

mewlist

Massive Clouds version 4.0.0

Screen Space Volumetric Clouds

MASSIVE CLOUDS



What is MassiveClouds

MassiveClouds is an asset for creating rich and procedural clouds by volume rendering.

Based on abundant presets, let's create clouds that match the world of the game!

In addition to the operation as a camera effect, it is also possible to set it as a custom effect of PostProcessingStack (V2). In the LWRP(4.x/5.x) / HDRP(4.x) environment, you need to set it as a custom effect of PostProcessingStack (V2). In LWRP (6.5 or later), drawing can be performed at any timing by providing a cloud drawing path as a Renderer Feature.

For environments where the use of scripts such as VRChat is restricted, it is also possible to draw clouds by pasting them on a mesh of spheres using MassiveCloudsMaterialExporter.



Unity Versions

	CameraEffect	PPSV2 Before Transparent	PPSV2 Before Stack	LWRP Renderer Feature
Unity 2017.4 Standard Render Pipeline	Work	Not Available	Not Available	Not Available
Unity 2017.4 VR Multi Pass Standard Render Pipeline	Work	Not Available	Not Available	Not Available
Unity 2017.4 VR Single Pass Standard Render Pipeline	Work	Not Available	Not Available	Not Available
Unity 2017.4 VR Single Pass Instanced Standard Render Pipeline	Not Available	Not Available	Not Available	Not Available
Unity 2018.3 Standard Render Pipeline	Work	Work	Work	Not Available
Unity 2018.3 VR Multi Pass Standard Render Pipeline	Work	Work	Work	Not Available
Unity 2018.3 VR Single Pass Standard Render Pipeline	Work	Work	Work	Not Available
Unity 2018.3 VR Single Pass Instanced Standard Render Pipeline	Not Available	Not Available	Not Available	Not Available
Unity 2018.3 Lightweight Render Pipeline (LWRP 4.x preview)	Not Available	Not Available	Work	Not Available
Unity 2018.3 High Definition Render Pipeline (HDRP 4.x preview)	Not Available	Not Available	Work	Not Available
Unity 2019.1 Standard Render Pipeline	Work	Work	Work	Not Available
Unity 2019.1 Lightweight Render Pipeline (LWRP 5.x) or VR LWRP(preview)	Not Available	Not Available	Work	Work
Unity 2019.1 High Definition Render Pipeline (HDRP 5.x preview)	Not Available	Not Available	Not Available	Not Available

Platforms

- Windows (DirectX11)
- MacOS (Metal)
- iOS (Metal)
- Android (OpenGL ES 3.0)
- Web GL 2.0 (Chrome)

VR Supported Platform

Build Platform	Virtual Reality SDK	Multi Pass	Single Pass	Single Pass Instanced
Windows DirectX 11	Oculus Rift	OK	OK	NG
Android OpenGL ES 3	Cardboard or Daydream	OK	OK	NG
	Mock HMD	OK	OK	NG

HTC Vive / Oculus Go and other devices may work, but actual machine check is not done.

VR is supported on

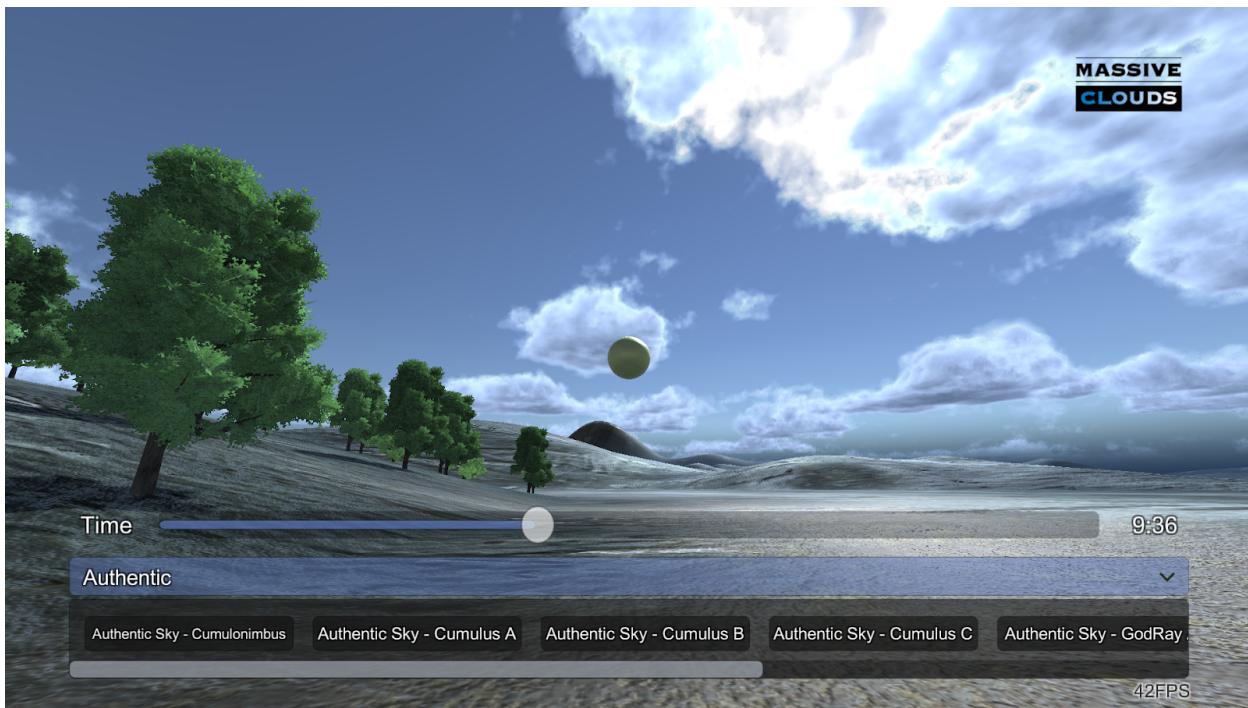
- Unity 2017.4 / 2018.4 / 2019.1 + Standard Render Pipeline
- Unity 2019.1 + VR Lightweight Render Pipeline

Demo Scene

Clouds Demo

Clouds Demo allows you to switch between various cloud presets. Because the cloud lighting is given by the directional light of the scene which becomes the sunlight, you can draw the cloud suitable for the scene. You can also draw toon-like clouds using the Ramp texture.

SampleScene / CloudsDemo Open the scene and play it.



You can switch to various clouds with the button at the bottom of the screen. Also, by moving the Time slider, you can see how the direction and color of light hits change and the appearance of the cloud changes with time.

