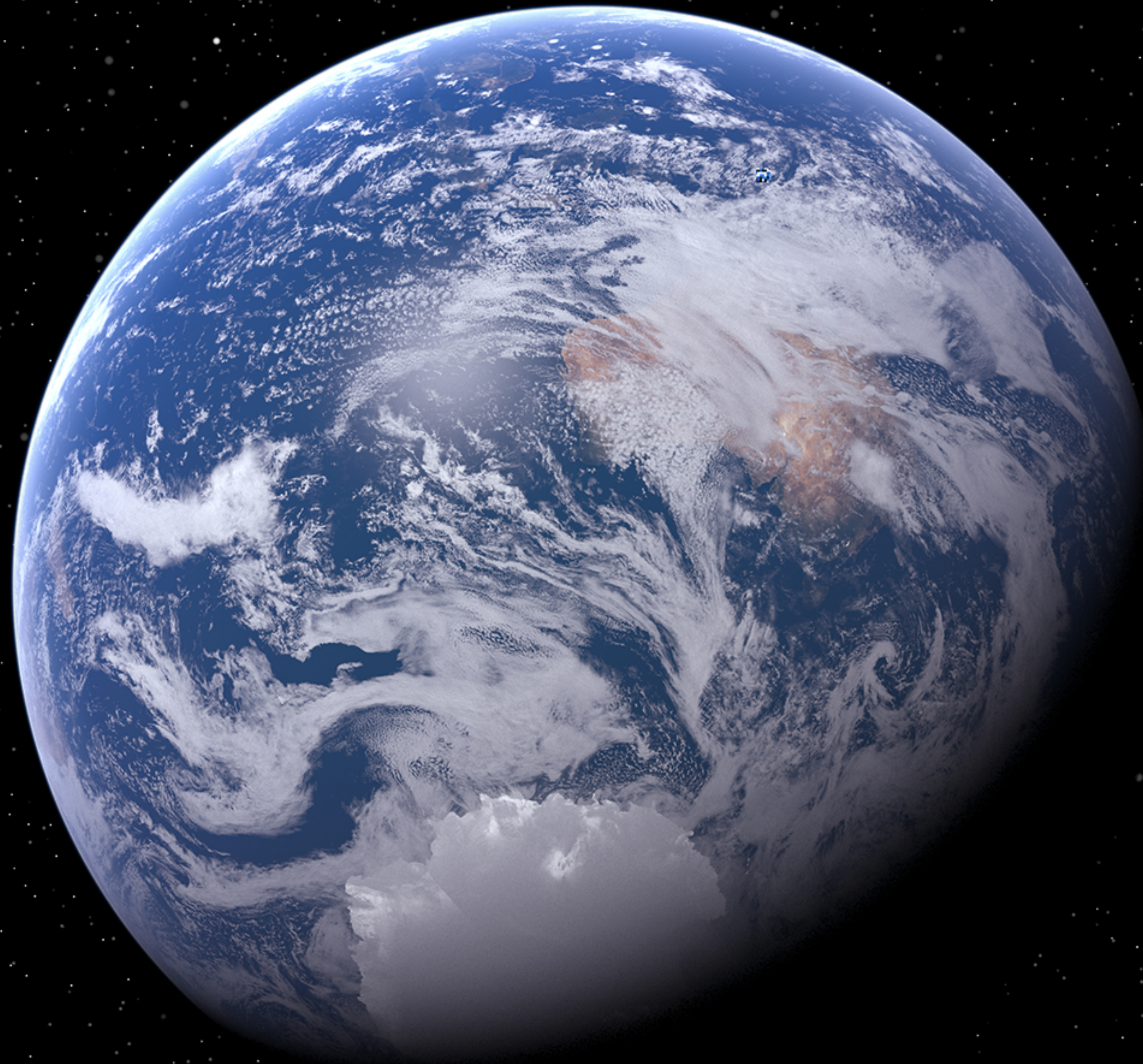


PHOTOREALISTIC EARTH 3D MODEL MANUAL

by Pavel Zverev a.k.a. Bazooka Joe



© 2023

Scene Objects.....3

Scene Structure.....4

Rendered Spheres.....5

Materials.....6

Textures.....7

Mesh.....9

Earth Rig.....10

Renders.....16

Contacts.....33

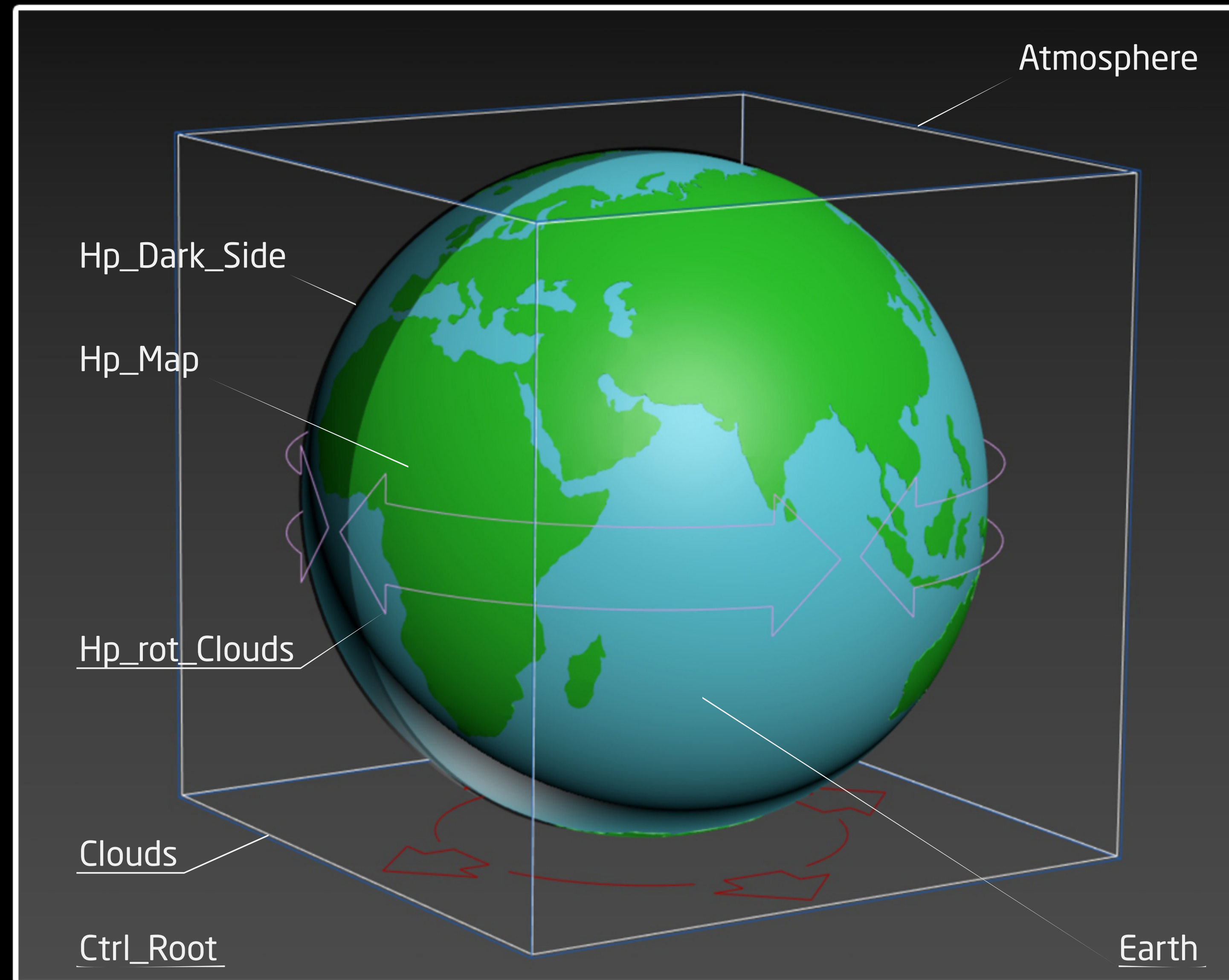


Fig. 1

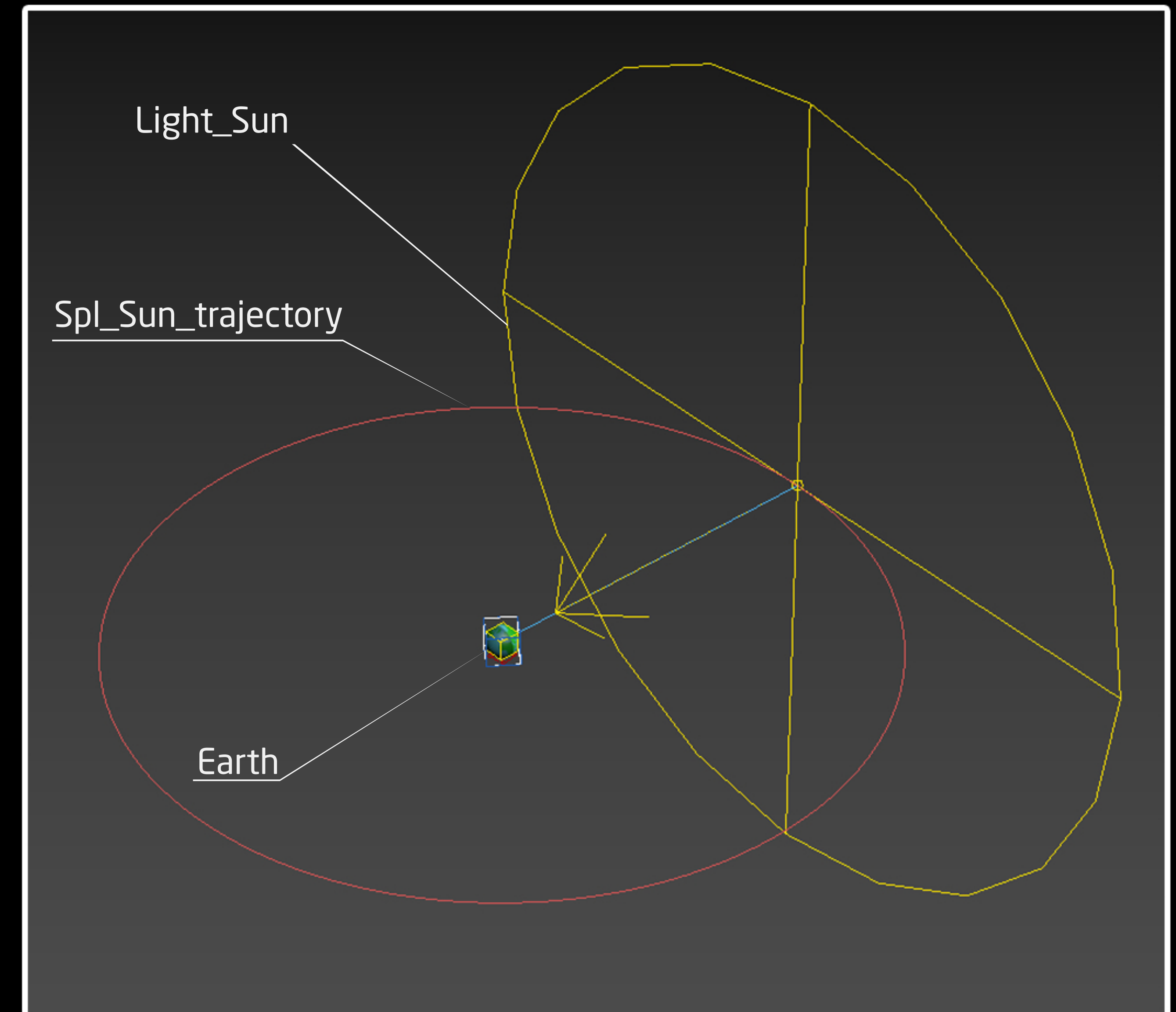


Fig. 2

Earth 3D model was originally made in **3ds max 2024** with **V-ray 6**. In resources folder you can find scenes saved in earlier versions of 3ds max (2021, 2018). Each scene file was checked and saved in its version of 3ds max.
Scene system units are **kilometers**. Scene contains 4 layers except “zero” one, which is empty by default.

