

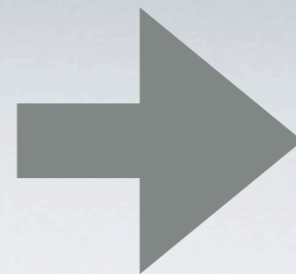
MAKING WORLDS

Procedural Planet Generation

PROCEDURAL CONTENT

PROCEDURAL CONTENT

Algorithms



Media
or
Assets

ILL-DEFINED



Visual Effects

ILL-DEFINED



Maps or Game Worlds

ILL-DEFINED



Models and Animations

ILL-DEFINED



Electronic Music

CHARACTERISTICS

CHARACTERISTICS

Sensory quality > Physical accuracy

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Sensory quality > Physical accuracy

Saves time and resources

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Sensory quality > Physical accuracy

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“Tech artist”

CHARACTERISTICS

Sensory quality > Physical accuracy

Saves time and resources

“Tech artist”

Knob twiddling

CHARACTERISTICS

Se

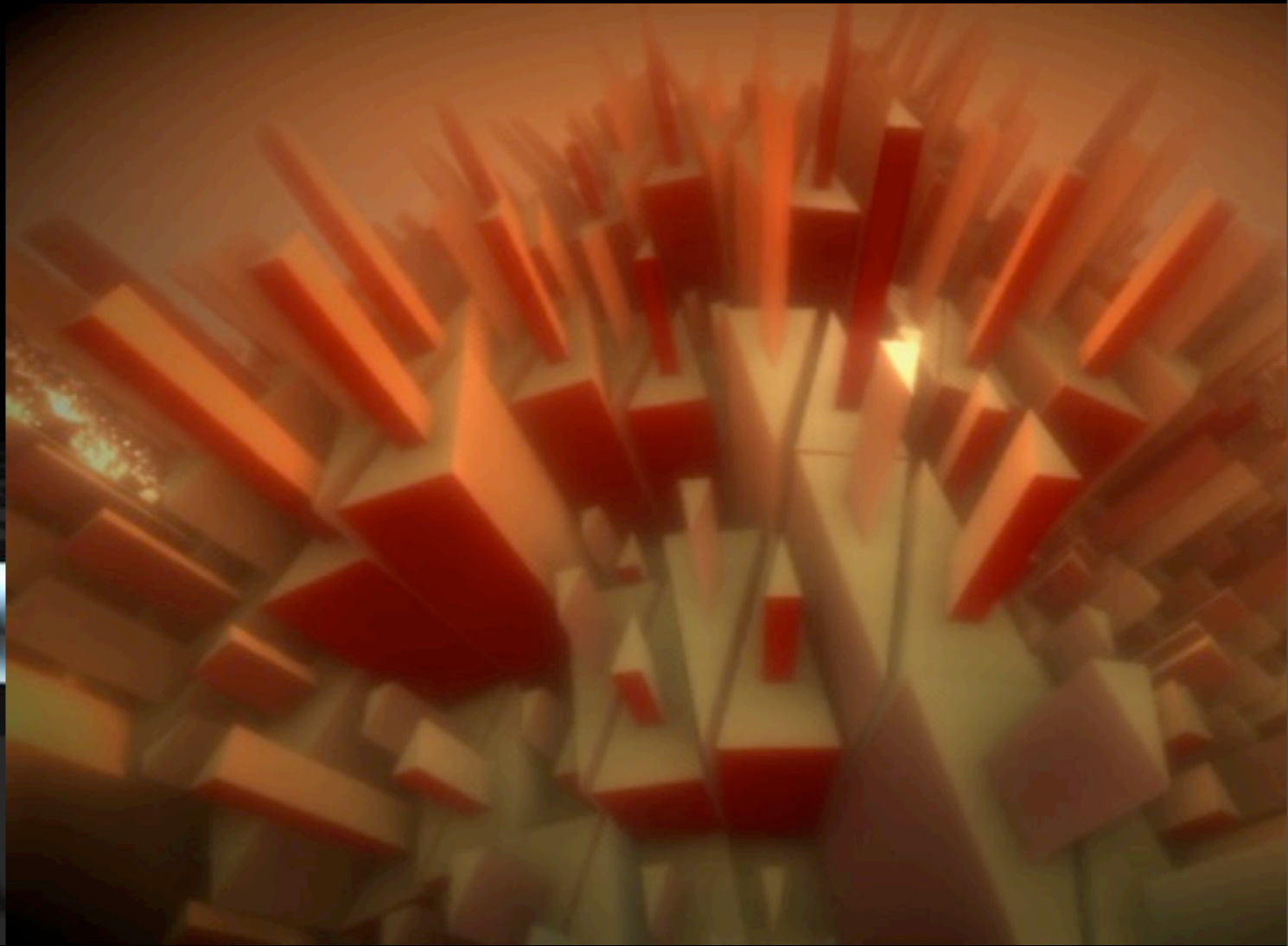
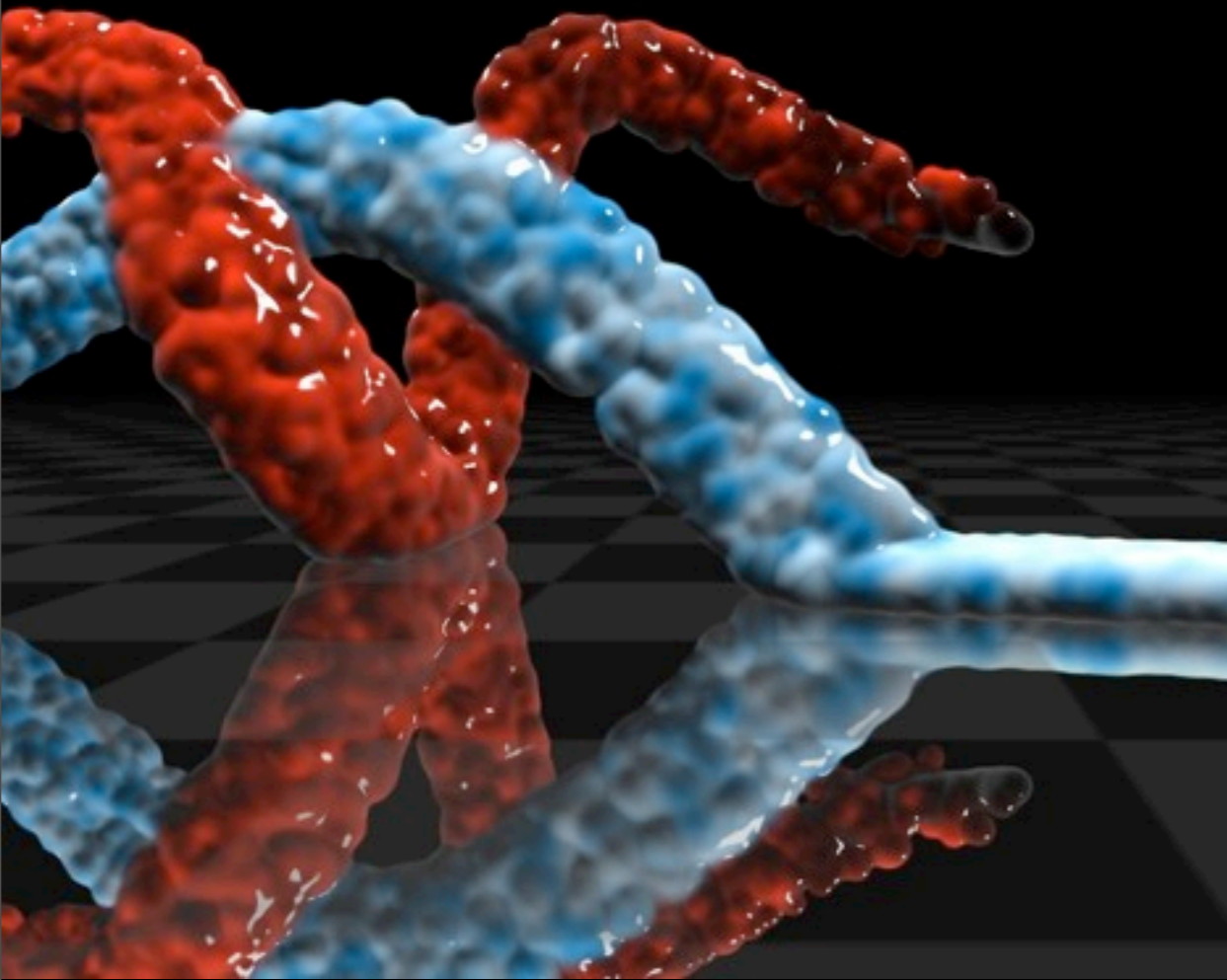
Sav

