HOW WE MADE REWIND THE RED PLANET

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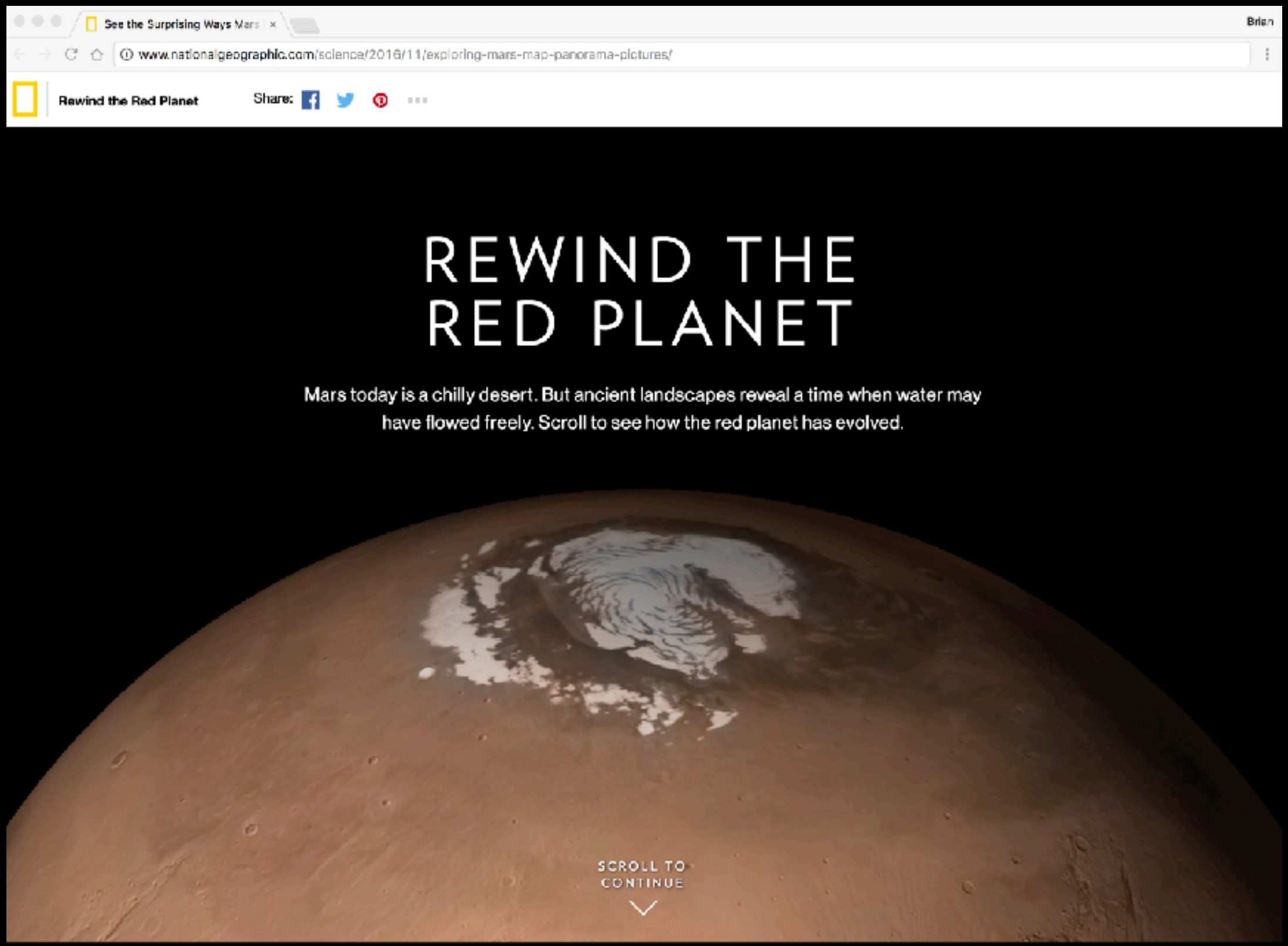
Slides here:
http://bit.ly/foss4mars

DESIGN

DEVELOPMENT

EDITORIAL

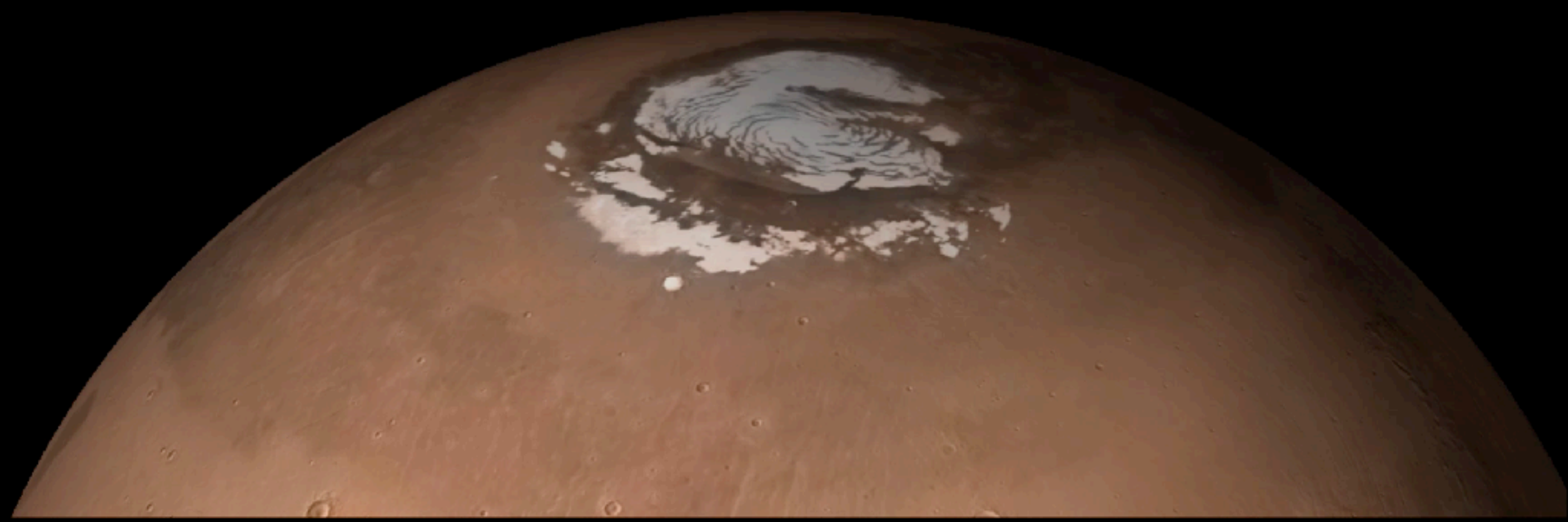
DATA



http://www.nationalgeographic.com/science/2016/11/exploring-mars-map-panorama-pictures/

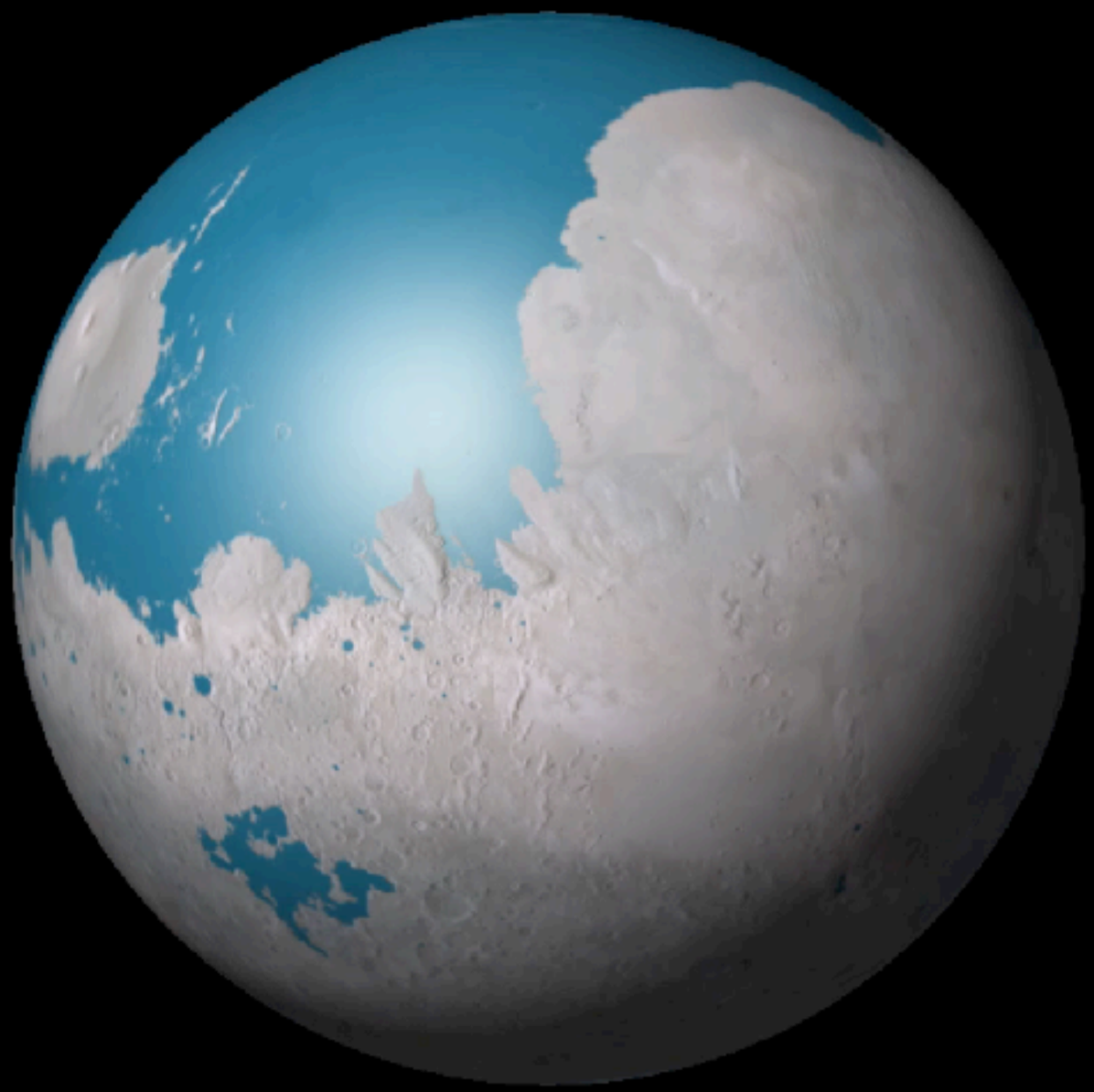
REWIND THE RED PLANET

Mars today is a chilly desert. But ancient landscapes reveal a time when water may have flowed freely. Scroll to see how the red planet has evolved.



