

# JUPITER

## USER GUIDE

(v1.0.1)

Procedural Sky for Unity

# PROLOGUE

Jupiter is a simple and lightweight procedural skybox controller for Unity. This is a must-have asset which saves you hundreds hours of work and tons of effort, give you more time and resources to focus on other aspects of your game.

This User Guide is created to help you get started with the tool, including the most basic information about its features and workflow, as well as best practices, tips and tricks from its creator and showcasing amazing work from other successful developers.

To see release log, please visit [this page](#).

For business, please contact: [hello@pinwheel.studio](mailto:hello@pinwheel.studio)

For support, report a bug or request a feature, please contact: [support@pinwheel.studio](mailto:support@pinwheel.studio)

# RELEASE LOG

## **V1.0.1**

### **IMPROVEMENTS**

- Adding HDR color picker for sun, moon and star.

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## **V1.0.0**

Initial release

# INTRODUCTION

Jupiter is a user friendly sky system dedicated to help you create dynamic skybox, deeply focused on low-poly and stylized scenes, that can run well on both Mobile and Desktop applications, save you a lot of time and effort!

Jupiter is carefully designed to give you the fastest and easiest way to create beautiful sky, with many elements such as shining sun, twinkling stars, flowing cloud, etc. Even if you are a beginner or an advanced creator, it is just the right tool for you!

Jupiter also comes with sample assets and example scenes for you to play with. You can even use them in your commercial projects. Have fun!

# FREQUENTLY USED EDITOR MENUS

You can easily find Jupiter functionalities in these editor menus:

- **Assets>Create>Jupiter>...**: Create specific assets like Sky Profile, Day Night Cycle Profile, etc.
- **GameObject>Create>3D Object>Jupiter Sky>...**: Create sky controller object in the scene.
- **Window>Jupiter>...**: Open additional editor window or configure Jupiter global settings.

# CREATE AND CUSTOMIZE THE SKY

## Create Sky object

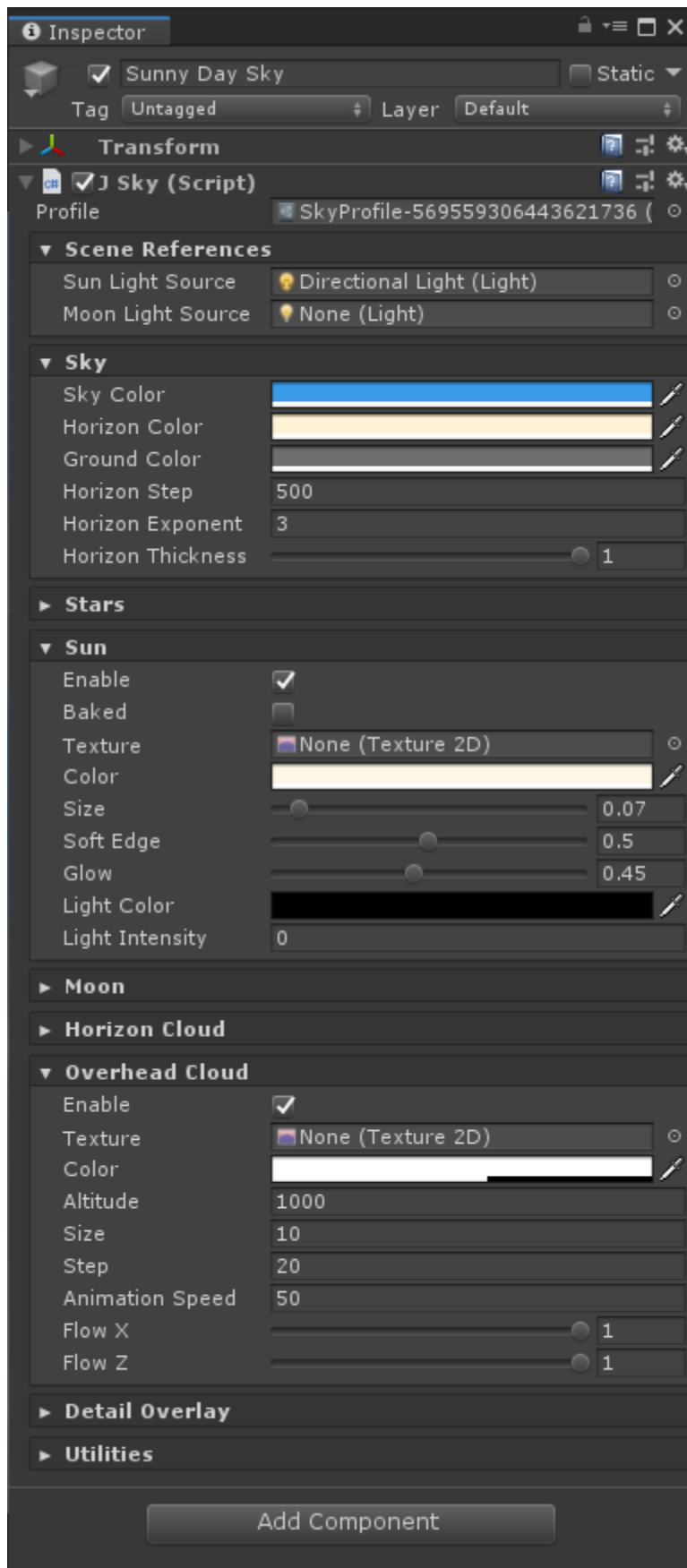
To create a new sky object, go to **GameObject>3D Object>Jupiter>...** and select a template depend on your need, such as Sunny Day. You can customize its look later.