Layers structure:

Controllers

- └─ Ctrl_Root

Earth_Geo

- └─ Atmosphere
- └─ Clouds
- └─ Earth

Helpers

- └─ Hp_Dark_Side
- └─ Hp_Map
- └─ Hp_rot_Clouds

Scene

- └─ Camera_Day
- └─ Camera_Night
- └─ Light_Sun
- └─ Light_Sun.Target
- └─ Spl_Sun_Trajectory

Scene Objects:

Ctrl_Root is a shape object, the only control object in the scene. It is the parent of Atmosphere, Clouds and Earth objects from the “Earth_Geo” layer. It has the Attribute holder in its modifier stack called “Earth Rig” with all required parametres for a quick and easy rig (see fig. 1, for more information see “Earth Rig” chapter).

Atmosphere is a spherical geometry object made from box with the help of “Spherify” modifier for better mesh on the poles. Displays as box by default (see fig. 1). It is linked to the “Ctrl_Root”.

Clouds is the same sphere as “Atmosphere” with a slightly smaller radius. Displays as box by default (see fig. 1). It is linked to the “Hp_Rot_Clouds”.

Earth is the same sphere as “Atmosphere” and “Clouds” with an even smaller radius (see fig. 1). It is linked to the “Ctrl_Root”.

Hp_Dark_Side is a black transparent semisphere needed to show in the viewport where the dark side is. Its position is wired to sun position. Not renderable (see fig. 1).

Hp_Map is a world map geometry needed to demonstrate in the viewport where the continents will be visible on the render. Its is linked to “Ctrl_Root”. Not renderable (see fig. 1).

Hp_rot_Clouds is a helper needed to change “Clouds” rotation (see fig. 1). It is a parent of “Clouds” and its rotaion value you can find in the Ctrl_Root’s Attribute Holder. Hidden by default.

Camera_Day and Camera_Night are both physical cameras. Select corresponding render preset in Ctrl_Root parametres.

Light Sun (and its target) is a Vray_Sun light object used for Sun illumination. It rotates around the Earth along the **Spl_Sun_Trajectory** (see fig. 2). Its rotation and illumination values you can also find in the Ctrl_Root’s Attribute Holder.

EARTH

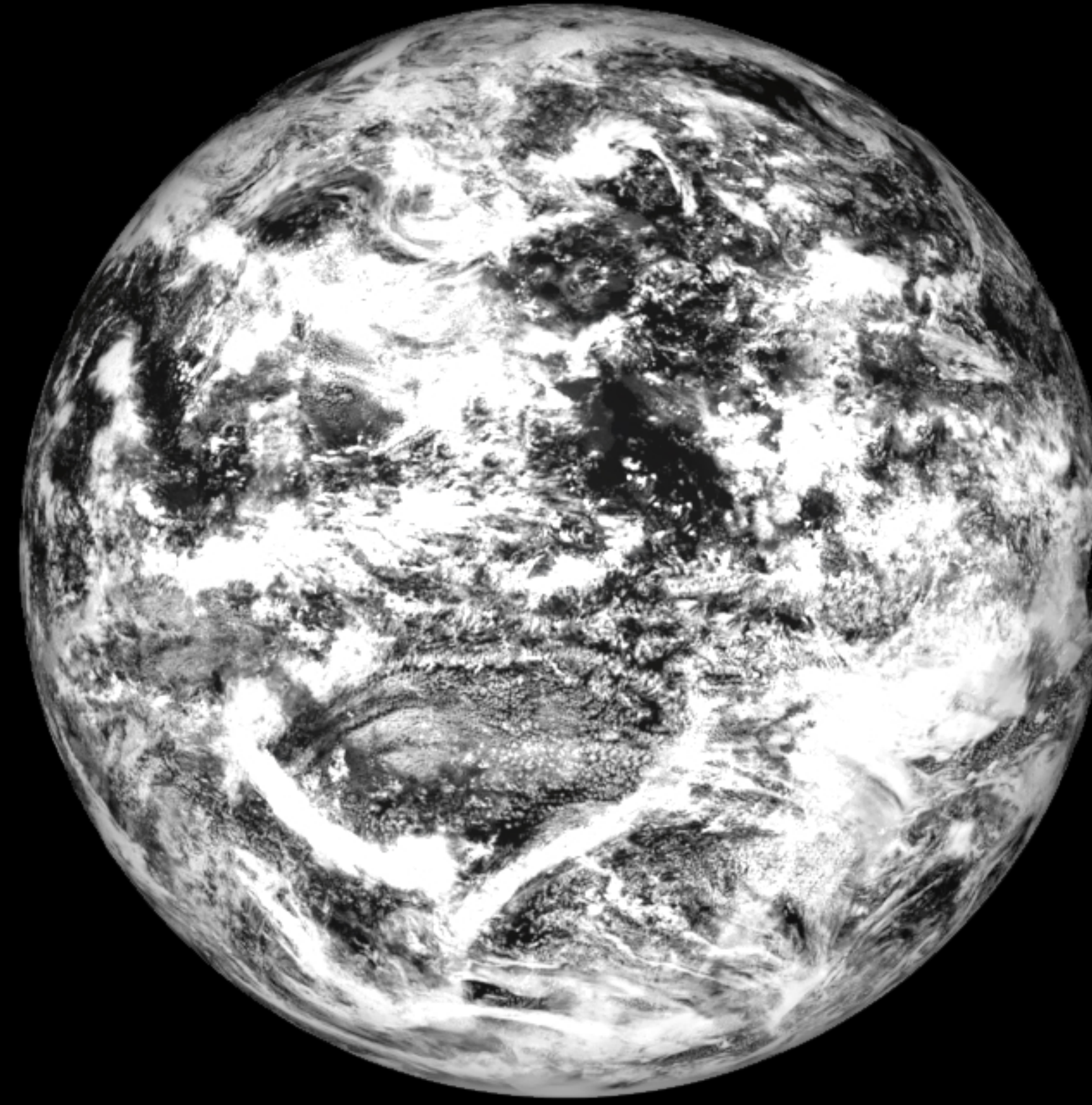
R=6371 km



Texture Resoluton -
8K - 86k

CLOUDS

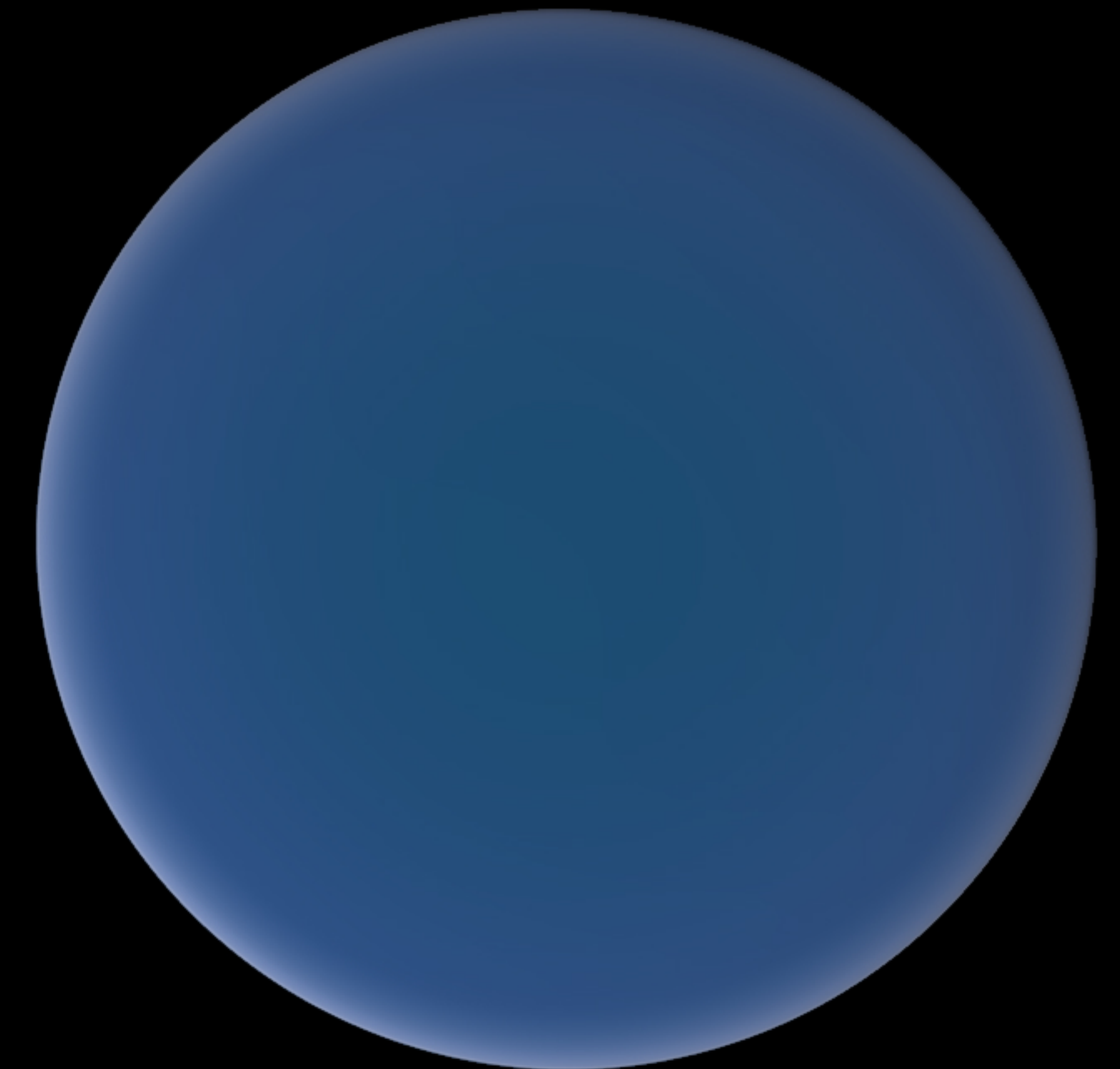
R=6373 km



Texture Resoluton -
8K - 43k

ATMOSPHERE

R=6422 km



Procedural
Material

Fig. 3

- In the scene there are three materials and one procedural sky map set to the Environment Map tab. Its value is wired with one of controllers in the Attribute Holder of the "Ctrl_Root" (see "Earth Rig" chapter).
- Atmosphere object has procedural V-ray material with no textures. Some options from this material are also wired with controllers in the Attribute Holder of the "Ctrl_Root" (see "Earth Rig" chapter).
- Earth and Cloud sphere objects have V-ray Switch Material applied to it. The goal of Switch Material is that we can link a number of usual materials to it with different options and ability to switch between them. In our case there is the only difference in materials - textures with different resolution. There are four texture sets from 8k to 86k resolution for Earth materials and there are three texture sets from 8k to 43k resolution for Clouds materials (see the next page).

