Procedurally Generated Height Maps and Visualizing Elevation Data

Anu and Jamie

Original Project Goals

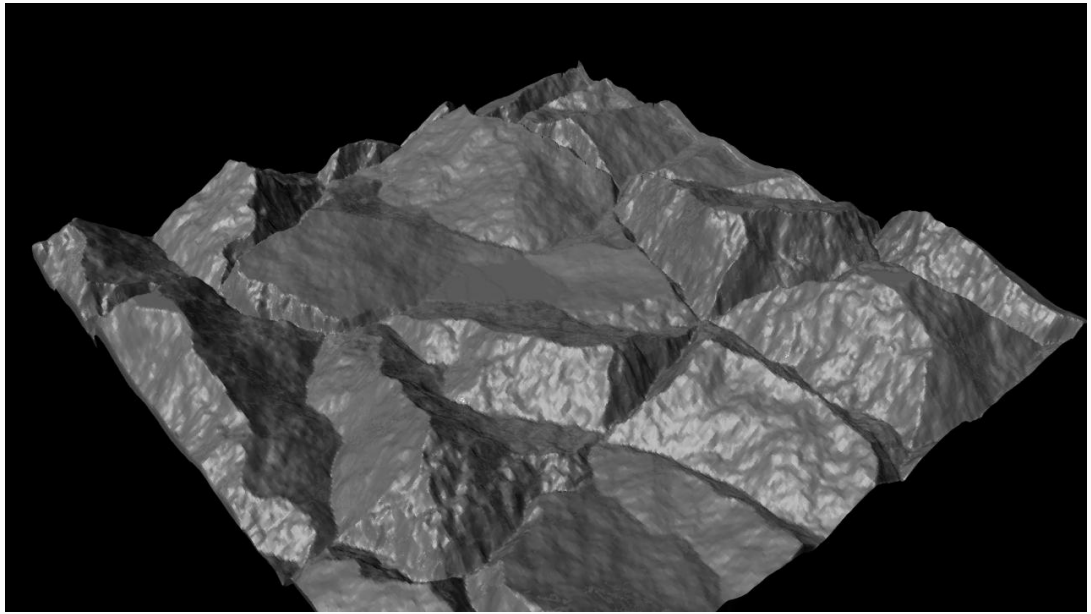
- Read in RGB data from an image
- Create a planar mesh with the same number of vertices as pixels in the image
- Procedurally move each vertex to best-fit height
- (brighter colors are higher elevations)

Motivation

- Explore Maya - both team members new to graphics
- Learn how to depict a 2D surface as a 3D surface
- Image Manipulation in C was topical