A new game object will be spawned into the scene.

A new Sky Profile asset will be created in Assets/ folder. You should rename and store it in a different directory for ease of management.

Select the sky game object, in the Inspector, you can see a various of settings for customize it.



## Scene References

Hold references to scene object such as Sun and Moon light source. These light sources are used to control Sun & Moon position, and should be **directional light**.

## Sky

Control sky background gradient.

- Sky Color: Color of the upper sky.
- Horizon Color: Color of the horizon.
- Ground Color: Color of the lower sky.
- Horizon Step: Control the step/banding effect of the horizon.
- Horizon Exponent: Control the transition between horizon and upper/lower sky.
- Horizon Thickness: Thickness of the horizon.

## Stars

Control stars effect.

- Enable: Enable the effect or not.
- Baked: Whether to use baked stars (from cubemap) or render them procedurally.
- Cubemap: The stars cubemap to sample from.
- Twinkle Map: A grayscale map to animate the stars. A noise texture is good enough.
- Start/End: Visible range of the stars, on Y axis.
- Opacity: Overall opacity, for fading in/out between day and night time.
- Layers: Number of star layers.

For each star layer:

- Color: Color of the stars.
- Density: Density of the starfield.
- Size: Size of the stars.
- Glow: Stars brightness.
- Twinkle: How fast the stars to blink.



This is a heavy effect, each layer are calculate separately, more layer cost more time to compute.

Star layers with the same density produce the same star position. Consider to use different density value.

**On mobile device, it's better to use a cubemap for this effect.**

## Sun/Moon

Sun and Moon are separated effects with similar settings.

- Enable: Enable the effect or not.
- Baked: Whether to use baked sun/moon (from cubemaps) or render them procedurally.
- Cubemap: The cubemap to sample from.
- Texture: A custom texture for sun/moon.
- Color: Tint color.
- Size: Size of the sun/moon.
- Soft Edge: Slightly fade out the edge of the sun/moon.
- Glow: Control the sun/moon brightness and the halo.
- Light Color: Color of the sun/moon light source.
- Light Intensity: Intensity of the sun/moon light source.

## Horizon Cloud

Animated cloud effect at the horizon.

- Enable: Enable the effect or not.
- Texture: Custom cloud texture. This will be shared with Overhead Cloud effect. Leave empty to use default cloud.
- Color: Color of the cloud.
- Start/End: Visible range of the cloud, on Y axis.
- Size: Size of the cloud.
- Step: Control the step/banding effect.
- Animation Speed: How fast the cloud animate.

## Overhead Cloud

Animated cloud effect high above.

- Enable: Enable the effect or not.
- Texture: Custom cloud texture. This will be shared with Horizon Cloud effect.
- Color: Color of the cloud.
- Altitude: Height of the cloud layer.
- Size: Size of the cloud.
- Step: Control the step/banding effect.
- Animation Speed: How fast to animate the cloud.
- Flow X/ Flow Z: Flow direction on X/Z axis.

For performance reason, this effect will simulate 2 cloud layers on PC and 1 layer on Mobile.

## Detail Overlay

Draw additional detail layer from a cube map, with a specific render order.

- Color: Tint color.
- Cubemap: The cubemap to sample from.
- Layer: the order to render the cubemap.
- Rotation Speed: How fast it rotate around Y-axis.

## Utilities

Contains some utility settings:

- Allow Step Effect: Check to enable step/banding effect for some module. Step effect is heavy on Mobile devices since it use modulo (%) operation.