① **Earth Material:**

Earth_Mtl_Switcher (VraySwitchMtl)

- Earth_8k (VrayMtl)
- Earth_21k (VrayMtl)
- Earth_43k (VrayMtl)
- Earth_86k (VrayMtl)

② **Clouds Material:**

Cloud_Mtl_Switcher (VraySwitchMtl)

- Clouds_8k (VrayMtl)
- Clouds_21k (VrayMtl)
- Clouds_43k (VrayMtl)

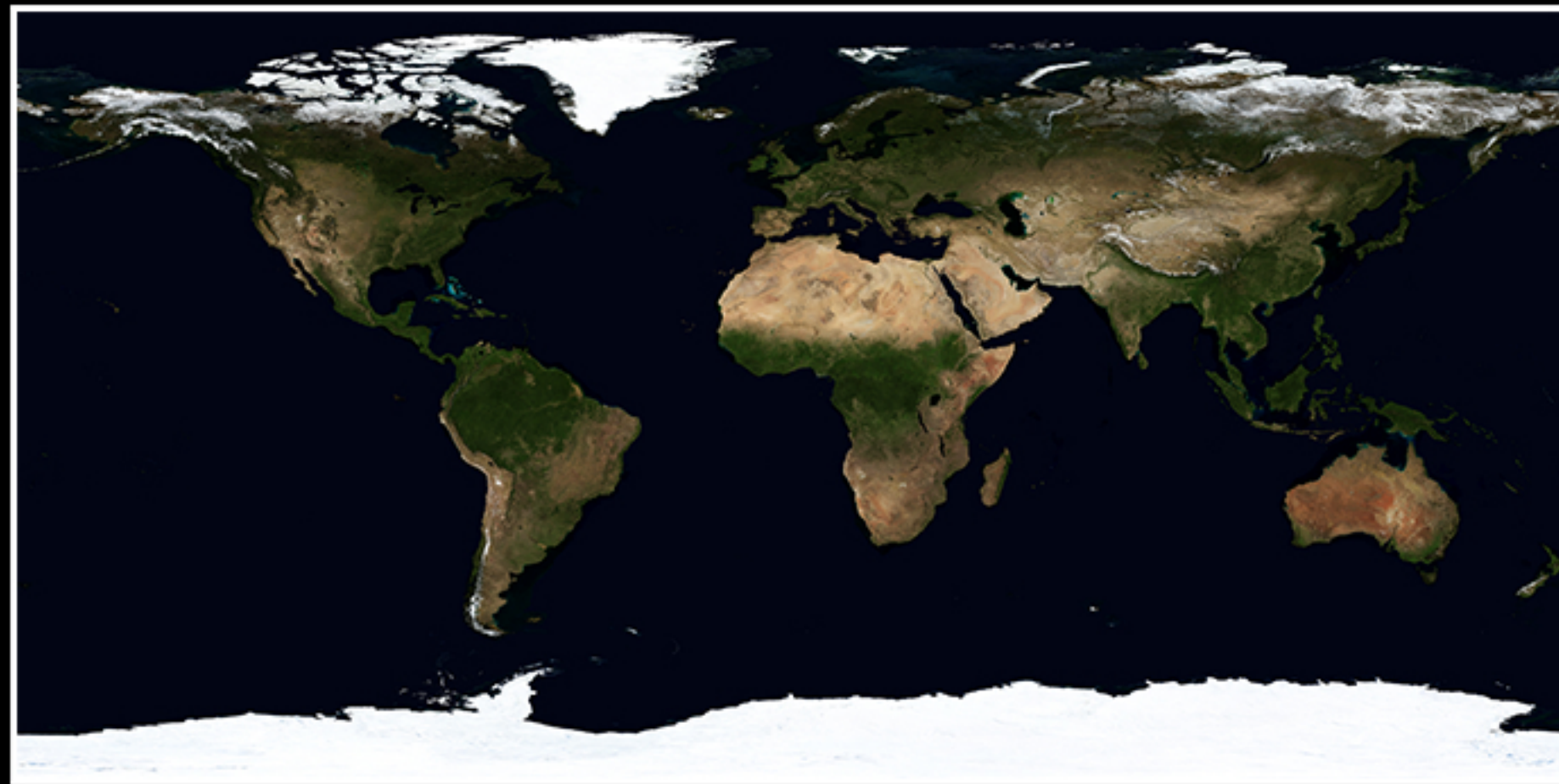
③ **Atmosphere Material:**

Atmosphere Procedural (VrayMtl)

④ **Environment Map:**

Stars Procedural (Output Map)

①



Diffuse (8k - 86k)



Dispalce (8k - 43k)

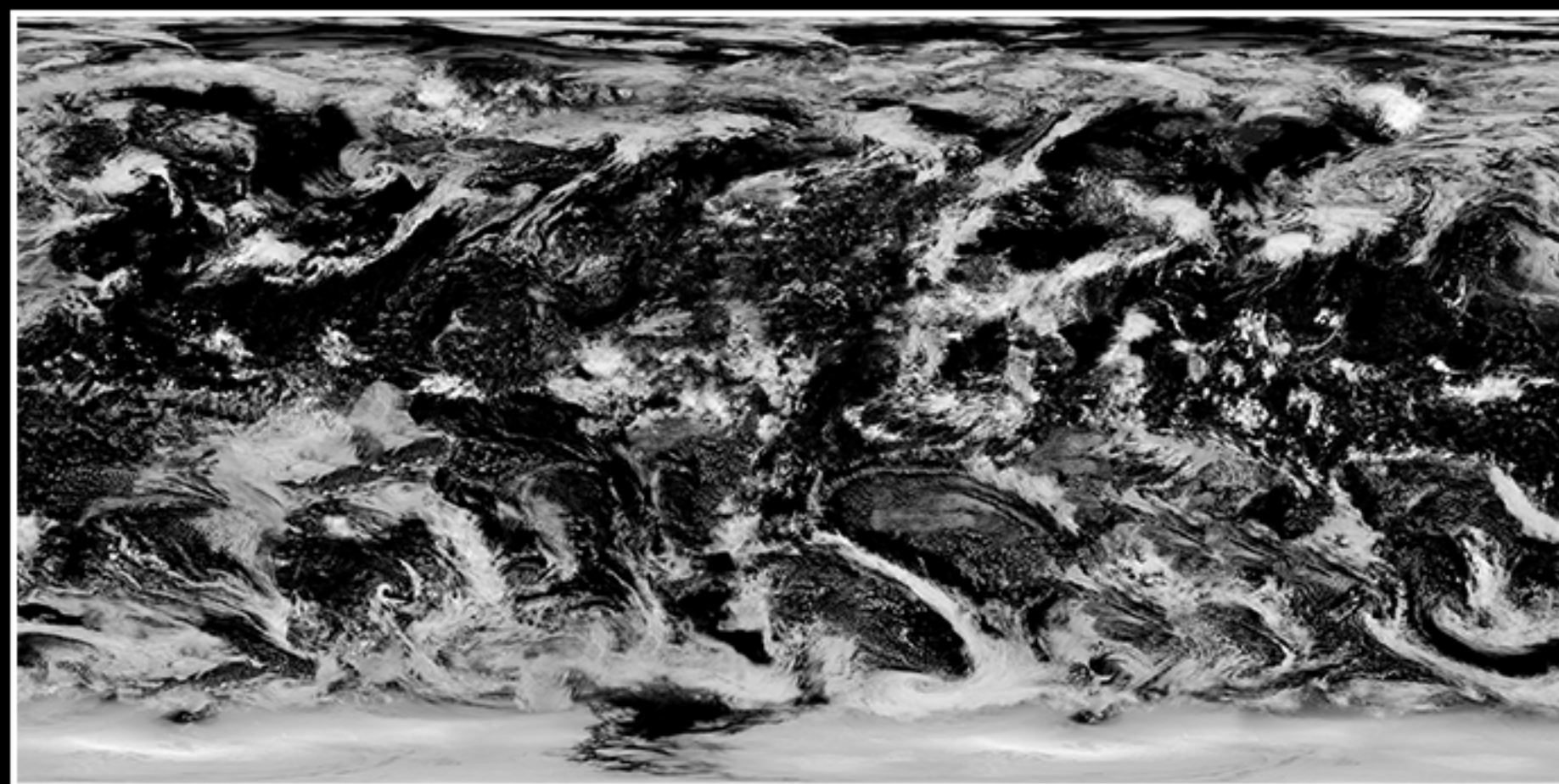


Reflection (8k - 16k)



Self-Illumination (8k - 86k)

②



Clouds (8k - 43k)

① Earth 8k Texture Set:

- Earth_Diffuse_8k.jpg
- Earth_Reflect_8k.jpg
- Earth_Displace_8k.jpg
- Earth_Nightlights_8k.jpg

Earth 21k Texture Set:

- Earth_Diffuse_21k.jpg
- Earth_Reflect_16K.jpg
- Earth_Displace_21k.jpg
- Earth_Nightlights_21k.jpg

Earth 43k Texture Set:

- Earth_Diffuse_43k.jpg
- Earth_Reflect_16k.jpg
- Earth_Displace_43k.jpg
- Earth_Nightlights_43k.jpg

Earth 86k Texture Set:

- Earth_Diffuse_86k_001.jpg
- Earth_Diffuse_86k_002.jpg
- Earth_Diffuse_86k_003.jpg
- Earth_Diffuse_86k_004.jpg
- Earth_Reflect_16k.jpg
- Earth_Displace_43k.jpg
- Earth_Nightlights_86k_001.jpg
- Earth_Nightlights_86k_002.jpg
- Earth_Nightlights_86k_003.jpg
- Earth_Nightlights_86k_004.jpg

② Clouds 8k Texture Set:

- Earth_Clouds_8k.jpg

Clouds 21k Texture Set:

- Earth_Clouds_21k.jpg

Clouds 43k Texture Set:

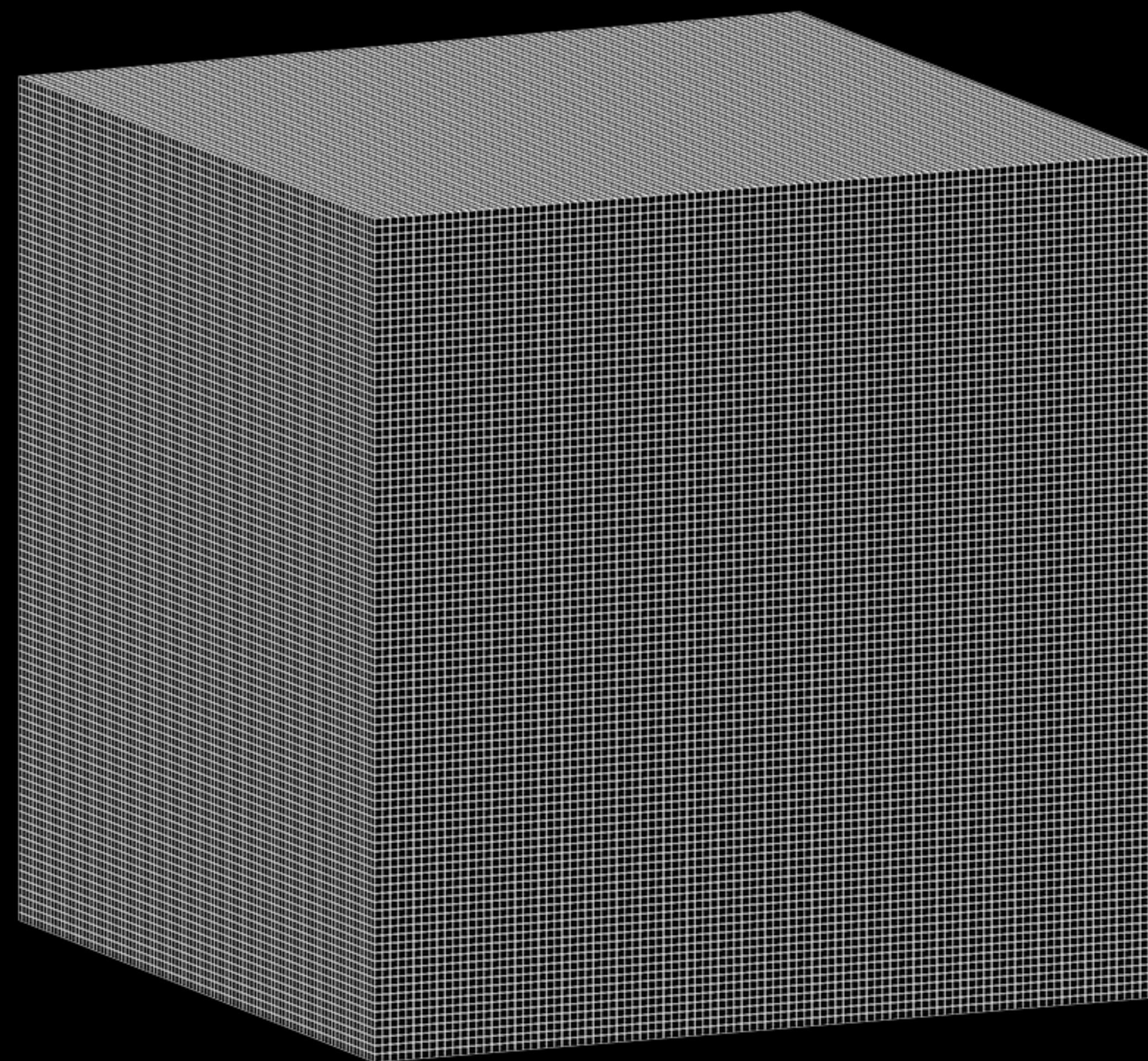
- Earth_Clouds_43k.jpg

Textures Resolution:

- 8k** - 8000x4000 px
- 16k** - 16200x8100 px
- 21k** - 21600x10800 px
- 43k** - 43200x21600 px
- 86k** - 86400x43200 px