“Tec

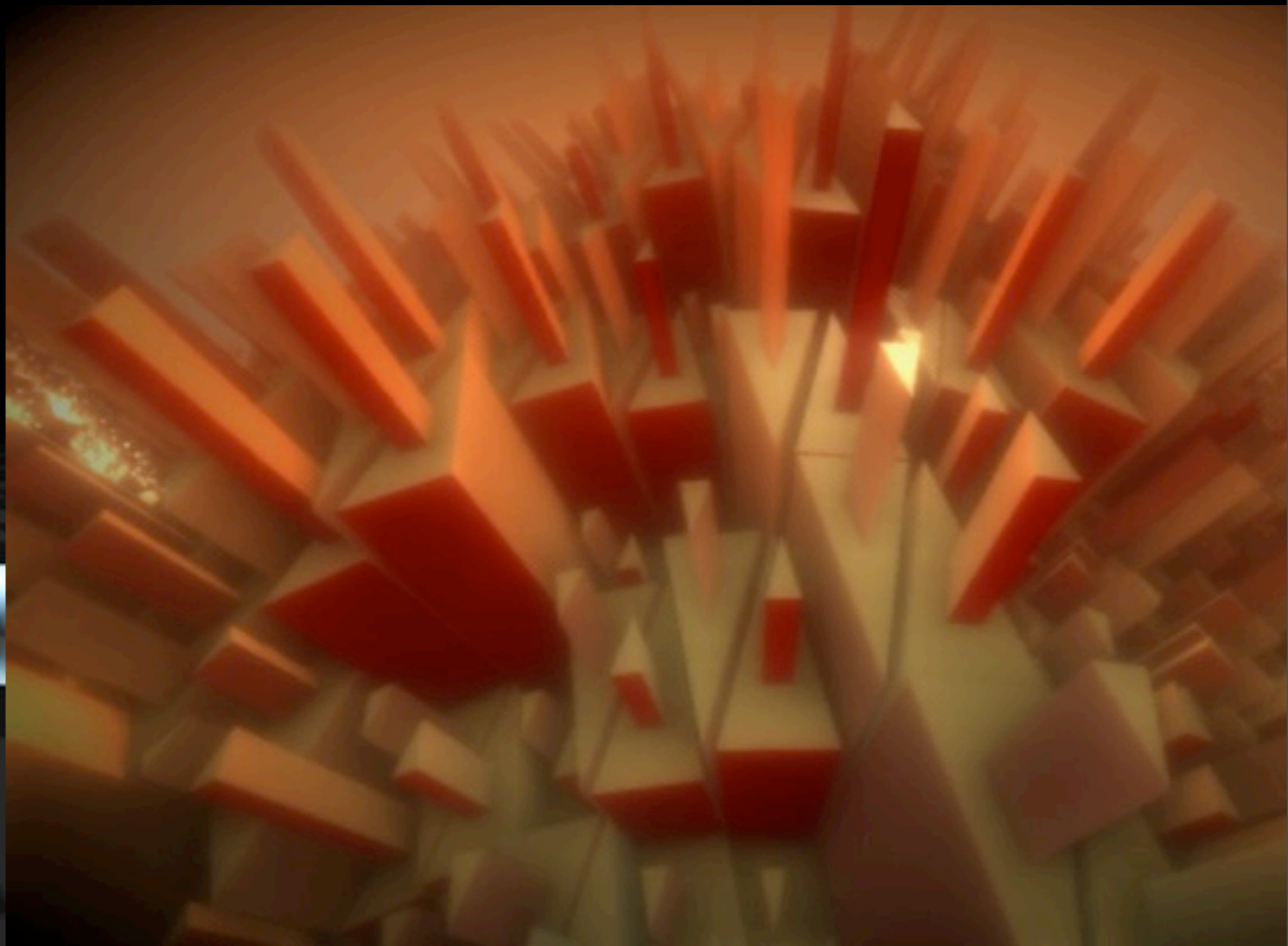
