

# MicroSplat

Terrain Blending Module, Documentation



## Overview

The Terrain Blending module allows you to easily blend meshes with the terrain.

# Quick Start

Setup couldn't be simpler.

1. Select your terrain and double click on the 'Template Material' on the MicroSplat Terrain component to bring up the shader properties.
2. Turn on "Terrain Blending" in the Shader Generator options.
3. If you NOT using Draw Instancing on your terrain, select the terrain and generate the per pixel normal map by pressing the Generate button next to the "Normal Data" section of the MicroSplatTerrain component
4. Place an object on your terrain.
5. Add the "MicroSplat Blendable Object" component to your object
6. Adjust the parameters to control the blend

Detected Terrain	# Terrain (Micro Splat Terrain)
Override Blend Target	None (Micro Splat Object)
Terrain Blending	<input checked="" type="checkbox"/>
Blend Distance	3
Blend Normal Distance	1
Blend Contrast	<input type="range"/> 0.0001
Lighting Matrix Blend	<input type="range"/> 72.3
Blend Curve	<input type="range"/> 1.57
Slope Filter	<input type="range"/> 1
Slope Contrast	<input type="range"/> 17.3
Slope Noise	<input type="range"/> 0.35

The Blendable Object component has two sections; one for Terrain Blending, and if you have the Snow module installed and turned on, one to put snow onto objects. You may turn either of these features on or off independently. The parameters are covered below:

## Terrain Shader Options

- Detected Terrain
  - This shows the terrain that was automatically detected, if any. When the component is enabled, it ray casts down from the center point of the object it is on to find the nearest terrain or mesh terrain.
- Override Blend Target
  - This allows you to specify which terrain the blend should work with. Usually you can just use the autodetected one, but if for some reason the pivot of your object is outside of the terrain bounds, this can be useful.
- Dither Alpha
  - Normally terrain blending is drawn in the transparent pass and uses alpha to blend with the existing scene. This can have some issues though, in that effects like SSAO render before the alpha pass. So an option to use a dither based alpha is available. When dither based alpha is used, the shader is drawn in the opaque pass, and uses a dither pattern to clip pixels to create an alpha like effect. It can create a “screen door” effect up close, but is surprisingly convincing, and when used in combination with Temporal Anti-Aliasing can look amazing.
- Object Normal Blending
  - When enabled, you can give each object a normal map to use when blending the normals
- Disable Alpha
  - By default, the vertex color’s alpha channel is used to adjust the blend. This allows you to use a vertex painting toolset to paint out areas of the terrain on meshes. You can even set the distance so the entire object is textured like the terrain, then use a vertex painter to paint the areas where the original texture should come through.
- Blend Noise
  - When enabled, a 3d noise of 1 or 3 octaves will be generated to modify the blend area.
- Enable Triplanar
  - If your terrain is in world space UV mode, and you have the triplanar module installed, you can turn triplanar on only for terrain blended objects using this option. This can save performance when your terrain looks fine without triplanar but your blended objects don’t.

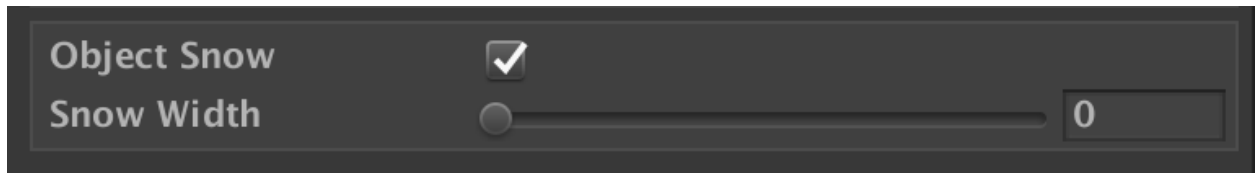
# Terrain Blending Object Properties

These options are adjusted on each object which blends with the terrain.