Technical Topics

- Displacement Maps
- Shaders - Blinn



Milestones & Setbacks

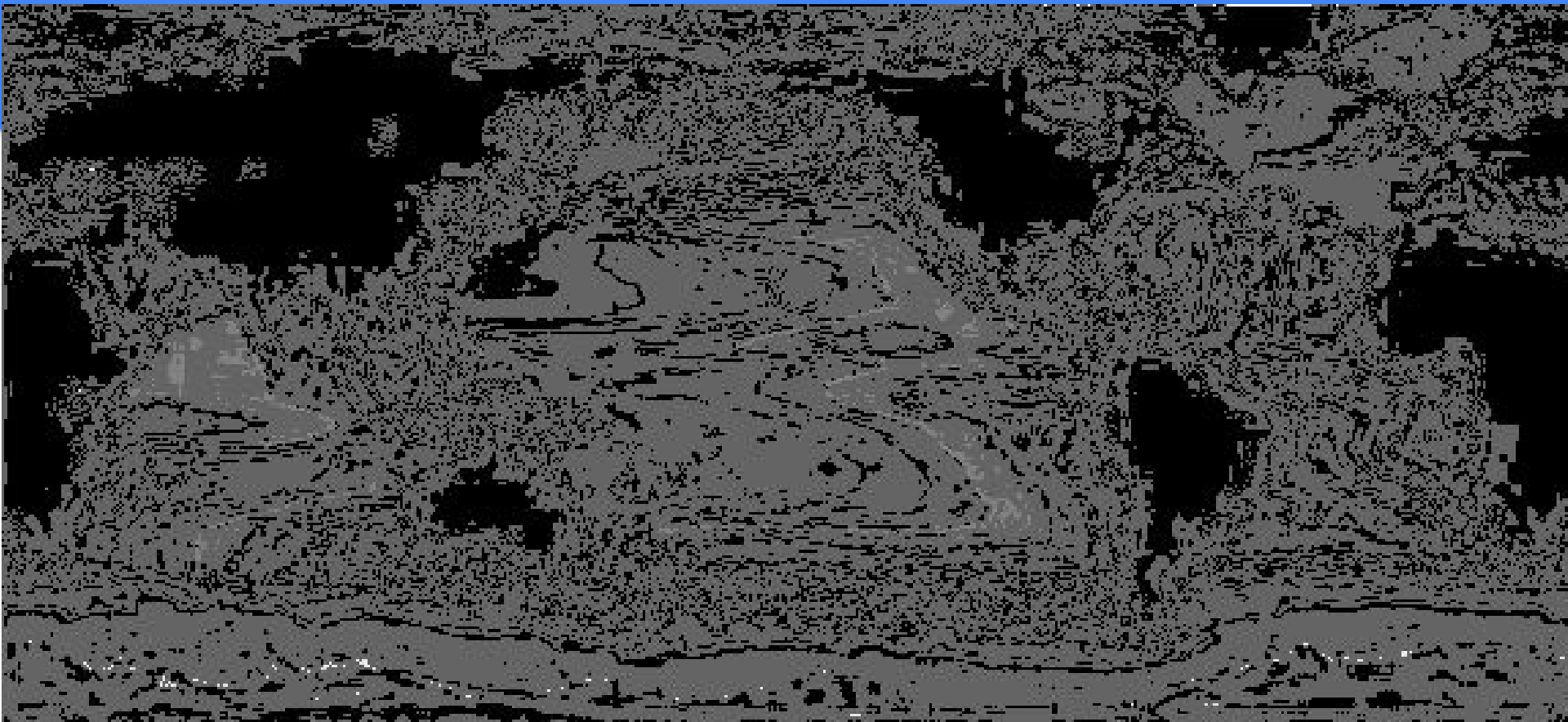
Milestones:

- Mapping original image to monochrome
- Rendering a displacement map
- Rendering a *presentable* displacement map

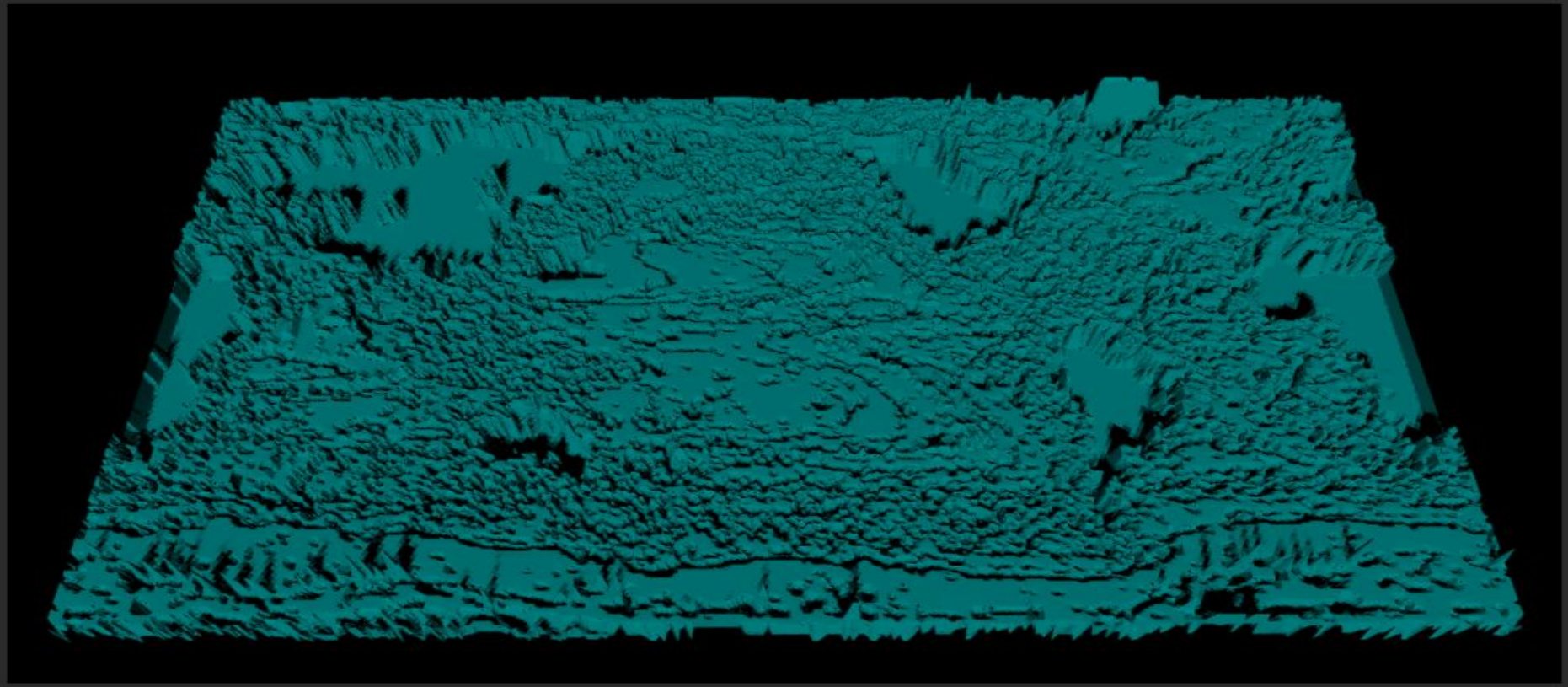
Setbacks:

- Difficulty in finding images
- RBG conversion to monochrome tricky & time-consuming
- Not being able to see displacement map in viewport

Converted Image, Attempt 1

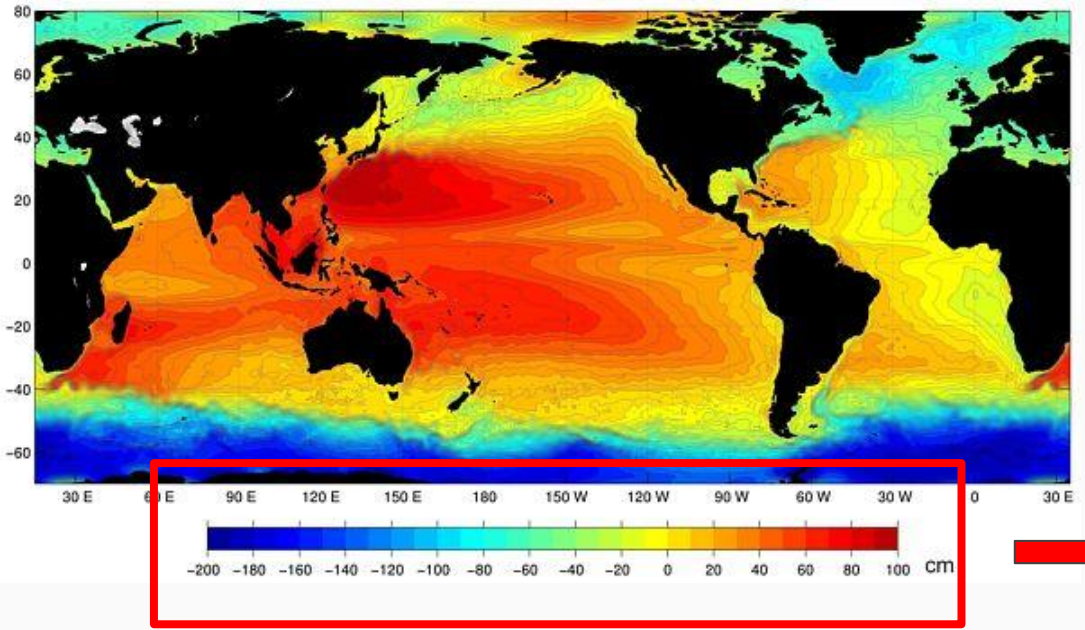


Displacement Map, Attempt 1



Code Review

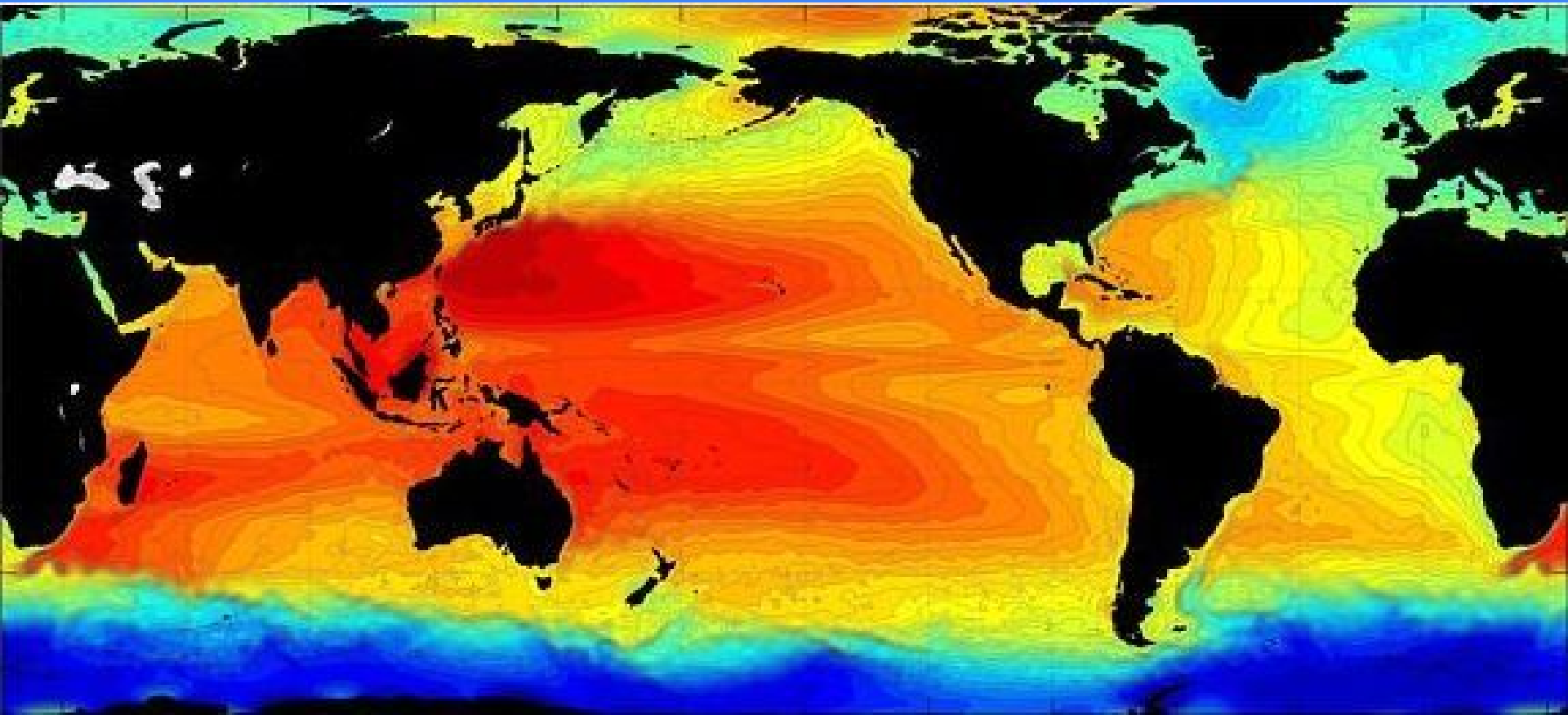
Scaling



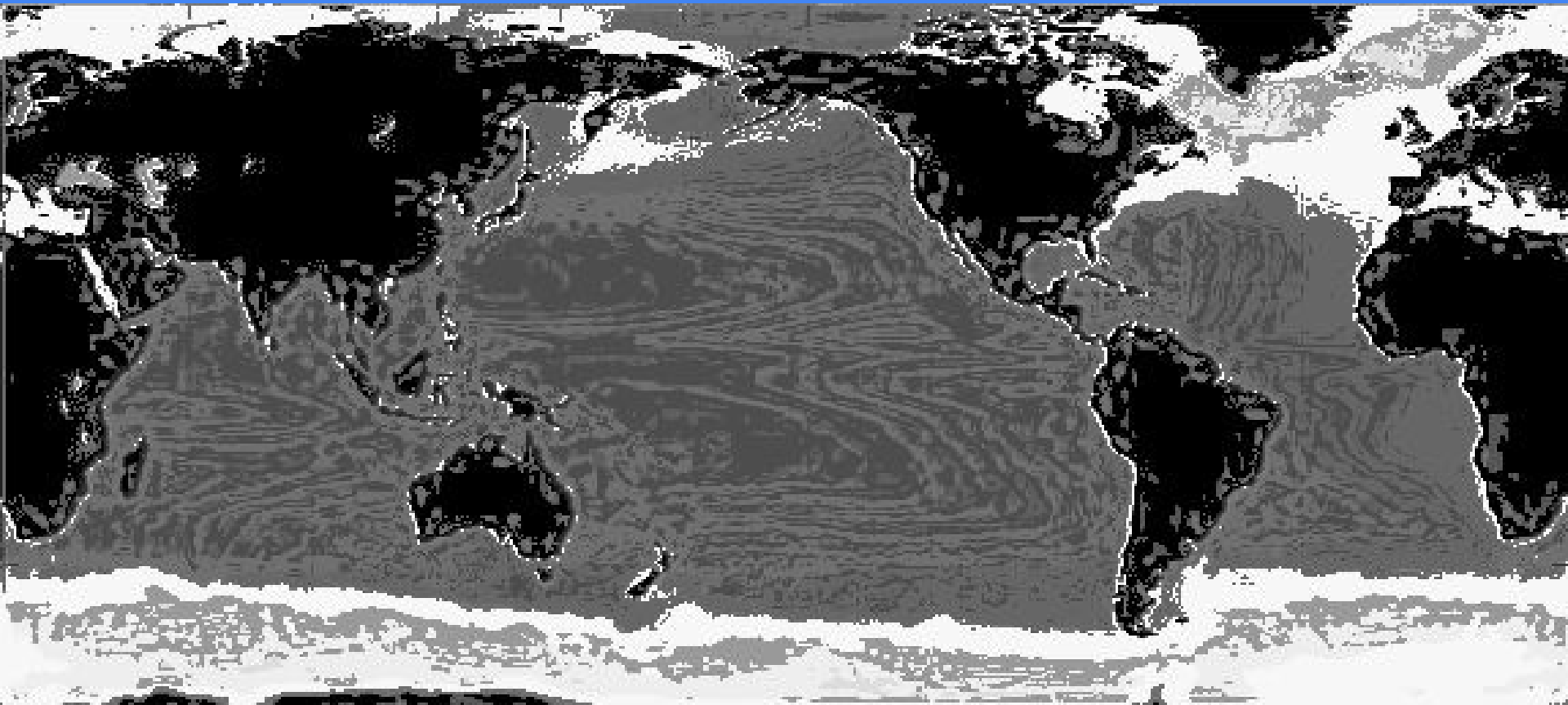
	A	B	C	D	E	F
1	From	To	R	G	B	Monochrome
2	-200	-190	2	1	158	0
3	-190	-180	2	0	187	9
4	-180	-170	1	0	222	17
5	-170	-160	1	2	249	26
6	-160	-150	3	32	252	34
7	-150	-140	3	62	254	43
8	-140	-130	2	96	253	51
9	-130	-120	4	127	250	60
10	-120	-110	5	157	250	68
11	-110	-100	4	190	249	77
12	-100	-90	8	187	246	85
13	-90	-80	9	221	250	94
14	-80	-70	10	250	248	102
15	-70	-60	65	251	192	111
16	-60	-50	100	251	160	119
17	-50	-40	128	251	132	128
18	-40	-30	163	251	98	136
19	-30	-20	194	252	67	145
20	-20	-10	224	253	14	153
21	-10	0	252	253	36	162
22	0	10	251	223	11	170
23	10	20	251	190	11	179
24	20	30	250	160	9	187
25	30	40	247	128	7	196
26	40	50	247	96	7	204
27	50	60	246	63	5	213
28	60	70	246	29	6	221
29	70	80	243	5	4	230
30	80	90	217	4	4	238
31	90	100	185	4	6	247
32	100	110				255