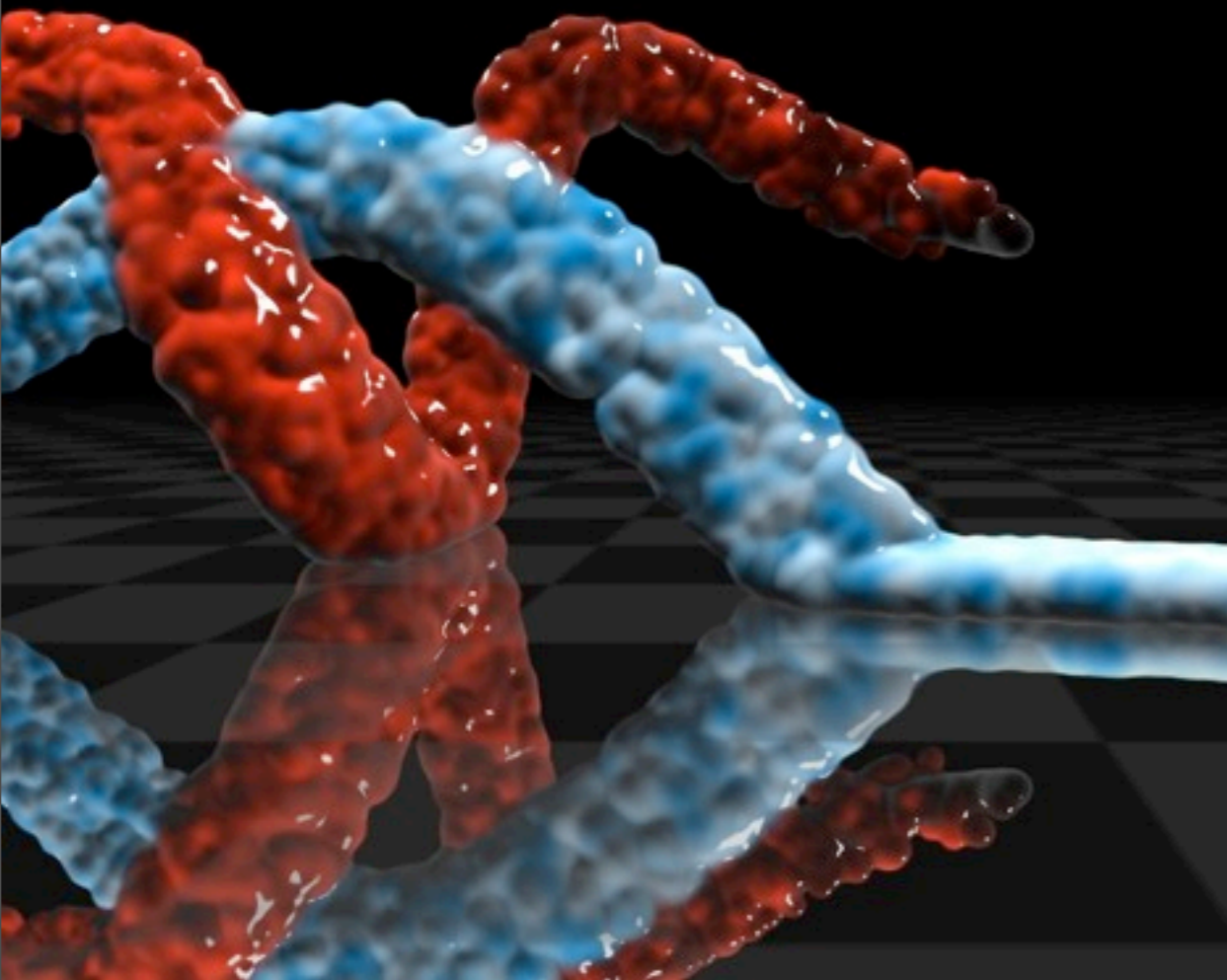
Knob twiddling