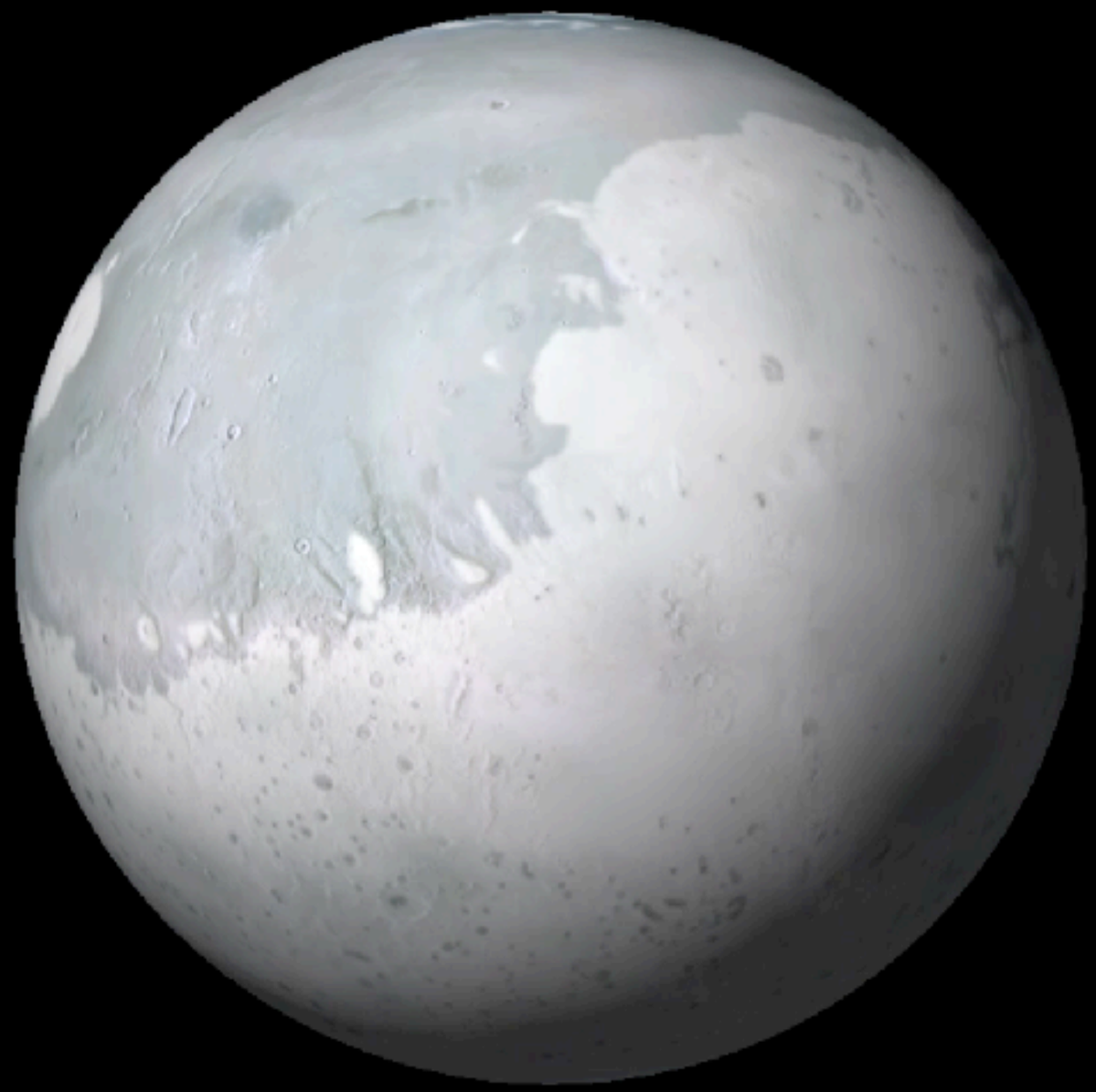
A YOUNG WATER WORLD

3.8 BILLION YEARS AGO



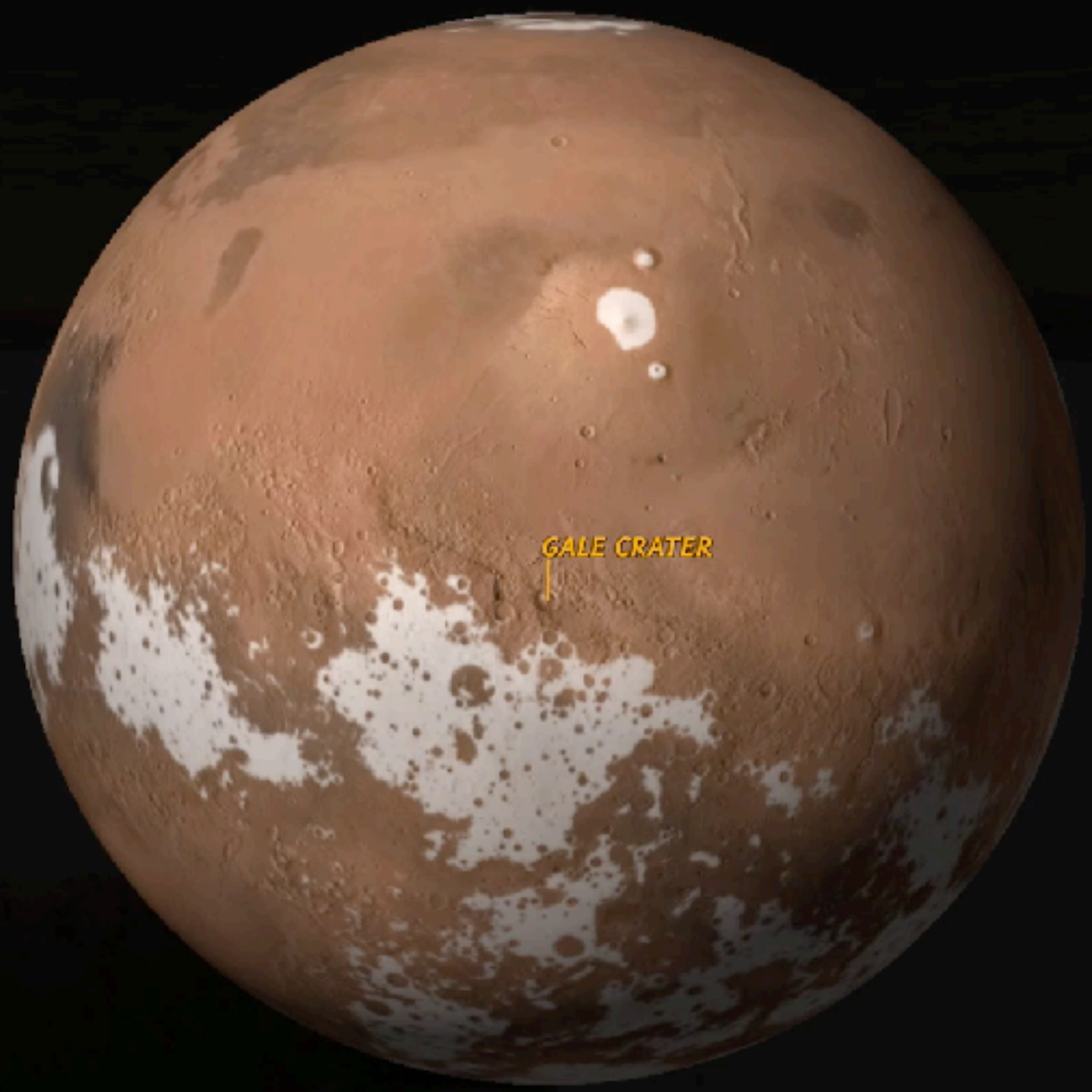
SNOW GLOBE HYPOTHESIS

3.8 BILLION YEARS AGO

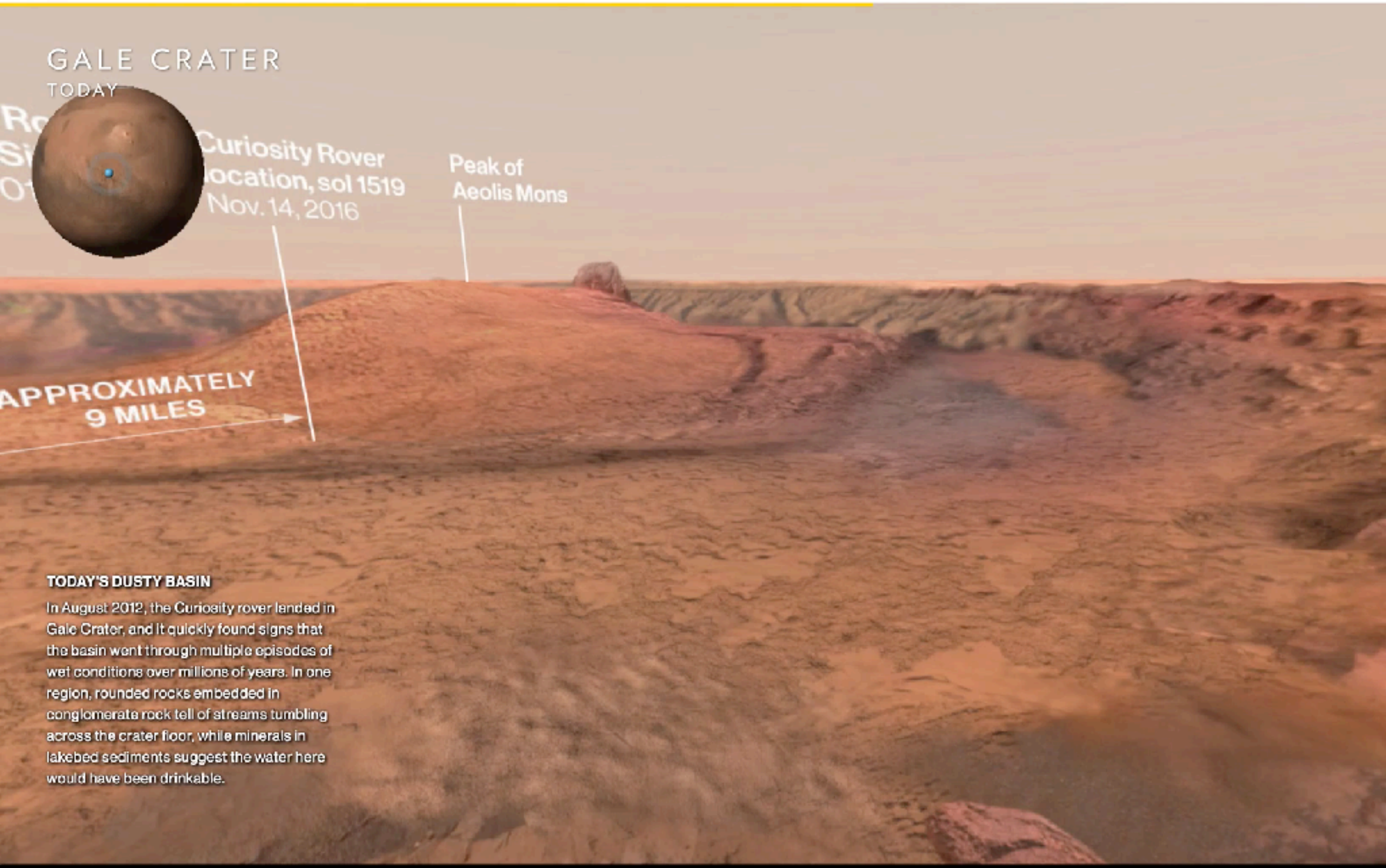


BECOMING A RUSTED REALM

3.5 BILLION YEARS AGO




GALE CRATER
3.5 BILLION YEARS AGO



TODAY'S DUSTY BASIN

In August 2012, the Curiosity rover landed in Gale Crater, and it quickly found signs that the basin went through multiple episodes of wet conditions over millions of years. In one region, rounded rocks embedded in conglomerate rock tell of streams tumbling across the crater floor, while minerals in lakebed sediments suggest the water here would have been drinkable.

THE RED PLANET
TODAY

ACQUIRE KNOWLEDGE/DATA

READING, REPORTING, RESEARCH

Bethany Ehlmann, NASA JPL California Institute of Technology
Robin Wordsworth, Harvard University
Caleb Fassett, NASA Marshall Space Flight Center
Tim Goudge, The University of Texas at Austin

