- 1. Download Site001_final_adj_5mpp_surf.tif from_https://pgda.gsfc.nasa.gov/products/78
- 2. Open file in QGIS <u>https://qgis.org/en/site/</u>
- 3. To clip from terrain map: Raster \rightarrow Extraction \rightarrow Clip Raster by Extent
 - a. In "Clipping Extent" select "Draw on Canvas"
- 4. Create contours: Raster→Extraction→Contours
 - a. Pick the interval at which the contours are placed (doesn't have to be 5 mpp try out lower values)
 - b. Save to a file with a unique name and in a location you know
 - c. Save as a .shp file

			Cont	our			;
Parameters	Log						
Input <mark>l</mark> ayer							
Fite01_final	_adj_5r	mpp_surf []					· · · · · · · · · · · · · · · · · · ·
Band number							
Band 1 (Gray)							-
Interval betwe	en cont	our lines					
5.000000							_
Attribute name	e (if not	set, no eleva	tion attribu	e is attach	ed) [optional]	
ELEV							
Offset from ze	ro relat	ive to which	to interpret	intervals [o	ptional]		
0.000000							
Advanced Pa	ramete	ers					
Contours							
/home/fletche	r/tmp/r	newDEM/Site	001Contour	s_5m.shp			⊠
✓ Open outpu GDAL/OGR con	t file af sole ca	Eter running a	lgorithm				
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			0%				Cance
Help Run	as Bato	ch Process				<mark>⊗</mark> Close	e 🛇 Rur

- 5. Open Blender; make sure you have add-on Blender GIS: https://github.com/domlysz/BlenderGIS
- 6. Delete object that is automatically generated in Blender (i.e. cube)
- 7. Import contours through GIS→Import→ShapeFile→Select file



8. Select Field and change ID to ELEV. This is where the elevation is associated with each contour line from QGIS

Import SHP							
Elevation so	<u>F</u> ield	~					
Elev. field:	ELEV	~					
Extrusion from field							
Separate objects							
CRS:	Web Mercator	~ +					
Ōĸ							

9. Zero the coordinates of the contours using the panel on the right



10. Create a mesh using GIS \rightarrow Mesh \rightarrow Delaunay



11. Can smooth the mesh by going to Object \rightarrow Shade Smooth



Blender to Gazebo

- 1. In .gazebo/models/ add Flare_Lunar_Terrain_Maps folder
- 2. Create a folder to hold a mode, in this case "Site001_05mpp" for 0.5 meter per pixel
- 3. In the folder create a "media" folder and "model.config" and "model.sdf"
- 4. In media create folders "DAE", "scripts", "Textures"
- 5. In DAE put the .dae file from Blender
- 6. In textures add the texture to be applied to the mesh
- 7. In scripts add "repeated.materials"

```
material RepeatedDust/Diffuse
```

```
{
    receive_shadows off
    technique
    {
        pass
        {
            texture_unit
            {
            // Relative to the location of the material script
            texture AS16-110-18026HR-512x512.jpg
            // Repeat the texture over the surface (4 per face)
        }
    }
}
```

 In model.config adjust appropriately <?xml version="1.0"?>

<model> <name>FLARE_lunar_cropped</name> <version>1.0</version> <sdf version="1.4">model.sdf</sdf>

<author>

<name>Fletcher</name> <email>fsmith14@terpmail.umd.edu</email> </author>

<description>

Site 001 mission site cropped 2000m for NASA mission </description>

</model>

- 9. In model.sdf adjust the directory path to make sure it goes to the correct dae file <?xml version="1.0" ?> <sdf version="1.5"> <model name="FLARE lunar terrain cropped"> <pose>0 0 0 0 0 0 0</pose> <static>true</static> <link name="body"> <visual name="visual"> <geometry> <mesh><uri>model://Site001 05mpp/media/DAE/Site001 LZ 05mpp.dae</uri></mesh> </geometry> <material> <script> <uri>model://FLARE Lunar Terrain/media/scripts</uri> <uri>model://FLARE_Lunar_Terrain/media/Textures</uri> <name>RepeatedDust/Diffuse</name> </script> </material> </visual> <collision name="collision"> <geometry> <mesh><uri>model://Site001 05mpp/media/DAE/Site001 LZ 05mpp.dae</uri></mesh> </geometry> </collision> </link>
 - </model>
 - </sdf>

Blender Scattering Rockers

Create the rock by using the rock generator

Method 1. Select the rock(s) that you want to scatter \rightarrow F3 to search for the scatter tool \rightarrow Draw on the surface the rocks you want to scatter

Method 2. Add particle emission, model as hair and interpolate the children