# DAY NIGHT CYCLE

## Create Day Night Cycle profile

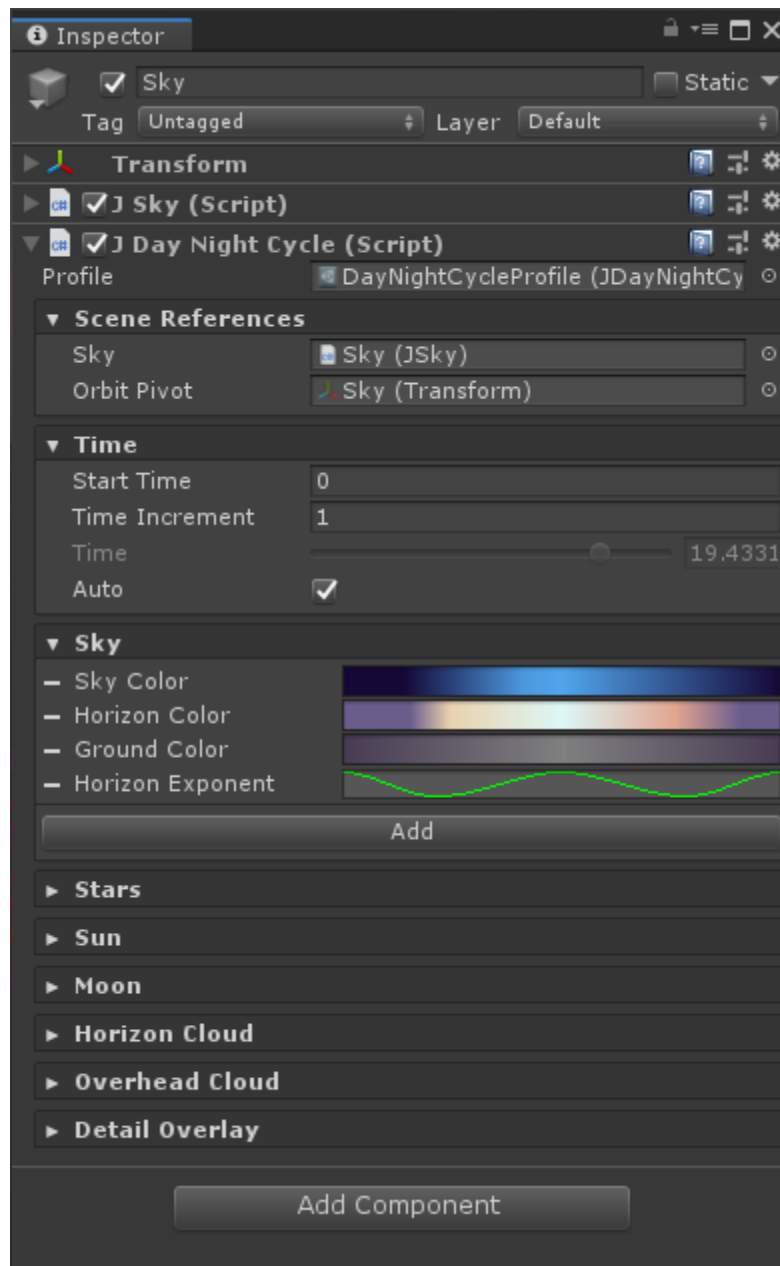
Day Night Cycle Profile is an asset type to store information about animated sky property, where you can override/animate them selectively depend on your need. This profile can be shared across many scenes.

To create a Day Night Cycle Profile, right click on the Project window and select **Create>Jupiter>Day Night Cycle Profile**. A new asset will be created, rename it and store in an appropriate folder.

## Create Day Night Cycle controller

To animate the sky over time, you need to add a **JDayNightCycle** component to a game object in the scene, it's recommended to add to the Sky object for ease of management.

In the Inspector, drag and drop your Day Night Cycle Profile into the Profile slot, then its module will appear for you to customize:



## Scene References

Hold references to some objects in the scene.

- Sky: The sky object.
- Orbit Pivot: An anchor transform for orbiting sun and moon. It's better to use the Transform of the same game object.

## Time

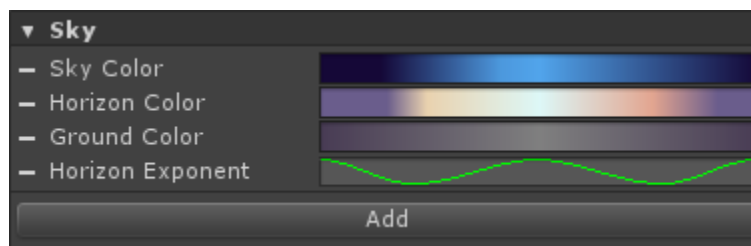
Contains timing settings.