CREATE A NARRATIVE

LOFI/HIFI DESIGNS

COMMISSION ILLUSTRATIONS

RESEARCH TECHNOLOGY

PROTOTYPE

TOOLS

SCRAWLER
https://github.com/cy-park/Scrawler

GREENSOCK ANIMATION PLATFORM
https://greensock.com/gsap

THREE.JS
https://threejs.org/

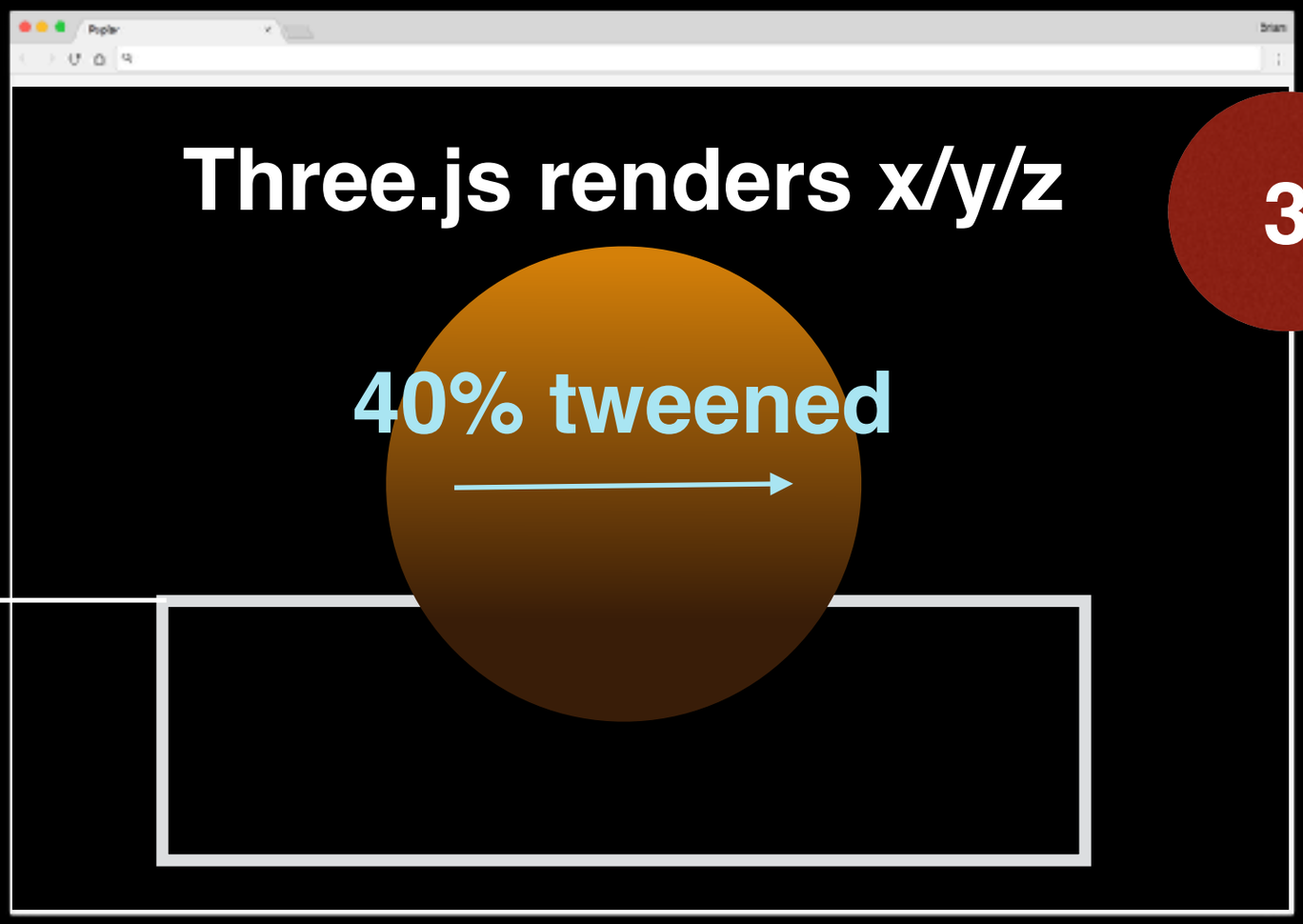
1

Scrawler tracks box

40%

100%

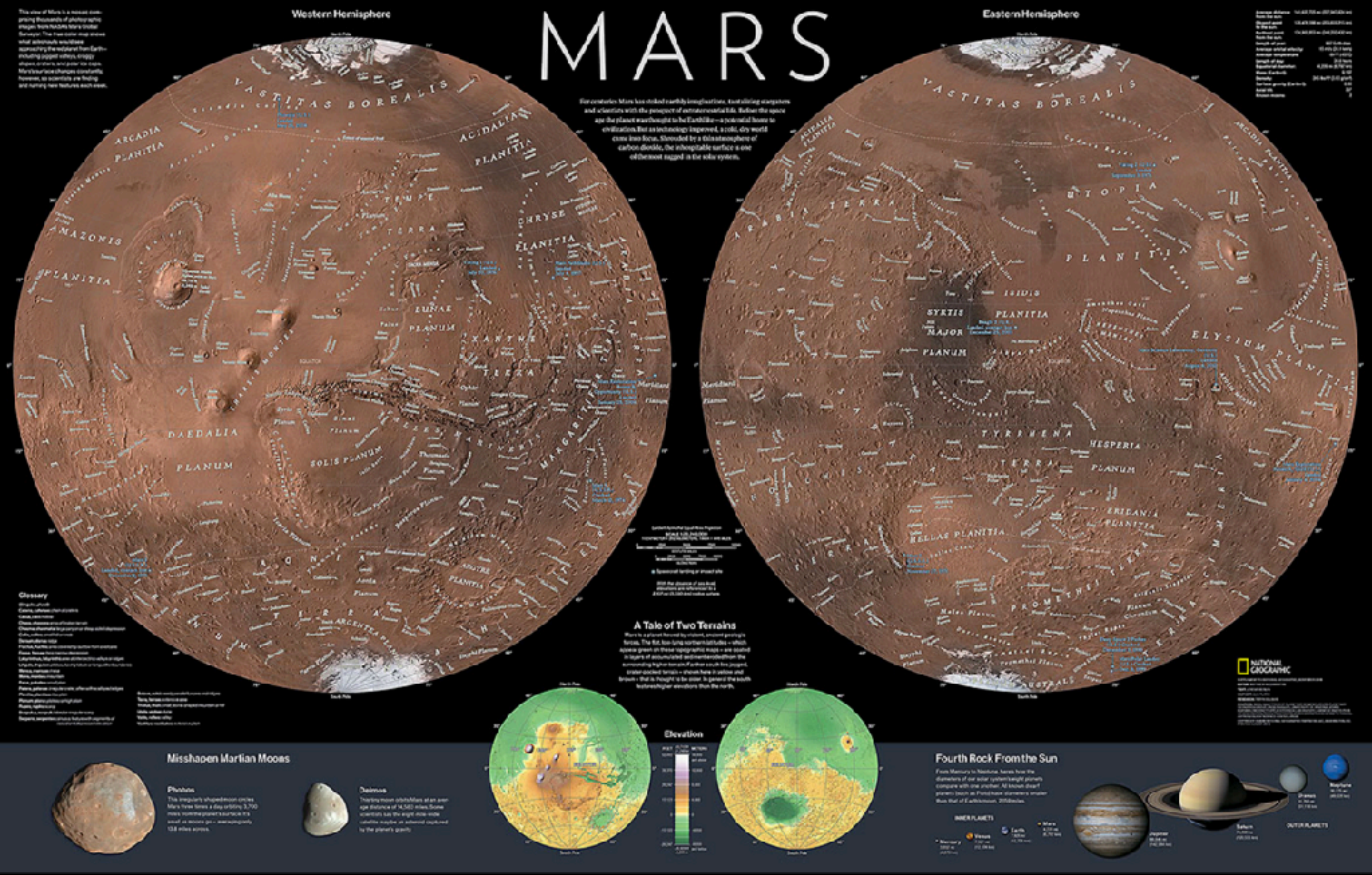
0%



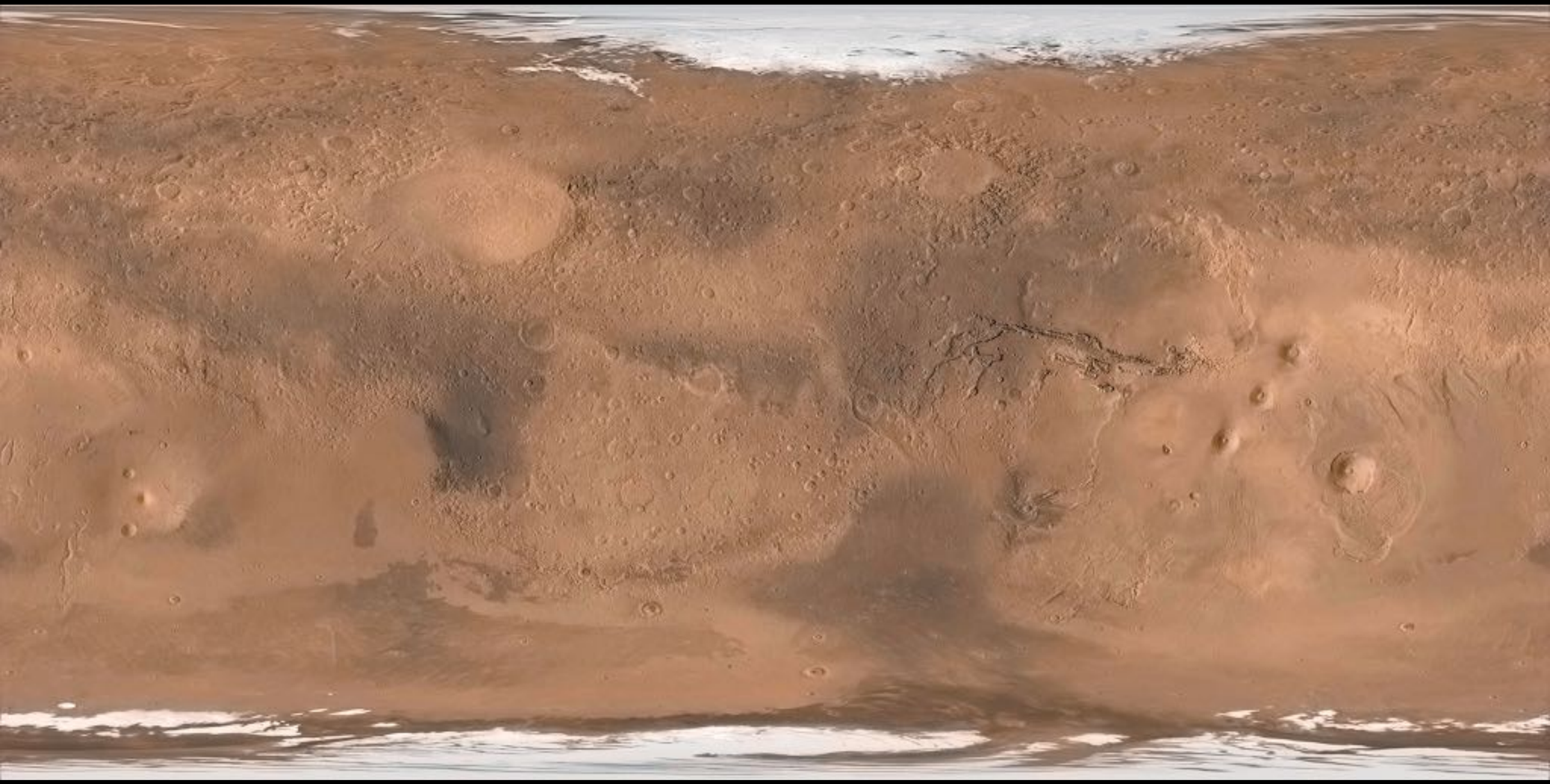
2

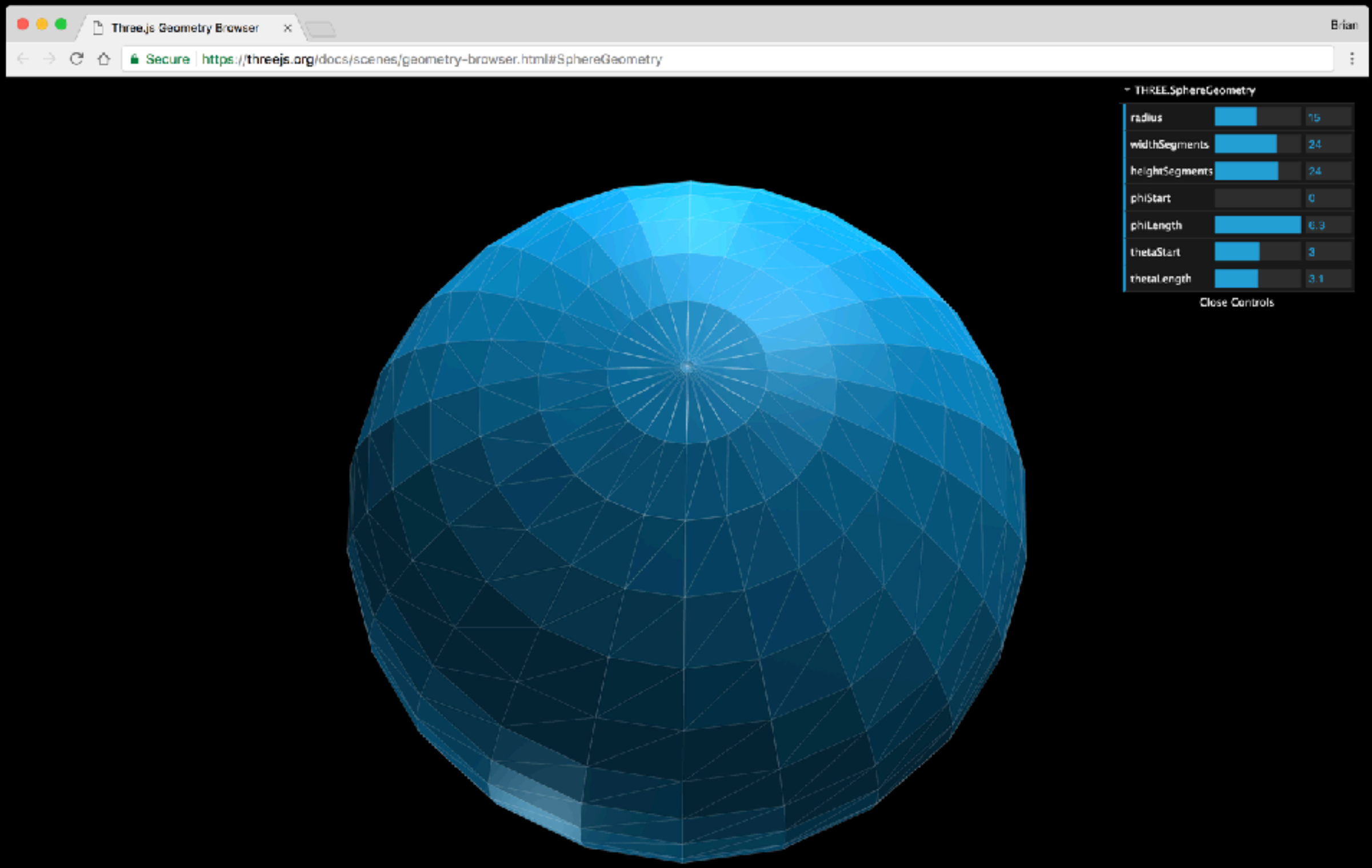
GSAP TimelineLite tweens values

0%	**40%**	**100%**
x: 0	**x: 0**	x: 0
y: 0	**y: 40**	y: 100
z: 0	**z: 40**	z: 100



MARS
Western Hemisphere
Eastern Hemisphere
For centuries Mars has stoked earthly imaginations, tantalizing stargazers and scientists with the prospect of extraterrestrial life. Before the space age the planet was thought to be Earthlike—a potential home to civilization. But as technology improved, a cold, dry world came into focus. Shrouded by a thin atmosphere of carbon dioxide, the inhospitable surface is one of the most rugged in the solar system.
VASTITAS BOREALIS
ARCADIA PLANITIA
ACIDALIA PLANITIA
AMAZONIS PLANITIA
CHRYSE PLANITIA
LUNAE PLANUM
DAEDALIA PLANUM
SOLIS PLANUM
UTOPIA PLANITIA
ARABIA TERRA
SYRTIS MAJOR PLANUM
ISIDIS PLANITIA
ELYSIUM PLANITIA
TYRRHENA TERRA
HESPERIA PLANUM
HELLAS PLANITIA
Glossary
A Tale of Two Terrains
Elevation
Misshapen Martian Moons
Phobos
Deimos
Fourth Rock From the Sun
INNER PLANETS
OUTER PLANETS
NATIONAL GEOGRAPHIC



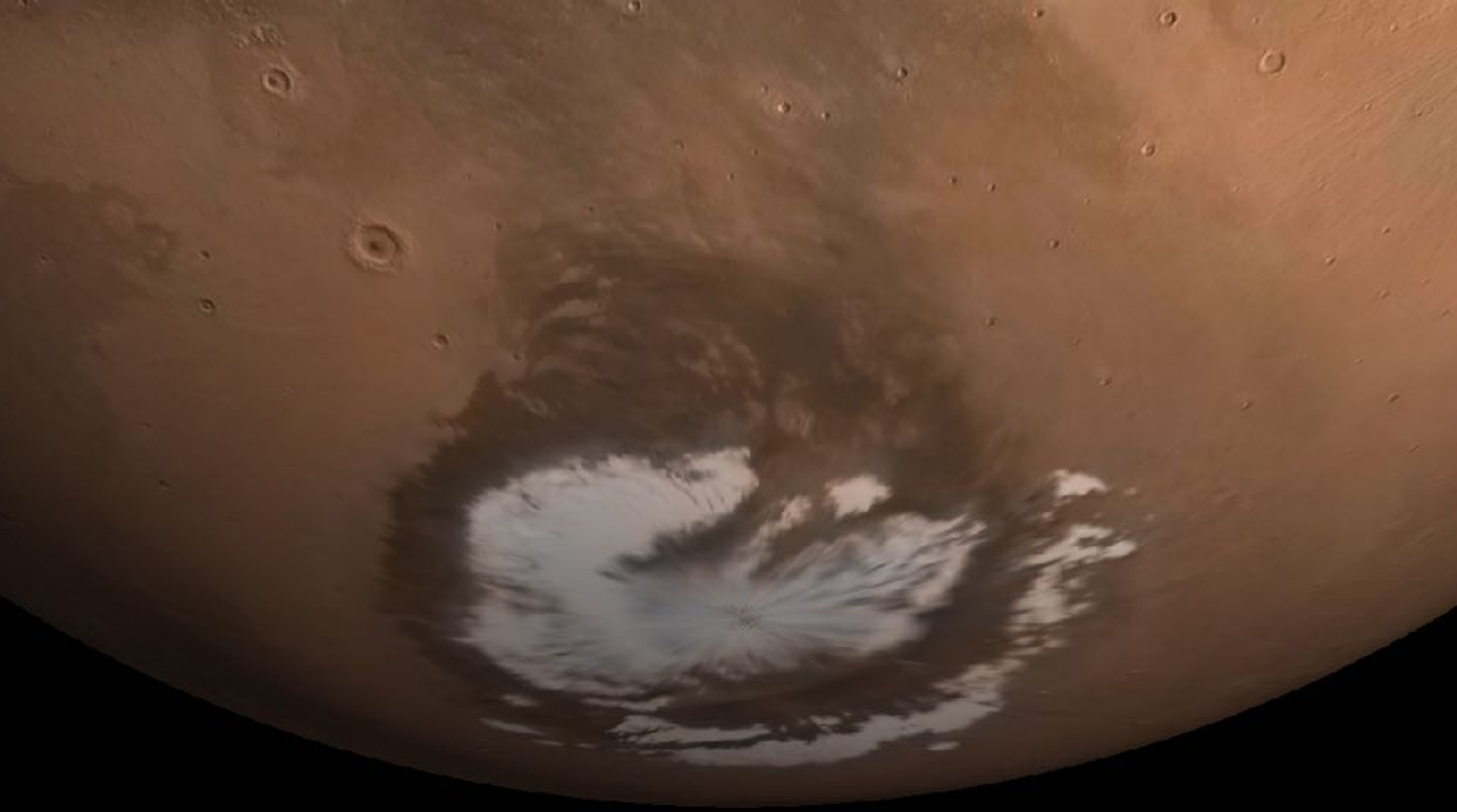


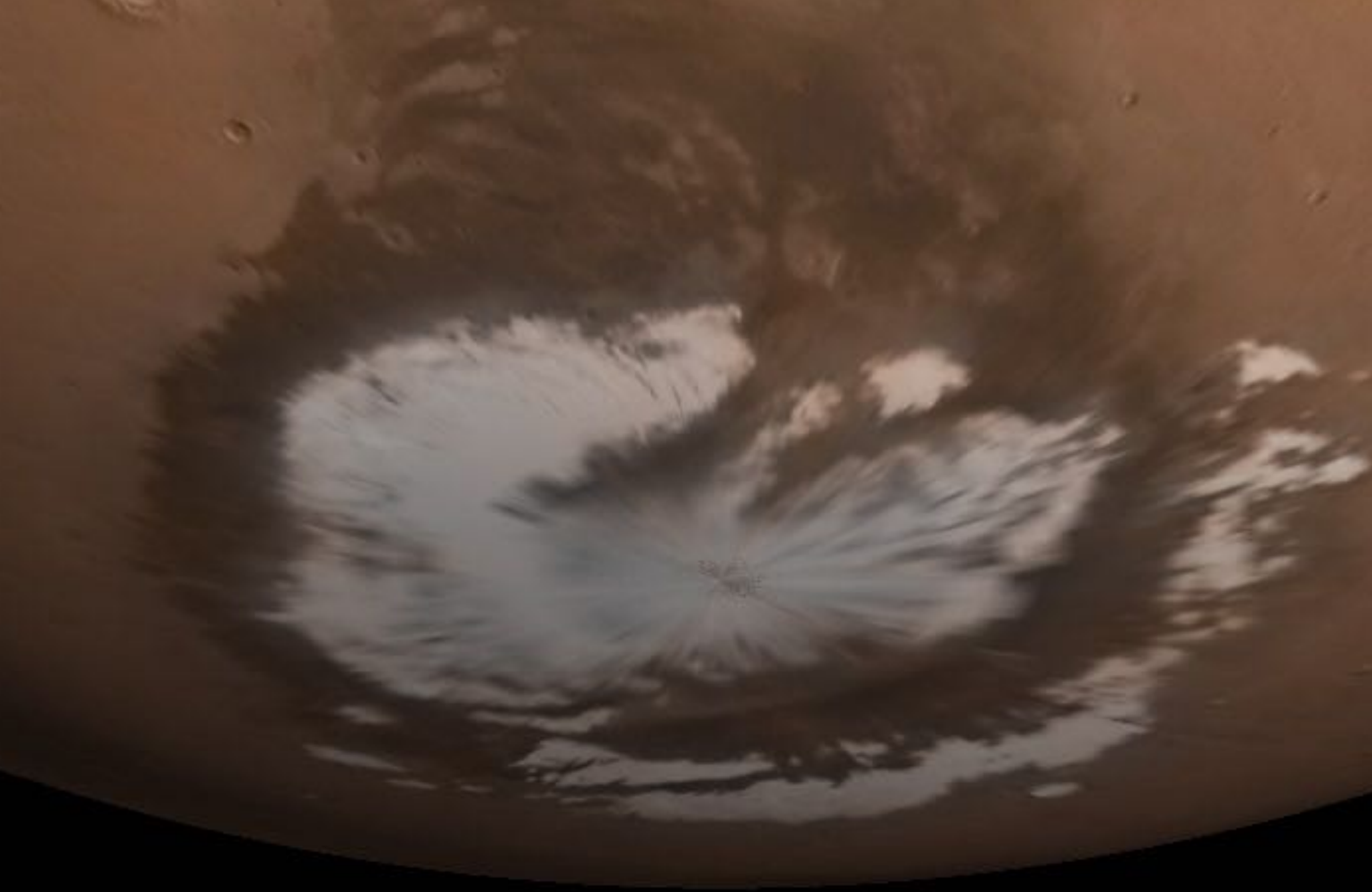
https://threejs.org/docs/scenes/geometry-browser.html#SphereGeometry