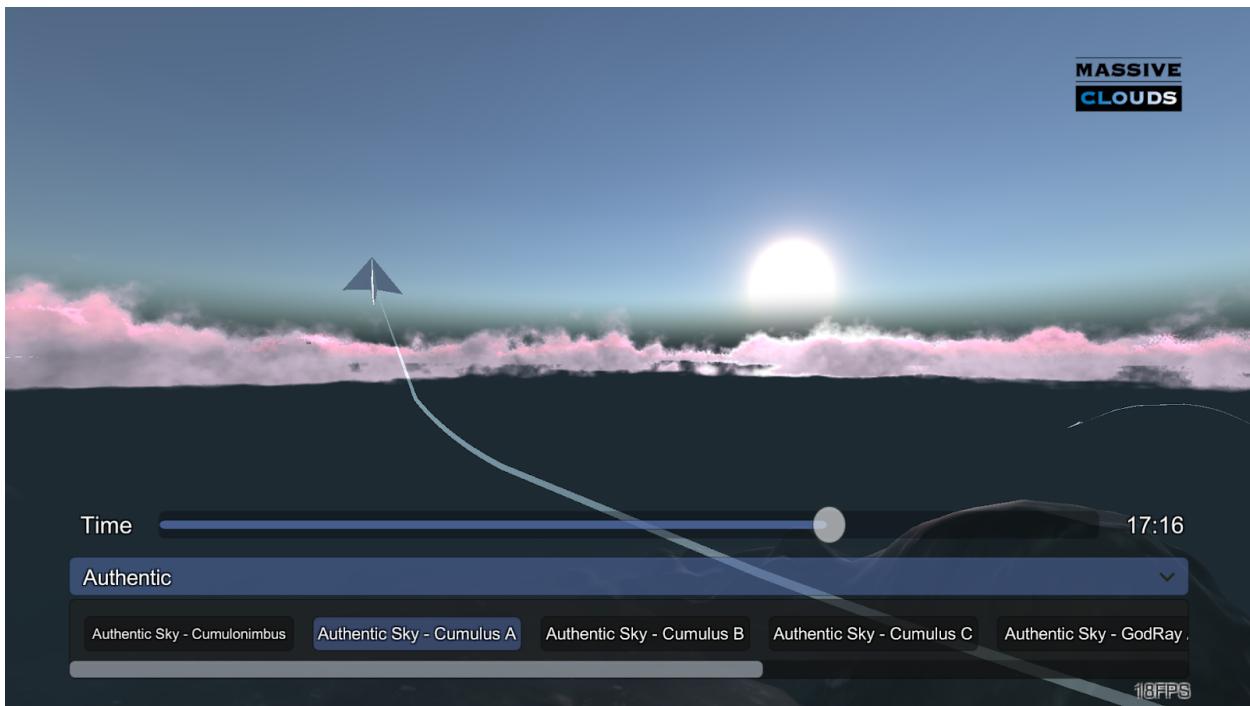
WebGL Demo

<https://mewli.st/MassiveCloudsDemo/v4.0.0/CloudsDemo/>

Beyond The Clouds Demo

Beyond The Clouds Demo allows you to check the expression of the sea of clouds. Because the clouds are drawn at the specified height, you can also go over the clouds to the sky. MassiveClouds draws clouds as post effects, but draws consistent with opaque objects in the scene.

SampleScene / BeyondTheCloudsDemo Open the scene and play it.



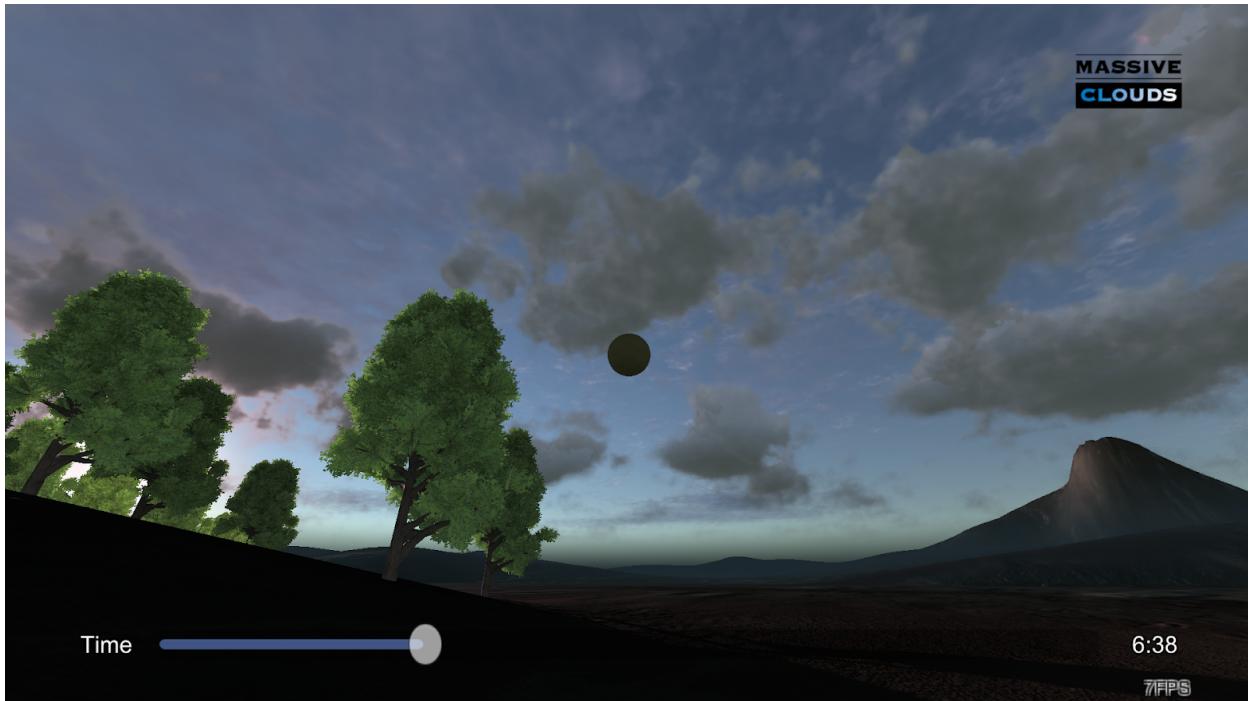
WebGL Demo

<https://mewli.st/MassiveCloudsDemo/v4.0.0/BeyondCloudsDemo/>

Multi Layered Demo

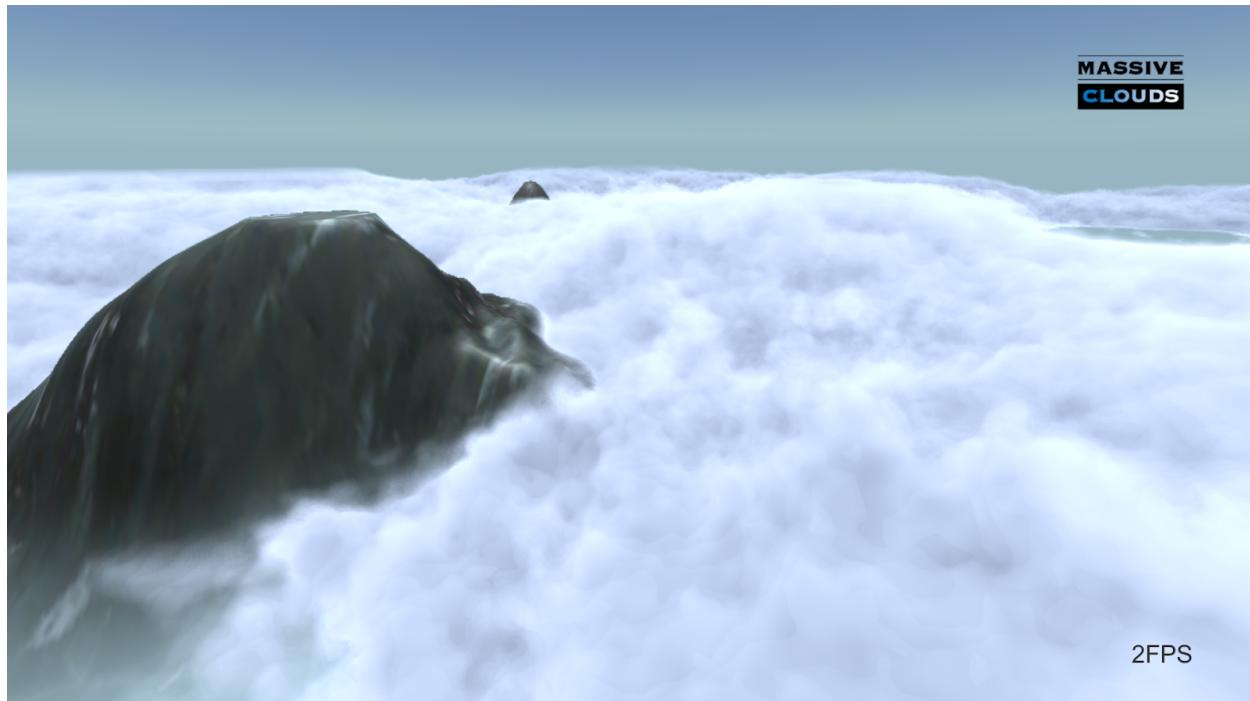
Multi Layered Demo performs drawing combining presets with different heights of 2 layers. The shadows of the clouds are also drawn with consistency.

