

Stored Textures

CSCI 4239/5239

Advanced Computer Graphics

Spring 2025

What are Stored Textures

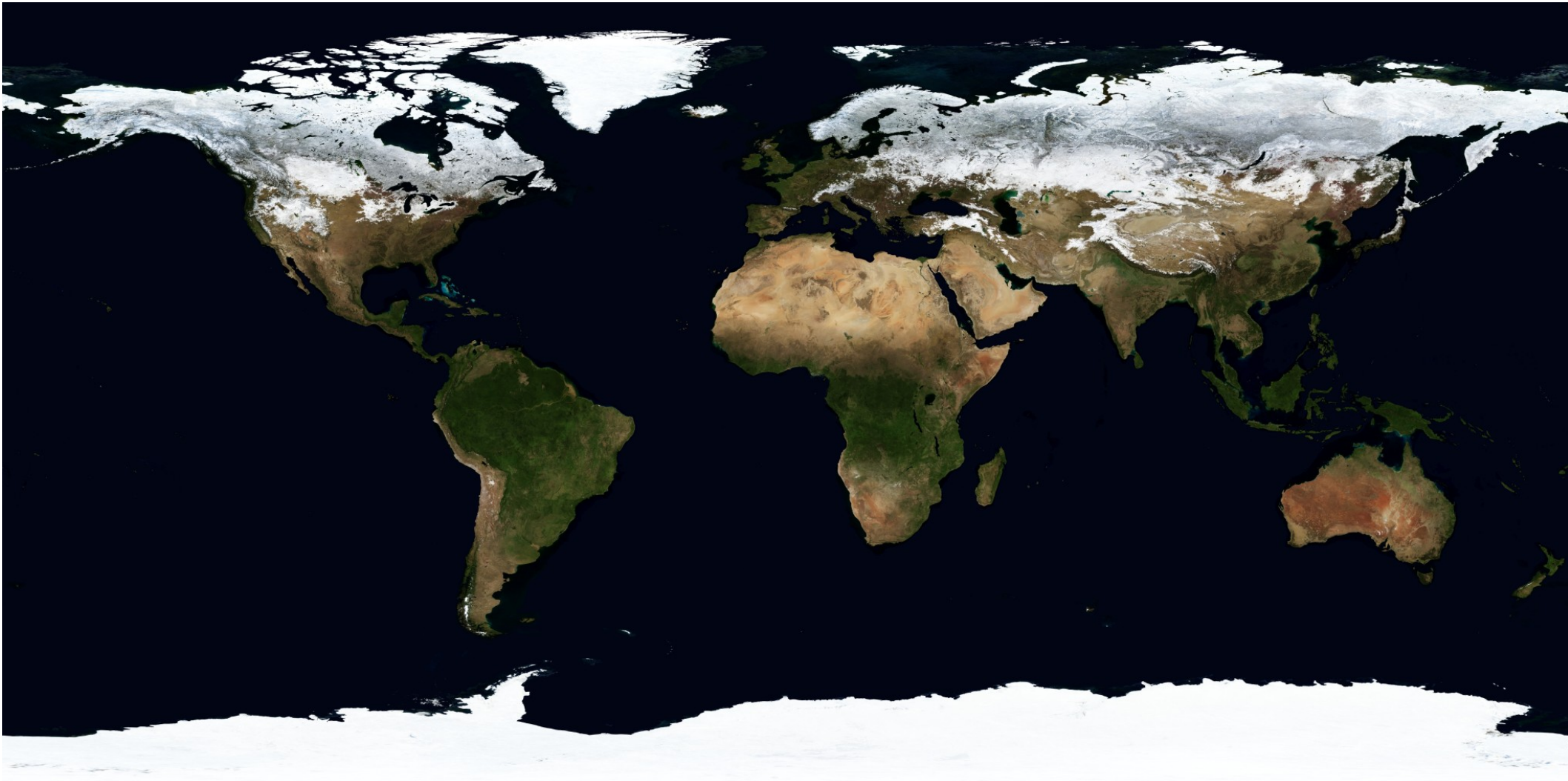
- Textures in OpenGL are Stored Textures
 - Not computed by shader but sampled by shader
 - Usually 2D
 - Simultaneous textures through multi-textures
- Textures are applied in shader
 - sampler2D point to texture units
 - texture2D sample textures
 - texture coordinates used to identify pixels