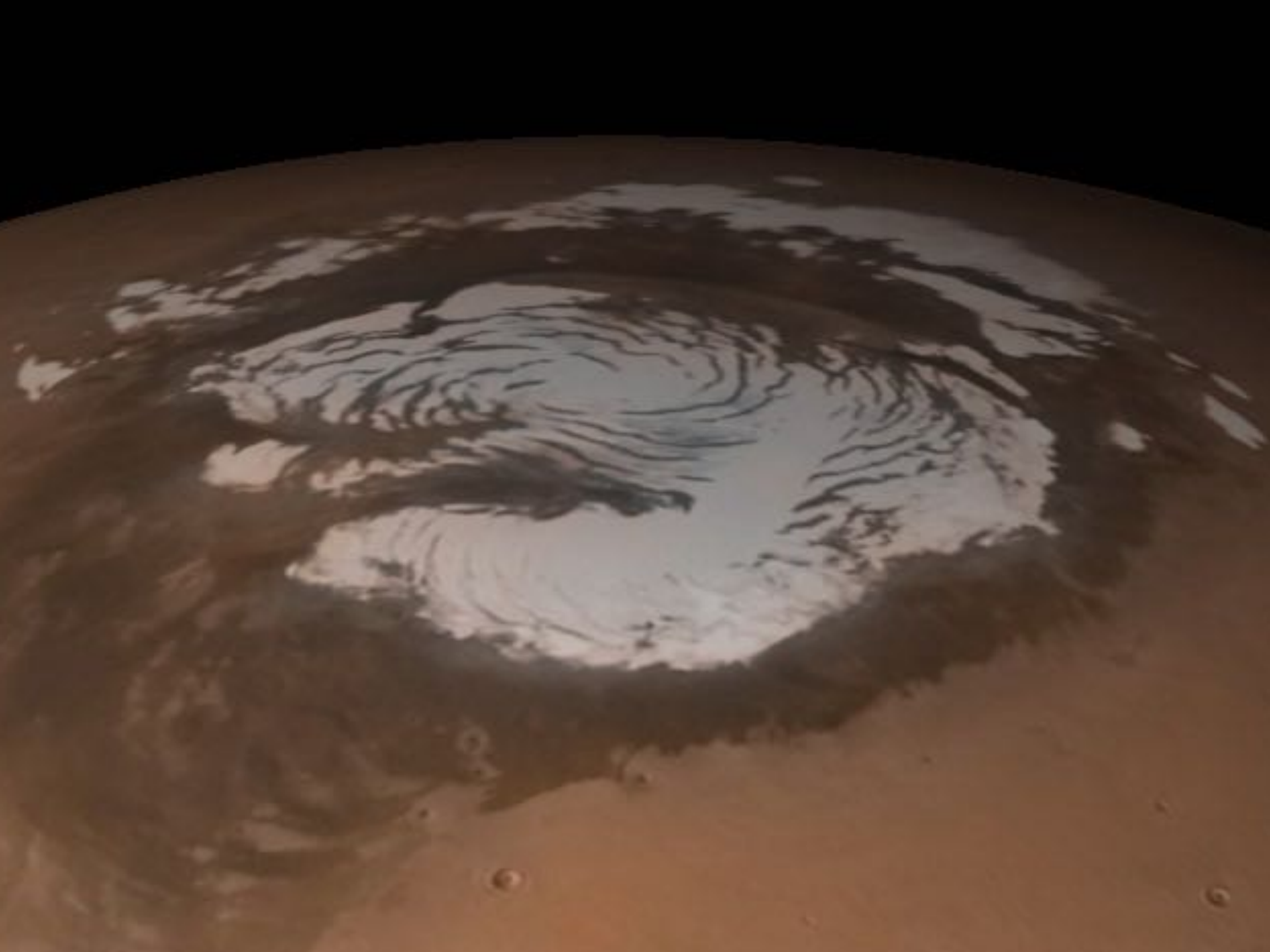
WebGL is a JavaScript API for rendering interactive 3D graphics in modern web browsers without the use of plug-ins. Three.js is built on top of WebGL, and allows you to create complex 3D scenes with a few lines of JavaScript. If your browser supports WebGL you should see a rotating Earth below:

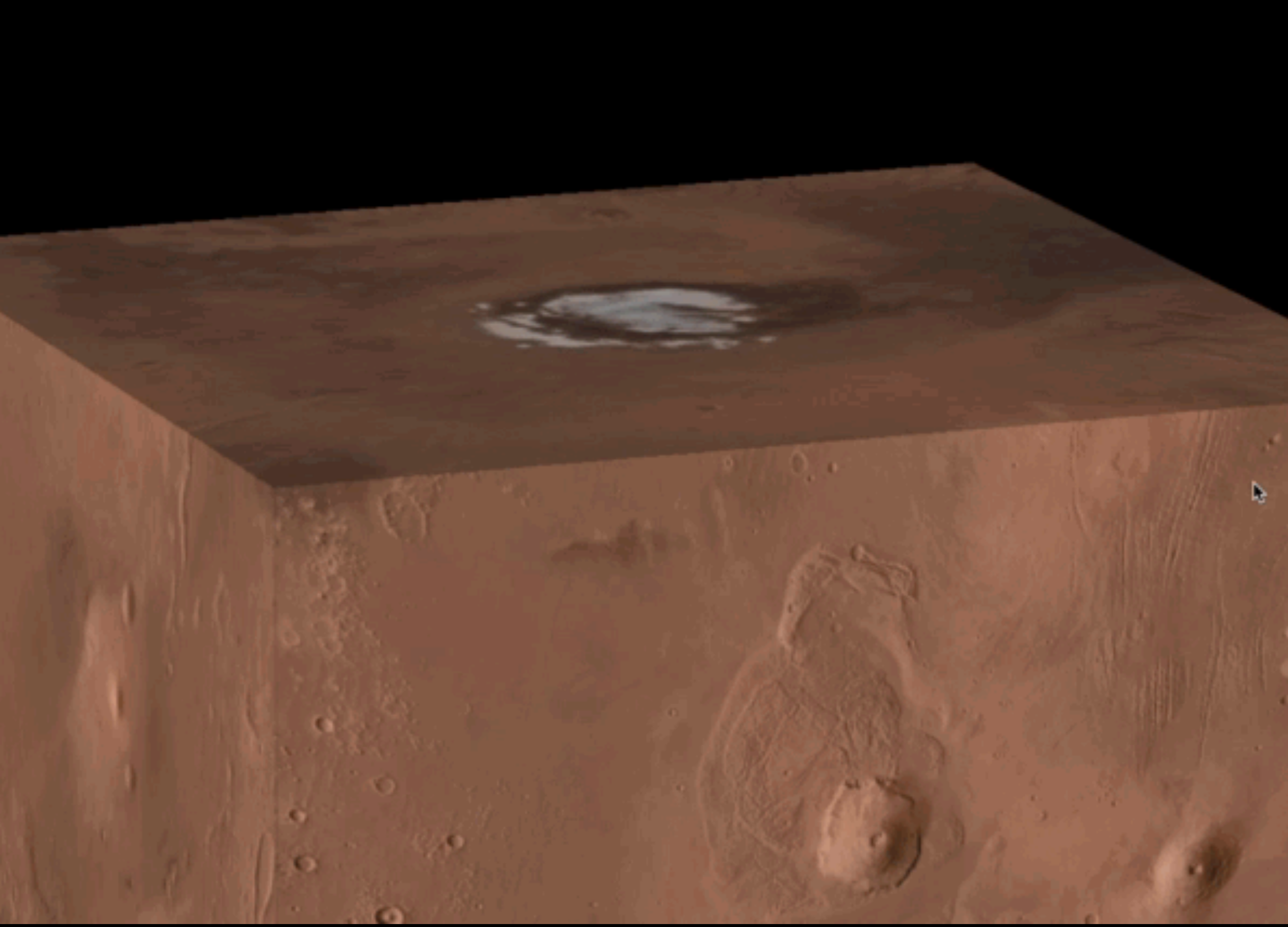
[Fullscreen]

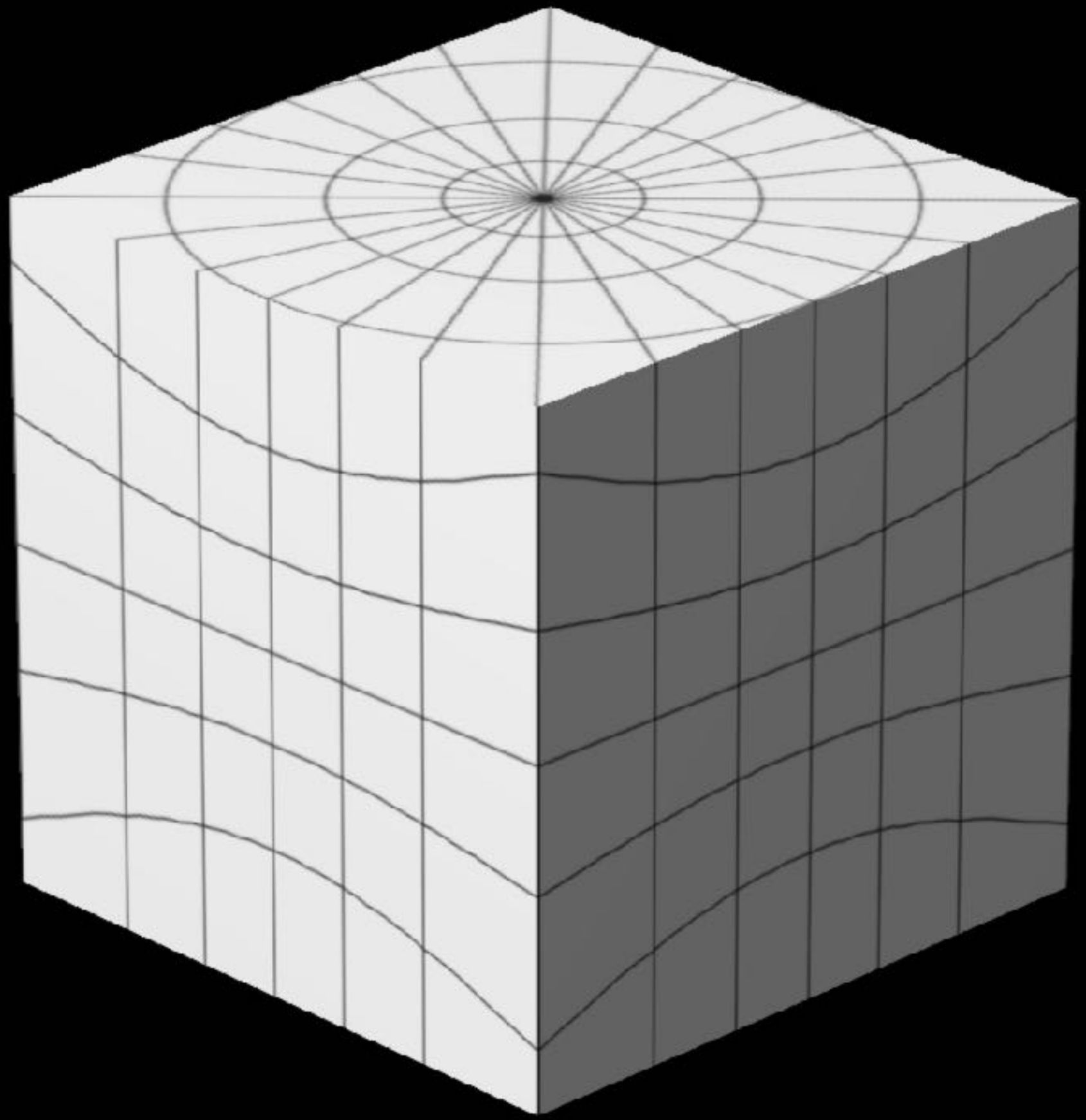
http://blog.mastermaps.com/2013/09/creating-webgl-earth-with-threejs.html

