

Project 2 | Complex Scene

Glow Worm Cave

Amanda Jayapurna

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Houdini Version 18.0.566

Important Statistics:

Average render time: 7min 14s (720HD, 3x3 Pixels, 2/9 Rays)

Number of lights in scene: 16 Point Lights, 1 Sky Light

Complexity of geometry (approximate):

- Instanced Sphere (strings): 372 Packed Geos
- Cave Wall: 2 Volumes

About the Project:

Following the reference picture below, the goal of my project was to emulate the magic of the Glow worms that light up caves in Waitomo, New Zealand. I focused on creating a more close up shot to highlight the details of the physical worm strings rather than just instanced lights.

For camera composition and movement, I used the video below as reference:

Reference Animation Video: <https://www.youtube.com/watch?v=ALLKjKgV5So>



Fig. 1. Reference Image: Waitomo's Lights

How the file is organized:

In the top level we can find different colored networks. The networks in yellow are the ones that contain geometry related to the scene. The ones in blue are the lights, and red is the camera.

The Process - Problems and Solutions:

1. Creating the Cave Terrain

- Because I had already determined my camera layout early on, my “cave” was simply a box with a small hole cut into it to let a bit of sky light seep inside. The “cave wall” was several height field noises layered on a plane.
- To create the large concave shapes I used a low frequency, smoothed Chebyshev Worley noise, and I blended that with 2 smaller frequency, rough, high amplitude perlin noises in a Heightfield layer node to create the overall bump across the entire surface.

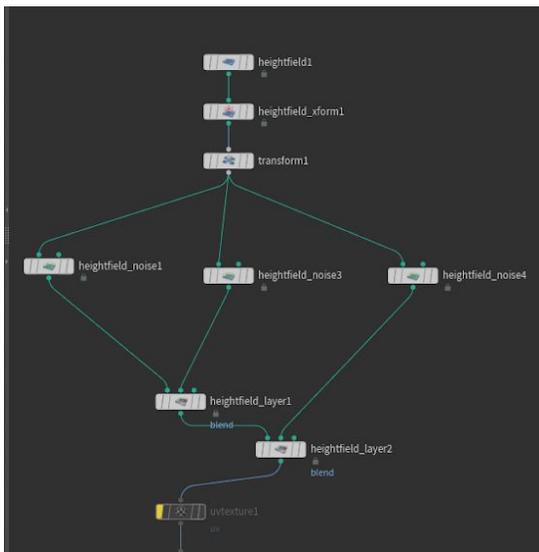
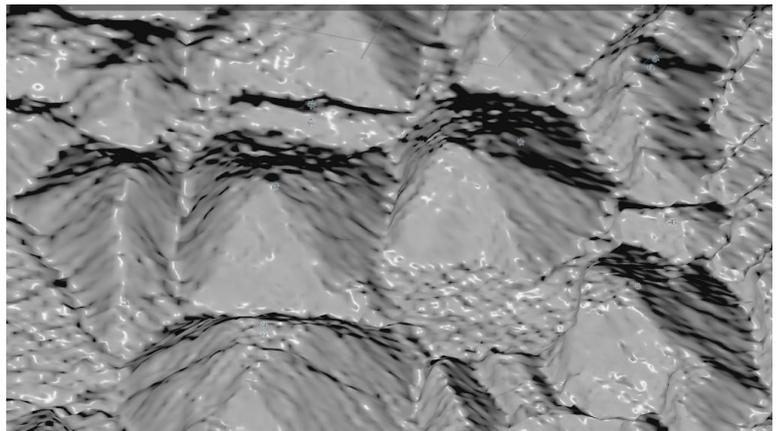
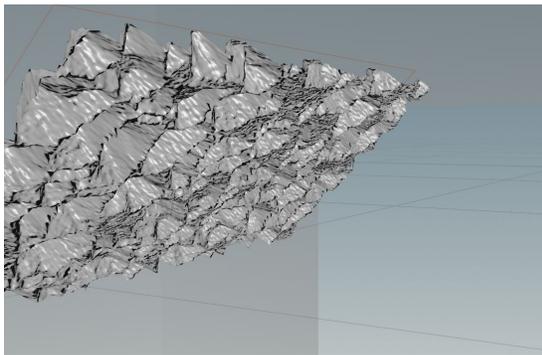


Fig. 2. Height Field Noise Blending

2. Randomize & Focus Spacing of Geometry:

- In order to focus the instanced spheres to clusters of points radial to the light sources, I used the Height Field Paint and Height Field Scatter nodes to hand select where they will go.
- After copying to points, I used the transform node to offset, rotate and scale to randomize placement and the blast node to delete the top parts of the circle path shapes.