DEMOSCENE



DEMOSCENE



Both 4KB – awards.scene.org

FR41 - DEBRIS

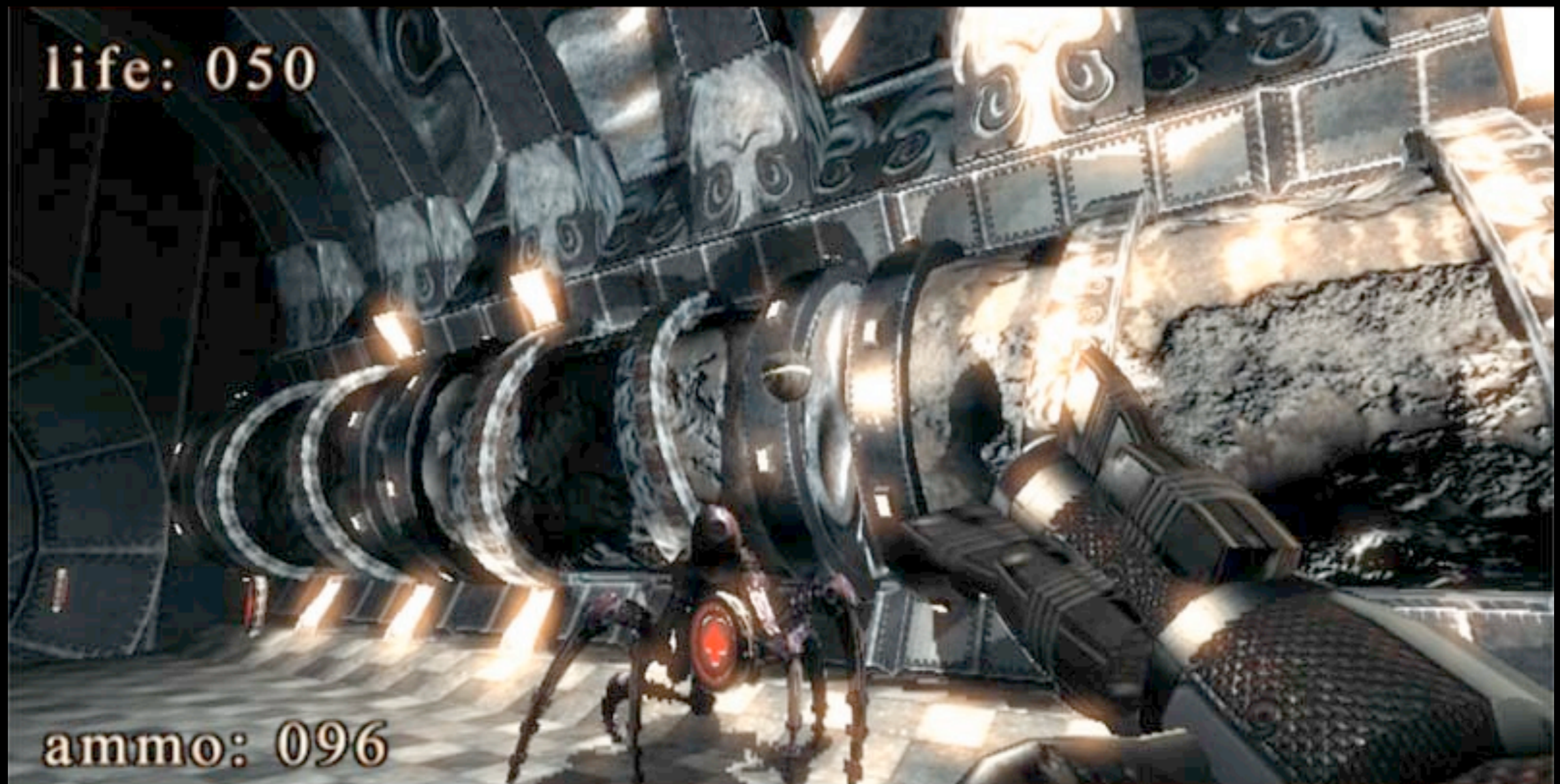
An aerial, high-angle photograph of a large, multi-story building complex at night. The building is illuminated from within, with many windows glowing. The central courtyard is brightly lit, and the surrounding buildings are also lit up, creating a warm, golden glow. The perspective is from directly above, looking down into the courtyard.