- Blend Distance
  - This is the distance over which to perform the blend with the terrain
- Normal Distance
  - This is the distance over which to blend the normals of the terrain and object. When using triplanar texturing, it's often desirable to blend the normal into the object normal faster.
- Blend Contrast
  - This changes the blend from a linear blend (soft) to a height map based blend (hard)
- Lighting Matrix Blend
  - This controls how quickly the lighting matrix goes from the terrain's matrix to the object's matrix. A more detailed explanation is below
- Blend Curve
  - This controls the midpoint of the blend between each surface. Values below 0 will pull the blend towards the ground, and values above one will push it over the object.
- Slope Filter
  - When values below 1 are used, the terrain texturing will get added to the top of objects. This allows you to have moss growing on the tops of rocks, etc.
- Slope Contrast
  - A contrast control for how sharp the transition is for the slope filter
- Slope Noise
  - Allows you to add a bit of noise to the slope transition area, which is derived from the terrain's normal map
- Blend Noise Scale



- If Blend Noise is on, this will allow you to scale the size of the procedural noise used to break up the blending. This control does not show if Blend Noise is not enabled.

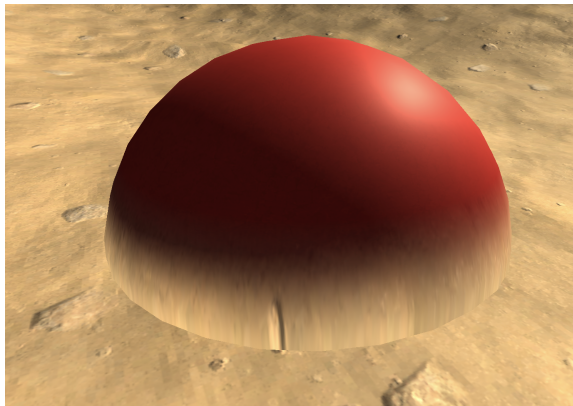


## Snow

- Snow Width
  - This controls the amount of snow that appears on an object based on the normal of the surface.

## Lighting Matrix Blend

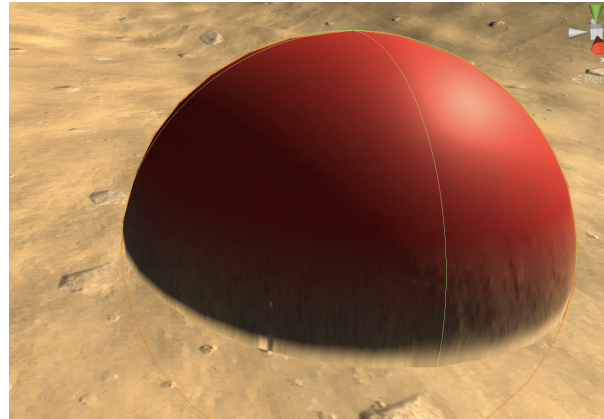
The blend is applied both to the texture and to the lighting, such that the object is lit like the terrain in the blending area. However, this can have some negative side effects when the blend is very wide and the difference in angles between the two objects is great:



In this example, the terrain is lit because the normal is pointing straight up, and thus the back of the ball looks as if it's glowing, because it's also being lit like it's facing up.

By increasing the Lighting Matrix Blend, we can make the area of the lighting blend much smaller.

When the blend area is much smaller, the unlit area no longer appears to glow, while the lit area still looks correct.



## Updating

If you are not using Draw Instance on your terrain, then you will need to manually update the terrain's per-pixel normal map after making changes to the terrain's heights. You can do this by pressing the Update button next to the "Normal Data" section of the MicroSplatTerrain component. The blending on objects will update automatically as you move them around, but after changing the terrain's topology you will have to update this data again.