Open **SampleScene / MultiLayeredDemo** and play.



Sea of Clouds Demo

Open `SampleScene / SeaOfCloudsDemo`



Three operating modes

Massive Clouds operates differently depending on the Unity version and the Render Pipeline used. **Camera Effect mode** can be used under the Standard Pipeline environment, **PostProcessingStack v2 CustomEffect mode** can be used under the PostProcessingStack v2 environment, and the **Renderer Feature mode** can be used under the LWRP environment after Unity 2019.

環境	使用できるモード
Standard Pipeline (Unity 2017 or later)	Camera Effect
PostProcessingStack v2 (HDRP / LWRP / SRP before Unity 2018)	PostProcessingStack v2 CustomEffect
LWRP / VR LWRP after Unity 2019	Renderer Feature

It does not currently work in the Unity 2019 or later HDRP environment. Currently, HDRP is a Preview release, and there is no valid drawing path extension point in 2019 or later. It seems that there will be a function for extending the drawing path in the future in the HDRP, so it will be supported as soon as it is installed.

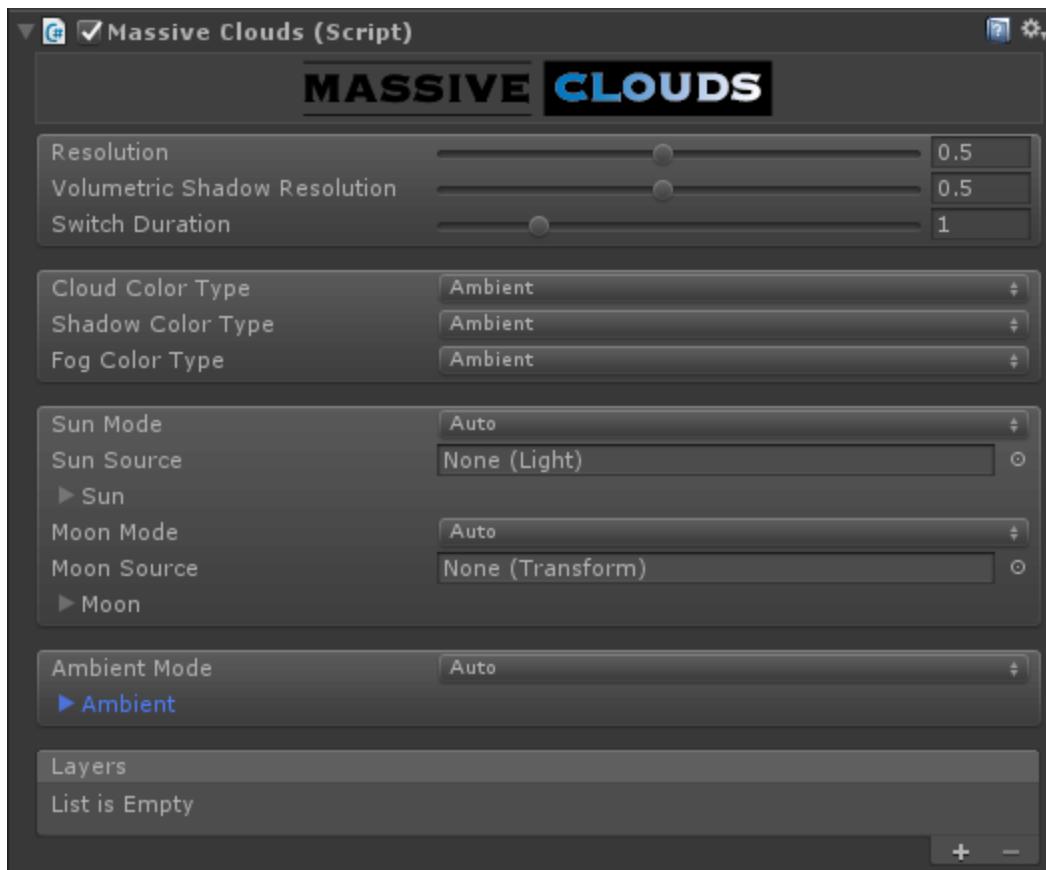
Set up according to the procedure described below according to your project.

Use Camera Effect mode (Standard Render Pipeline)

Use Camera Effect mode (Standard Render Pipeline)

Follow these steps to set up MassiveClouds on the scene you are creating.

1. Add MassiveClouds component to MainCamera.



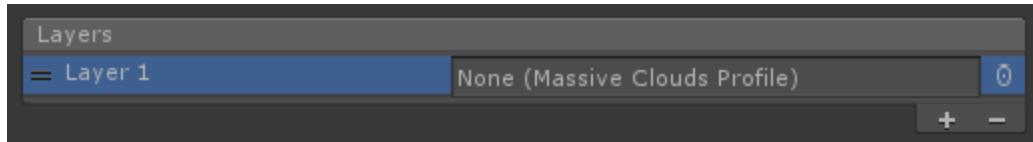
2. Add MassiveClouds Camera Effect component to MainCamera as well.



3. Click + on Layers in Massive Clouds content to add layers.



4. Press the Ⓢ button to the right of the added layer to select a profile.



5. Make sure the cloud is drawn in the game window

Change of drawing timing

To change the drawing timing in the pipeline, specify the Camera Event of Massive Clouds Camera Effect component.



Limitations in Camera Effect Mode

There are some limitations when operating in this mode.

1. This mode is compatible with Standard Render Pipeline only. Clouds are not drawn in the HDRP / LWRP environment.
2. Clouds do not appear in the scene view.

Since Standard Render Pipeline can use PostProcessingStack v2, it can also operate as **PostProcessingStack v2 CustomEffect mode**.

