Mountain Generator Research.

- Hanwei Wu

I have always loved landscape and mountain is one of my favor element with in a landscape. Therefore I want to build a mountain generator for my self with in the three space.

I was inspired from the movie District 9, with in the movie there was one shot looks like this image on the right, and I thought it was very interesting.Later, I had an idea with mountain with different seasonal change ability then simplified down to just how to create the peaks and valleys of the mountain first then get in to the second part later. Then I did many search on the net about how others have done similar things before, and down to how possible if what they did in the movie was possible. There are many approaches, some used triangulated fractal math, some use image based normal deformer, some are more realistic approach, and some are more technical oriented.

The fluid effect in the movies was based on Ferrofluid and the fluid is made up of tiny magnetic fragments of iron suspended in oil (often kerosene) with a surfactant to prevent clumping (usually oleic acid)[1] it's done by Zoic Studios, they achieved the effect by playing around sine wave deformers and then hand-animated the effects. I thought the ferrofluid was very interesting and did some more reading.

Continuing reading things on the net, I found some one made a very simple generator by calculating the mid point of a side of a triangle and displacing it by a random amount in the direction Y and followed by the normal of triangles. After several iterations and subdivisions, they have a terrain of a mountain. They end up looking more like floating ice more then anything.[2]

Spend more time going around on the net I found a very realistic and more sophisticated approach to the problem, but it's rather doing it time after time rather then a procedural where you can run it quick and ease. You will start off using a satellite digital elevation map (DEM) and displacement inside of Maya with the Mental Ray plug-in. DEM

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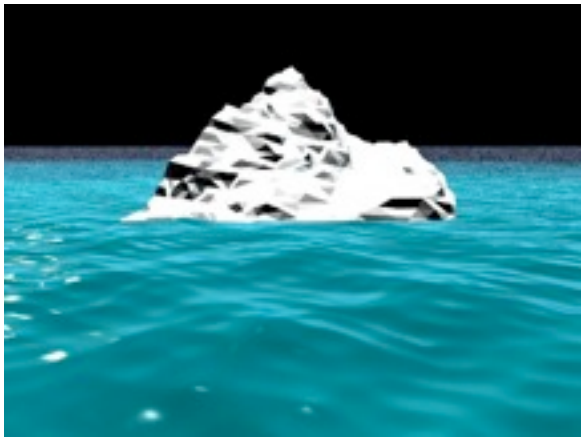
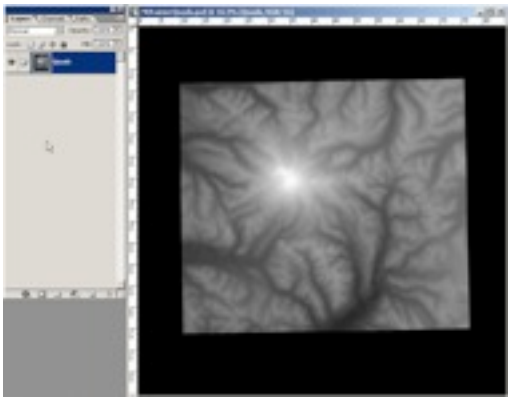
[1] http://www.popsci.com/diy/article/2009-09/making-ferrofluids-work-you

[2] http://www.fx.clemson.edu/~jpotdar/805/proj4/index.html
http://gameprogrammer.com/fractal.html

are greyscale photographs taken by satellites in the orbit of Earth capturing terrain elevation values.



After having all the elements you need, you will then open Maya, and starting by creating a NURBS plane. With your plane selected, you will then open the Approximation Editor, then create a Displace Approx. Then, you create a Lambert shader and give the out put attribute as a Displacement Mat. When you done, hit render, you will see small amount of Displacement but not enough to push out the peaks and valleys. now we will go into the the attribute Editor after selecting the NURBS Plane. Under the Color Balance we will push up the Alpha Gain to give more bumpiness to the surface, at the same time we need to turn on Display Render Tessellation. This way it will increase the amount of the NURBS faces when render witch will achieve the very detailed peaks and valleys that are happening in the DEM map. [3]



By doing many research it comes to me that many people have try and done a great job of doing it. I have always try to achieve something more original and creative. In this case, with the amount of the knowlogy I have with in MEL, I have looking into the exercise we have done during this quarter, one of them was the random transformation of object. I thought what if I use that but only in Y direction will that achieve what I was looking for. so I went into maya created a NURBS plane with the new edit of the script, the position of each CV points are going crazy after I have run the scrip and I realize the value of the Max and Minimum was very large therefore I have lower the value of both section and the result was acceptable at the moment. I will select the areas where I need to peak up, and each user will be select their area of choice to peak up. This is something I think it's very important to have. Further into the development of this project it comes to the realizations where I want the user to have the ability to control where the highest peaks might be with a slider. I then was trying to make the CVs

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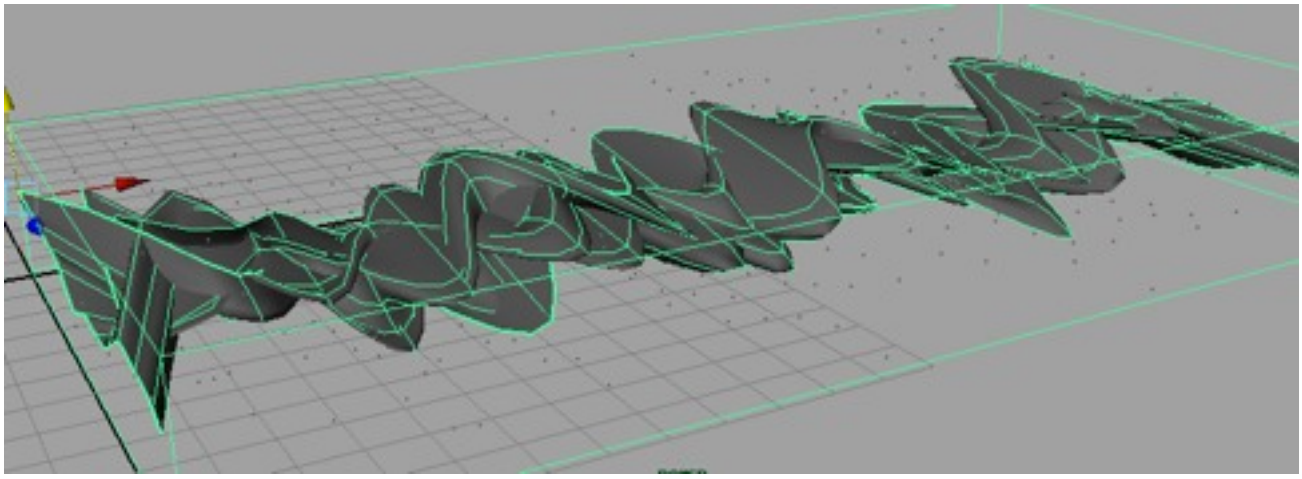
[3] http://www.creativecrash.com/tutorials/digital-elevation-model-dem-terrain-displacement/page5#tabs

into softbody dynamics and use particle expression by giving multiable sine wave at the same time from different direction. Due to lack understanding of the dynamics. I realize that could not be achieved because I was not able to convert the selected CVs into the soft body. It seems that this could happen only with the entire geometry. So I did give a try to the entire body and it shows up as something looking more like this, which is something



I was not looking for.

At the end all I had was just a CV or vertex manipulation tool, it was far from what I was trying to achieve at the beginning. Even it was a failure, I still think the target of this MEL scripting class was achieved. Here is an image of my final product from my script.