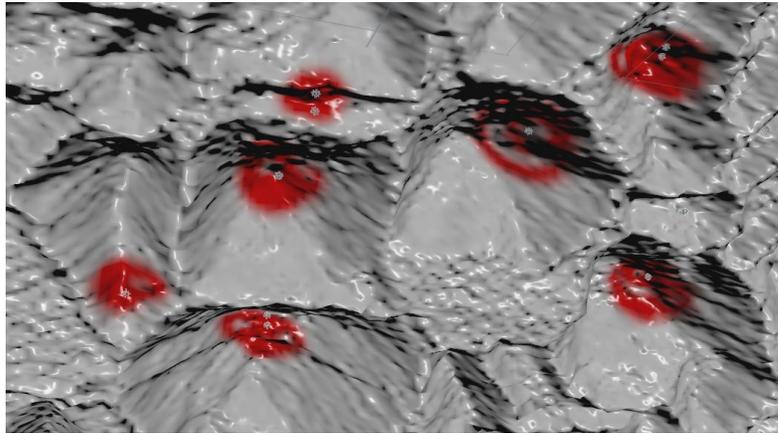


Fig. 3. Height Field Paint Mask

3. Cast Shadows:

- On initial render, I ran into the problem of having too many overlapping and distracting cast shadows from the massive amount of spheres. This was resolved by taking the sphere geo to the top level nodes so it could be object merged in to turn off shadows in the Shadow Mask.



Fig. 4. Cast Shadows

4. Match Lighting:

- To achieve the look of a bright hotspot with a softer outer glow, I added 2 point lights within each cave divet-- one with a high exposure and small active radius, and one with a low exposure and large active radius.
- I had initially applied a translucent, glass-like shader to the spheres, but this caused the render to be unnecessarily noisy, so I changed it to a simple white base color with a higher specular roughness to save render times.
- Lastly, I used the Glow and Color correct nodes in Nuke to enhance this effect in post.

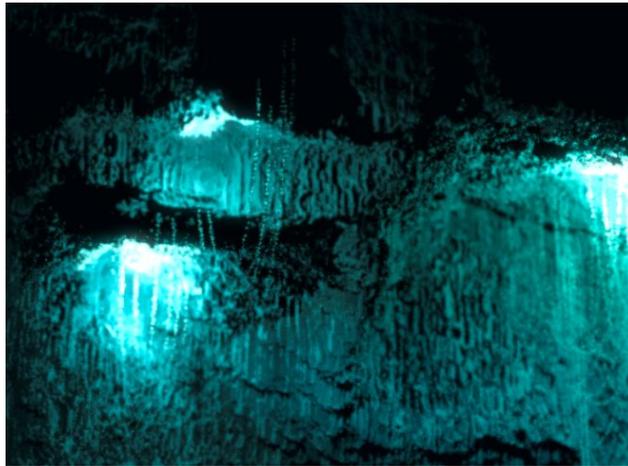


Fig. 5. Glow Effect

Final Result

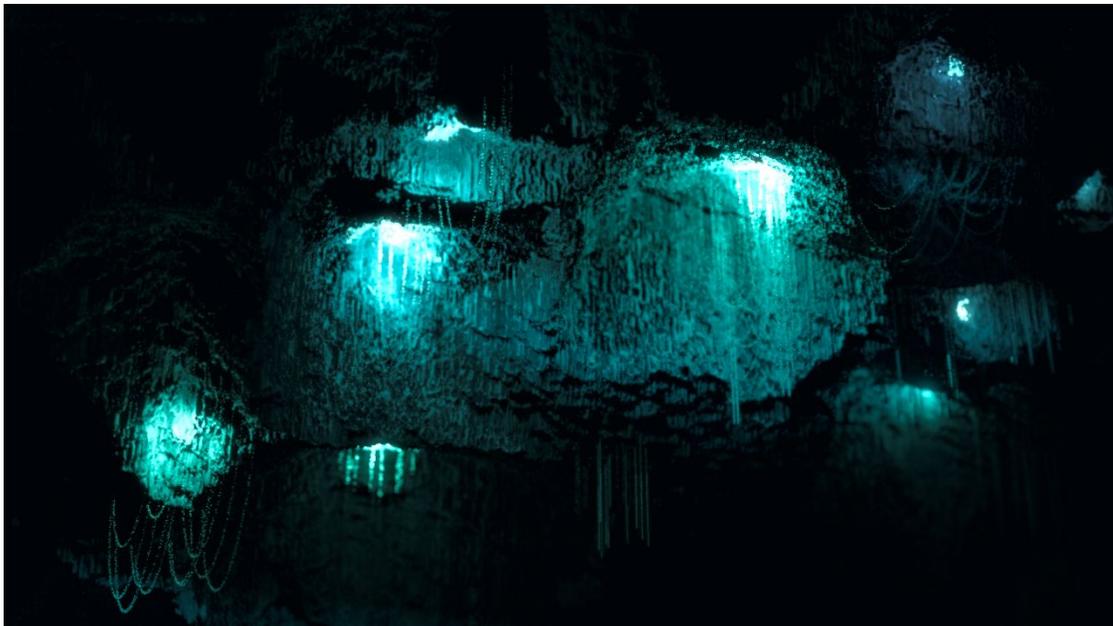


Fig. 6. Final Beauty Pass