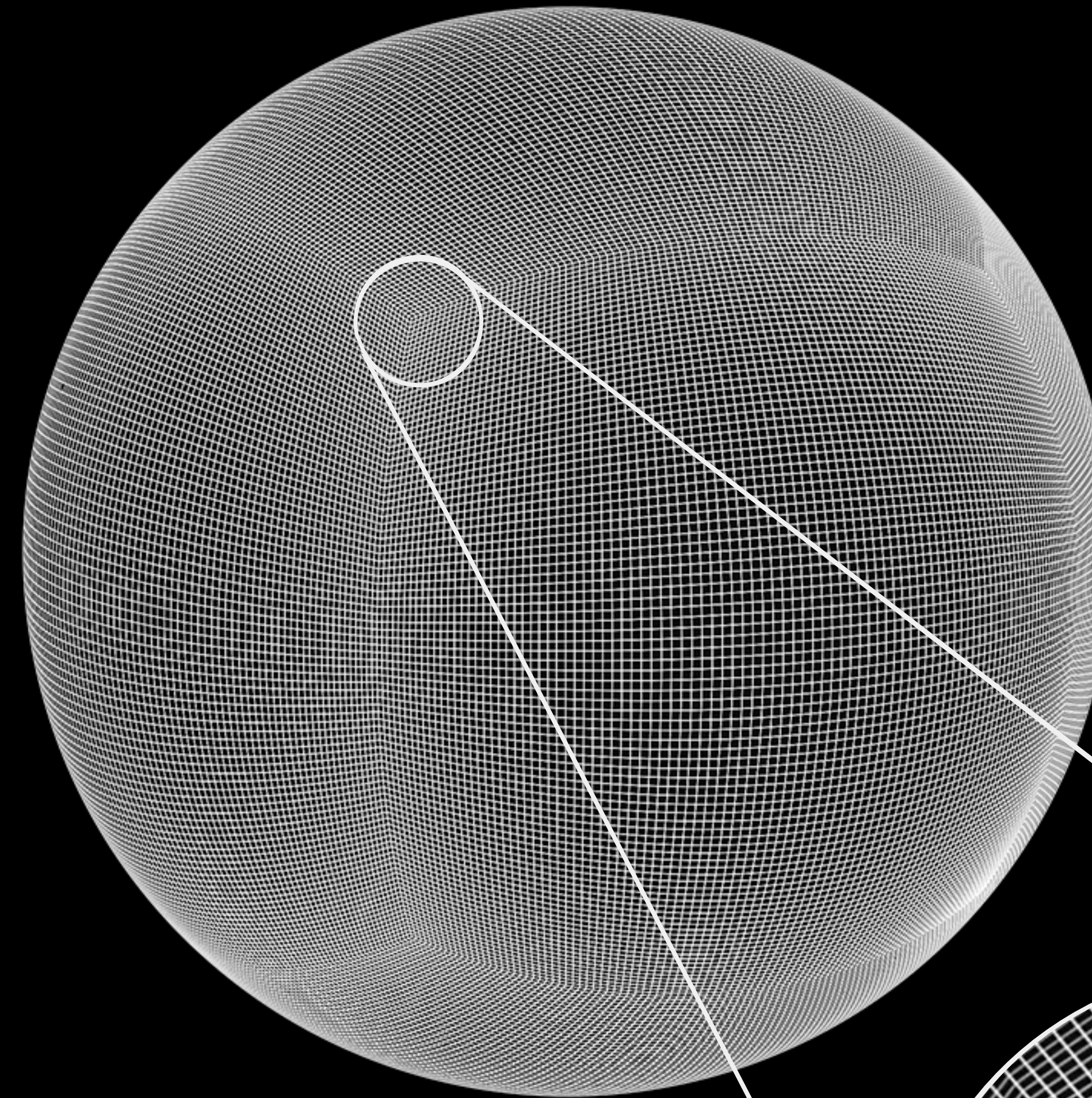
The idea of the same materials with different texture sets is that you can quickly switch between texture's resolution. You can switch to 8k texture set for draft or far away renders and as it gets closer to the Earth's surface the texture resolution can be increased. These changes can be animatable! The slider controller for extra quick switching between texture sets is placed to the Attribute Holder of the "Ctrl_Root" (see "Earth Rig" chapter).

* - 86k textures are very heavy for uploading to the memory even if you have a very powerful computer. It has been tested for many times that it would be much easier for your PC to upload four 43k textures instead of one 86k texture. So all 86k textures have been splited on 4 pieces. In 3ds max material browser these pieces are assembled to one seamless texture by the Composite map.



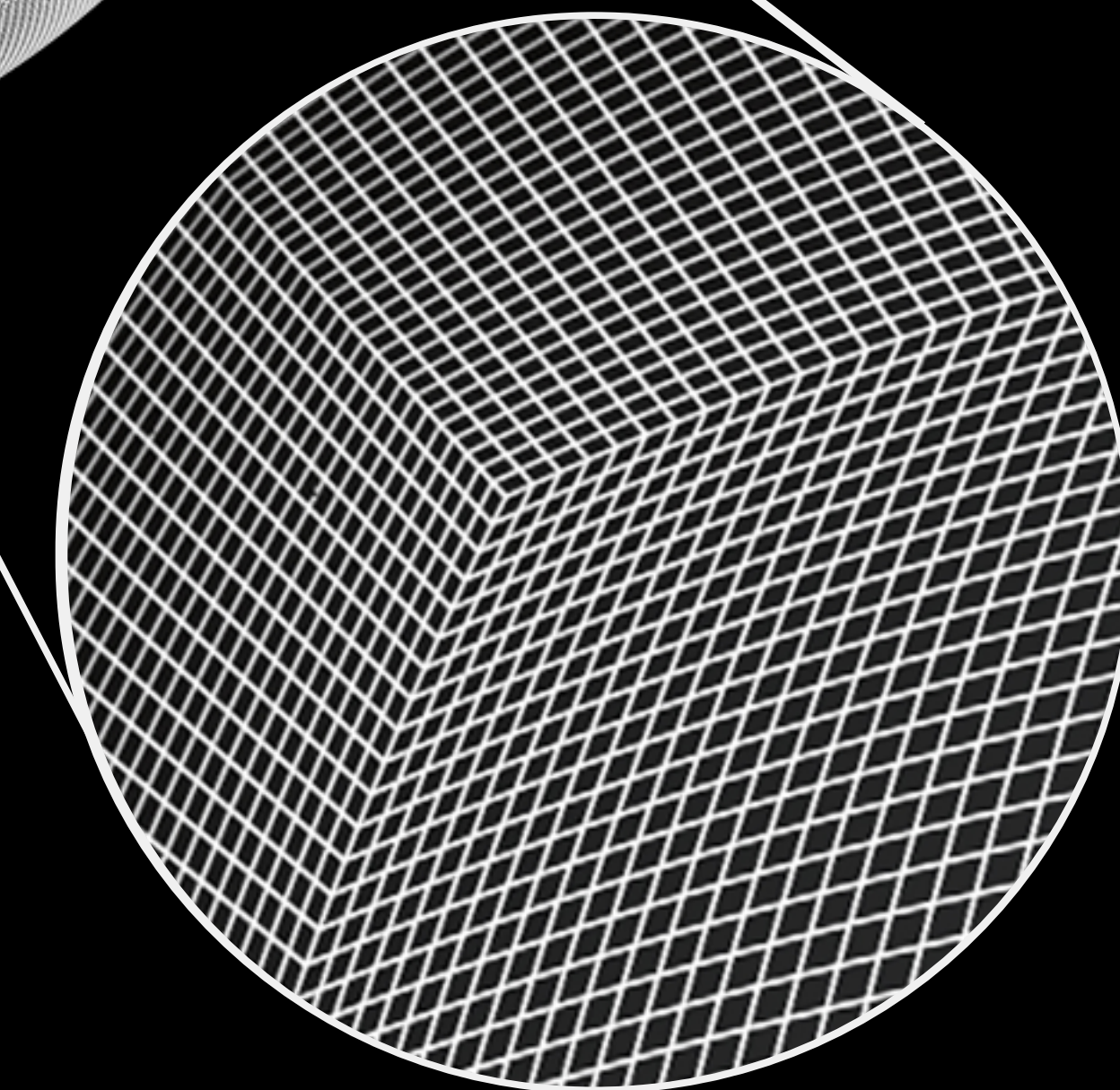
BOX
Segs: 100x100x100

Spherify
+
UVW Map

Total:
Polys: 398 044
Verts: 199 124

Earth/Clouds/Atmosphere:
Polys: 120 000
Verts: 60 002



Earth, Clouds and Atmosphere objects all have equal meshes. It is standart box with segmets 100x100x100 with spherify modifier. There is no Turbosmooth because it ruins texture mapping. They also have the same position in the scene (0, 0, 0). The only difference between them is radius (see fig. 3).

Modifier stacks are **not** collapsed! So you can change box segs at any time.

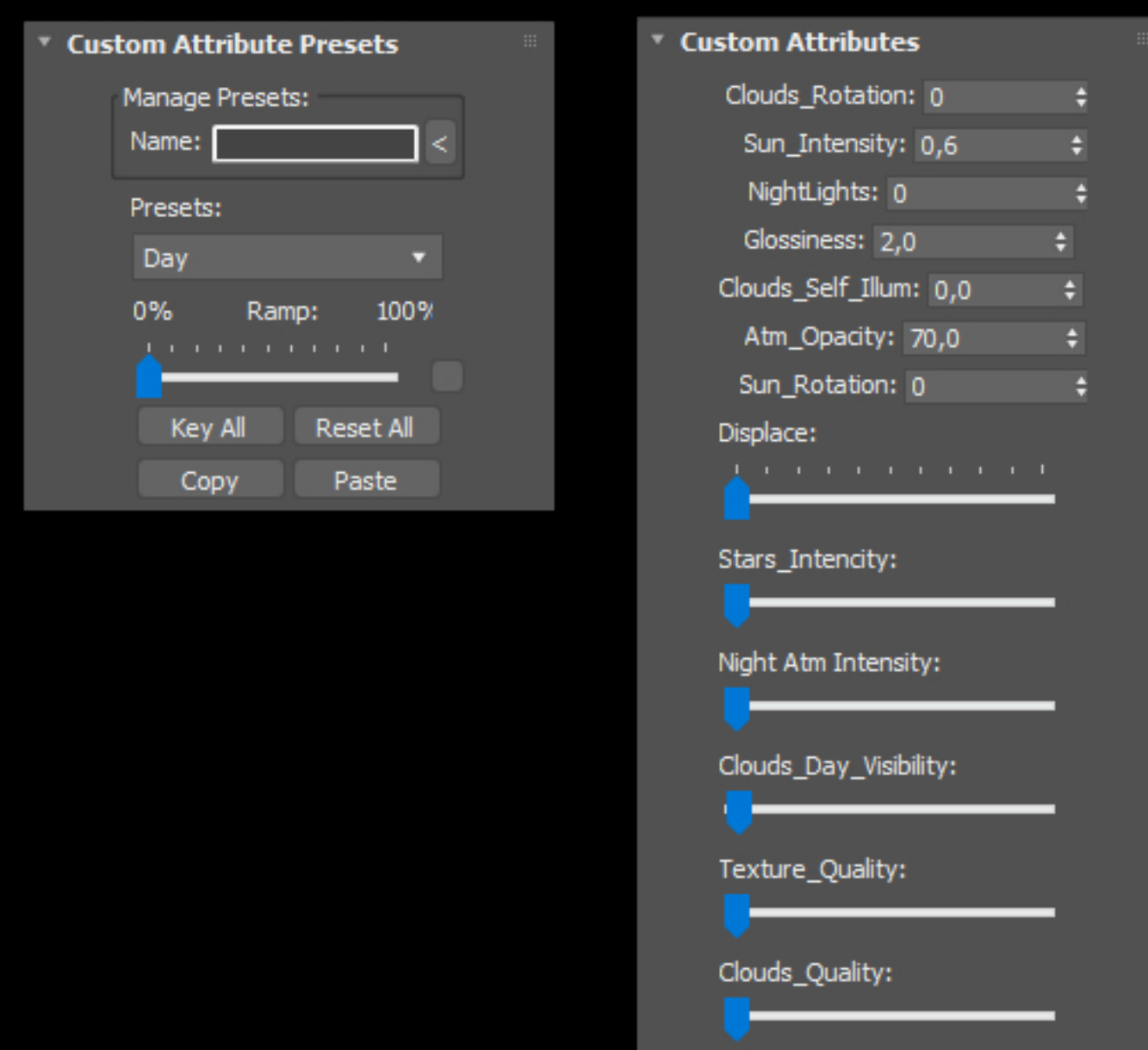


Fig. 4

All necessary parameters for managing the Earth are placed in the attribute holder to Modifirier's stack of the "Ctrl_Root". (see fig. 4). For customer's convenience there were two presets created for Day and Night renders.