180KB – www.farb-rausch.com



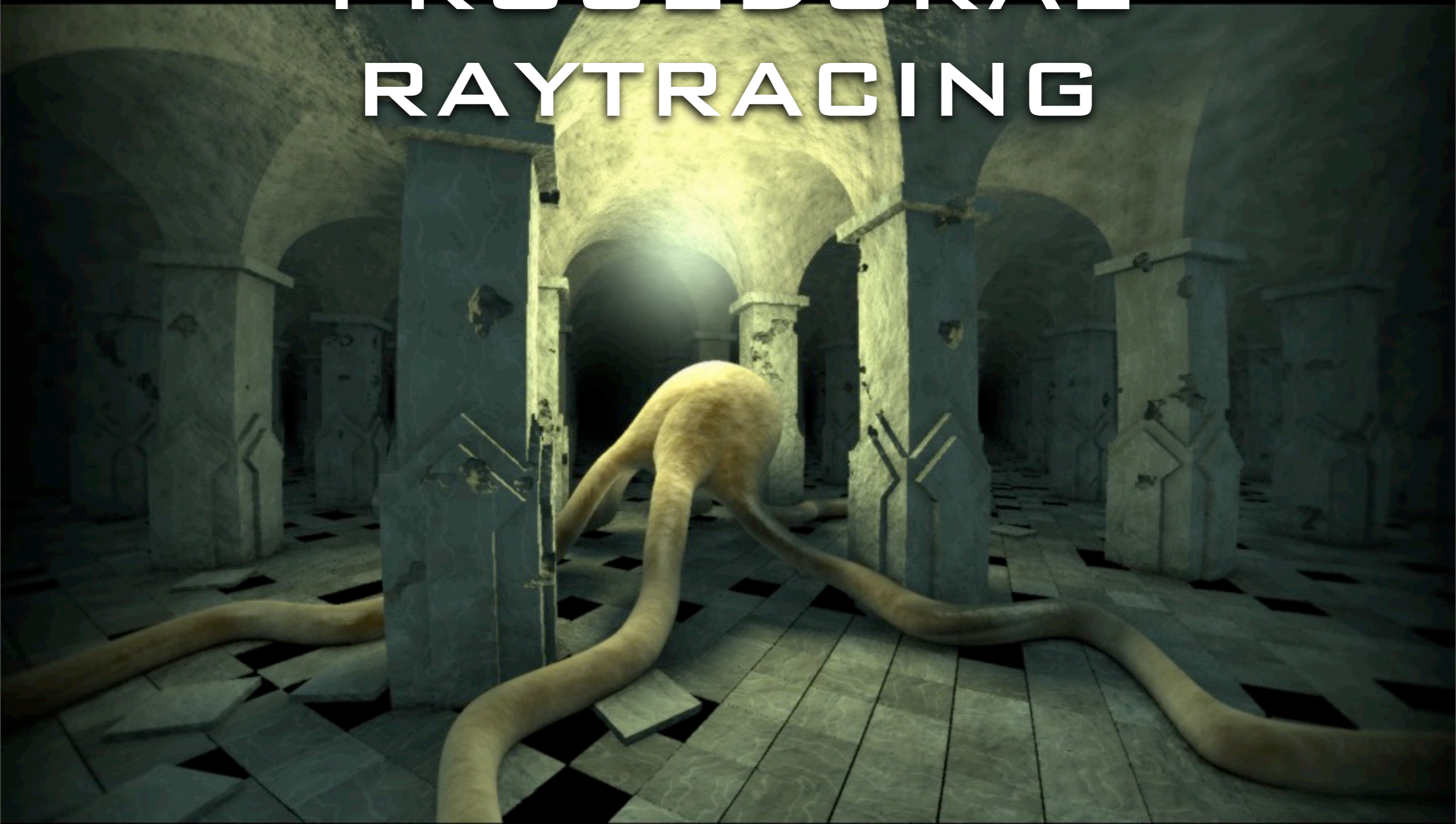
180KB – www.farb-rausch.com

.KKRIEGER (FPS)