- Start Time: The time when the game start.
- Time Increment: A small interval to increase each frame.
- Time: The current time.
- Auto: Should it use auto time increment or not. Disable this to set time manually.

## Animate Sky Properties

The following modules are similar to Sky Profile, where you can define which properties should be animate overtime.

Click on **"Add"** button to add a new property, click on the **"-"** button to remove an added one.



A color property will be overridden by a gradient, while a number will be overridden by a curve.

For each gradient or curve, the evaluation time at 0.0 and 1.0 equal to 00:00 midnight (AM), and 0.5 equal to 12:00 noon (PM), adjust them for your desired effect.

See the demo scene for a sample setup.

## Environment Lighting

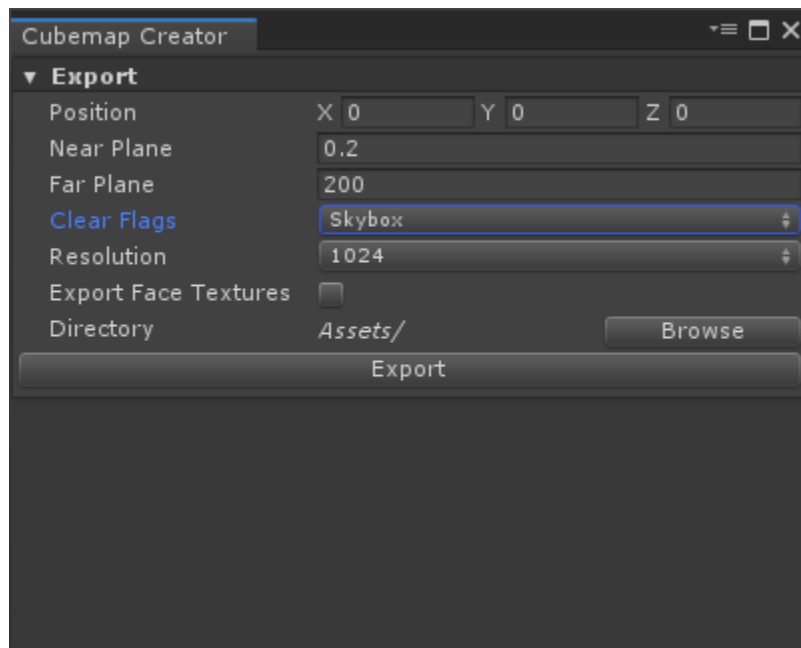
You may encounter some issue with environment lighting with incorrect reflection because the sky changes every frame. A work around for this is to setup a reflection probe with Type set up Realtime.

# BAKING SKY TO CUBEMAP

You can render your sky into a cubemap and use it statically, or render a specific effect of the sky material to use in Baked mode and save some performance on Mobile.