Blue Marble Example

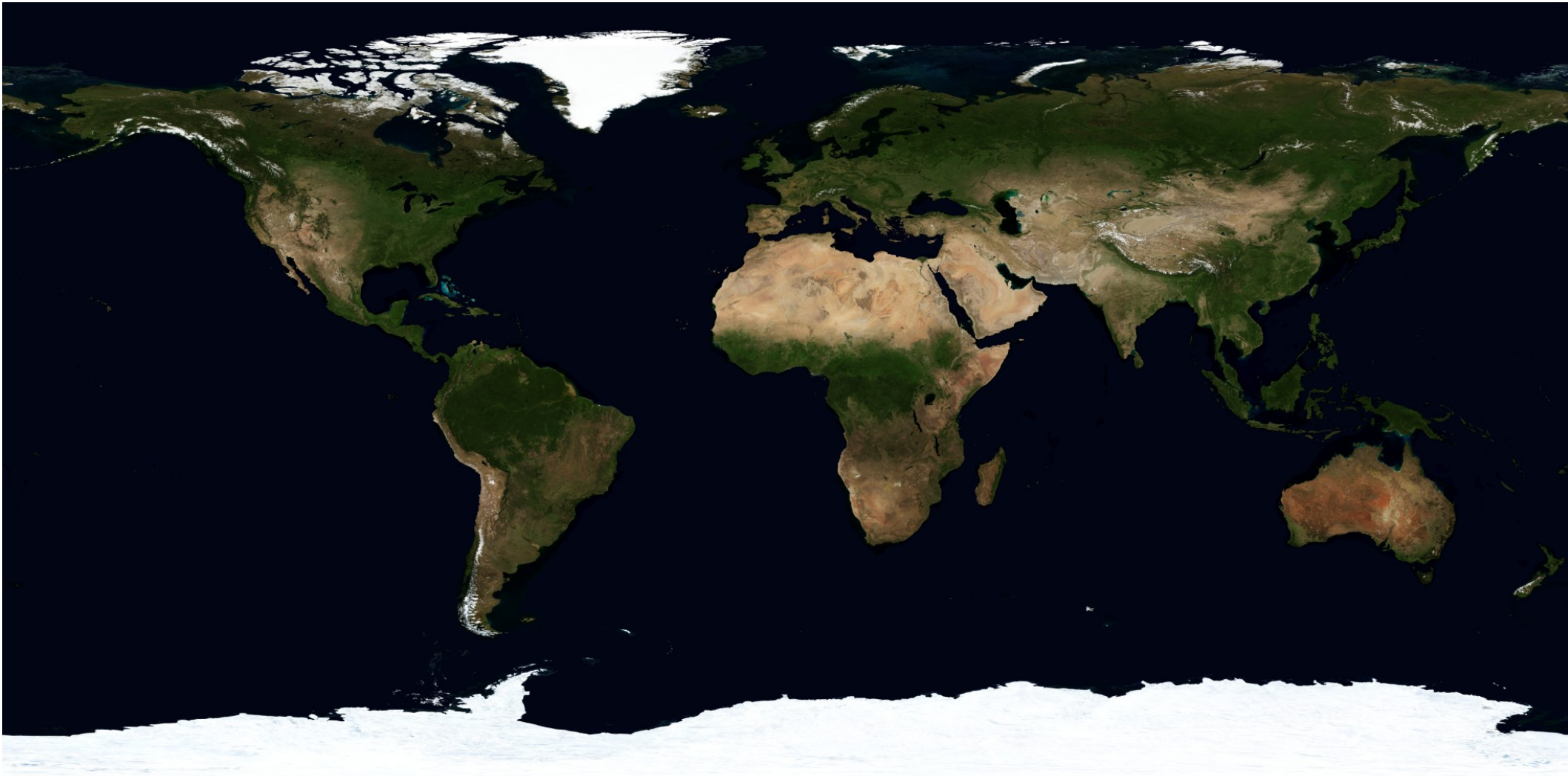
- MODIS satellite data
 - 1km raw resolution
- High resolution textures
 - Monthly cloudless daytime
 - Earth's city lights
 - Clouds
- Mercator projection
 - Works with gluSphere