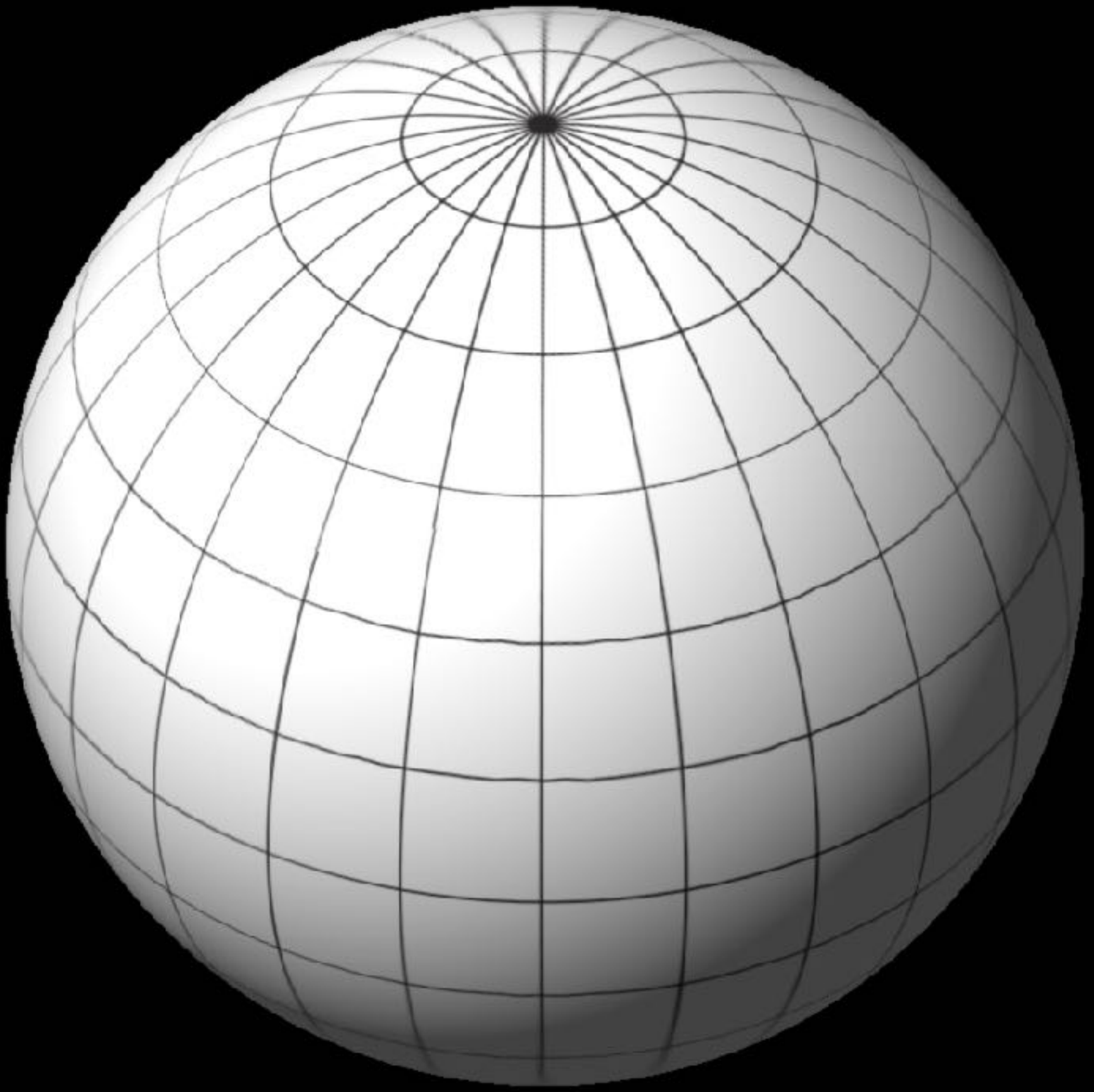


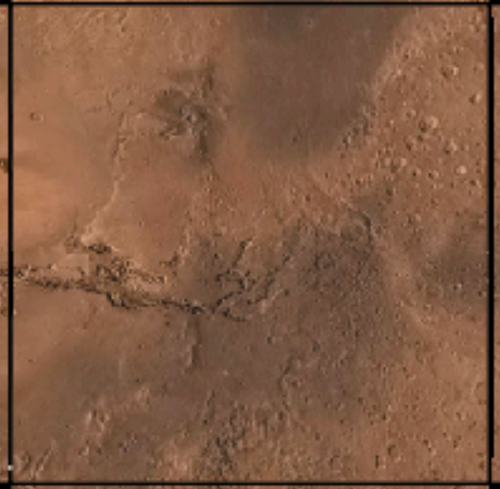


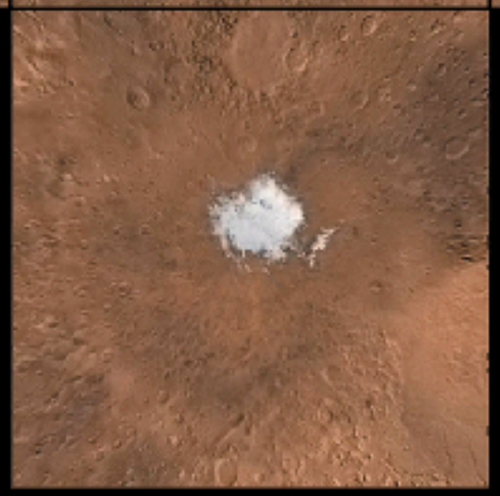


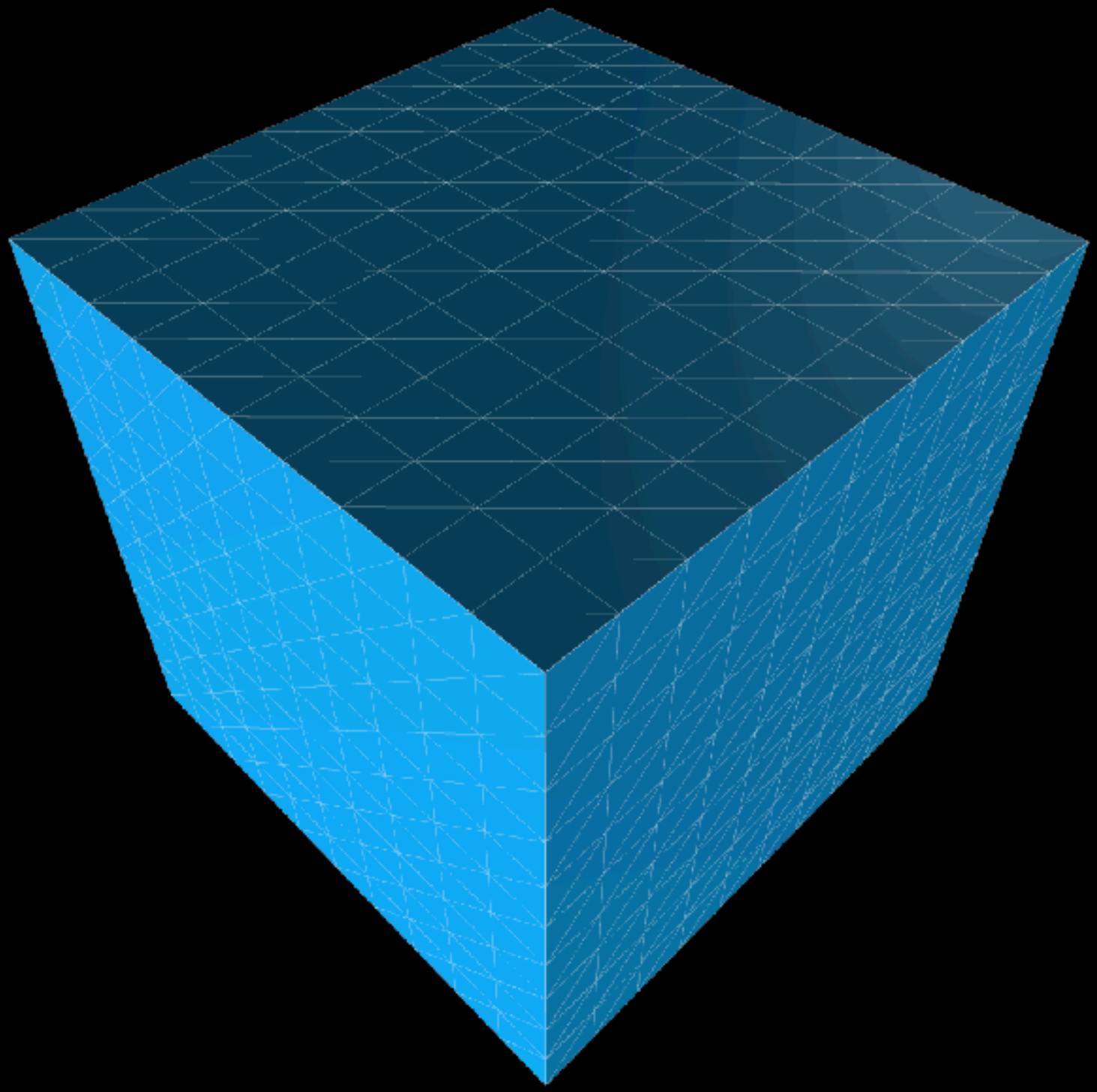


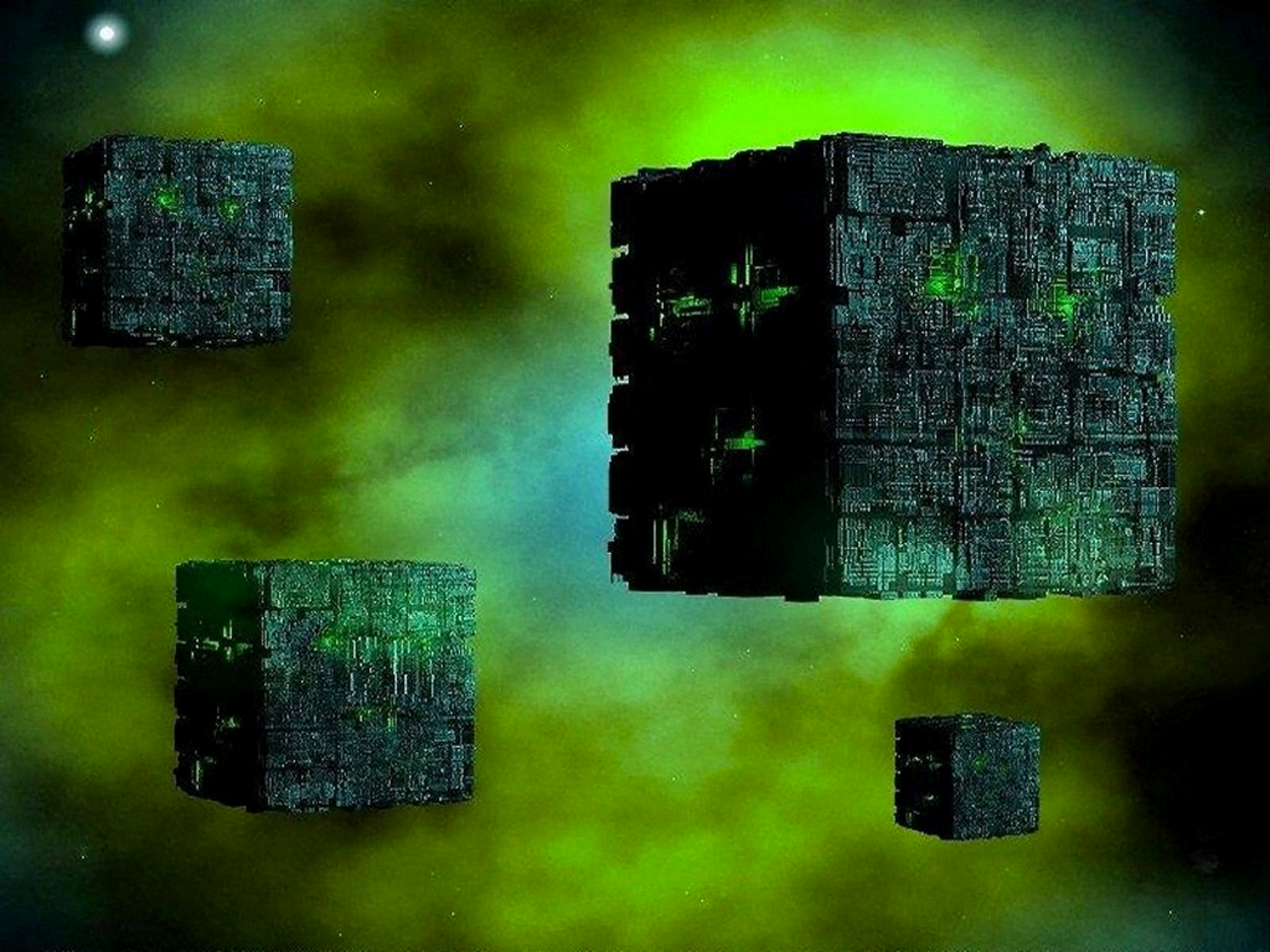


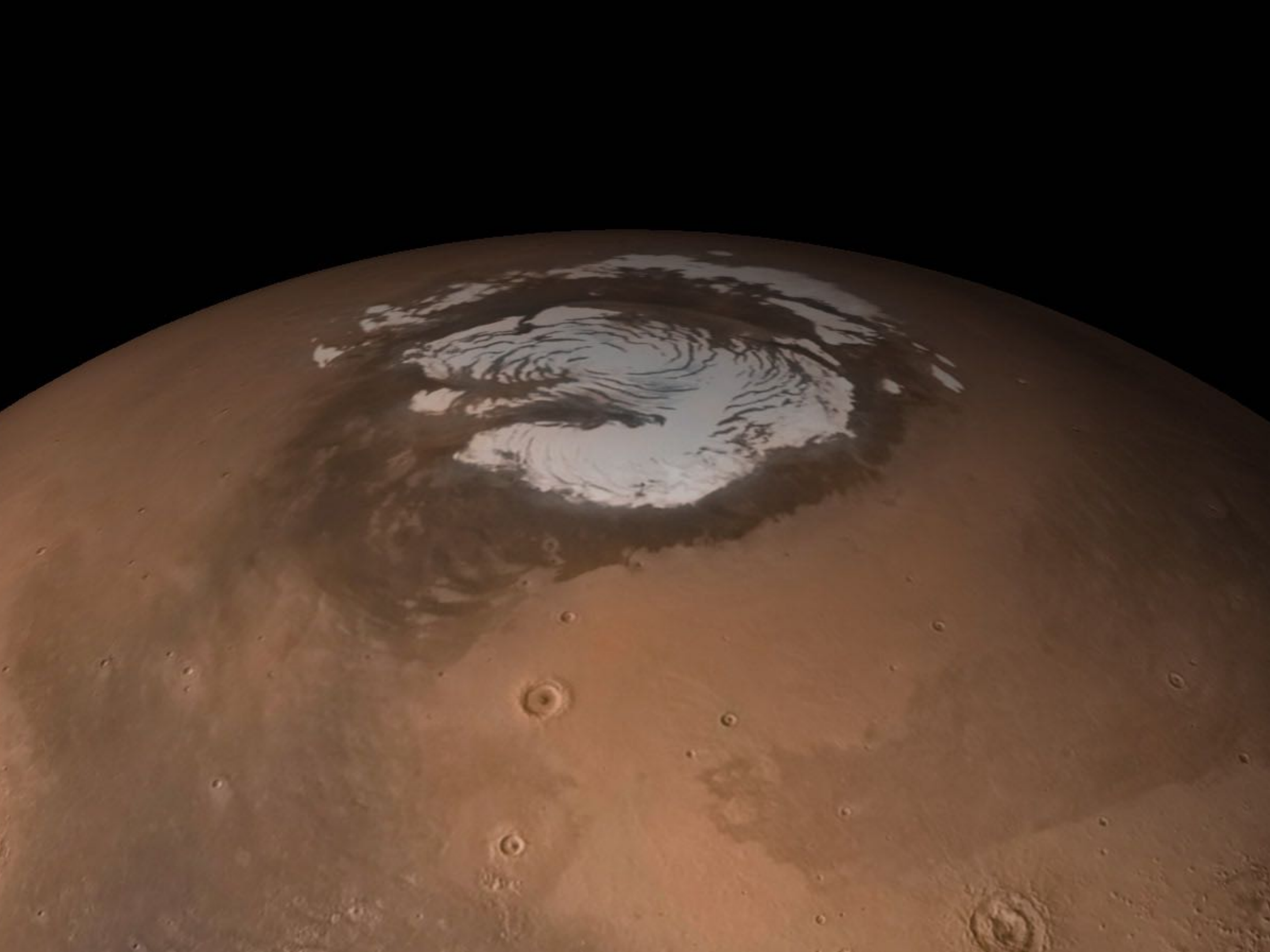












AGO

GitHubGist Search... All gists GitHub New gist

briantjacobs / cubeSphere-example.js

Last active 5 minutes ago

Edit Delete Star 0

Code Revisions 5

Embed <script src="https://gist. Download ZIP

Create 6 gnomonic cube faces from a WGS84 input geotiff, render in three.js

SCRIPTS TO DO THIS

cubeSphere-example.js Raw

```
var cubeSphere = new CubeSphere({
            parent: PARENT, // scene or Object3D
            scale: 1, // in case scaling according to other objects in scene
            radius: 5, // size of sphere
            textureF
            new THREE.ImageUtils.loadTexture(03.jpg),
            new THREE.ImageUtils.loadTexture(00.jpg),
            new THREE.ImageUtils.loadTexture(02.jpg),
            new THREE.ImageUtils.loadTexture(01.jpg)
        ]
})
```