Based on the laws of physics, in order to see the night lights and stars, it is necessary to greatly increase the exposure, as a result of which the day side will become overexposed.

If it is necessary to fine-tune your renders for certain cases, the influence of each parameter is described in detail below.

Clouds_Rotation [-360; 360] - wired with the Hp_rot_Clouds helper, rotates clouds around Z axis. If it is not enough, select Clouds object and rotate it as you want.



Clouds_Rotation = 0



Clouds_Rotation = 45



Clouds_Rotation = 180

Fig. 5

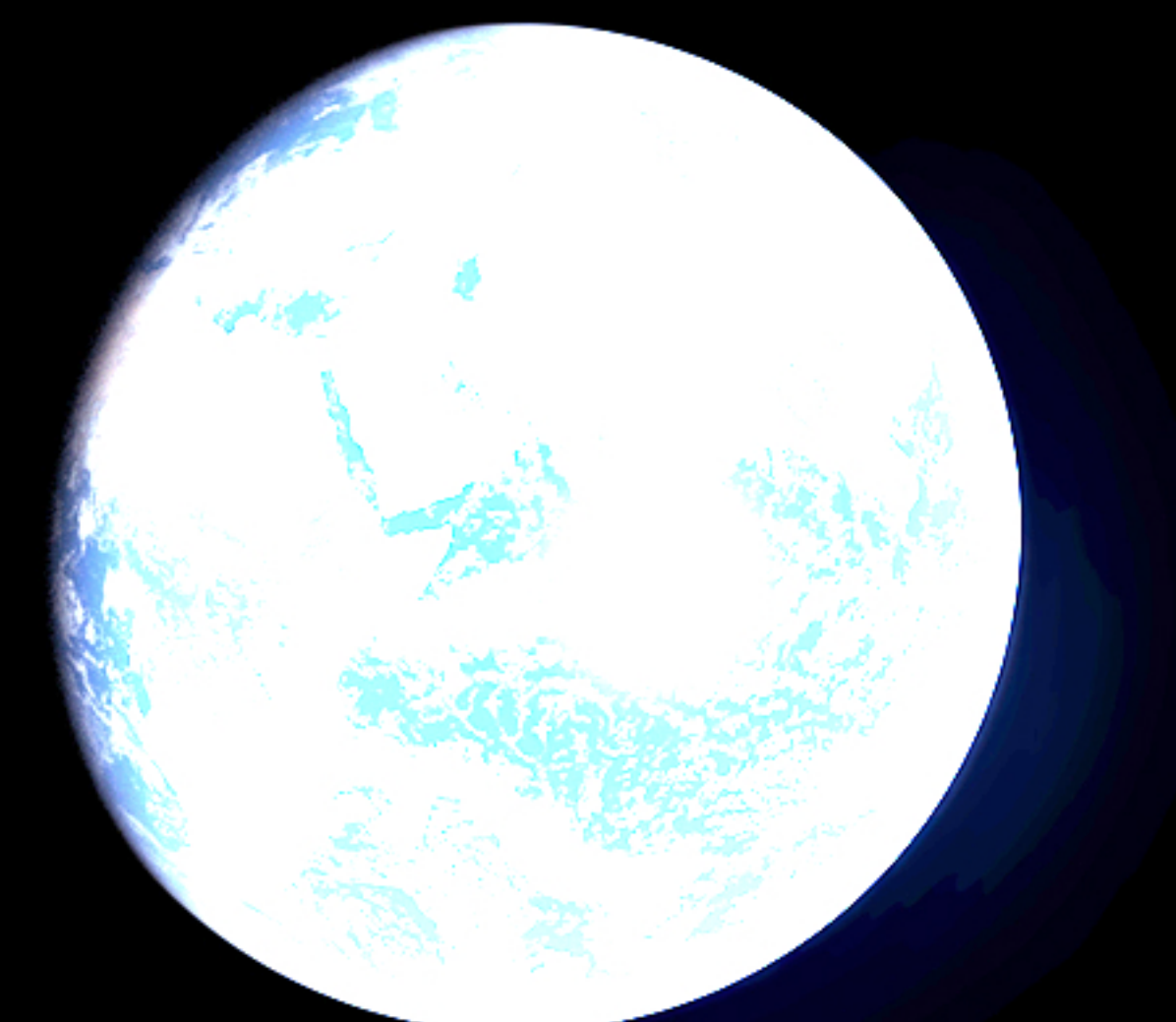
Sun_Intensity [0; 10] - its default value for day preset is 0.6, for the night one is 10.



Sun_Intensity = 0.1



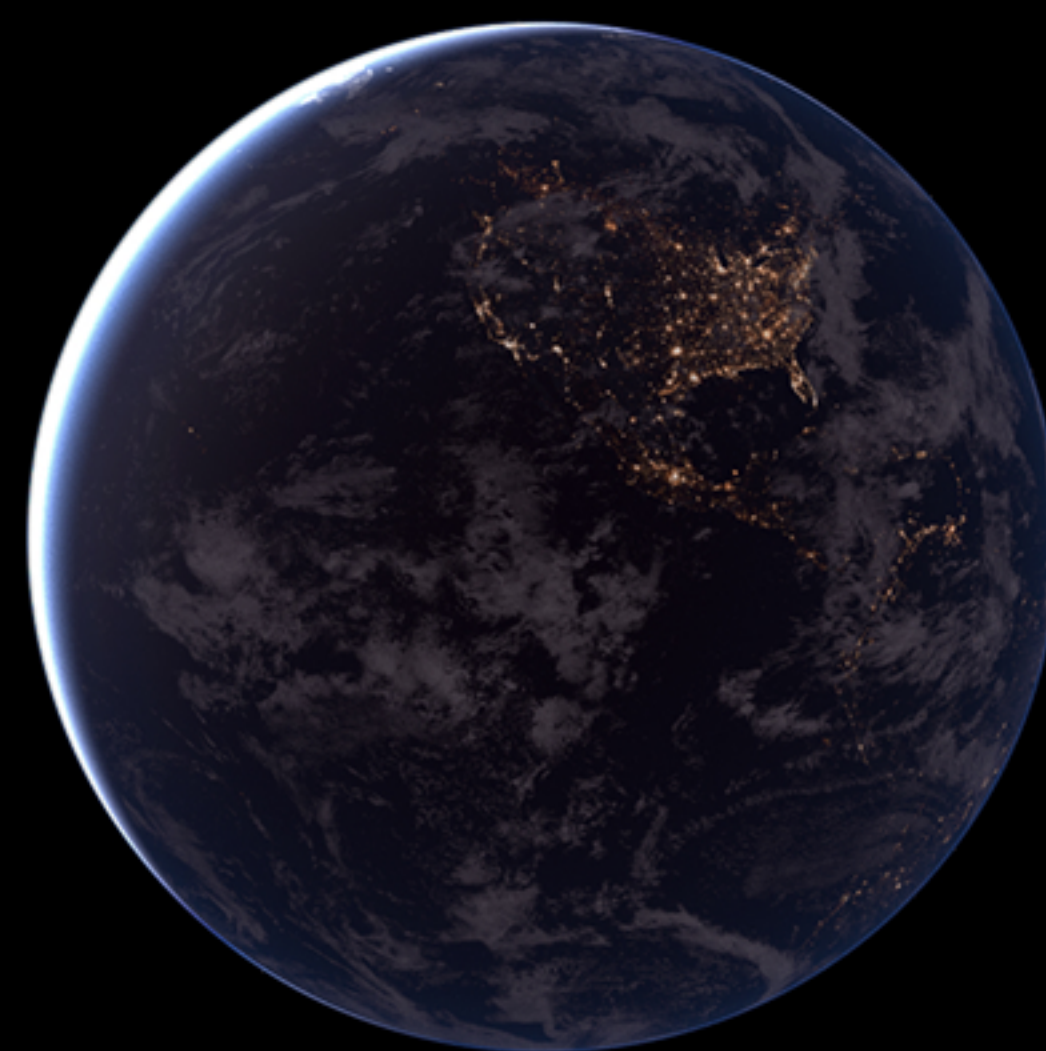
Sun_Intensity = 0.6



Sun_Intensity = 5

Fig. 6

NightLights [0; 200] - nightlights intensity, day preset default is 0, night one is 50.



NightLights = 10



NightLights = 50



NightLights = 200

Fig. 7

Glossiness [1; 10] - the intensity of glare on the water, day preset default is 2, night one is 1. (see fig. 8).



Glossiness = 1



Glossiness = 2



Glossiness = 10

Fig. 8

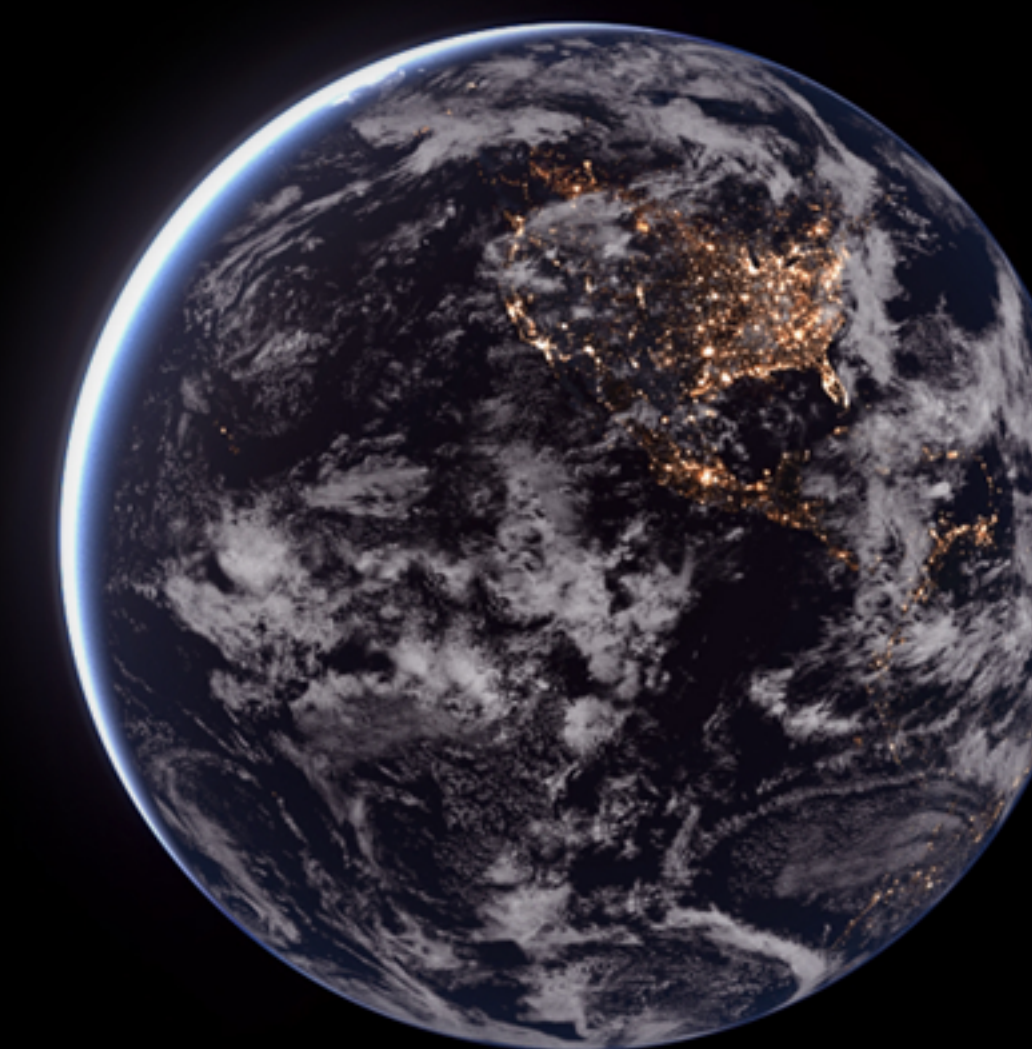
Clouds_Self_Illum [0; 10] - illuminates clouds only on the dark side. Night preset default is 1 (see fig. 9).