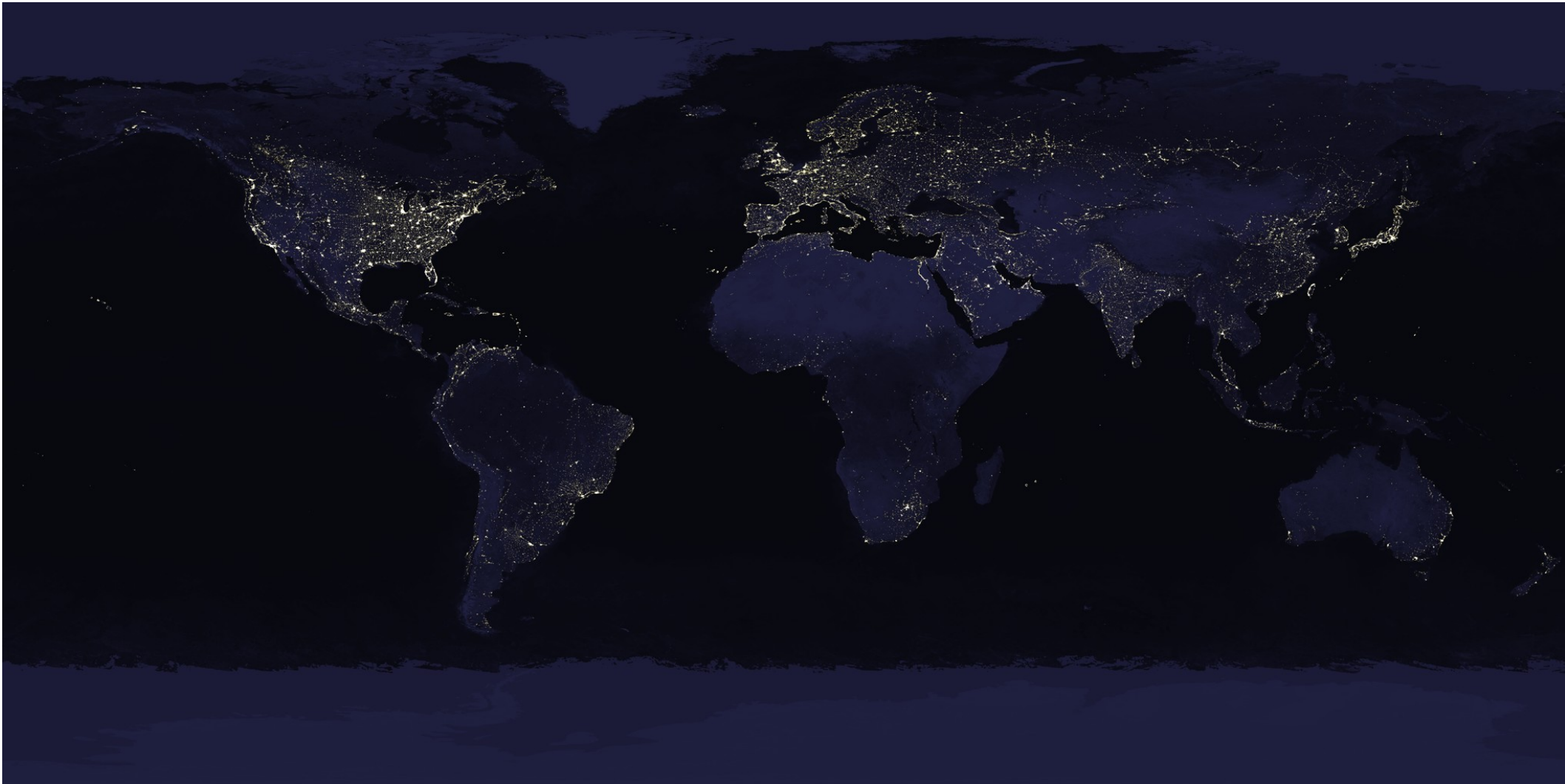
January Daytime Texture



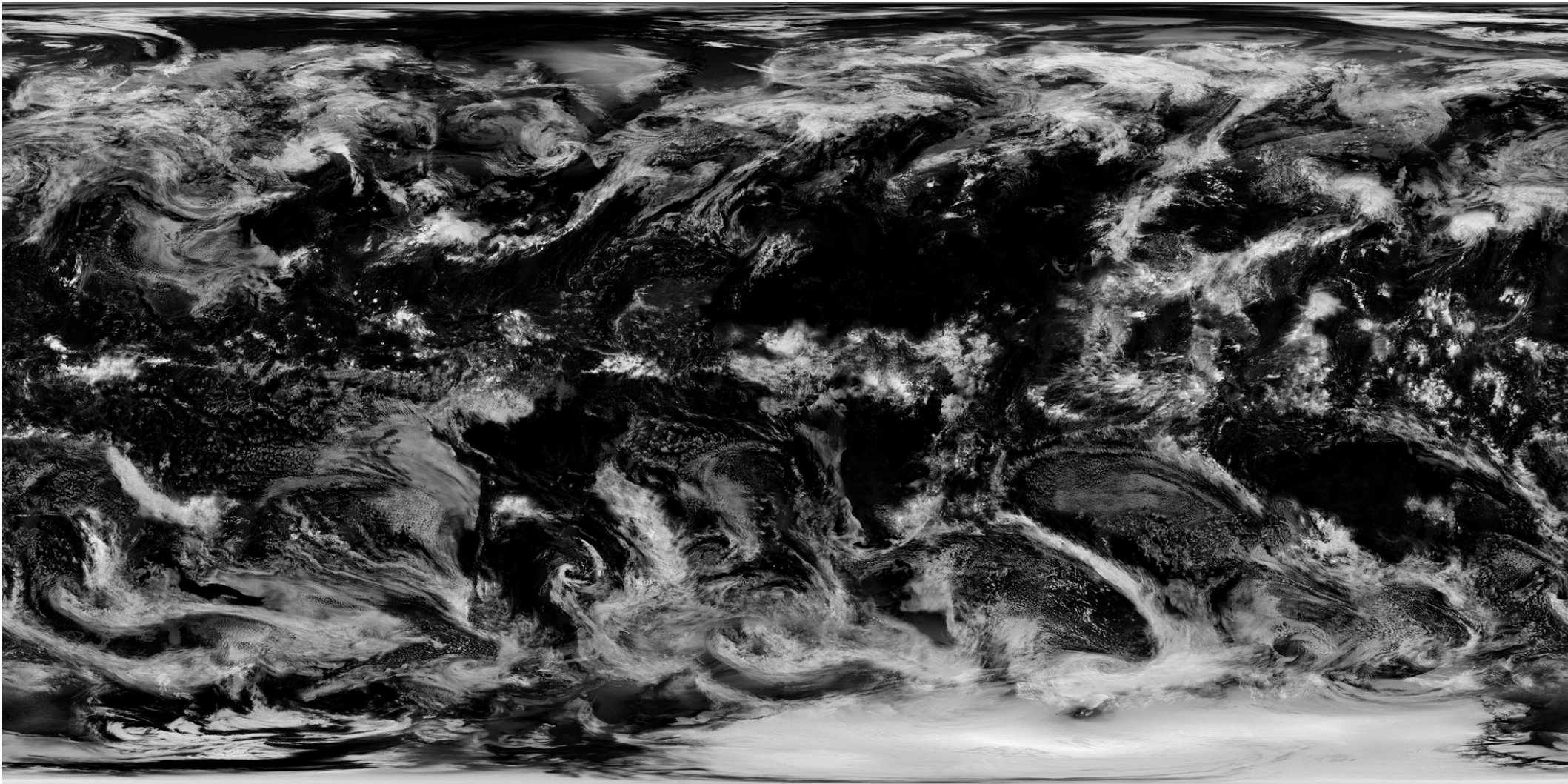
July Daytime Texture



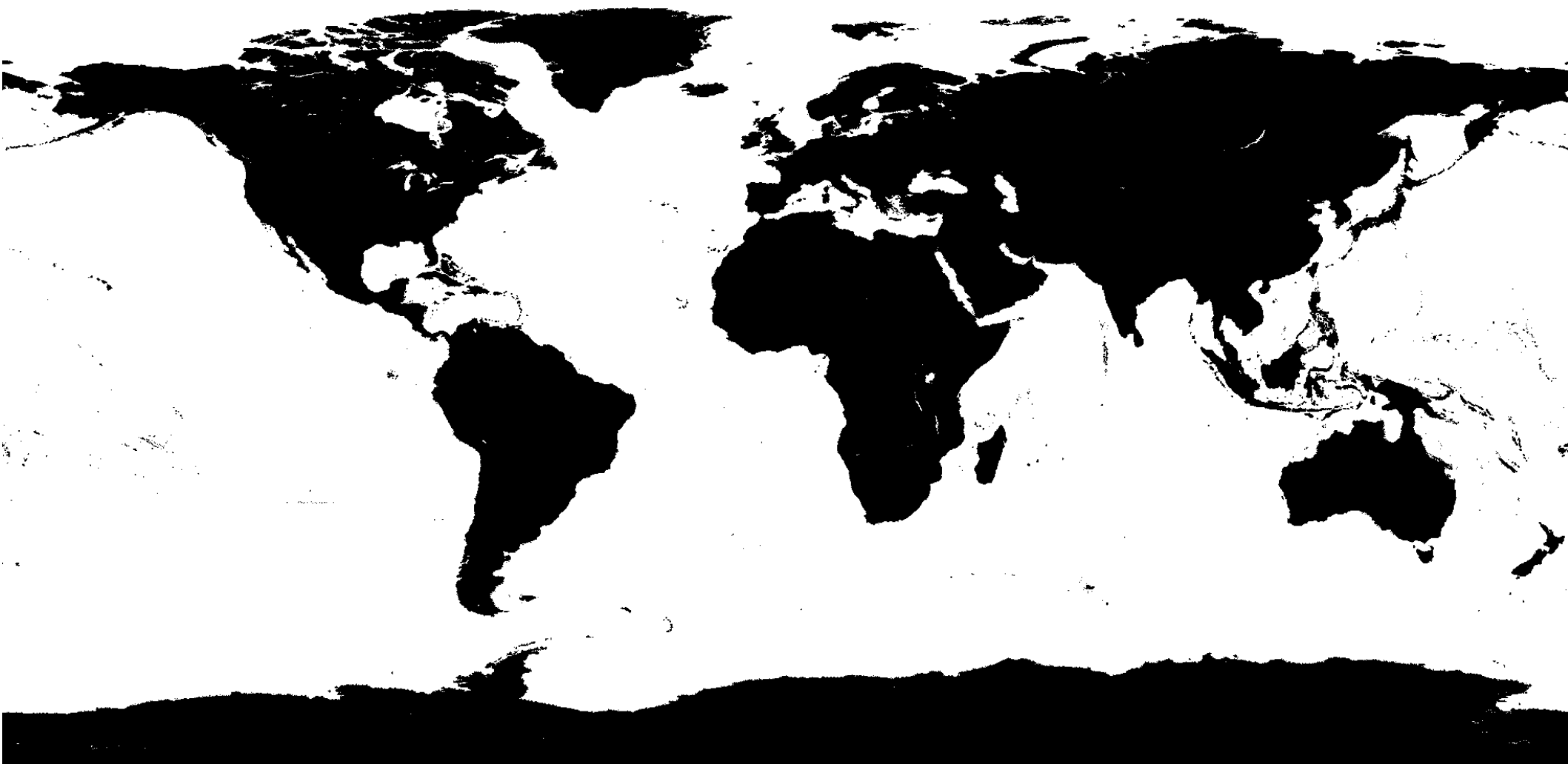
Nighttime Texture



Cloud Texture



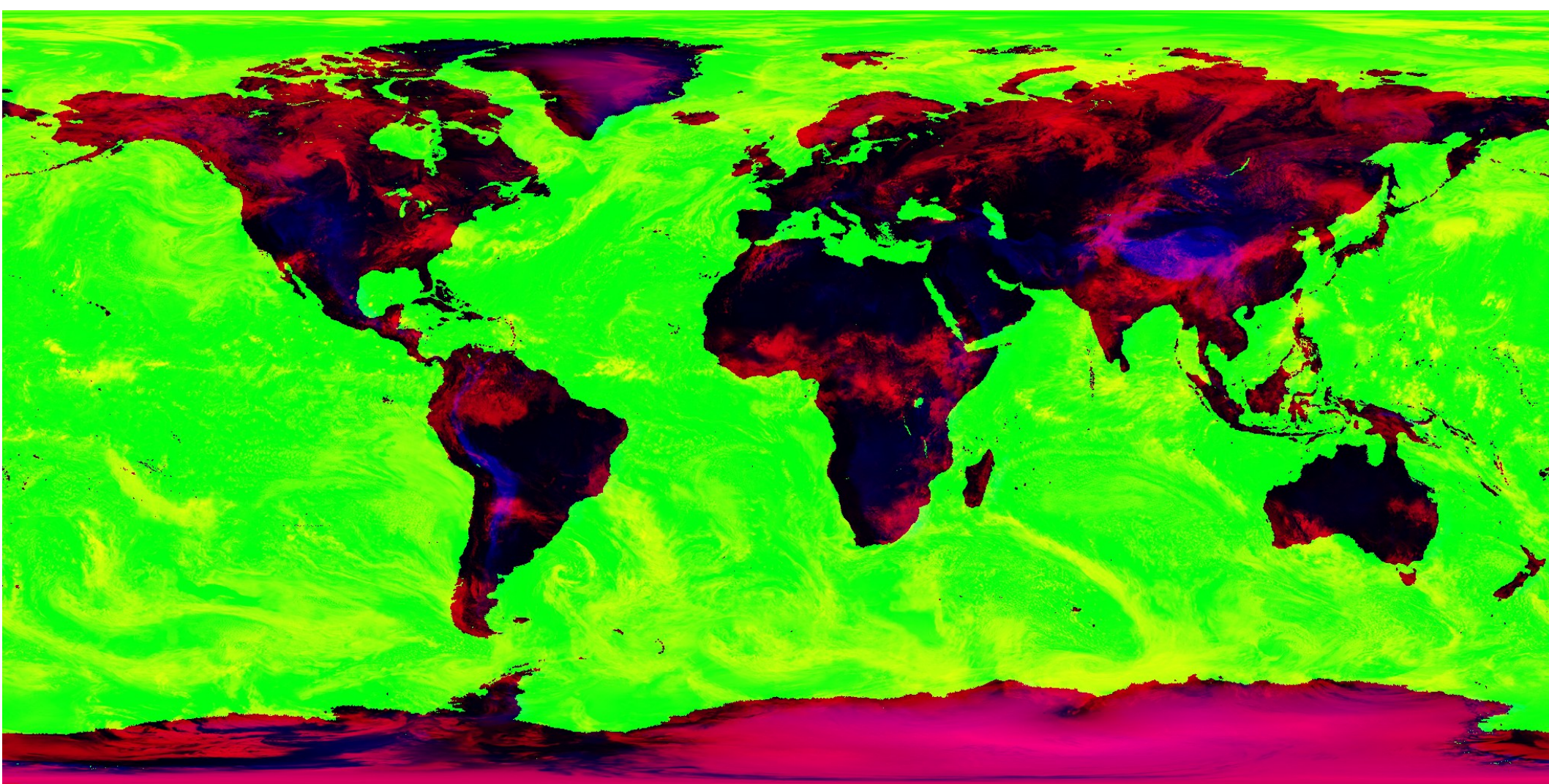
Gloss (Ocean) Texture



Elevation Texture



Cloud (R) Gloss (G) Elevation (B)



Tasks

- Compute lighting
 - Gloss sets specular shininess
- Mix daytime textures to day of year
- Mix day and night textures
- Mix cloud with image
 - Reflects sun during day
 - Block lights at night

Passing textures to shaders

- Select texture units
 - `glActiveTexture(GL_TEXTUREx)`
- Select active texture
 - `glBindTexture(GL_TEXTURE_2D , name)`
- Map sampler to multitexture
 - `id = glGetUniformLocation(shader , varname)`
 - `glUniform1i(id , x)`
 - **x** is 0,1,2,3 - texture unit
- In shader access is by sampler
 - `texture2D(varname , texture_coords)`

This is what it should look like

- Photograph from Apollo 17
 - Bright everywhere
 - Light blue oceans
 - Bright white clouds
- Lighting properties
 - Sun far away
 - Refraction