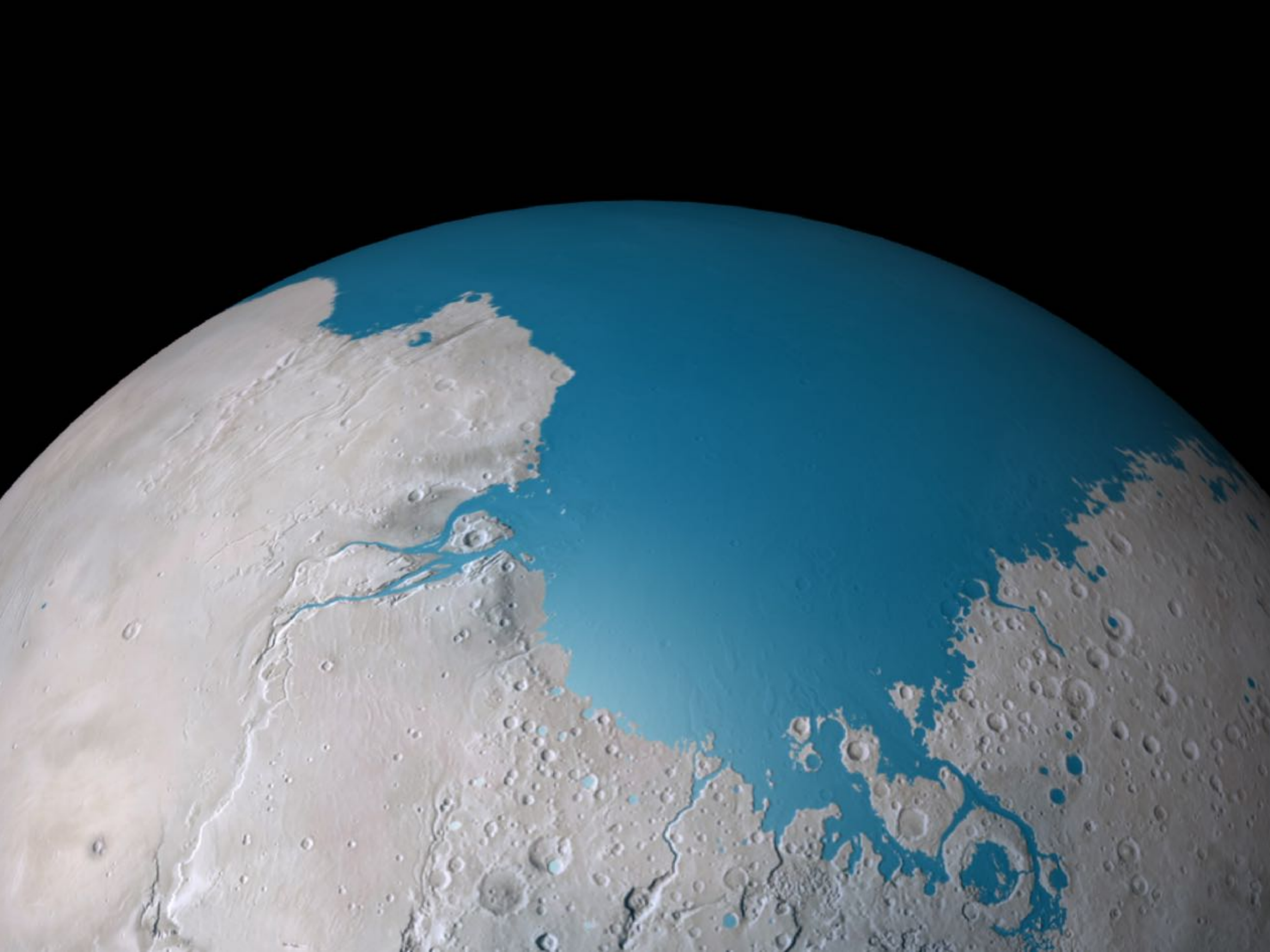
Python/GDAL script to automate face creation

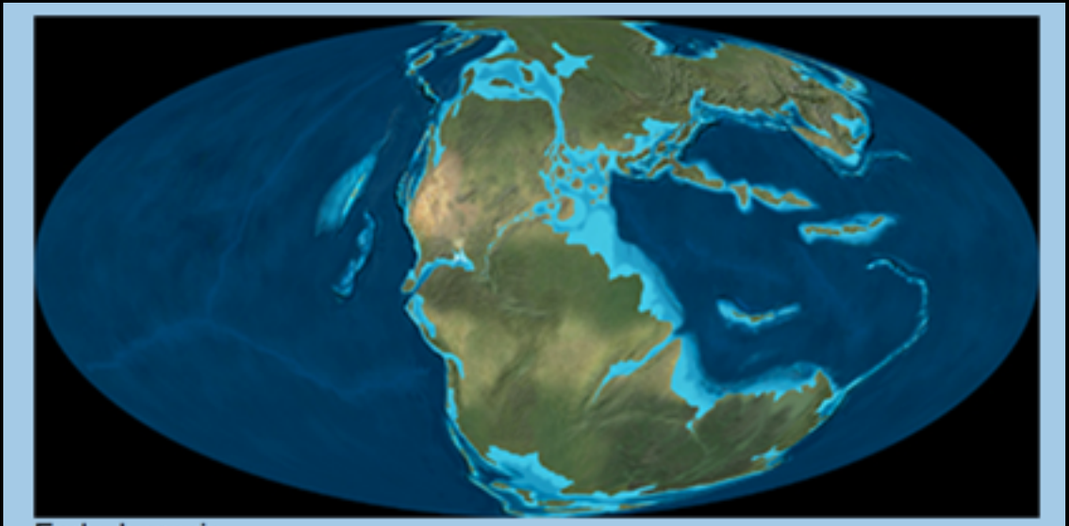
three.js snippets to render the faces and inflate

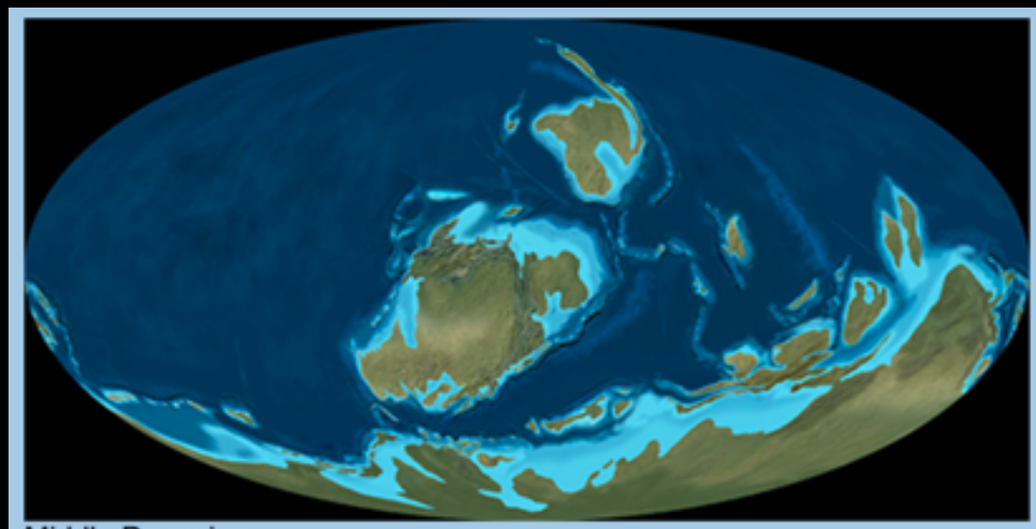
https://github.com/briantjacobs/foss4g-2017-talk/

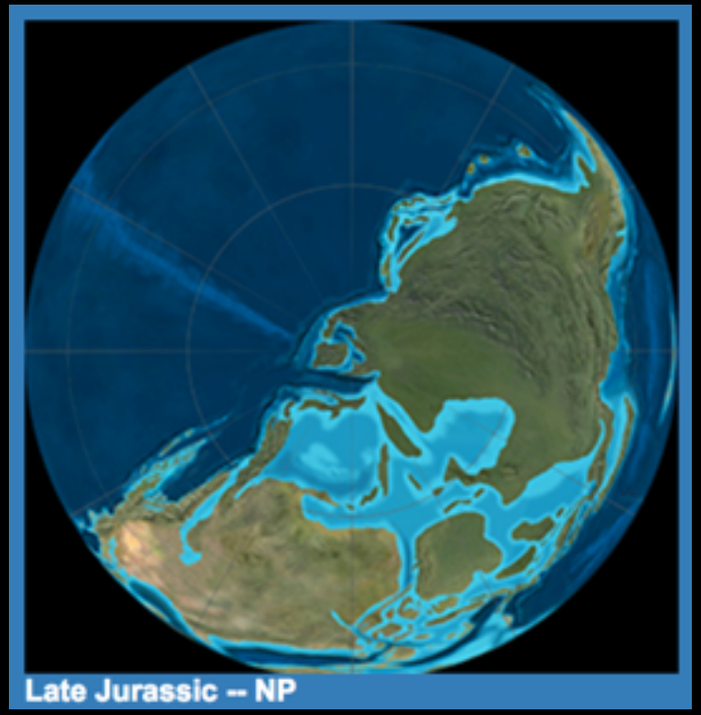
processWGS84intoGnomonicFaces.py Raw

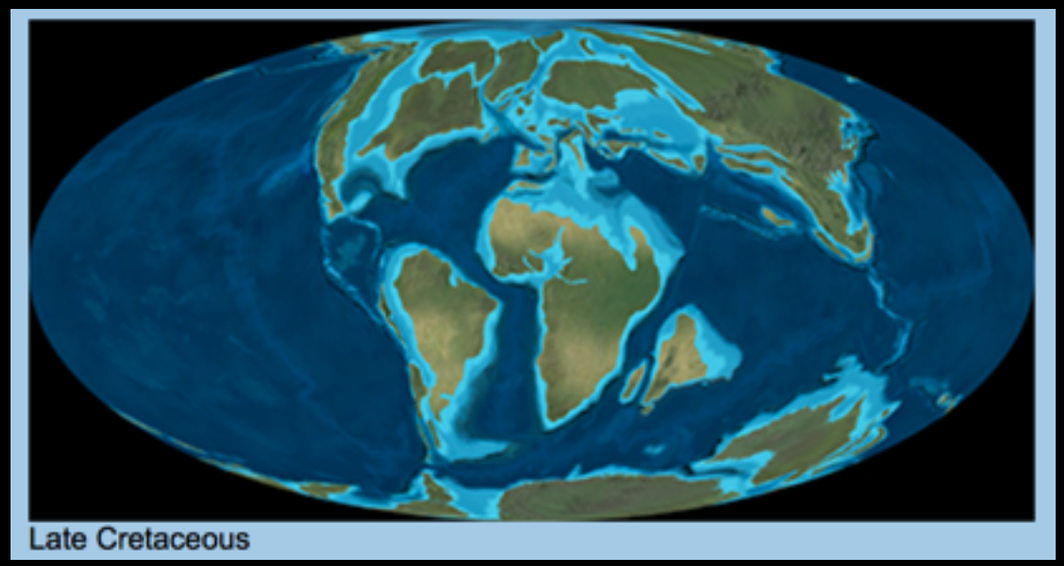
```
# requres gdal cli installed
# run like this:
# python processWGS84intoGnomonicFaces.py input-geotiff.tif

import subprocess
import sys
inputFile = sys.argv[-1]
outputPath = "/path/to/faces/"
```