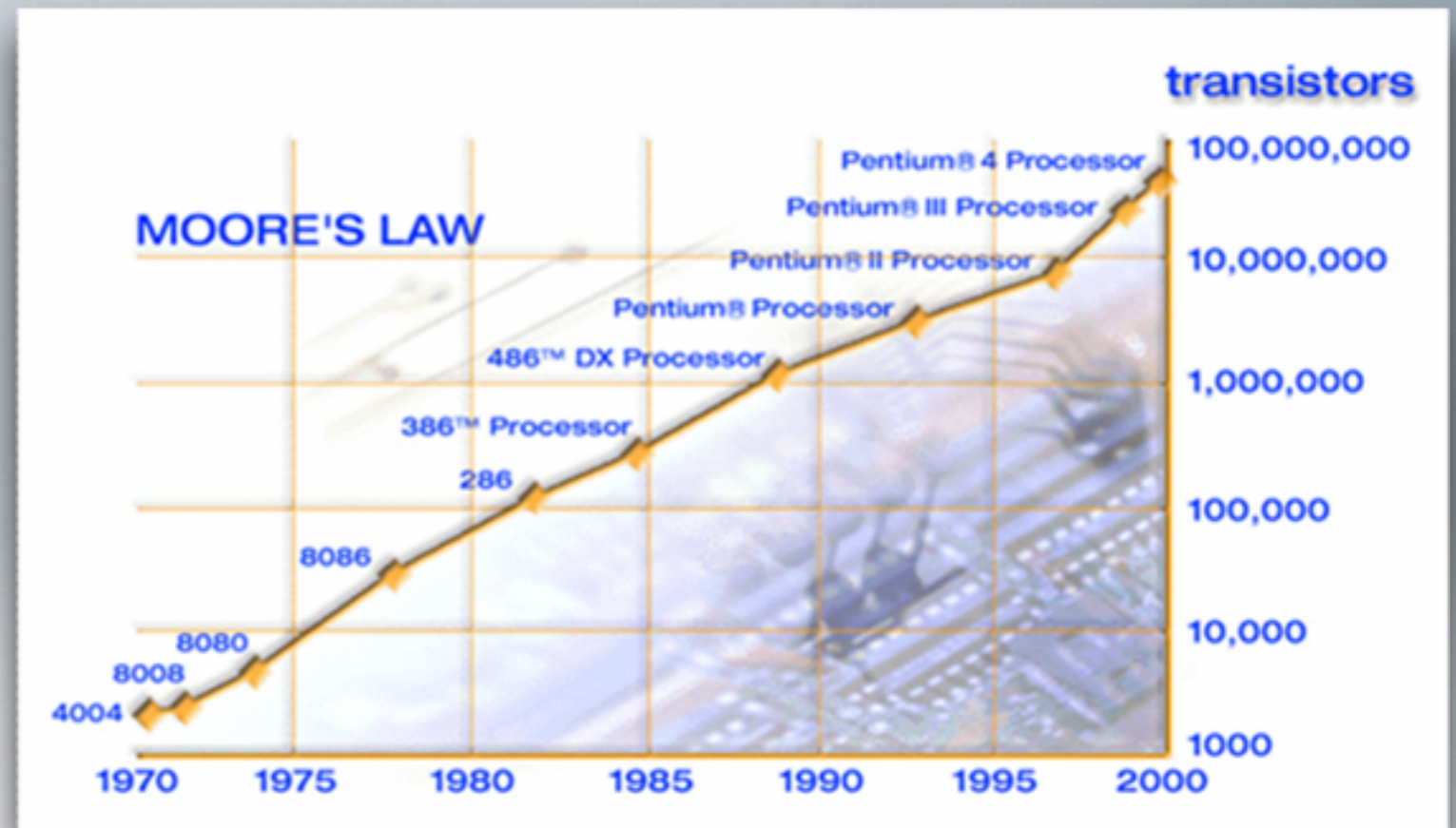
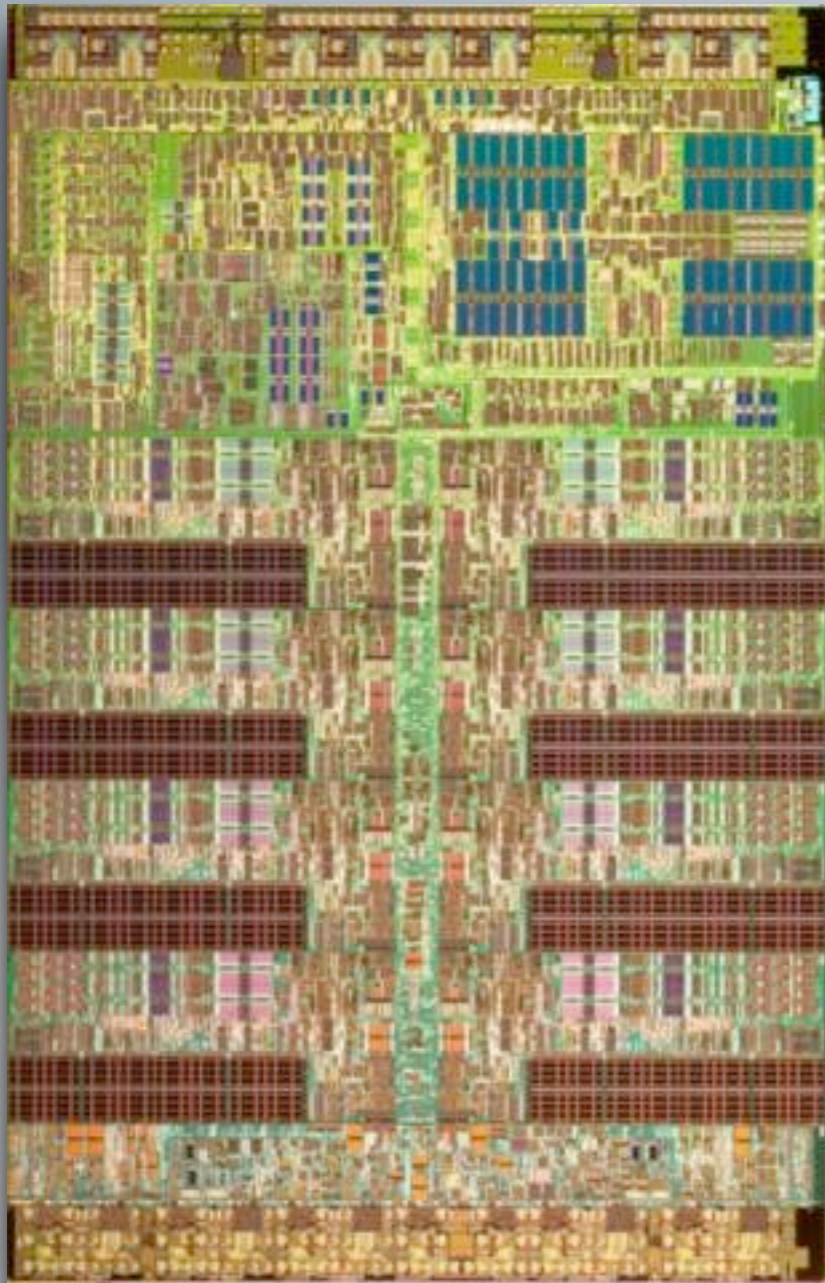
96KB → 200–300 MB

