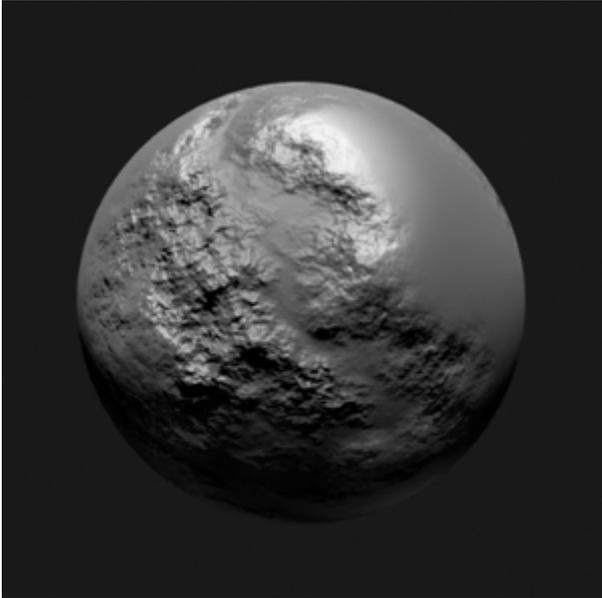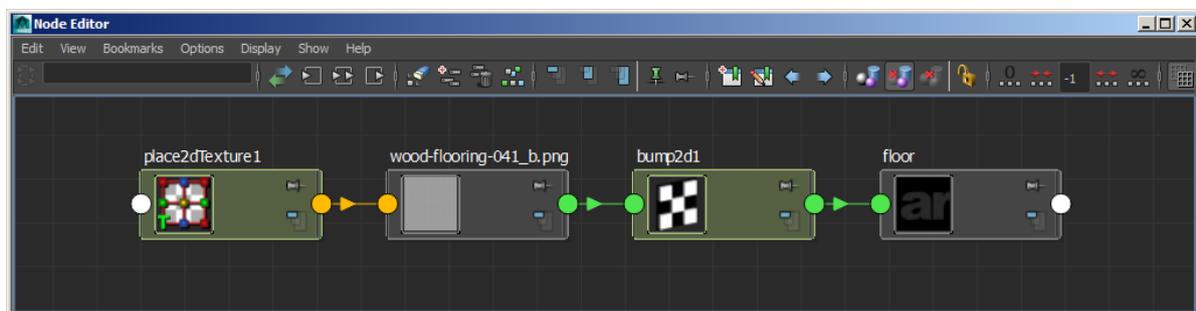# Bump Mapping

The bump mapping attribute accepts a shader that perturbs the normal for bump mapping.

bump2d shading network

Normal Mapping

Normal mapping works by replacing the interpolated surface normal by the one evaluated from an RGB texture, where each channel (Red, Green, Blue) represents an axis and strength for the bump. It can be faster than bump mapping since bump mapping requires evaluating the shader underneath three or more times.

> ⊖ When using Color Management in Maya (2017), normal maps should be set to **RAW**. More information can be found here.

> ⓘ A tutorial that shows how to combine normal and bump maps can be found here.

> ⓘ There is also the Arnold specific Normal Map shader.

In the example below a normal map is connected to a Maya bump2d node which is connected to the bump mapping attribute of an a Standard shader.
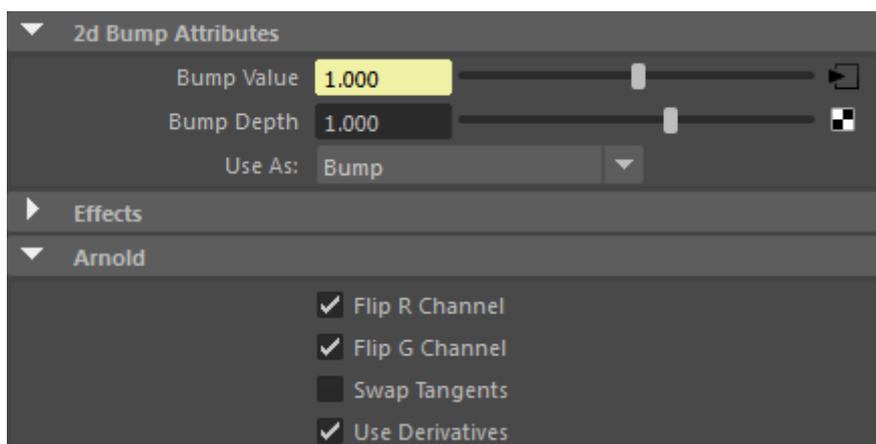
> ⚠ Note that adjusting the Bump Depth attribute will have no effect on the normal map.
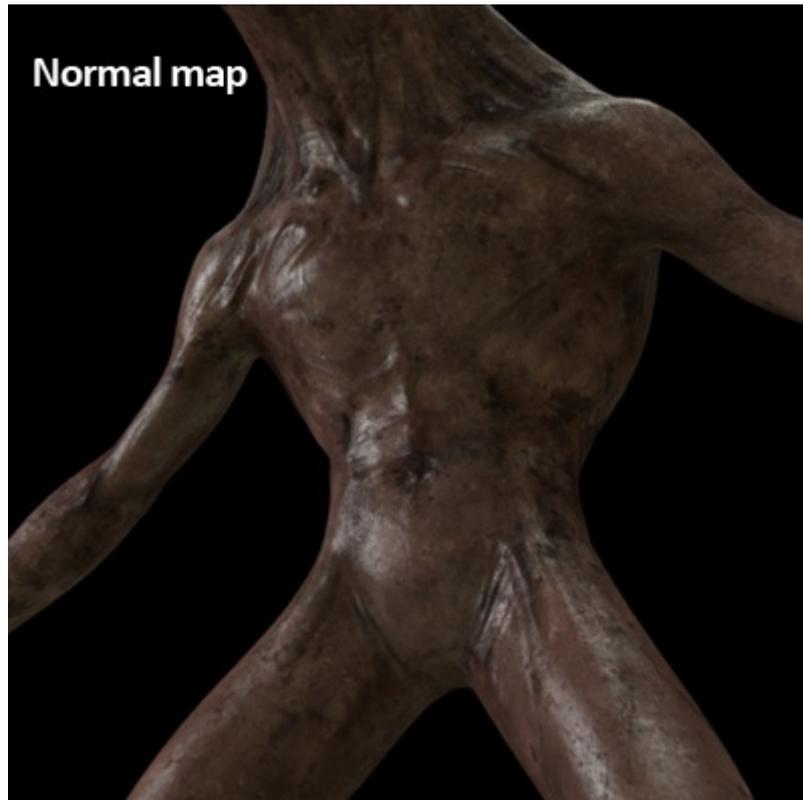
Normal map connected to a Maya 'bump 2d' node. 2d Bump set to 'Tangent Space Normals (rollover image)

Arnold Attributes

MtoA supports normal maps through the native Maya bump2d node. However, there are some extra attributes added to Flip the different channels:

FlipR

The FlipR button will flip the Red Channel of the Normal Map.

FlipR (rollover image)

FlipG

The FlipG button will flip the Green Channel of the Normal Map.

FlipG (rollover image)

Swap Tangents

The Swap Tangents will switch the Red and Green channels of the selected Normal Map.

Swap Tangents (rollover image)

Use Derivatives

Enables the use of derivative normal maps. If you disable 'Use Derivatives' when using tangent-space normal mapping, the bump shader uses the tangent and bitangent data stored on the mesh. Otherwise (by default), the bump shader will use the UV surface derivatives from the Arnold shading globals.