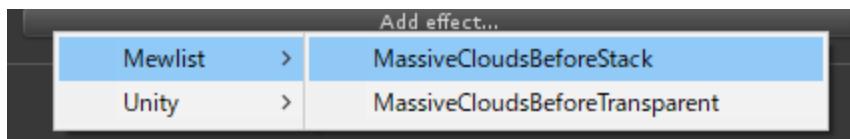
Use PostProcessingStack v2 Custom Effect mode

Follow these steps to set up MassiveClouds as PostProcessingStack effects. (Please set up PostProcessingStack)

1. Add the MassiveClouds component to MainCamera.

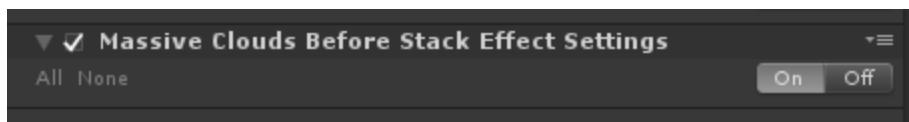


2. Press the Add Effect ... button in any PostProcessingVolume component inspector.



3. From the displayed pop-up menu and Choose

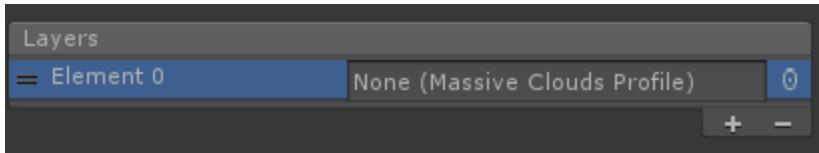
[Mewlist]-> [MassiveCloudsBeforeStack / MassiveCloudsBeforeTransparent]



4. Click + on Layers in Massive Clouds content to add layers.



5. Press the ⓧ button to the right of the added layer to select a profile.



6. Make sure the clouds are drawn

MassiveCloudsBeforeStack

Draw clouds after all meshes containing translucent objects are drawn.

MassiveCloudsBeforeTransparent (**only works with Standard Render Pipeline**)

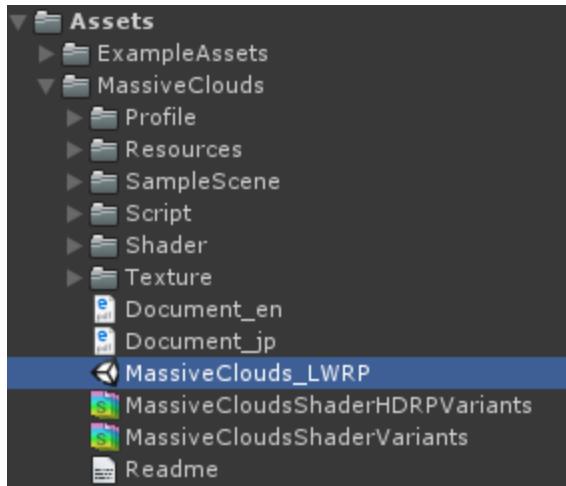
Draw clouds before drawing translucent objects. However, in LWRP (4.x, 5.x) and HDRP (4.x) environments, this specification is invalid because the Pipeline side does not support this.

Use Renderer Feature mode (LWRP for Unity 2019 or later)

To set up MassiveClouds as Renderer Feature mode, follow these steps:

Install LWRP Extension Package

First, install the packages required to operate in the LWRP environment.

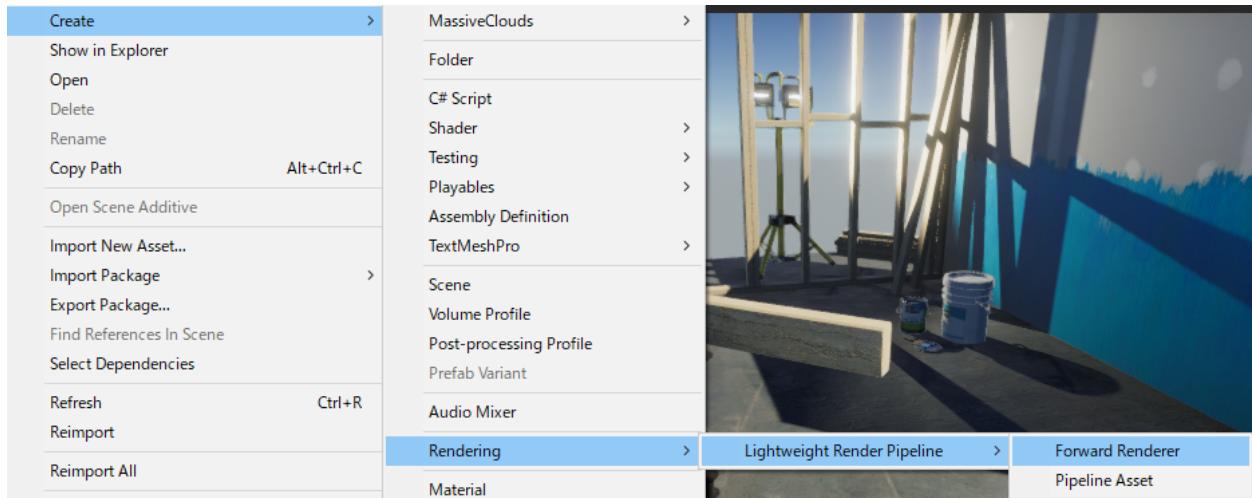


By double-clicking MassiveClouds_LWRP under the MassiveClouds folder in Project, the importer of the LWRP extended package is launched, so press the Import button to install it.

Register Renderer Feature to Pipeline

In LWRP, you can add a cloud drawing path by using a function called Renderer Feature.

1. Create an LWRP custom renderer.

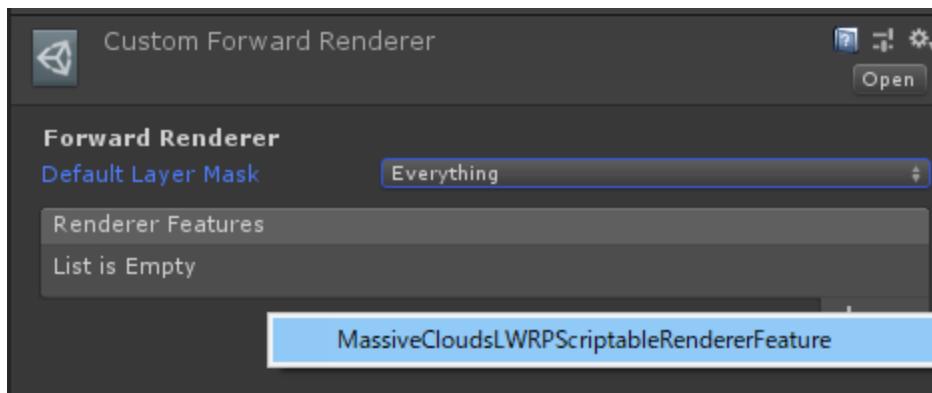


Assets-> Create-> Rendering-> Lightweight Render Pipeline-> Forward Renderer

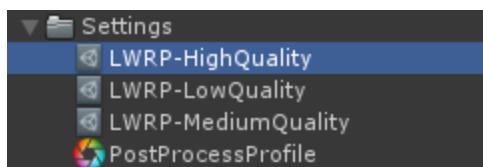
Select Menu to create a **Custom Forward Renderer**.

2. Open the Inspector of the Renderer you created, and add

MassiveCloudsLWRPScriptableRendererFeature to Renderer Features.