Clouds_Self_Illum = 0



Clouds_Self_Illum = 1



Clouds_Self_Illum = 10

Fig. 9

Atm_Opacity [0; 100] - it is 70 by default. Change it only if you are sure what you are doing.

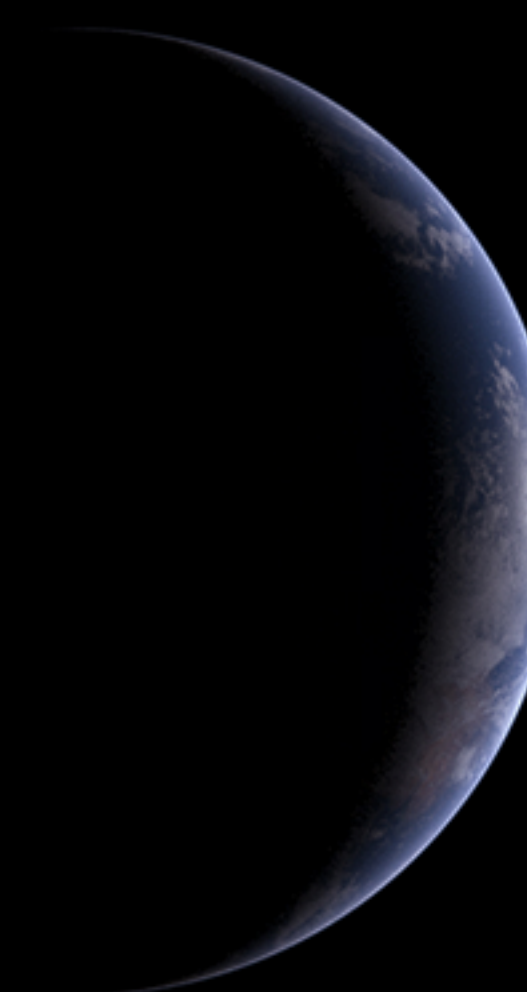
Sun_Rotation [-360; 360] - either rotate "Ctrl_Root" around Z axis or use this spinner (see fig. 10).



Sun_Rotation = 0



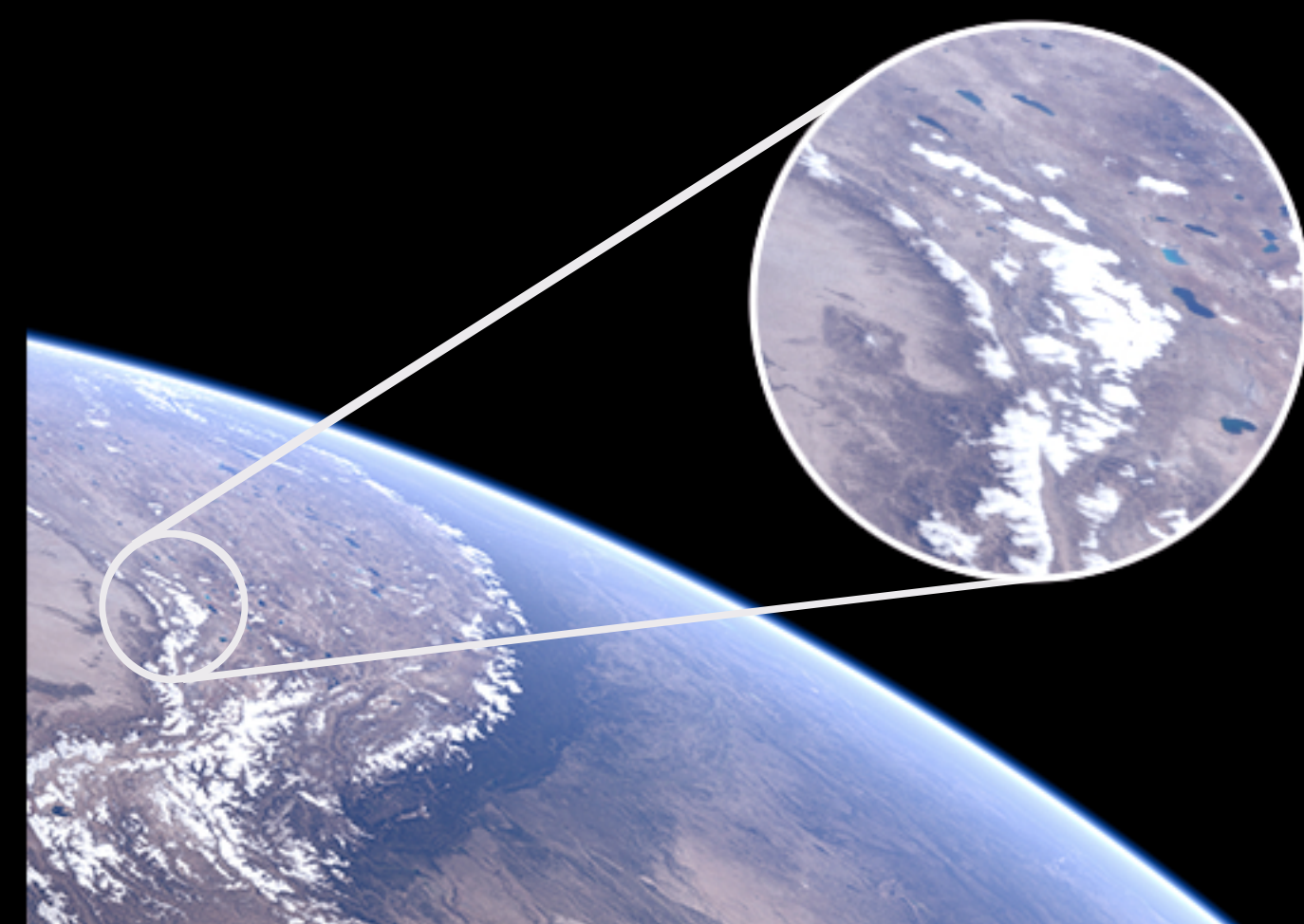
Sun_Rotation = 90



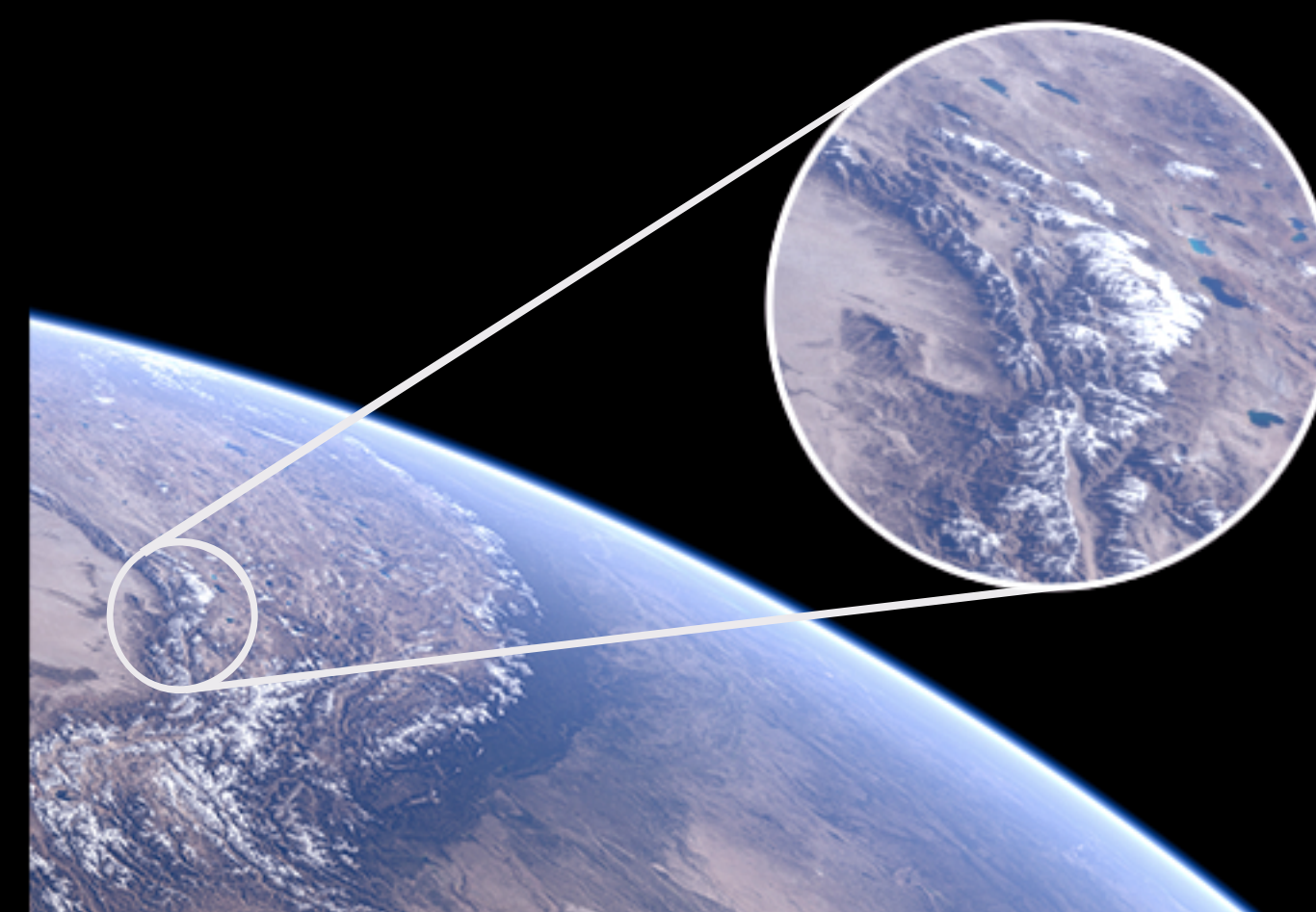
Sun_Rotation = 135

Fig. 10

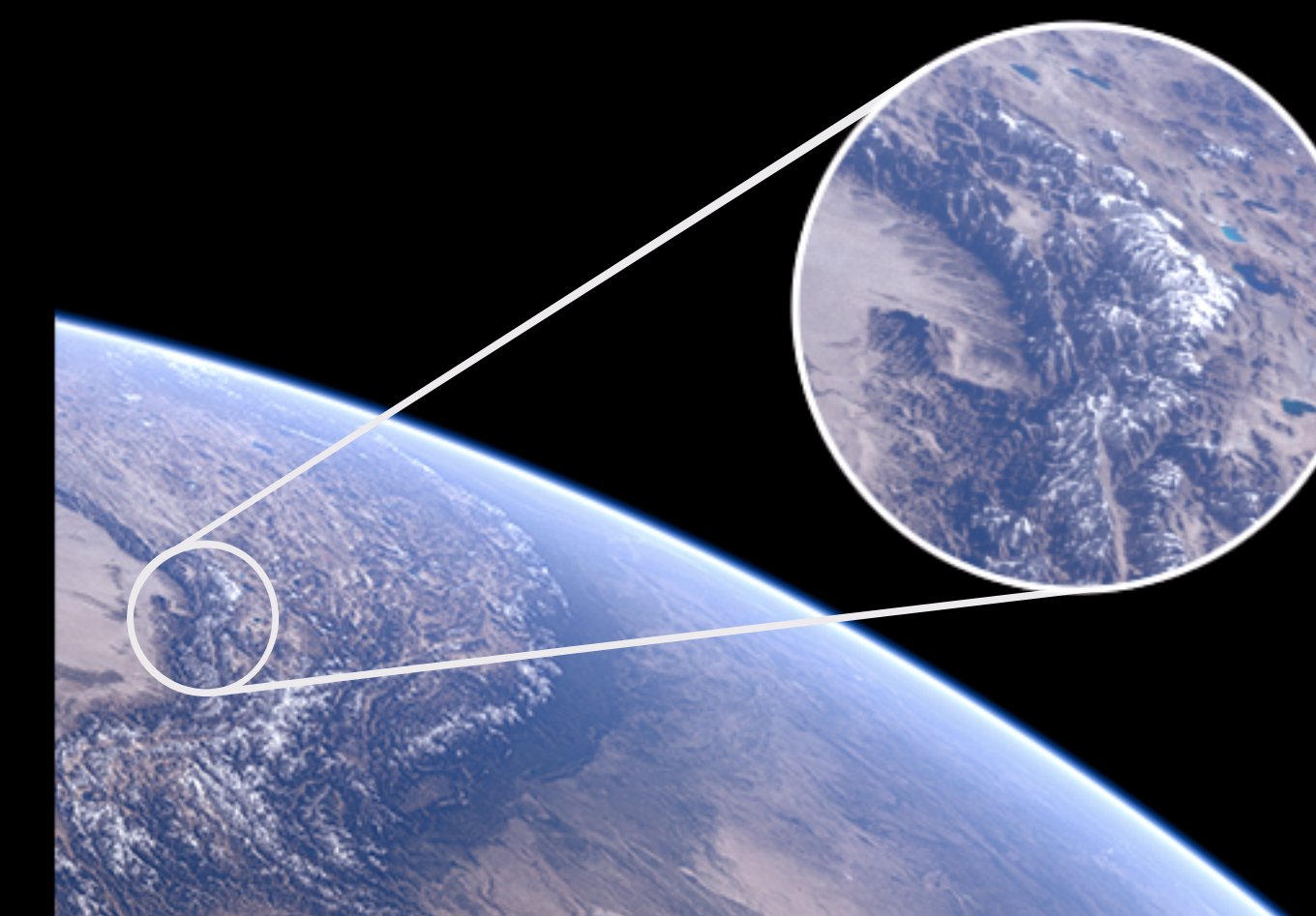
Displace [0; 10] - affects the intensity of bump and displace maps. Zero by default. Change it only for close renders.