Demo

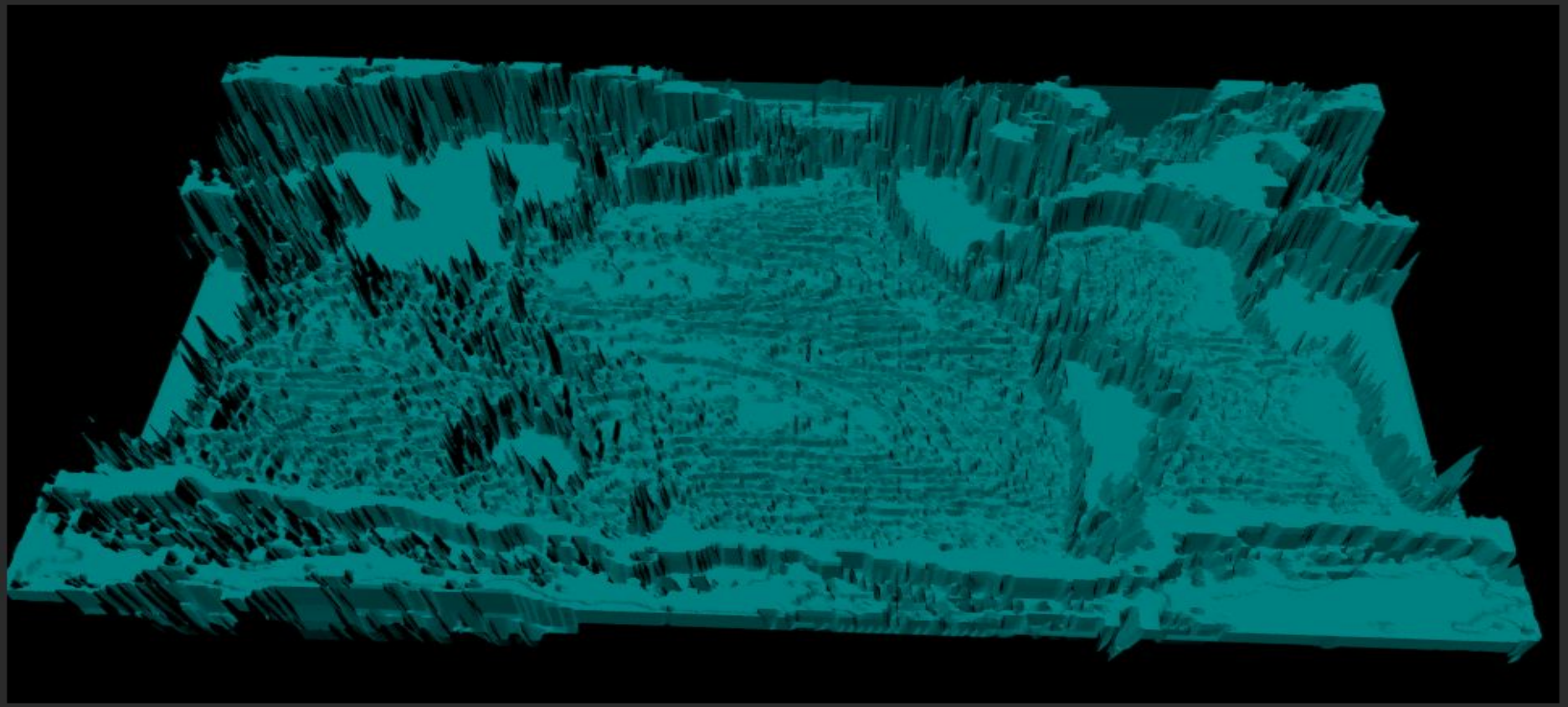
Original Heat Map



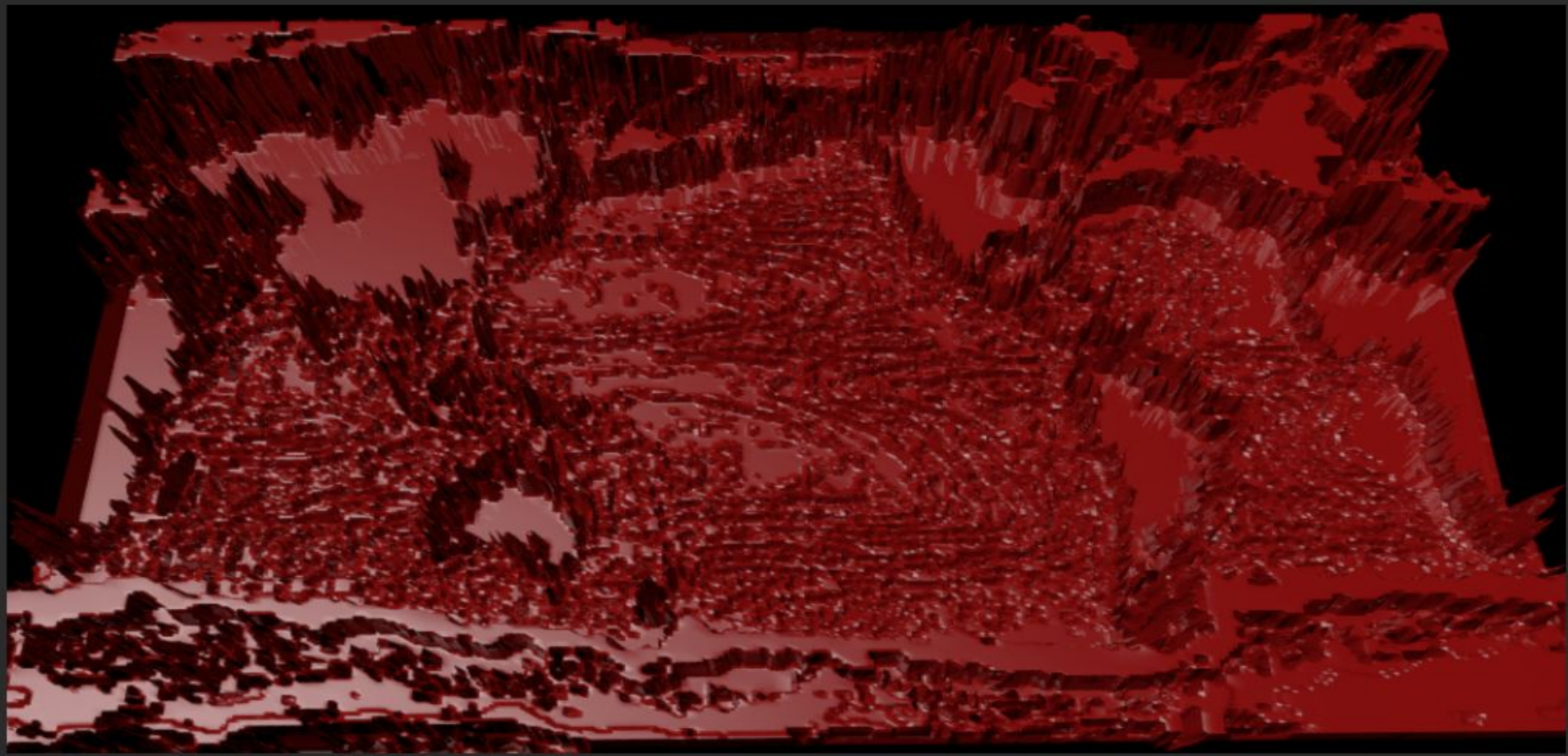
Successfully Converted Image



Successful Displacement Map



Different Material



Lessons Learned

- Mapping colored images to monochromatic images is difficult
- Detail-level of final render depends upon quality of conversion scale and level of resolution

Conclusions & Future Work

- Project went well for first attempt
- Many ways we can portray the best data possible
  - Height Mapping
  - Color mapping
  - Materials