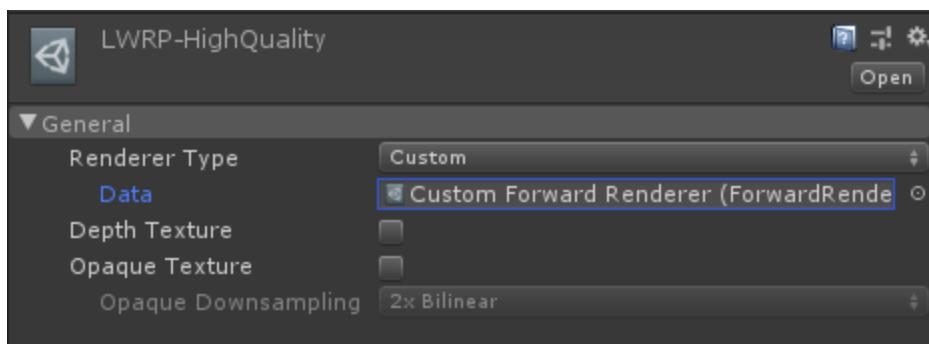


- Finally, register the Custom Forward Renderer as a LWRP pipeline asset.



Open the Inspector for pipeline assets,

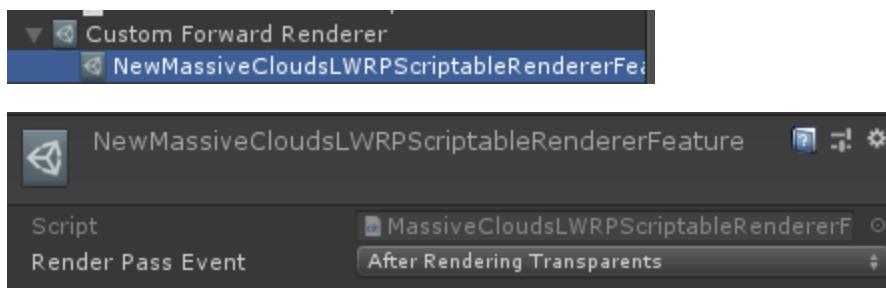
Set **Renderer Type** to **Custom**, and specify the **Custom Forward Renderer** created in **Data**.



This completes LWRP's pipeline setup.

Change of drawing timing

To change the rendering timing in the Renderer Feature mode pipeline, open the Inspector for the Renderer Feature that is hanging on a child of Custom Forward Renderer, and specify the Render Pass Event.



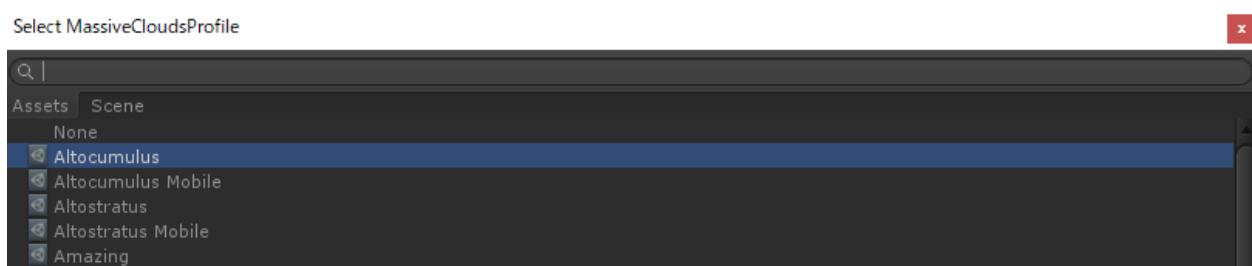
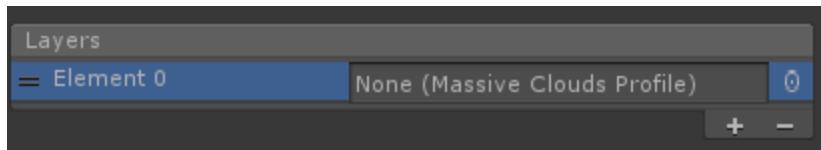
4. Next, add the MassiveClouds component to MainCamera.



5. Click + on Layers of Massive Clouds component to add a layer.



6. Press the ◎ button to the right of the added layer to select a profile.

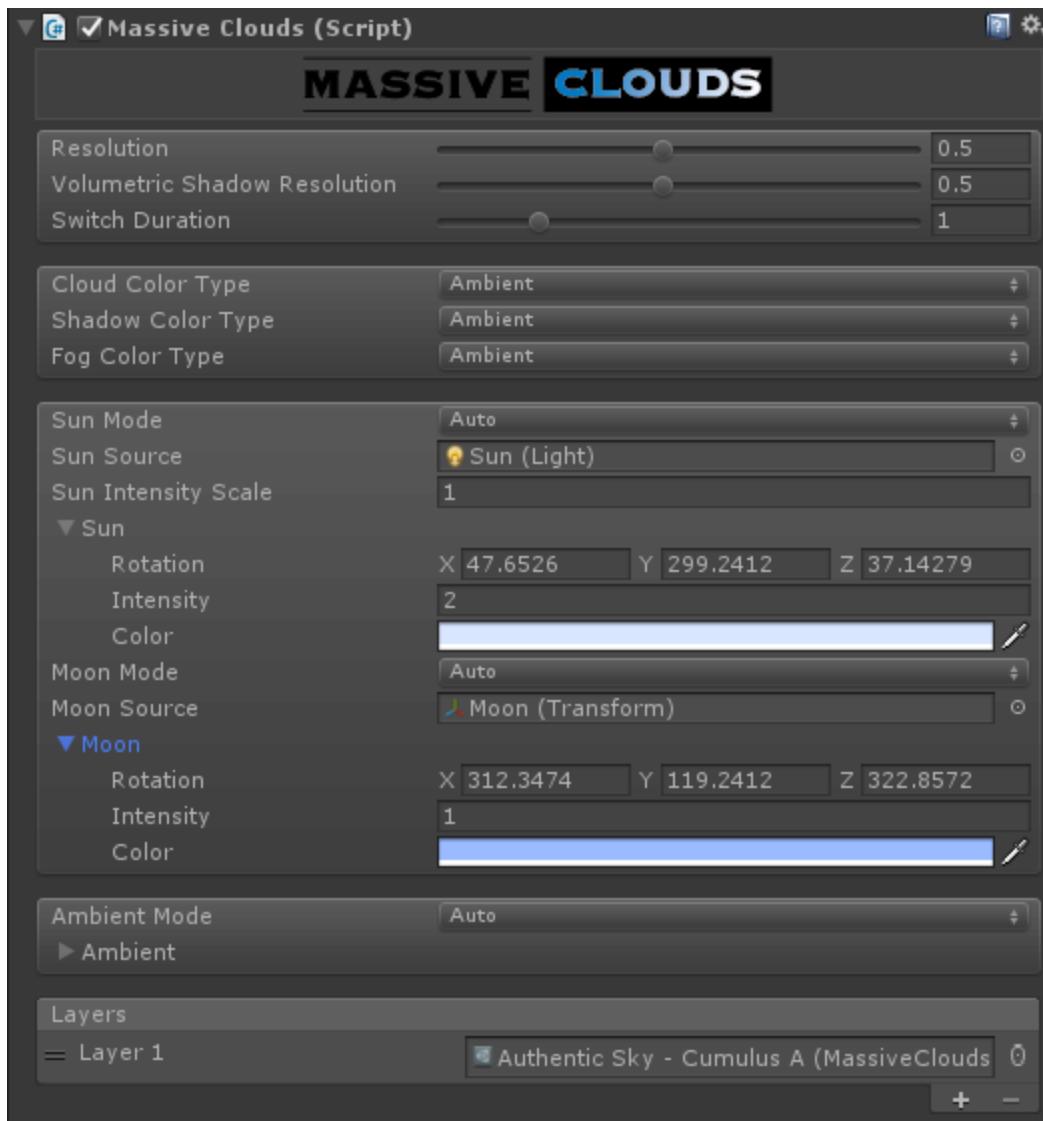


7. Make sure the clouds are drawn

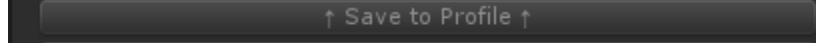


Explanation of basic parameters

MassiveClouds parameters



Camera Effect Parameters	
Resolution	You can reduce the drawing resolution of the cloud to a specified magnification. The GPU load can be greatly reduced, but the quality is reduced.
Volumetric Shadow Resolution	Specifies the drawing resolution for volume shadows.
Switch Duration	Specify transition animation time when switching presets.