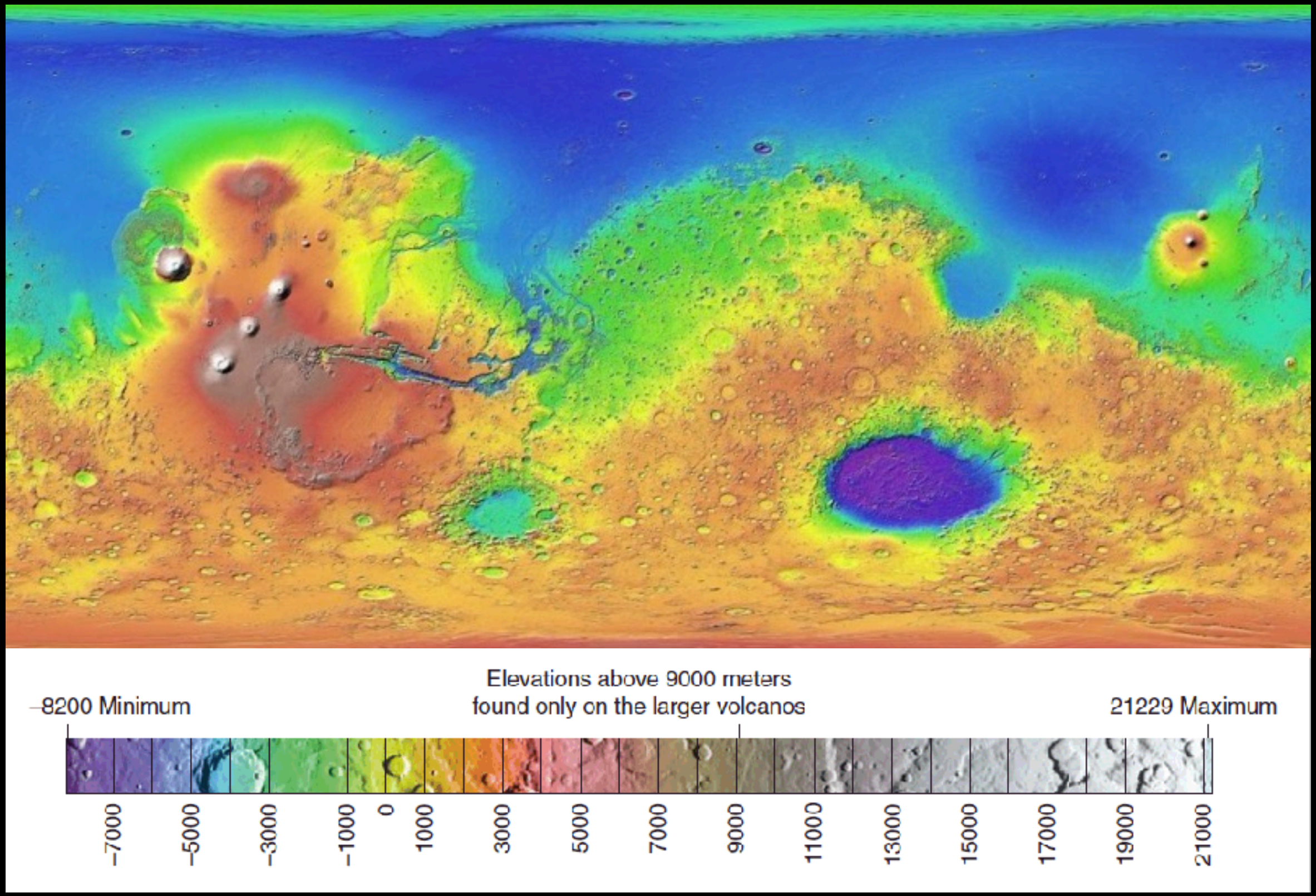

Early Jurassic


Middle Devonian

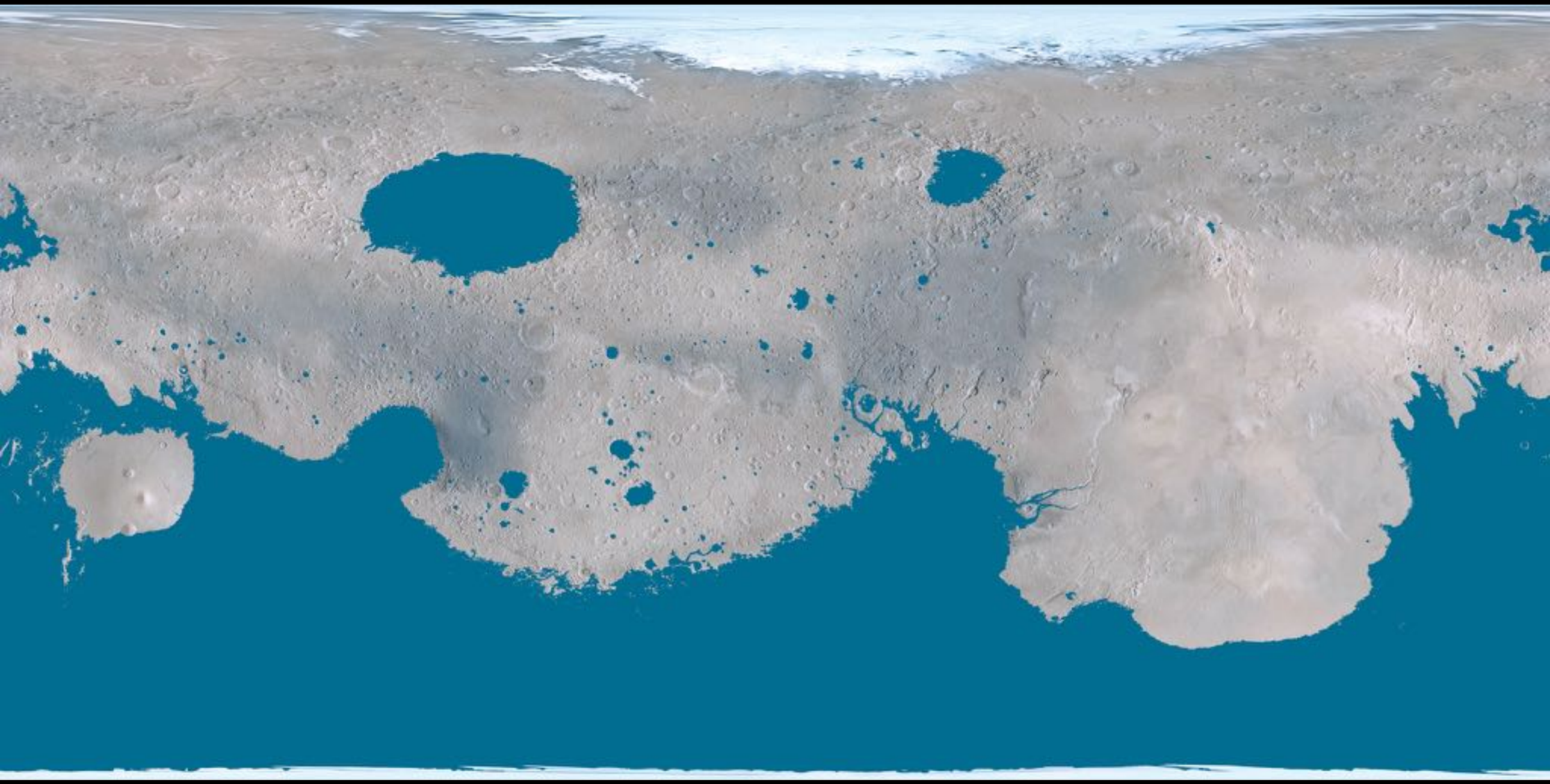

Late Jurassic -- NP


Late Cretaceous

http://jan.ucc.nau.edu/rcb7/globaltext2.html

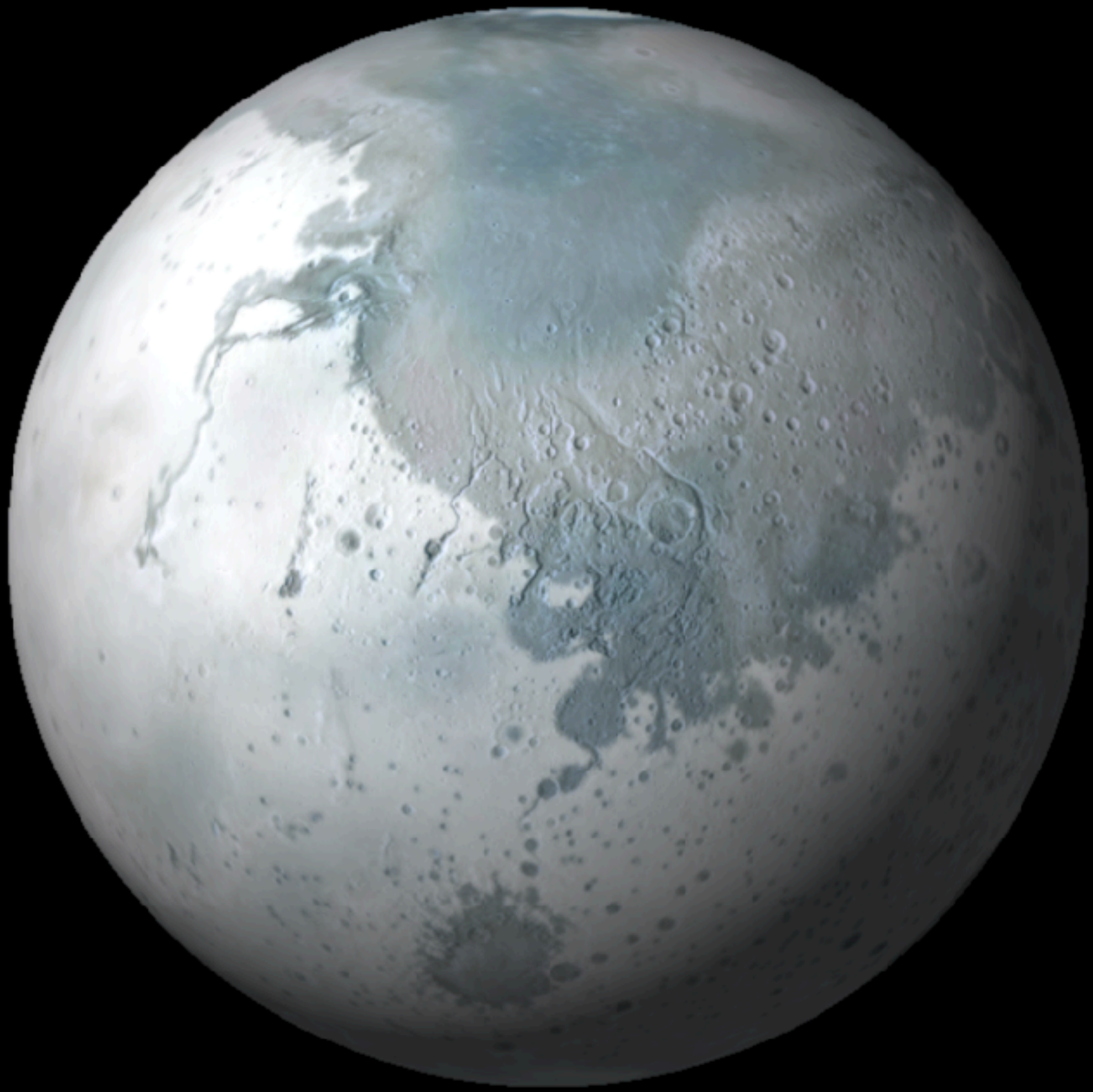


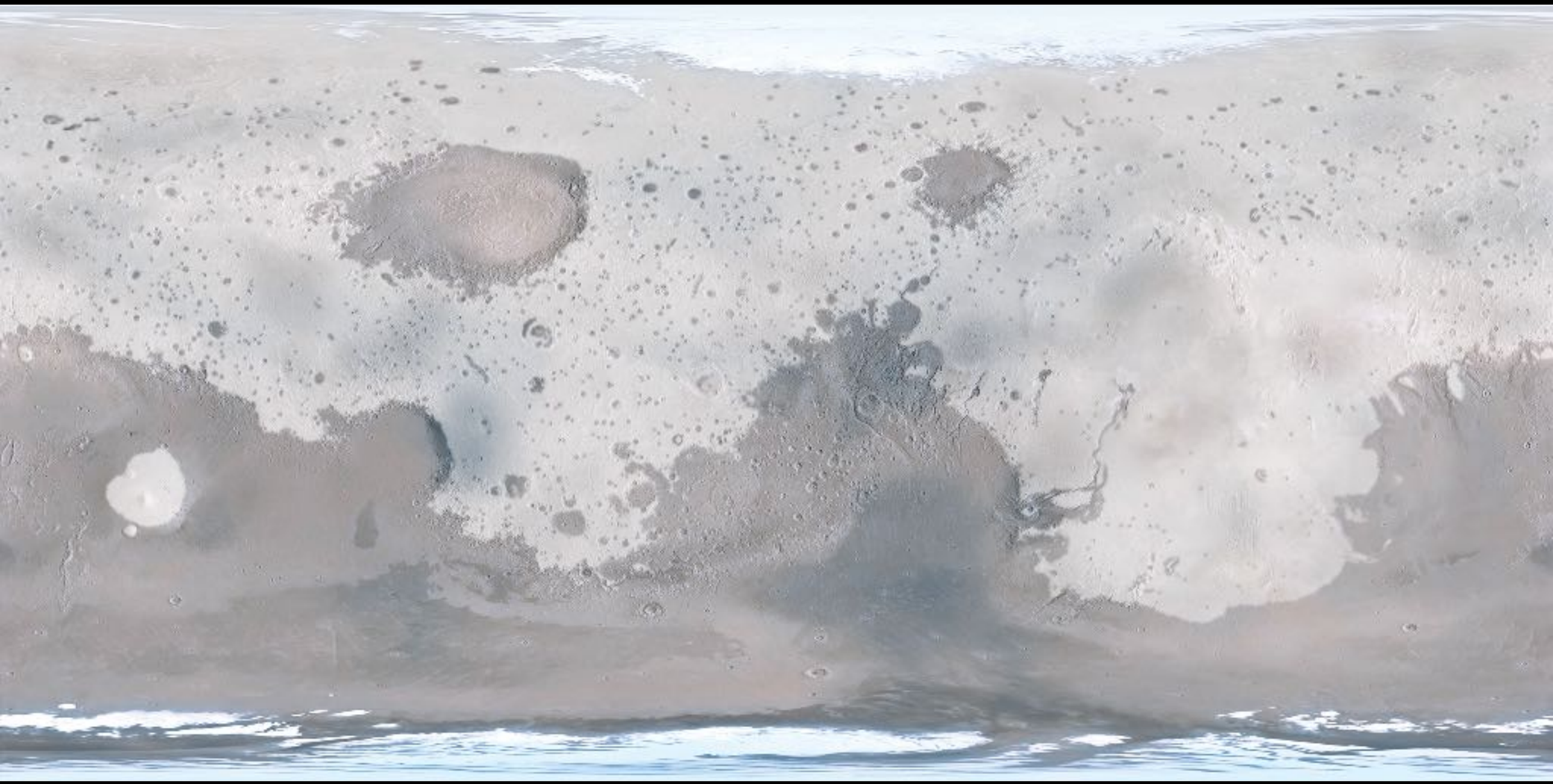
https://astrogeology.usgs.gov/search/map/Mars/GlobalSurveyor/MOLA/Mars_MGS_MOLA_DEM_mosaic_global_463m