Displace = 0



Displace = 5



Displace = 10

Fig. 11

Stars_Intencity [0; 5] - stars, night sky intensity slider. Default value is ~1 (see fig. 12).



Stars_Intencity ~ 1



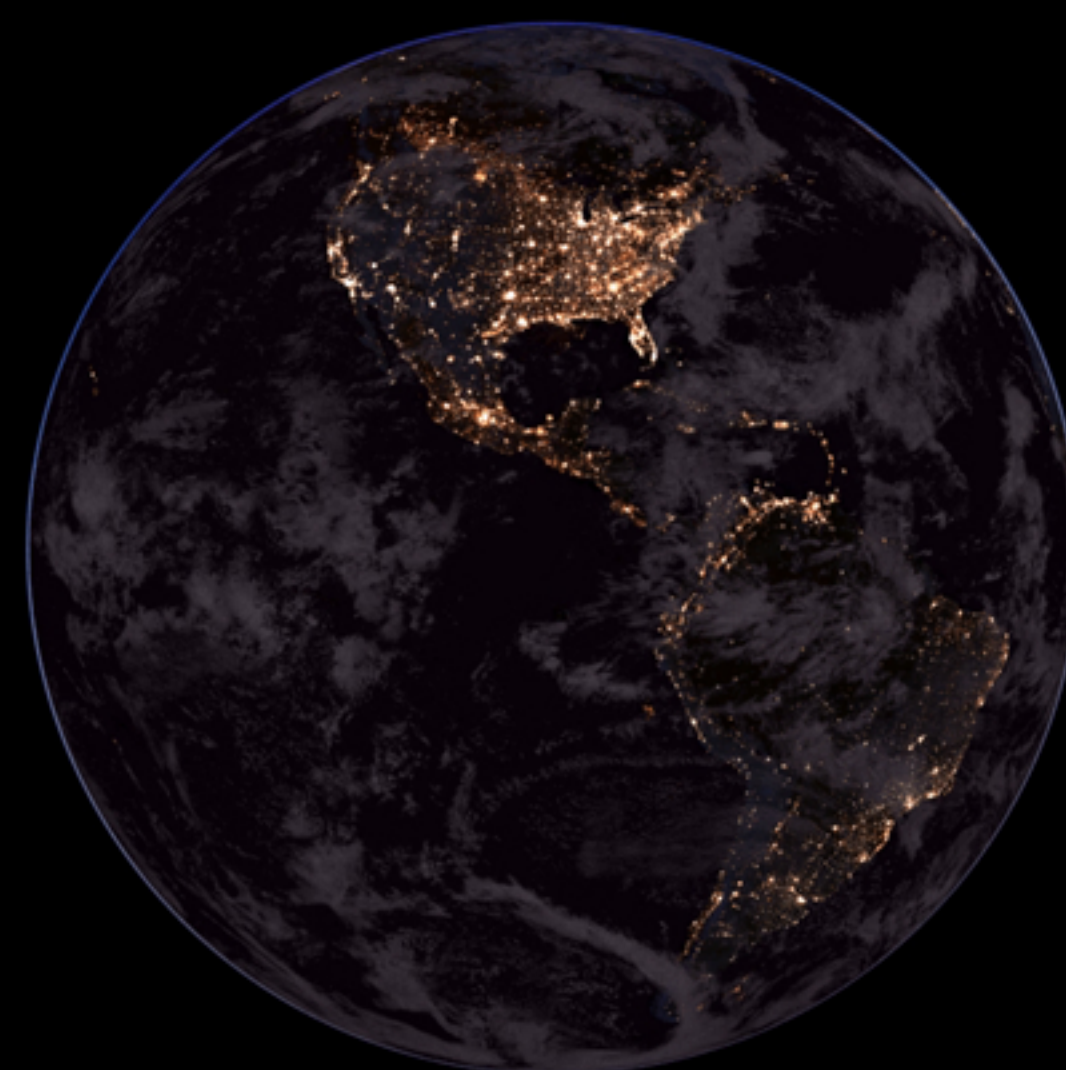
Stars_Intencity ~ 2.5



Stars_Intencity ~ 5

Fig. 12

Night Atm Intensity [0; 100] - day preset default is zero, night one is ~20. Adjust it according to your inner sense of beauty (see fig. 13).



Night Atm Intensity = 0



Night Atm Intensity = 20



Night Atm Intensity = 100

Fig. 13

Clouds_Day_Visibility [0; 100] - day preset default is zero, night one is 100. No need to change these defaults.

Texture_Quality [1, 2, 3, 4] - switches between earth materials with texture sets from 8k to 86k (see pages 6-7).
1 = 8k, 2 = 21k, 3 = 43k, 4 = 86k (see fig. 14).

Clouds_Quality [1, 2, 3] - switches between clouds materials with texture sets from 8k to 43k (see pages 6-7).
1 = 8k, 2 = 21k, 3 = 43k (see fig. 14).

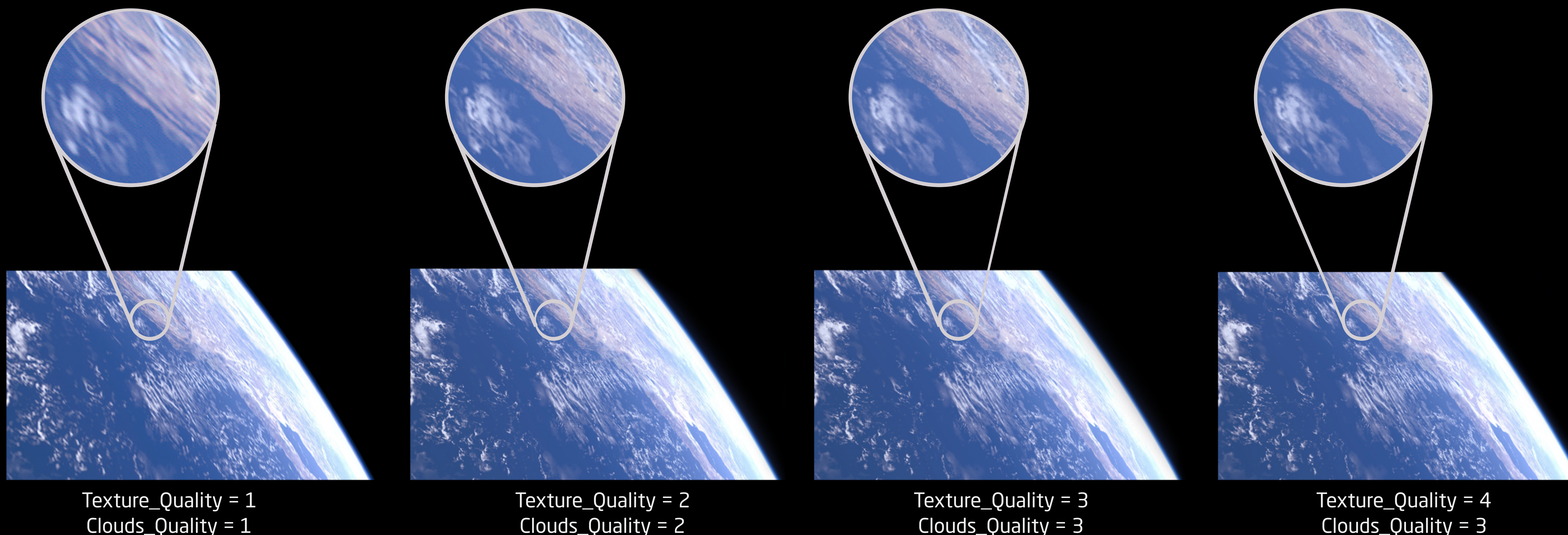
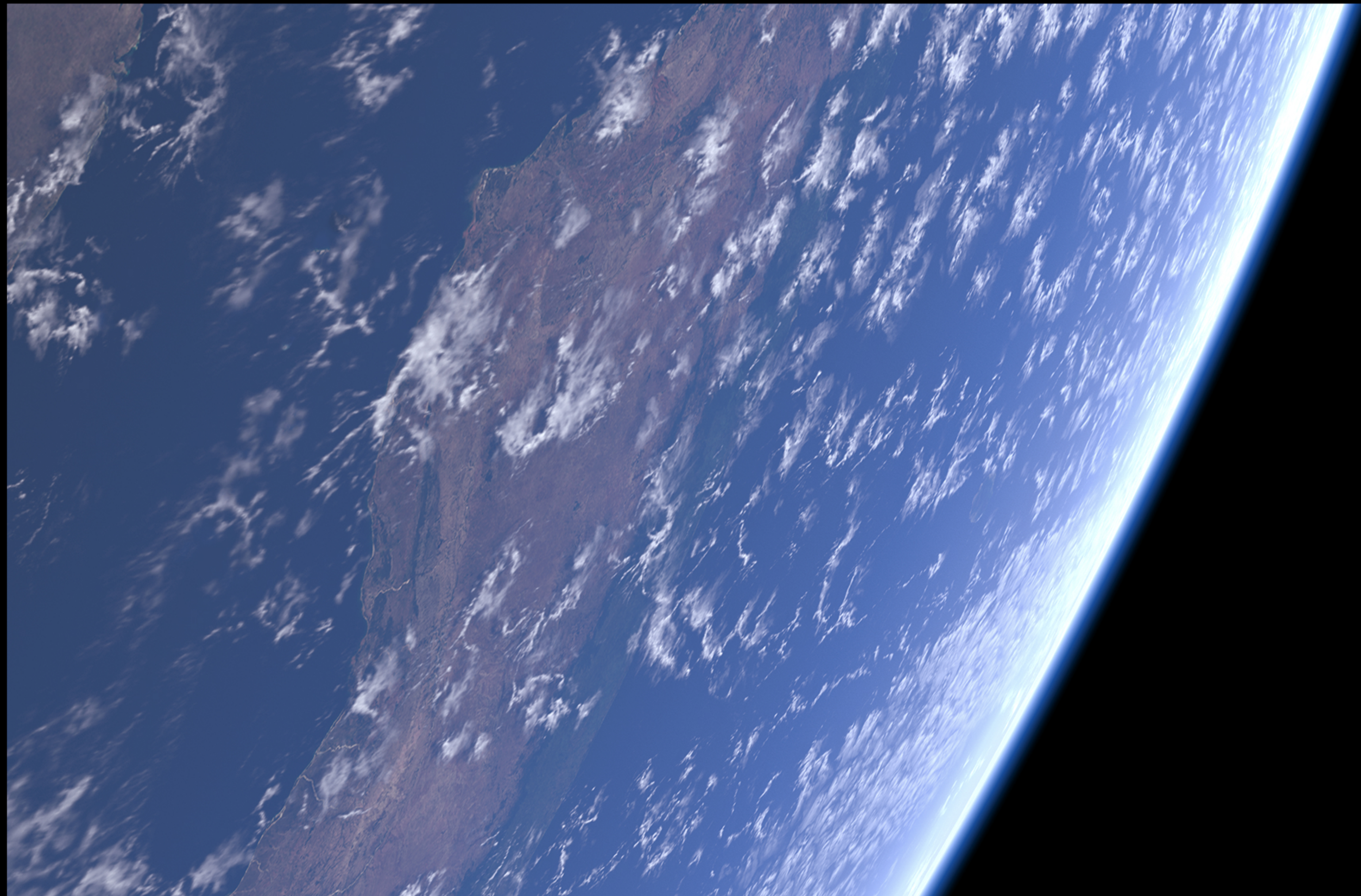