Cloud Color Type	Specifies how the cloud base color is determined. Constant: Specified color Fog Color: Fog color of Lighting setting Ambient: Ambient Probe
Shadow Color Type	Specifies how the color of the shadow is determined. Constant: Specified color Fog Color: Fog color of Lighting setting Ambient: Ambient Probe
Fog Color Type	Specifies how the color of the Height Fog is determined Constant: Specified color Fog Color: Fog color of Lighting setting Ambient: Ambient Probe
Sun Mode	Specifies how to light the daytime clouds. Auto : Lighting based on the light specified in Sun Source Manual : Directly specify Sun light parameters. (Rotation / Intensity / Color)
Sun Source	When Sun Mode is Auto, specify the Directional Light to be linked.
Sun Intensity Scale	Adjust the light intensity of the daytime cloud.
Moon Mode	Specifies how to light the clouds at night. Auto : Lighting is based on the rotation direction of Transform specified in Moon Source Manual : Specify Moon light parameters directly. (Rotation) In either case, Intensity / Color is set manually.
Moon Source	When Moon Mode is Auto, specify the Transform to be linked.
Ambient Mode	Specifies the ambient light method. Auto : Obtained from AmbientProbe of the scene. Manual : Specify Sky / Equator / Ground Color respectively.
Layers	Specifies the cloud preset to draw. You can specify multiple layers. Selecting a layer allows you to edit the parameters in the Inspector. * By clicking on the layer name and selecting it, you can edit the parameters in the inspector.
Save to Profile Button	 Overwrites the changed Parameter with the profile information. Parameter will not be saved in Profile until Save is done.

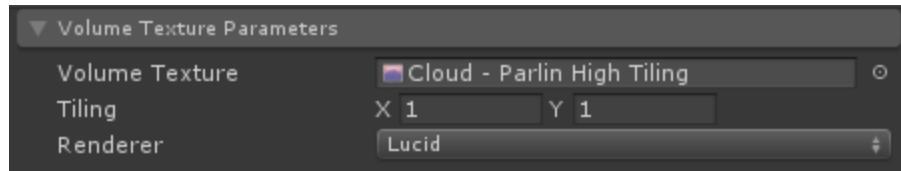
MassiveCloudsProfile

Cloud settings (Profile) are saved as ScriptableObject. You can change the type of cloud by switching Profile.

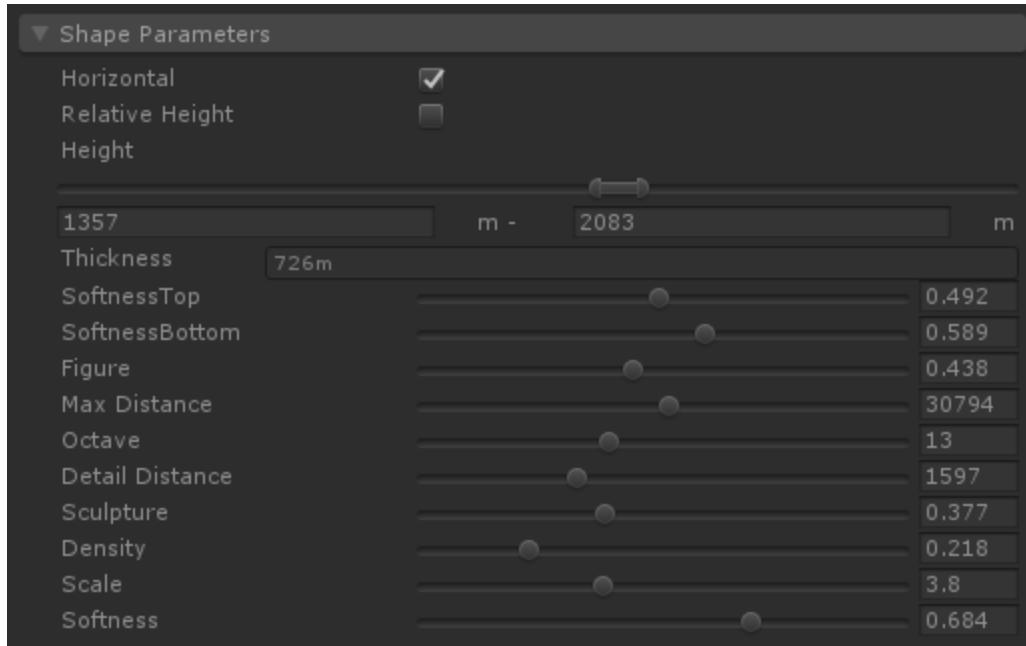
Create New profile

You can create new Profile in Assets Menu -> Create -> MassiveClouds -> Profile.

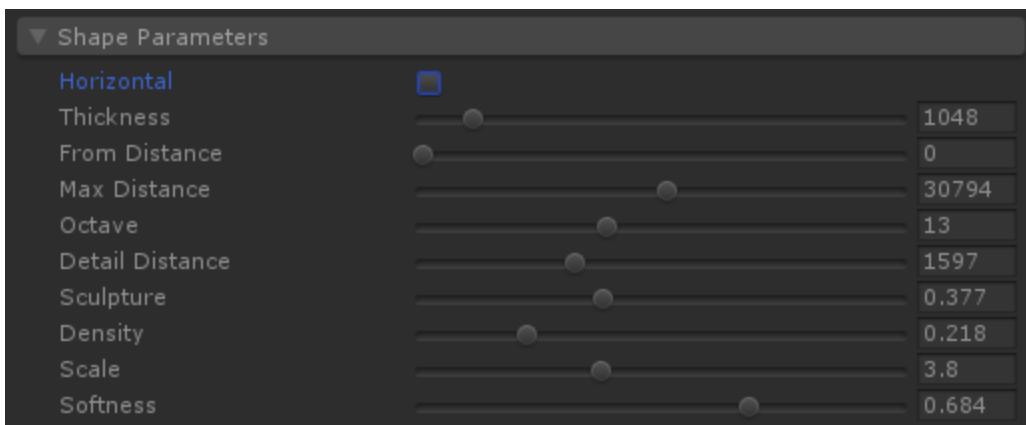
MassiveCloudsProfile Parameter description



