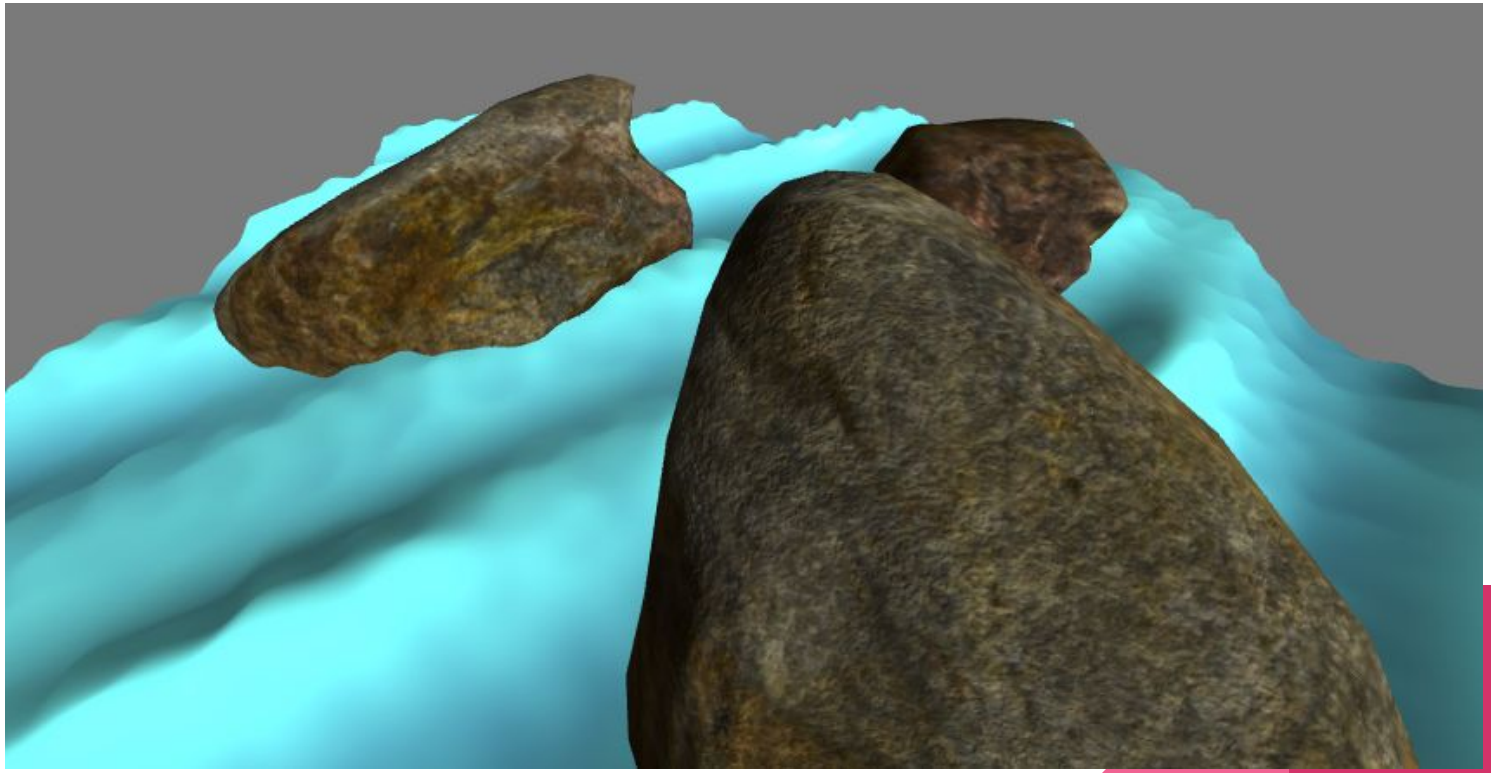
Stacking Waves

- To make it look more real, we stack waves on top of one another
- Finding the right numbers is trial and error
- Each wave has the following:
  - Direction
  - Amplitude
  - Frequency
  - Steepness
  - Speed