If you are using Draw Instanced, then by default you will still have to generate the data with the Update button. But another option is to add the MicroSplatUseInstanceNormal.cs script to your terrain. This will allow you to use the data Unity automatically generates for terrains instead of needing to generate it whenever you make a change - however, due to a bug in Unity, this data is not immediately available on the first frame, so a separate script needs to run to grab this data each frame. Note that blending may not work on the first frame due to the unity bug, but this can save considerable texture data when running in Draw Instance mode.

## Restrictions

Currently, Terrain Blending only supports a single mesh per object. If your object has multiple submeshes, Unity will only apply the blend to the first submesh of the object. It is

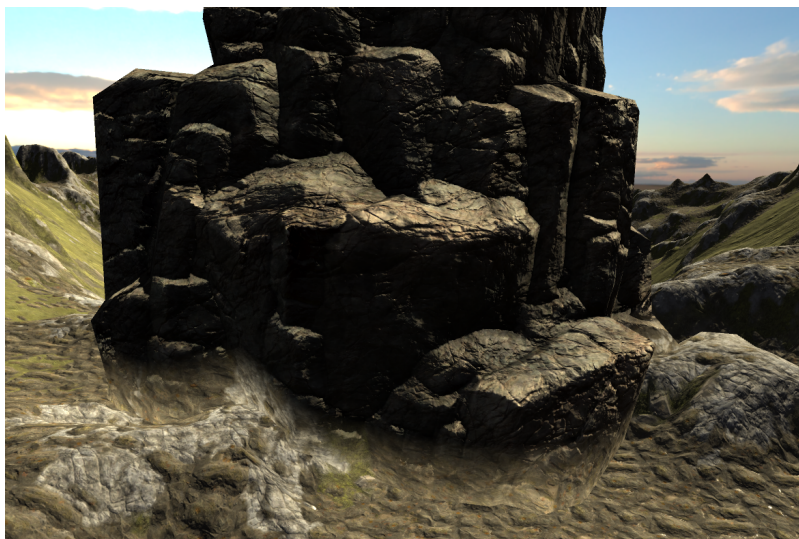
recommended to break these objects into multiple meshes or combine the textures into a single texture page for better performance.

The blending data is named after your terrain object and placed in the MegaSplatData folder along with the other objects your terrains use. If you have multiple terrains sharing the same setup, you should make sure each terrain has a unique name.

You will notice that the component adds a second material to your mesh. Should you wish to remove the blending feature you will want to remove this second material as well. Note that it is best to only add the blending component to meshes which intersect the terrain, as you will pay an additional rendering cost for them.

## Useful Info

The terrain blending feature generates a special shader to perform the blend with the terrain. This shader is recreated every time a feature is changed on the main shader, and any change to the shader properties done in the editor is also propagated to this shader via the MicroSplatTerrain Syncing mechanism (which can be called from code via `MicroSplatTerrain.SyncAll();` )



Blending with the terrain can create undesirable results. Wide blending areas can look amazing, but since you are blending both the texturing and lighting data, it can cause the

backside of an object to appear brighter than you would expect, as it's blending to a surface which faces a completely different direction. In the above shot, the lighting data is interpolating between the ground (lit) and the back of the rock (unlit), which makes the back side of the rock look like it's illuminated when it shouldn't be. Tightening up the blend area can make this less pronounced, either by decreasing the blend size or adjusting the blend curve.

## Additional Options

When the Anti-Tiling module is installed and Detail Noise, Distance Noise, or Distance Resampling are enabled, options are available under the Terrain Blending option to disable each of these features on the blending shader. This is primarily useful with Triplanar Texturing enabled, as these features use standard UV mapping, and may cause streaking issues when blending on vertical surfaces.

## Hidden tricks

When Draw Instanced is enabled, the terrain blending system internally uses the instancing height and normal map to sample the terrain data instead of the terrain descriptor. This means that if you're using something like Map Magic to dynamically generate your terrain, you can still use Terrain Blending on your objects as long as Draw Instanced is enabled. Note that it also means you can save the memory of the per pixel normal map if you are not using it for other features (like dynamic streams).