Volume Texture Parameters									
Volume Texture	Specifies 3DTexture data that determines the shape of the cloud. Various noise textures and shape textures are prepared in the Texture folder.								
Tiling	Adjust tiling of 3DTexture. X: Horizontal direction Y: Vertical tiling value.								
Renderer	<table border="1"><tbody><tr><td>Surface</td><td>Lighting like opaque objects</td></tr><tr><td>Lucid</td><td>Suitable for transparent clouds, but poor sense of lighting direction</td></tr><tr><td>Solid</td><td>Highlighted and directional lighting</td></tr><tr><td>Authentic</td><td>Realistic lighting and less noise. When the camera plunges into the cloud, you can draw without losing detail</td></tr></tbody></table>	Surface	Lighting like opaque objects	Lucid	Suitable for transparent clouds, but poor sense of lighting direction	Solid	Highlighted and directional lighting	Authentic	Realistic lighting and less noise. When the camera plunges into the cloud, you can draw without losing detail
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horizontal on



horizontal off

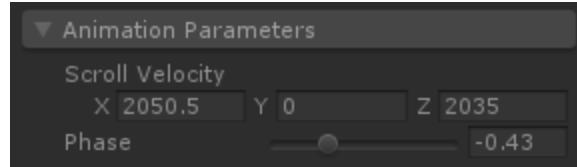
Shape Parameters	
Horizontal	Render clouds Horizontal. You will be able to express the clouds in a more distant view.
Relative Height	Adjust the drawing position of the cloud. If Horizontal is checked, draw a cloud at the relative height position from the camera. Even if the height of the camera changes, the distance to the cloud will not change.
Softness Top / Softness Bottom	Adjust the softness of the top and bottom. If this value is set large, the surface that becomes the boundary of clouds in Horizontal mode becomes soft.

Figure	Adjust the amount of scraping on the top and bottom. You can emphasize the cloud top by increasing the value.
Height	Specify the height of the bottom / top of the cloud.
From Distance	Specify distance from the camera to start drawing the cloud.
Max Distance	Specifies the maximum distance that the cloud will be drawn.
Octave	Adjust the detail of the cloud. If this value is set to a large value, clouds are drawn in more detail.
Detail Distance	Specifies the distance to add detail to the clouds in the near view.
Sculpture	Adjust the depth of the cloud carving.
Density	Adjusts the density of the cloud. If this value is set high, it will change to cover the entire sky.
Scale	Adjusts the scale of the volume texture.
Softness	Adjust the smoothness of the cloud. Setting this value high will soften the boundary between clouds and the sky.



Raymarching Parameters

Iteration	Specify the number of loops of ray marching. The larger the value, the finer the drawing can be, but the GPU load becomes higher. It is recommended to set a low value in environments with low GPU performance such as mobile environment. *Not used in the Authentic renderer.
Dissolve	Adjust the strength of the background color. If you set this value large, the colors of the background and clouds will be dissolved.
Fade	Adjust clouds in the distant view. If this value is set to a large value, clouds in the distant view are blended in the sky.
Optimize	As the value is larger, the drawing process is reduced according to the distance to the camera.



Animation Parameters

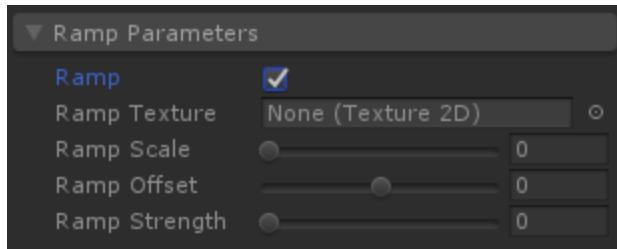
Scroll Velocity	Specify the speed of each axis of scroll animation.
Phase	You can shift the scroll speed of the Octave component. You will get the effect of the clouds coming and going.



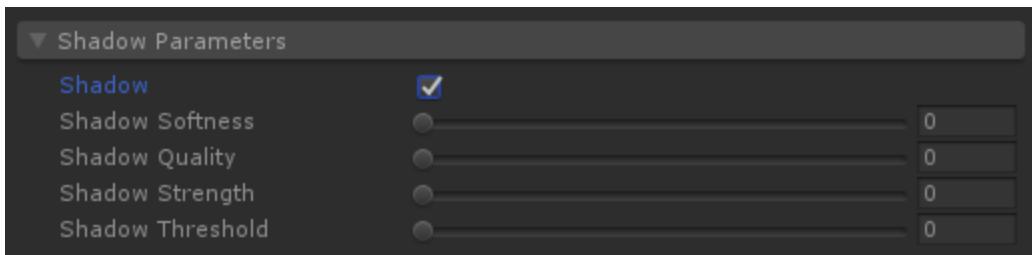
Lighting Parameters	
Lighting	Light power of Directional Light. Setting this value to a large value strongly influences the light.
Direct Light	Enhance the light of the surface that receives the light of the cloud
Ambient	Adjust how much you are affected by ambient light
Lighting Quality	When RenderMode is Lucid, Solid, it has no effect. Adjust the lighting calculation quality. If you increase this value, the GPU load will increase rapidly, so it is recommended to set it as small as possible.
Light Scattering	Set the intensity of the pseudo internal scattered light.
Light Smoothness	Adjust shade strength. Setting this value to a large value will cause shadows of clouds to appear extensively. ※Not used in the Authentic renderer.
Shading	Adjust the shadow's strength. Increasing this value will cause shadows to appear in a wider area



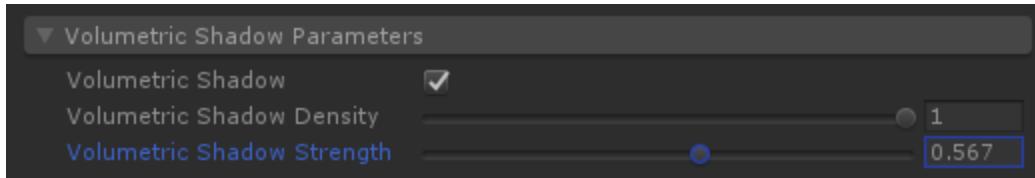
Global Lighting Parameters	
Global Lighting	Brighten the cloud in the direction of the directional light (or makes it dark)
Global Lighting Range	Range of Global Light from the sun position.
Edge Lighting	Brighten the cloud edge in the direction of the directional light.



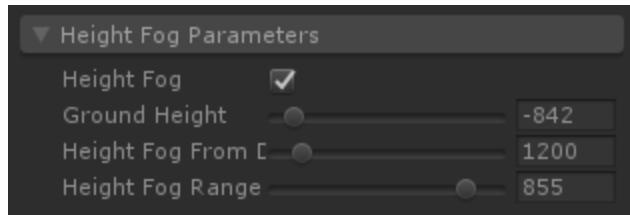
Ramp Parameters	
Ramp	Performs drawing using Ramp Texture. It is useful for setting effects like toon shading and creating effects.
Ramp Texture	Specifies a 2D texture with Ramp information specified in the X axis direction. (The tiling mode of the texture is usually set to Clamp.)
Ramp Scale	Adjusts the scale of Ramp Texture.
Ramp Offset	Adjusts the position of Ramp Texture.
Ramp Strength	Adjusts the applied amount of Ramp drawing.