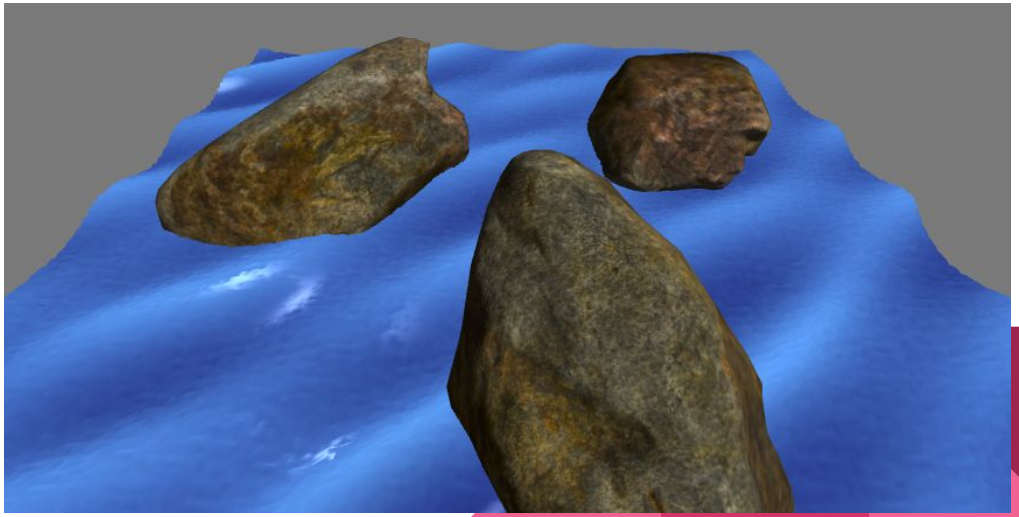


Adding Rocks



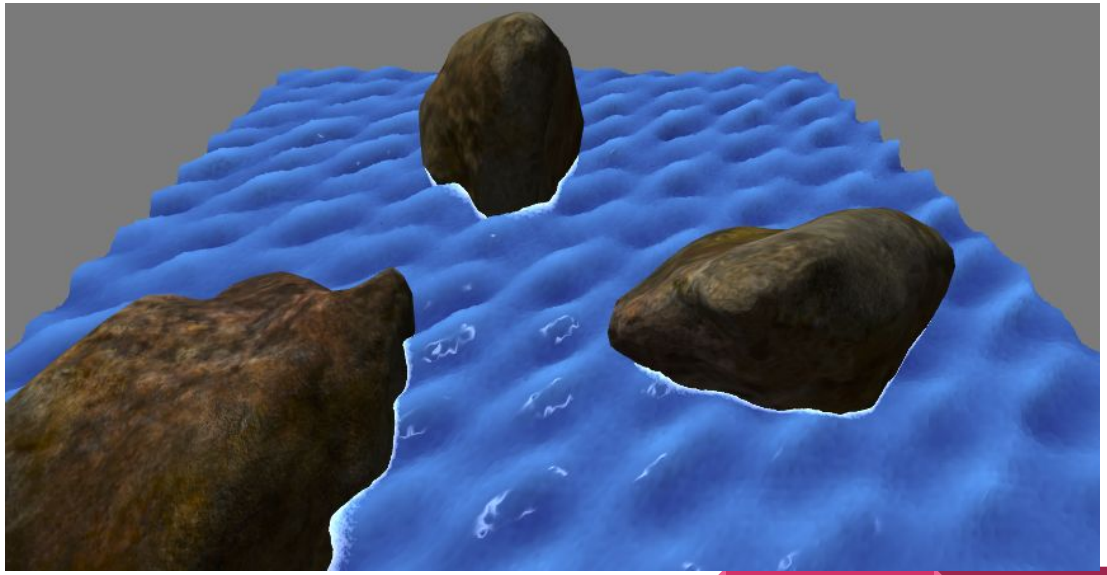
Proper lighting and color

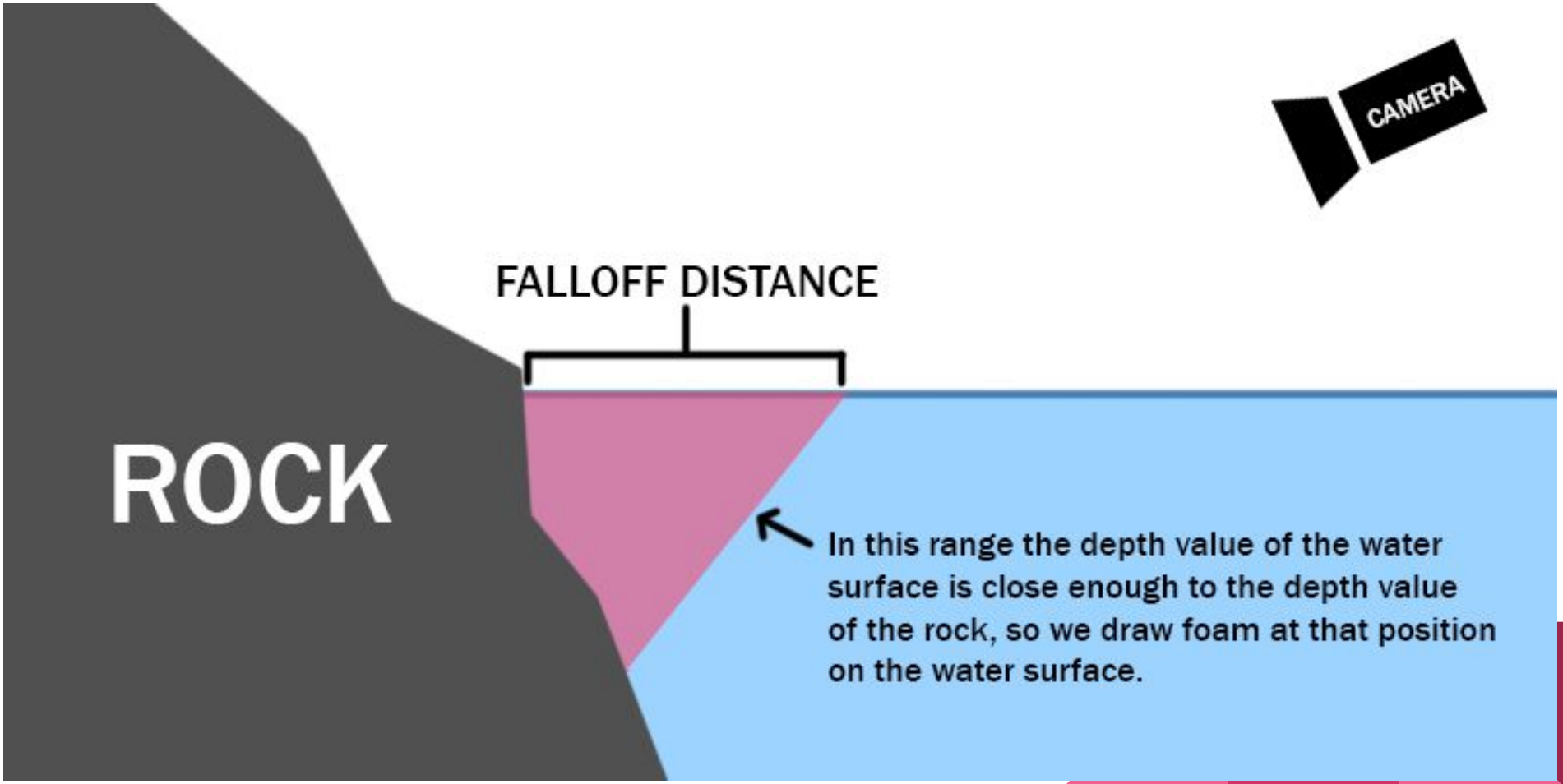
- Using Blinn-Phong lighting model
- Set specular to high number to simulate real water
- Adjusting color to be based on height