Fig. 14



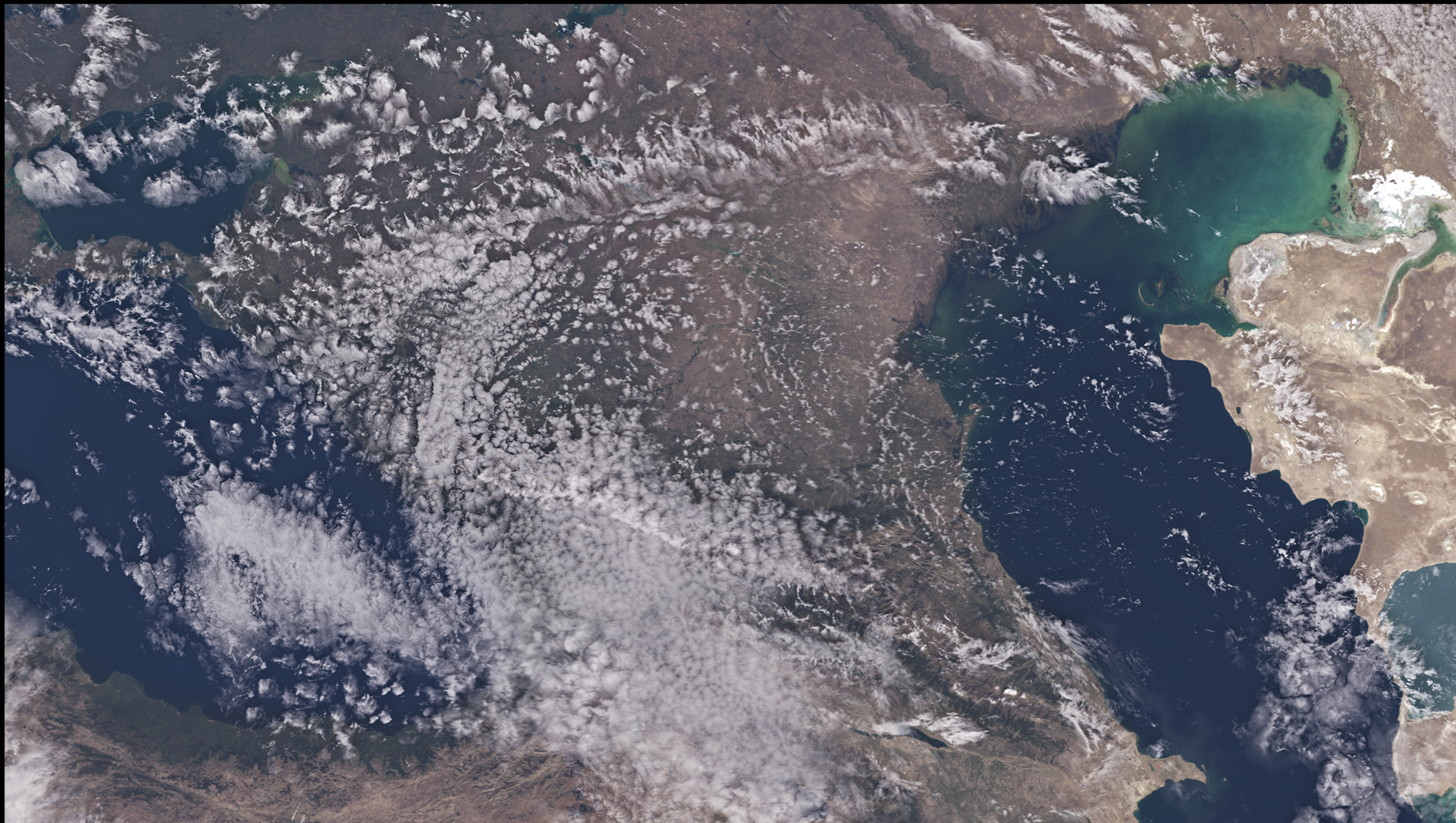








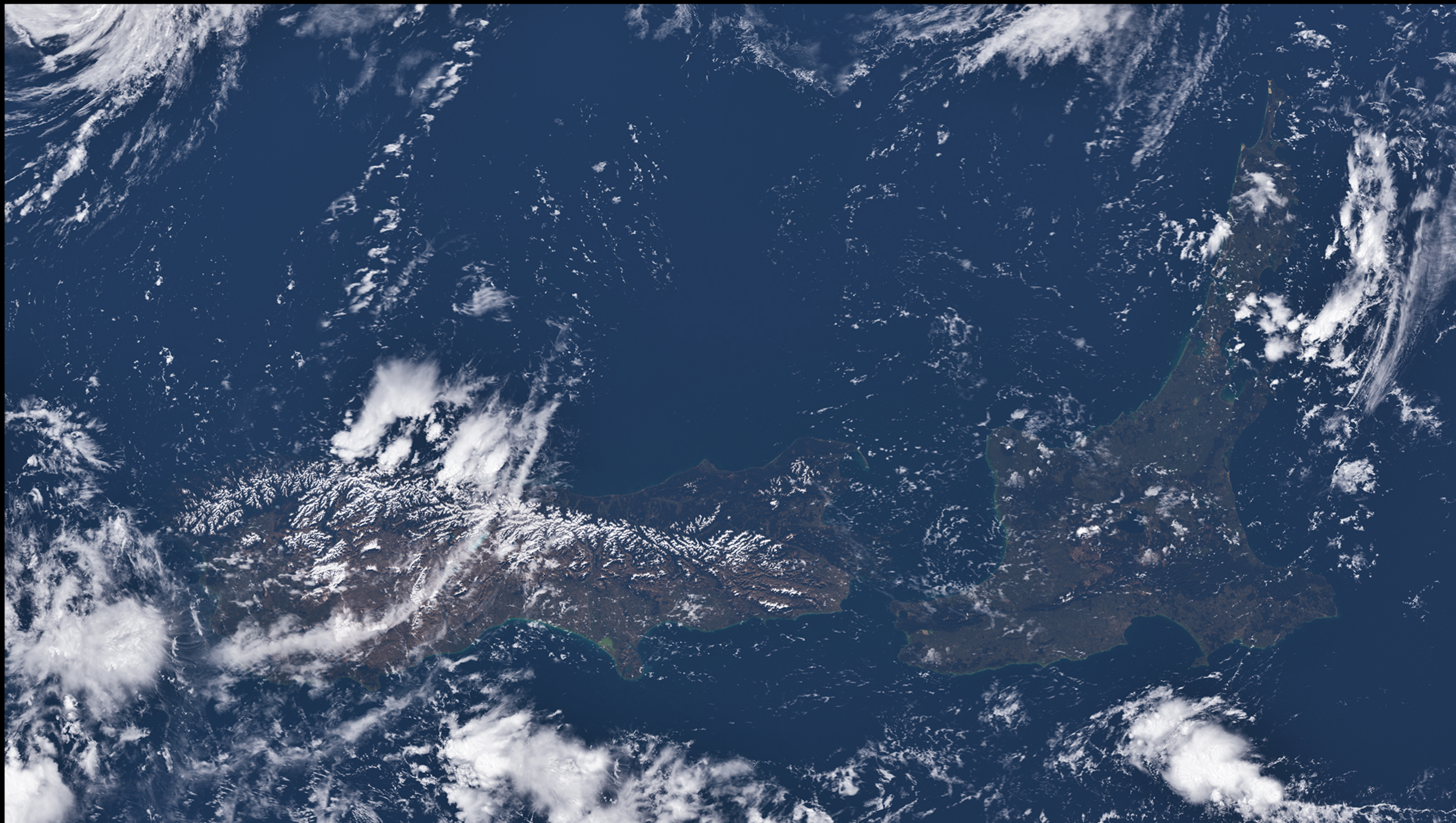


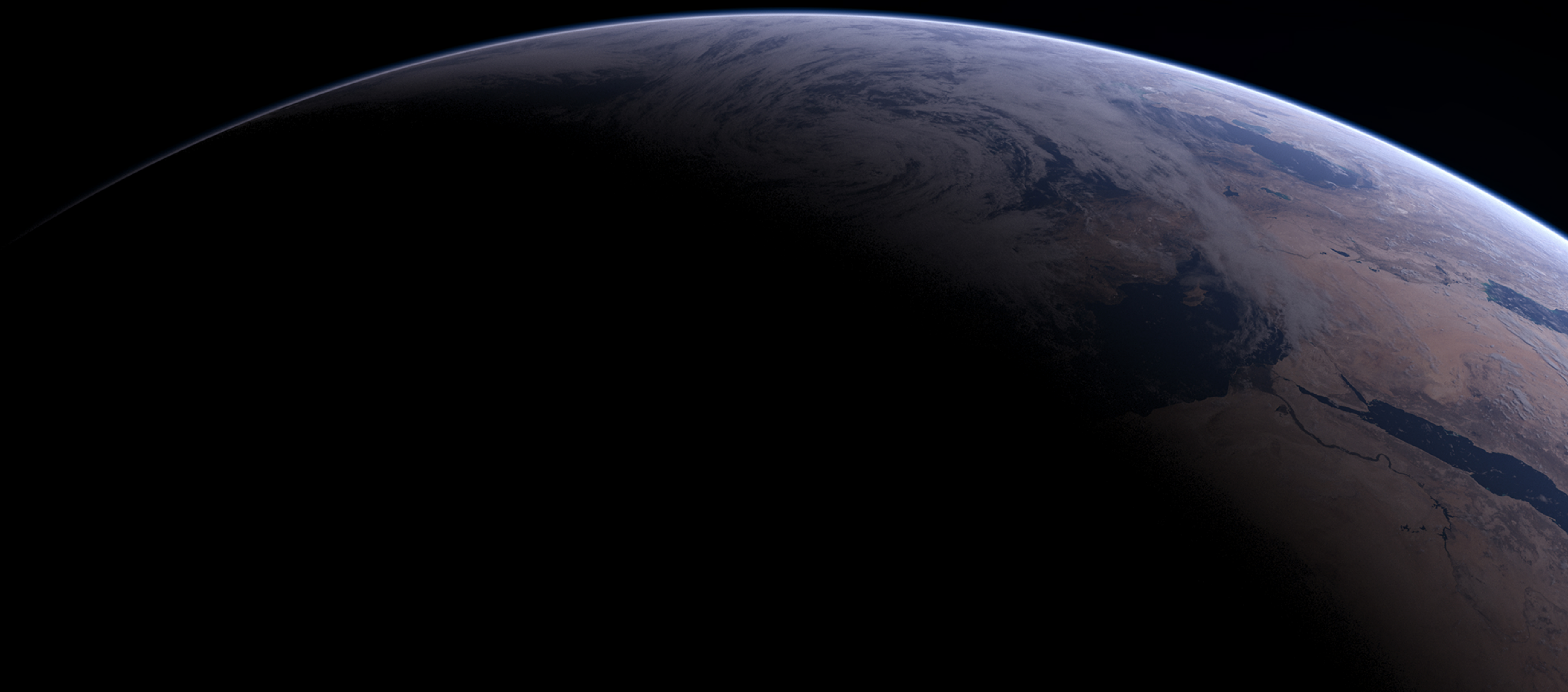
























Zverev Pavel a.k.a. Bazooka Joe

Hard surface modeller, rigger, animator



3dbazooka.com



youtube.com/@3DBAZOOKA



pavel_zverev@3dbazooka.com



vk.com/bazooka_joe_1987



[@dddbazooka](https://t.me/dddbazooka)



artstation.com/bazooka_joe