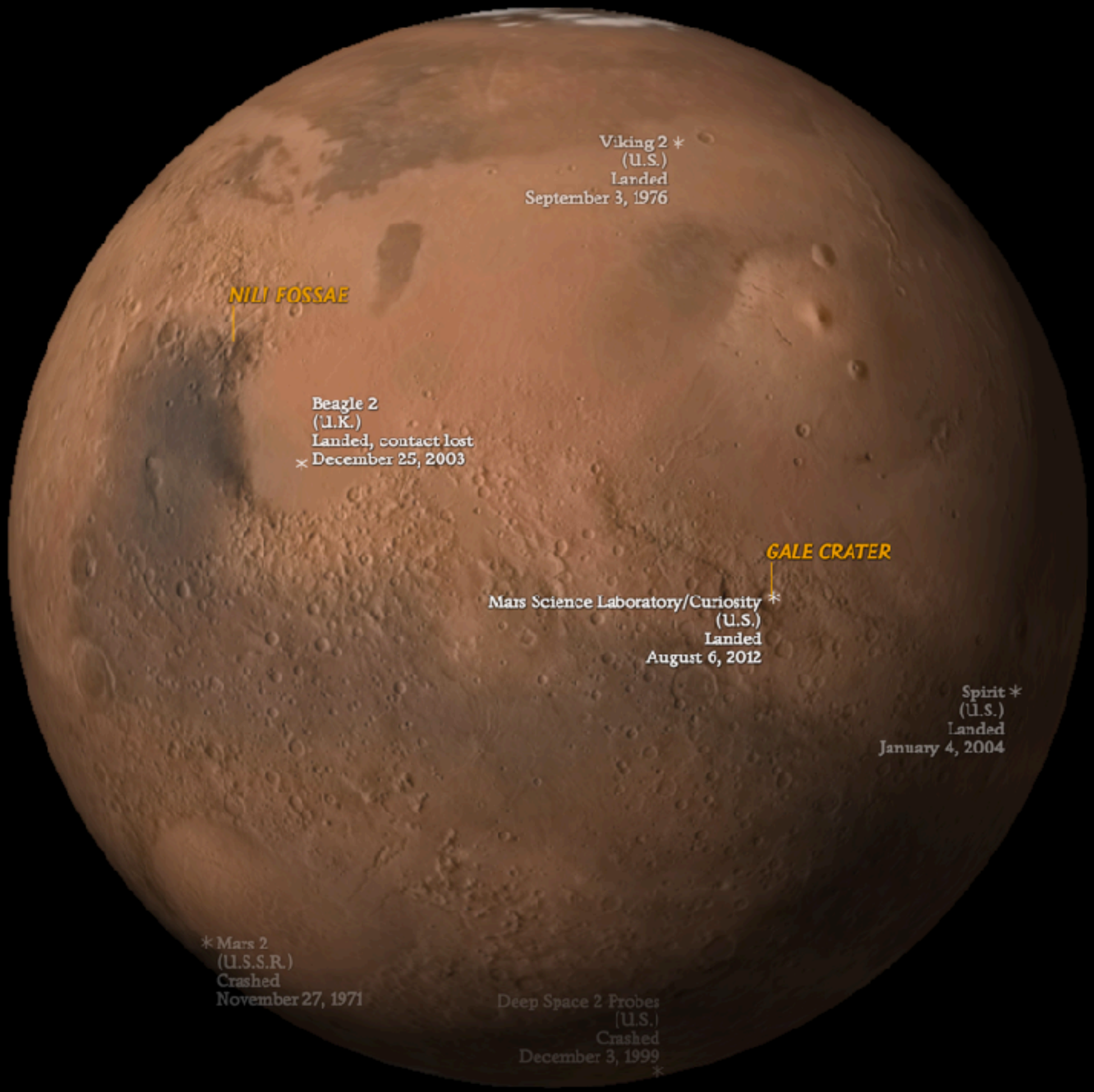


SNOW GLOBE HYPOTHESIS

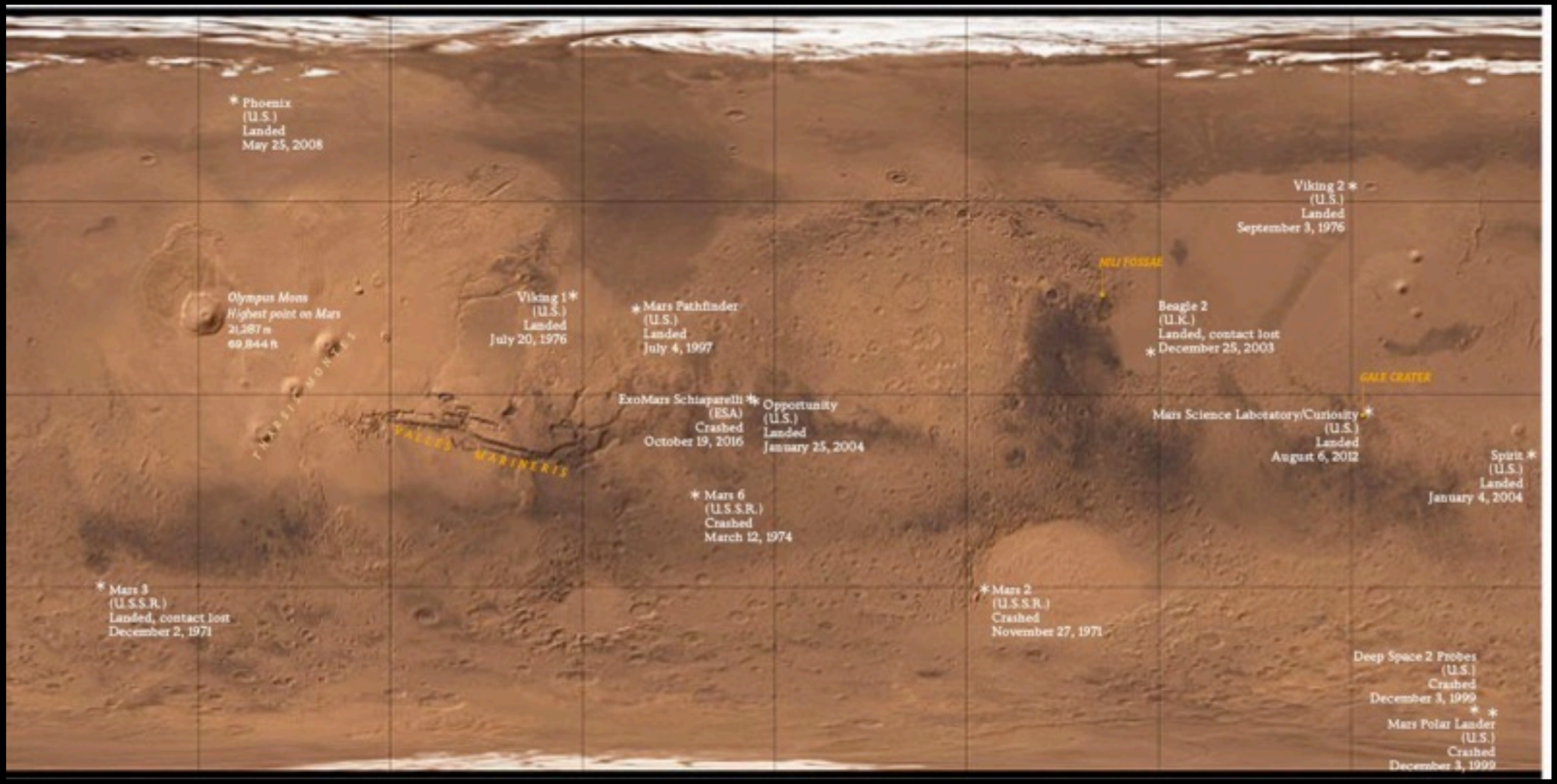
3.8 BILLION YEARS AGO






Viking 2
(U.S.)
Landed
September 3, 1976
NILI FOSSAE
Beagle 2
(U.K.)
Landed, contact lost
December 25, 2003
GALE CRATER
Mars Science Laboratory/Curiosity
(U.S.)
Landed
August 6, 2012
Spirit
(U.S.)
Landed
January 4, 2004
Mars 2
(U.S.S.R.)
Crashed
November 27, 1971
Deep Space 2 Probes
(U.S.)
Crashed
December 3, 1999

Text in SVG, not AI2HTML



(http://ai2html.org/)

2D SVG X/Y to 3D XYZ

```
var longitude = (xSVGPos * (360 / widthSVG))
var latitude = (ySVGPos * (180 / heightSVG))
```

```
var latitudeRadians = latitude * (Math.PI / 180.0);
var longitudeRadians = longitude * (Math.PI / 180.0);

var x = sphereRadius * Math.sin(latRads) * Math.cos(lngRads);
var y = sphereRadius * Math.cos(latRads);
var z = sphereRadius * Math.sin(latRads) * Math.sin(lngRads);
```

PERFORMANCE

requestAnimationFrame

https://developer.mozilla.org/en-US/docs/Web/API/window/requestAnimationFrame

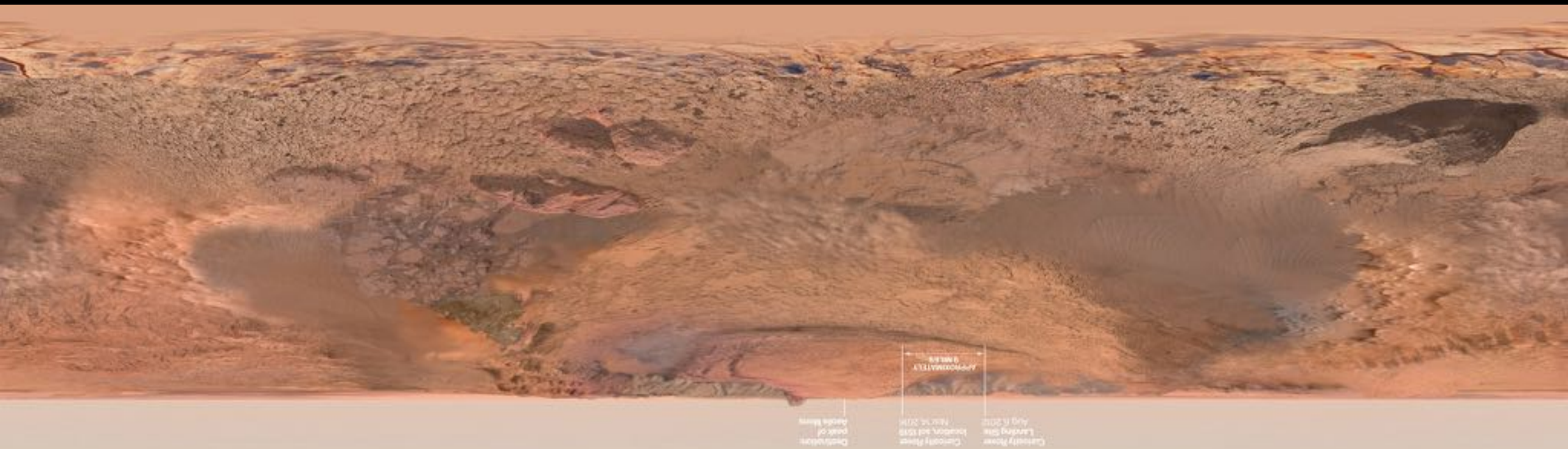
http://creativejs.com/resources/requestanimationframe/index.html

Texture sizes

ifMobile ? 512x512.jpg : 1024x1024.jpg

Antialiasing

new THREE.WebGLRenderer({ antialias: ifMobile ? false : true });


Curiosity Rover
Landing Site
Aug 6, 2012
Curiosity Rover
location, sol 1518
May 14, 2016
Destination
peak of
Aeolis Mons

360 PANORAMA

three.js 360

https://threejs.org/examples/webgl_panorama_equirectangular.html

Nice Writeup

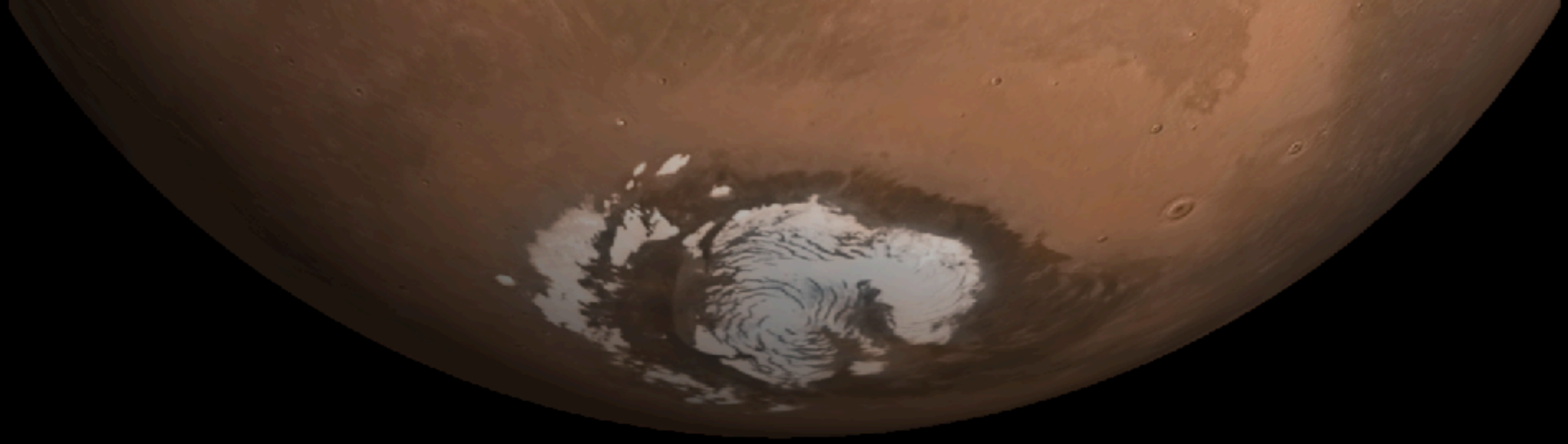
https://open.blogs.nytimes.com/2016/11/11/building-a-cross-platform-360-degree-video-experience-at-the-new-york-times/

Enter the Sphere

https://codepen.io/thiagopnts/pen/RRQVpa

Dependency free library

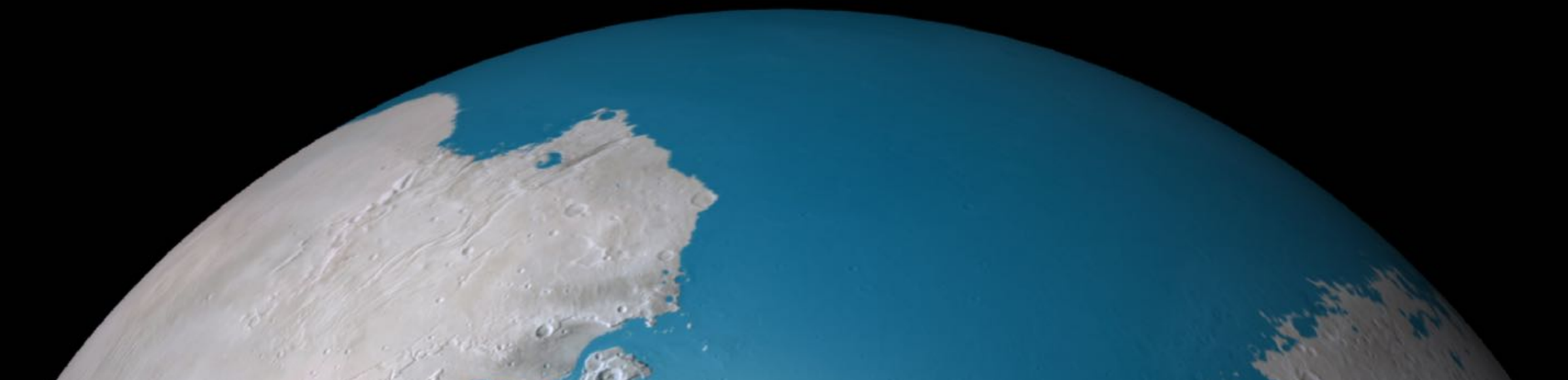
https://github.com/thiagopnts/kaleidoscope



"How We Made a Rewind the Red Planet"

https://source.opennews.org/articles/how-we-made-rewind-red-planet/

Scroll to bottom for resources section on 3D globes/maps



ARTICLE RESOURCES

https://source.opennews.org/articles/how-we-made-rewind-red-planet/#resources

Scroll to bottom for resources section on 3D globes/maps

THREE.JS resources and examples

3D Globes

3D Maps

3D Object Manipulation

CUBESPHERE SCRIPT+CODE

https://github.com/briantjacobs/foss4g-2017-talk/

SEARCH "REWIND THE RED PLANET"

http://www.nationalgeographic.com/science/2016/11/exploring-mars-map-panorama-pictures/

"How We Resurrected a Dragon"

https://source.opennews.org/articles/resurrecting-dragon/

"How We Made Losing Ground"

https://source.opennews.org/articles/how-we-made-losing-ground/

THANK YOU!

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