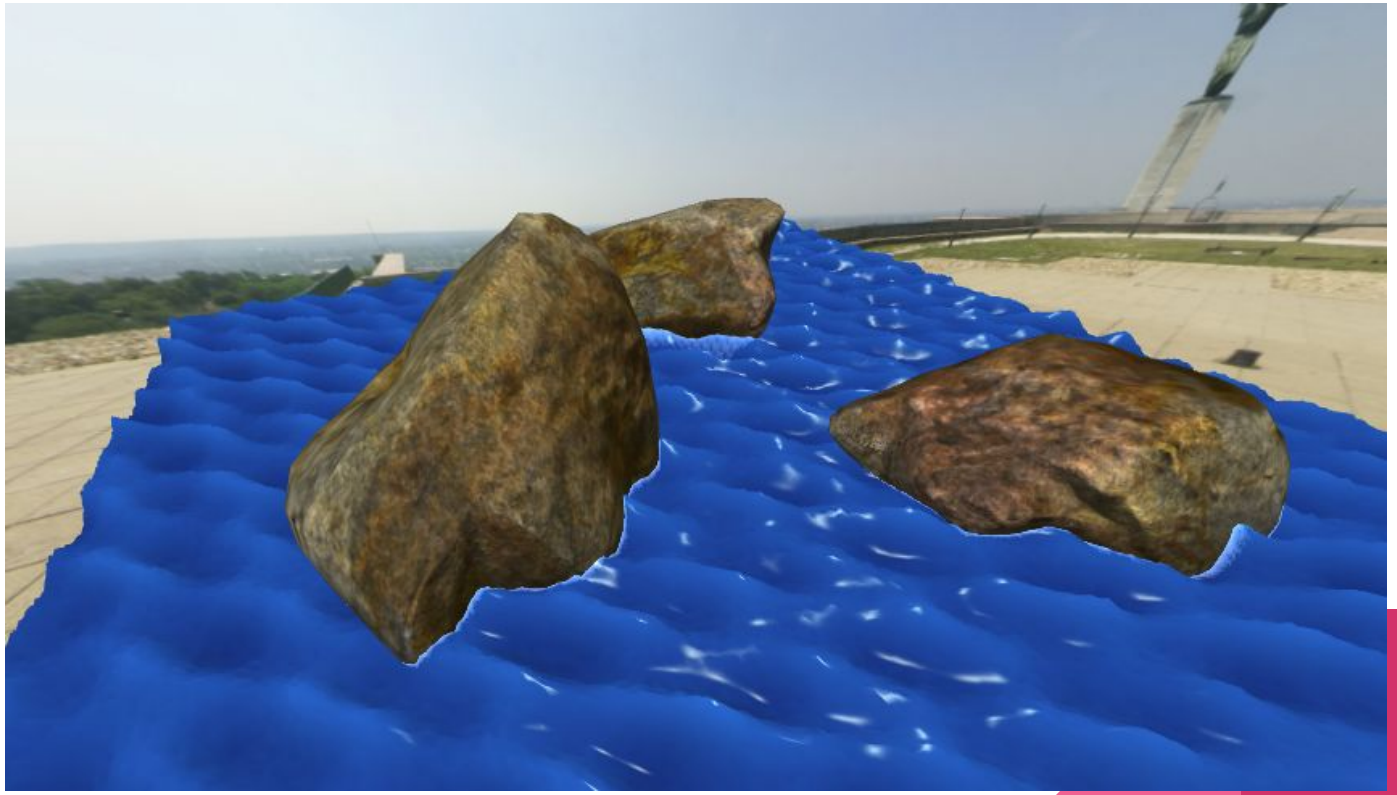
Foam Around Objects

- Using depth buffer
- Gets difference between depth of rock and depth of water
- If within some amount, color it white.
- Fade it based on how far it is from the rock



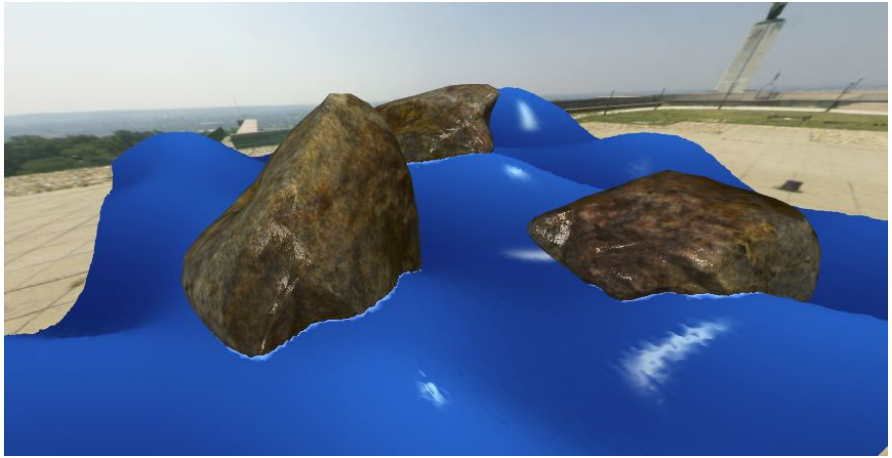

CAMERA
FALLOFF DISTANCE
ROCK
In this range the depth value of the water surface is close enough to the depth value of the rock, so we draw foam at that position on the water surface.

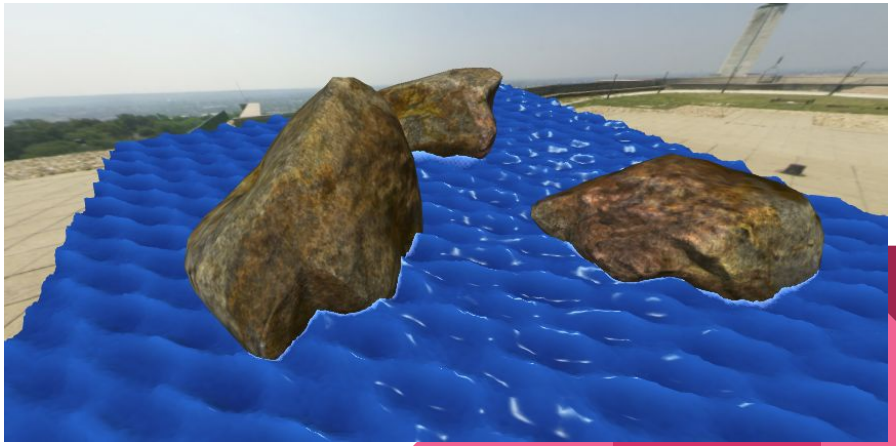
Added cubemap



Wet Rocks

- Gets maximum height of water
- Interpolates how specular the rocks are based on height





Makeshift foam on peaks

- Adding real foam is quite complex to look good
- Set tops of waves to be lighter based on maximum height