

# Complex Scene: Crystal Cave

## Project Breakdown

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VSFX 350

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Houdini Version: 18.0.287

### **Important Statistics:**

- Render Information
  - renderer: mantra
  - image resolution: 1280 x 720
  - noise level: 0.01
  - min/max rays: 6 / 12
  - diffuse quality: 3
  - pixel samples: 5 , 5
  - average render time per frame: 4 hours, 10 mins
- Lights: 2 grid spotlights, 4 grid lights, 1 disk light, 1 instanced sphere light
- Geometry Complexity:
  - 2 heightfields
  - packed geos: 6 types of packed crystal variations, between 10-30 packed geos in each copy group.
  - 23 objects in outer level

### **Project Description:**

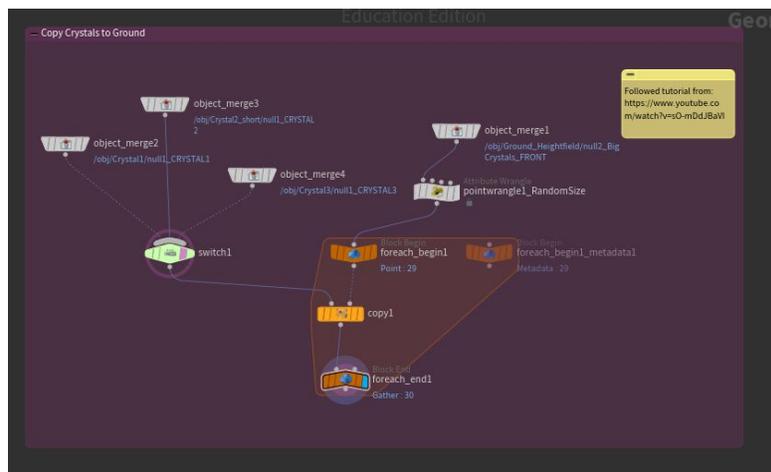
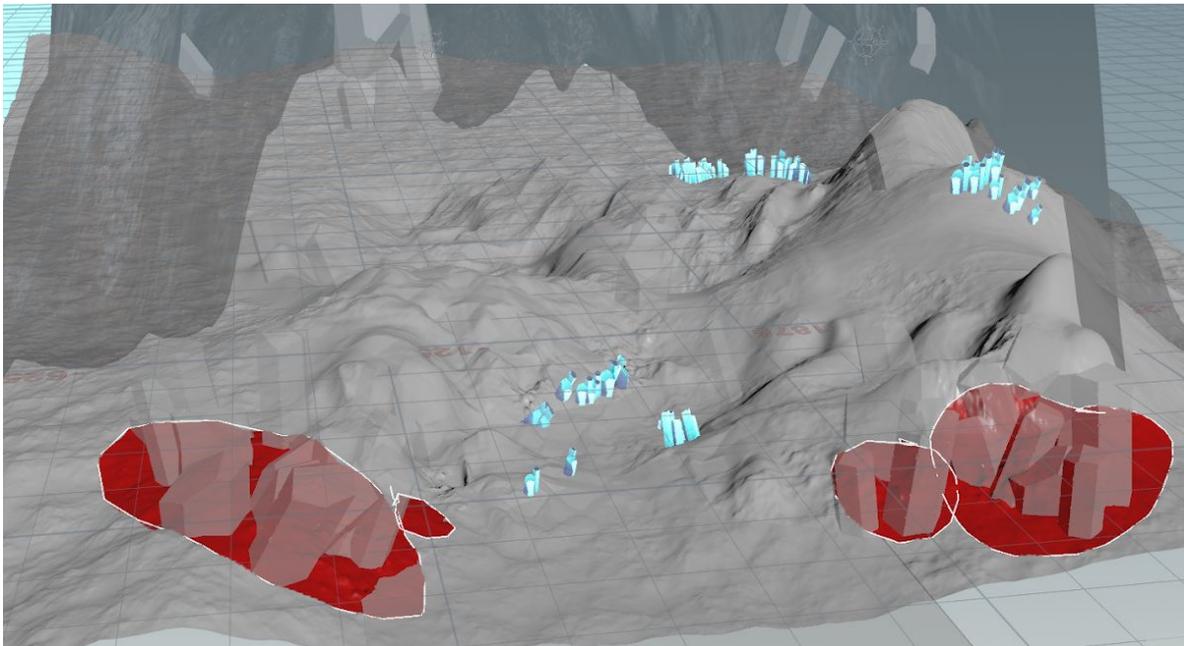
- Reference: environment art by Sihun Park on ArtStation



My goal for this project was to take this concept art and create my own stylized, unique scene with a similar mood and lighting.

## Technical Guide:

- **Heightfield Creation:**
  - The initial shape of the cave was created using basic geometry and a heightfield project node to mold the heightfield around that geometry. I then blended it and used heightfield paint and heightfield noise with masks to make the desired shape and texture of the cave.
  - I added a ground plane in a separate geo with heightfield paint and noise.
- **Heightfield Masks and Heightfield Scatter to Points:**
  - In order to get the crystals to stick to the heightfields, I used heightfield masks and scattered points to the areas in the masks. The 3 different crystal models were then plugged into a switch node setup (below) and assigned to the points in the masks. This allowed me to create variety and added flexibility to the number/type of crystals and their placement in my scene.



- **Crystal Modeling and Texturing:**
  - I wanted to make sure that my crystals did not seem too perfect, since crystals in reality have many chips and cracks running through their surface. I followed a tutorial from <https://vimeo.com/205629784> to create those chips in the edges of my crystals to achieve more depth and interesting effects with lighting.
  - For the texture of my crystals, I used a blue gradient map and matching emission map I created in Substance Painter so that the emission color would also match the gradient. I then altered other settings such as transparency and reflection until I began to see the results I wanted.

### **Problems and Solutions:**

- **Render Optimization:**
  - I wrote out all of my crystal geometry and read it back in using a File node so that it would be quicker for Houdini to process.
  - I ran into trouble with render times, render memory, and crashes during this project. I did tests to isolate where the issue was happening and found out it was a problem with my initial crystal shader. After I simplified it, I was able to render.
- **Volumetric light and atmospheric fog effects:**
  - In order to achieve the foggy, dreamy look of the concept art, I wanted to create atmospheric lights and god rays in my scene. However, due to the already high render times, this was not reasonable to do within Houdini.
  - Therefore, I decided to use Nuke to create the atmospheric lighting post-render along with some touch up work to create a more cohesive mood.