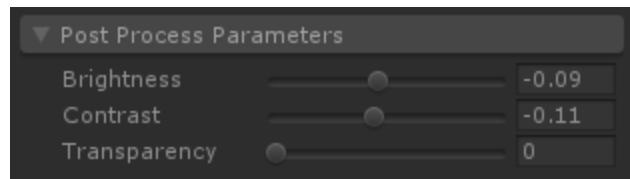
Shadow Parameters	
Shadow	Check if want to cast shadow.
Shadow Softness	Shadow edge softness.
Shadow Quality	Ray quality for shadow detection. Higher value requires high GPU costs.
Shadow Strength	Strength of shadow. Higher value is stronger shadow.
Shadow Threshold	Affected luminance threshold of screen for shadow.



Volumetric Shadow Parameters	
Volumetric Shadow	Please check if you want to draw a volume shadow
Volumetric Shadow Density	Adjust the depth of the shadow.
Volumetric Shadow Strength	Adjust the degree of light scattering. It becomes easy to get GodRay by enlarging it.



Height Fog Parameters	
Height Use Fog	Height Fog.
Ground Height	Specify the height of the ground which is the reference of fog.
Height Fog From Distance	Specifies the fog drawing start distance from the camera.
Height Fog Range	Specify the thickness of the fog.



Post Process Parameters	
Brightness	Adjust the brightness of the whole cloud.
Contrast	Adjust the contrast of the entire cloud.
Transparency	Adjust the transparency. If this value is set to a large value, it can be blended with the background.

To draw clouds in an environment where script execution is restricted

Camera effect · PostProcessingStack custom effects can not be operated in environments where script specifications are limited.

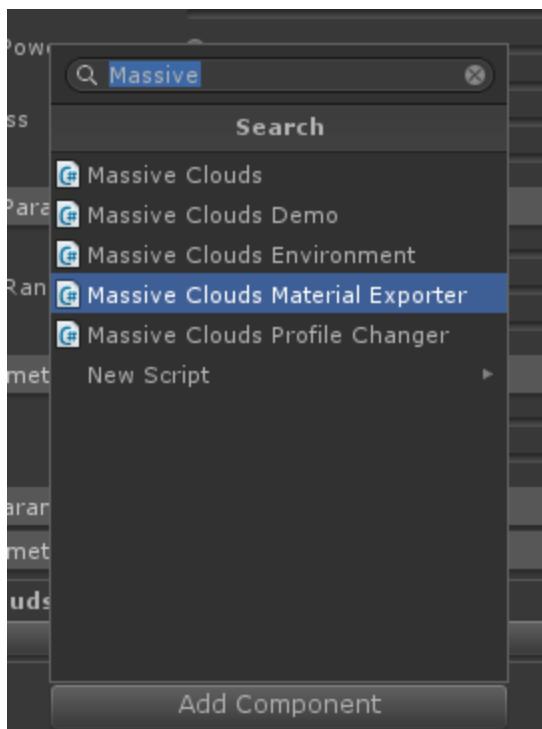
Using the Massive Clouds Material Exporter, you can export cloud presets as material and designate it as an arbitrary skybox mesh to draw clouds.

Materials created with Massive Clouds Material Exporter support operation with the Standard Render Pipeline. (Please use PostProcessingStack v2 in LWRP / HDRP environment)

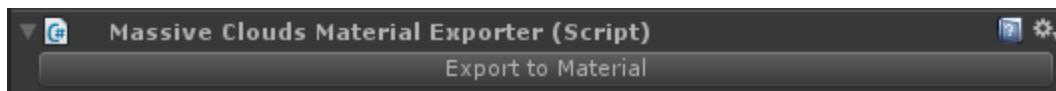
Follow the procedure below to create the material.

Procedure for using MassiveCloudsMaterialExporter

1. Add Component Massive Clouds Material Exporter component to GameObject with MassiveClouds component as camera effect.



2. Press the Export to Material button for the added component.



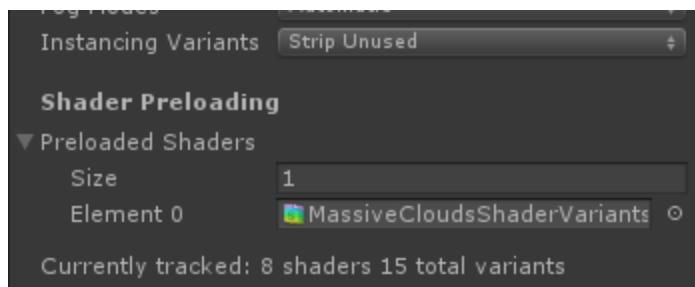
3. A dialog will be displayed, so specify the destination of the material file.
4. Sets the material created for any MeshRendererer.

See SphereMeshCloudsDemo. This scene is constructed with Sphere Mesh and Clouds Material.

Precautions on Build

Always set Preload Shaders. When building an executable file for each platform, make the following settings so that shaders are not stripped.

Open Edit -> Project Settings -> Graphics menu.



In the bottom Shader Preloading, specify MassiveClouds / MassiveCloudsShaderVariants.

Please refer to the official document about Shader Variants.

<https://docs.unity3d.com/en/2018.1/Manual/OptimizingShaderLoadTime.html>

Consistency with translucent objects

MassiveClouds relies heavily on depth buffers to draw clouds as being consistent with the scene as image effects.

Therefore, it is necessary to pay attention to the drawing order with objects that do not write depth information to the scene like translucent.

The case of drawing clouds as a distant view of the scene after Skybox

CameraEffect Specify CameraEvent as AfterSkybox. In PPSv2, clouds are drawn at equal timing by using MassiveCloudsBeforeTransparent effect. However,

PPSv2 in LWRP / HDRP environment can not add effects to BeforeTransparent timing, and there is currently no way to set it. Please use Renderer Feature setup in LWRP environment.

Support for setting arbitrary drawing timing in the HDRP environment will be supported in a future version upgrade.

The case of drawing a translucent object while in the clouds

Basically, there is no way to correctly draw an object with transparency in an expansive cloud. If it's like an effect, you will need to decide on a rule that you can always draw after the cloud, or switch to Opaque Pass drawing according to the distance.

Control parameters from script

We prepared sample components to control the scroll position and various parameters from script.

MassiveClouds / SampleScene / MassiveCloudsScriptableScrollSample.cs

The scroll position is controlled using the massiveClouds.SetOffset (Vector3 offset) API. At this time, set Scroll Velocity in Profile to 0 beforehand to stop the scroll processing performed in the shader. By doing this, it is possible to control the exact offset position from the script. The unit of the offset value is in meter.

Also, dynamic control of various parameters is possible by updating MassiveClouds. Profile from external components. The sample allows you to change the density value from the inspector.

Optimization guidelines

Volume rendering is generally a GPU-intensive process. In order to draw a beautiful cloud with a smaller drawing load, we will introduce the adjustment guidelines of the parameters that affect the drawing load.

- The smaller the Iteration, the lighter the load
- As the value of LightingQuality (at Surface / XRay) causes load in the order of Iteration x LightingQuality, try setting the preset in the range of 0-0.199 first
- The smaller the ShadowQuality, the lighter the load
- The smaller the MaxDistance at the time of Horizontal, the smaller the drawn area of the cloud, the smaller the load tends to be.
- Make the Optimize value as large as possible
- If Octave is large or if the tiling count is increased due to the Scale / Tiling setting, GPU stalls may occur at the time of Texture Fetch, so Octave is not too high and tiling count should be as small as possible.
- If you set the Resolution parameter to x0.75, 1/2 will not be drawn.
- If you set the Resolution parameter to x 0.5, 1/4 will not be drawn.
- Make Resolution as small as possible