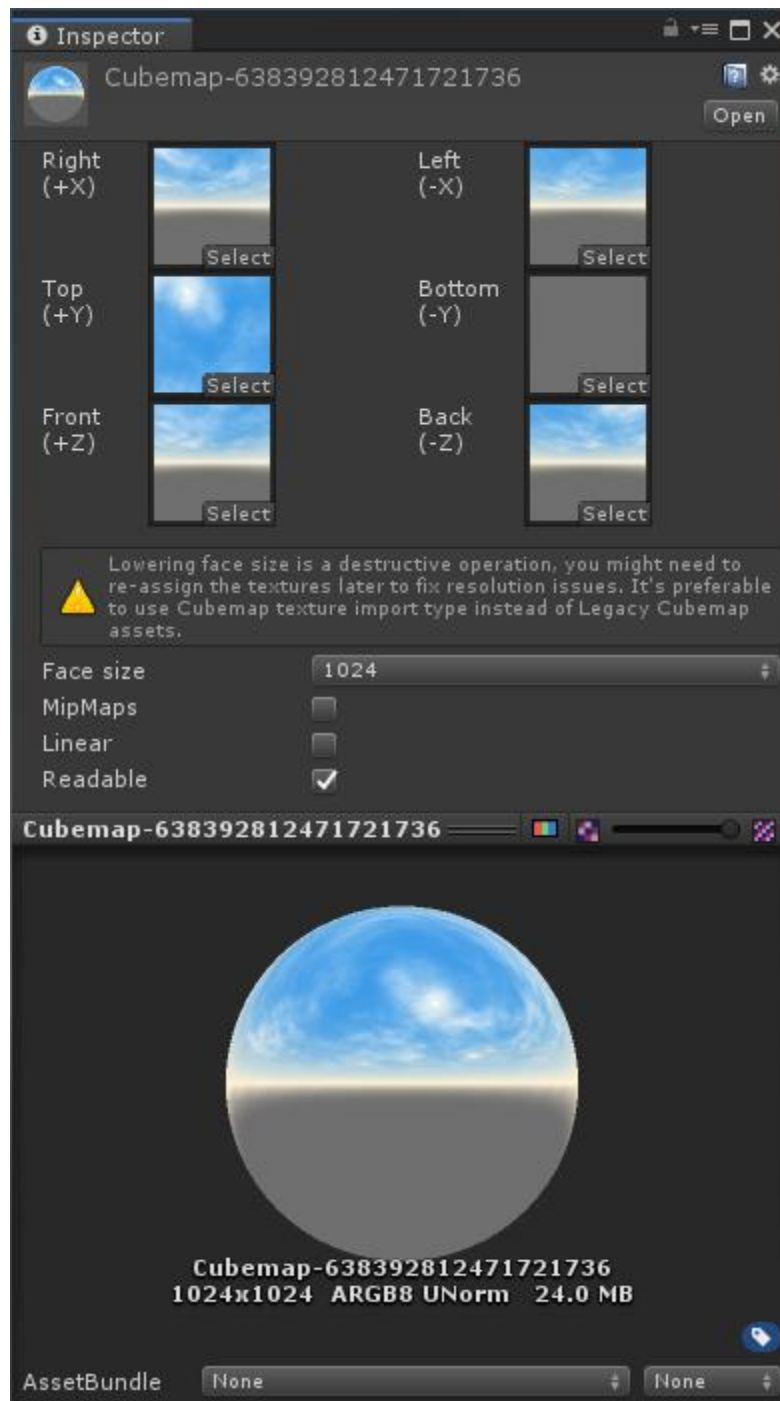
## Cubemap Creator

To open the Cubemap Creator, go to **Window>Jupiter>Tools>Cubemap Creator**.



- Position/Near Plane/Far Plane/Clear Flags: The camera properties to render the cubemap.
- Resolution: Size of each face on the cubemap.
- Export Face Textures: Check this on to export individual face textures along with the cubemap, for further polishing in other software.
- Directory: A folder to save these asset.

Hit Export to create the assets.



## Use Cubemap as static skybox

To use the exported cubemap as static skybox, create a material with Skybox>Cubemap shader. Assign the cubemap to its slot, then assign the material to the skybox material slot in Lighting window.

## Render separate sky effect into cubemaps

You can render separate sky effect such as Stars, Sun, Moon into cubemaps to use with Baked mode, which is a performance saver on Mobile.

To do this, just enable only the effect you want to render, set Sky Color, Horizon Color, Ground Color alpha to 0 and use the Cubemap Creator to export.

For Sun and Moon effect, it is important to set their **light source rotation to (0,0,0)**, or NULL before render to cubemap, so in Baked mode it can react correctly to light direction and Day Night Cycle.

Some example cubemaps are provided under **Assets/Jupiter/Demo/Cubemaps** folder.



# PERFORMANCE TIPS

It is necessary to do some optimization to achieve high framerate, or 60 FPS on Mobile devices.

Below are some tips for you:

- Bake it, don't simulate: Some effect such as Stars, Sun, Moon provide the Baked mode where it sample from a cubemap instead of procedurally render the element. See [BAKING SKY TO CUBEMAP](#) for more detail.
- Use as less module as you can: The more effect to render, the more time it cost.
- Disable Step/Banding effect: Step effect uses modulo (%) operation, which is heavy on Mobile, disable it by uncheck Utilities>Allow Step Effect.
- If you must use procedural stars, use as less star layer as possible.
- If you must use procedural sun/moon, it will render faster without texture.
- Use small/low resolution texture/cubemap, to reduce texture bandwidth.
- If you use Day Night Cycle, disable Real-time Environment Lighting in the Lighting window.
- If you don't need animated effect, just setup a super beautiful sky then render it into a cubemap and use it statically. See [Use Cubemap as static skybox](#) for more detail.

# LIGHTWEIGHT/UNIVERSAL RENDER PIPELINE UPGRADE GUIDE

Jupiter also support for Unity Lightweight/Universal Render Pipeline. Note that render pipeline other than the built-in and LWRP/URP is not supported. It will work after installing the render pipeline, you don't need to do anything.

Minimum version for LWRP support: **Unity 2019.1**

Minimum version for URP support: **Unity 2019.3**