PROCEDURAL RAYTRACING

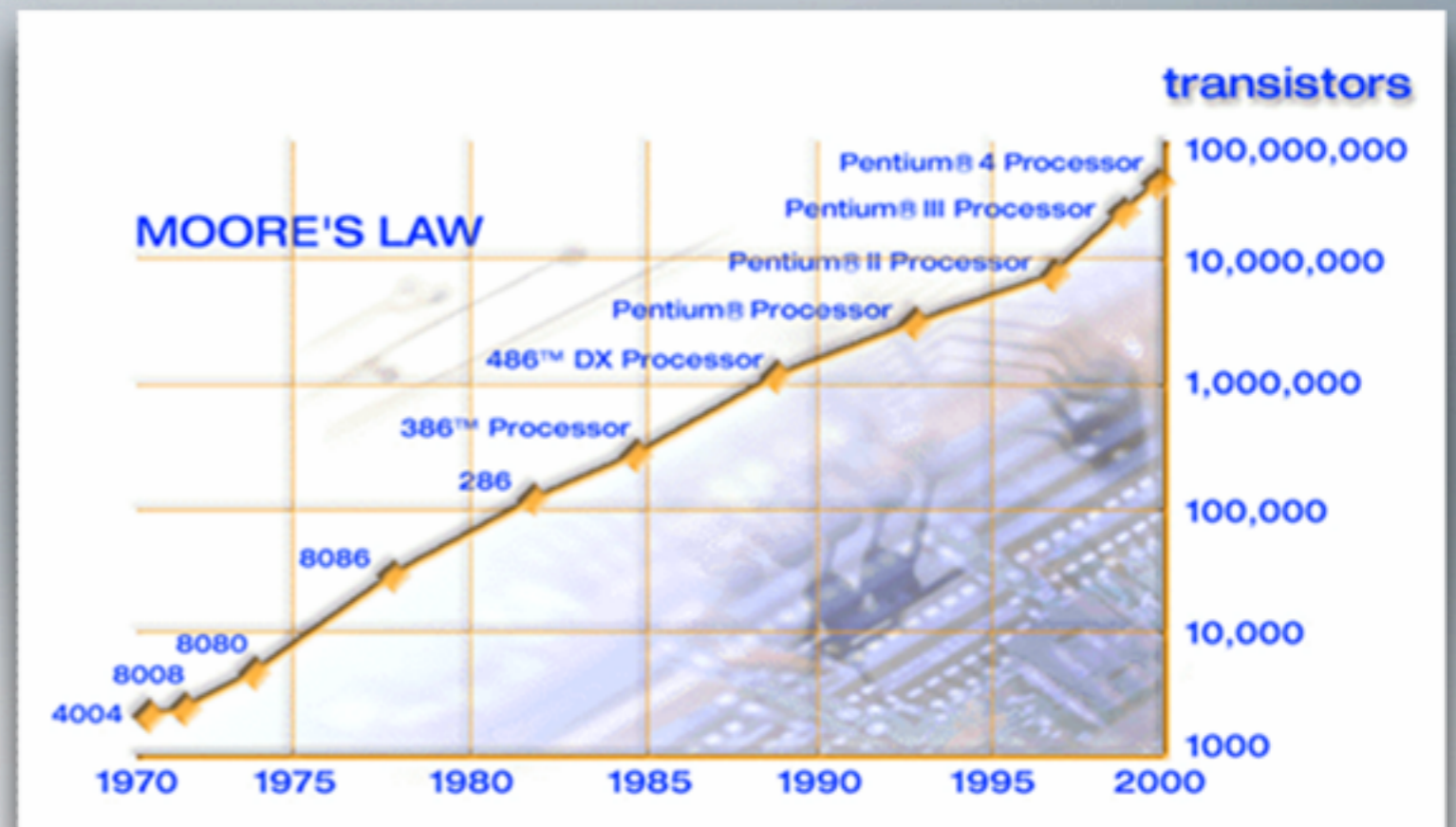
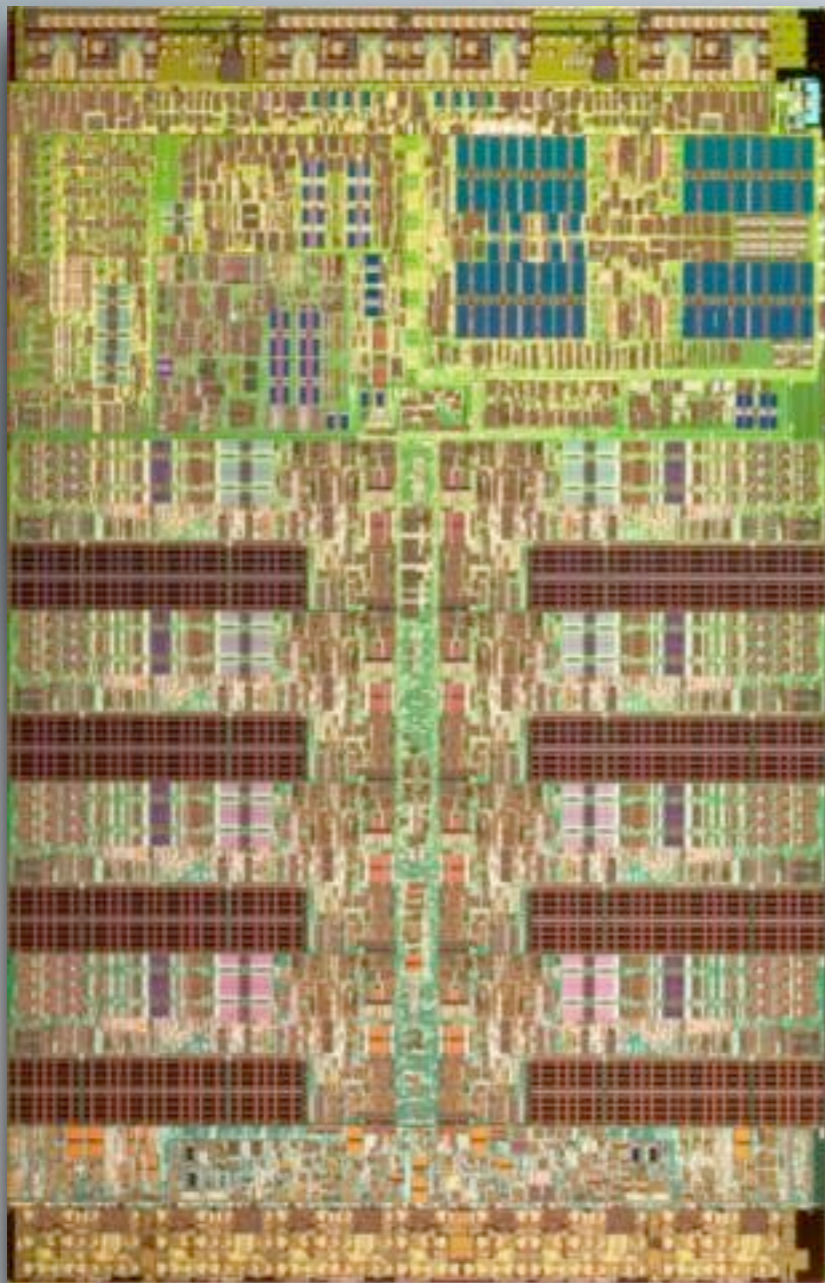


<http://www.iquilezles.org/www/material/nvscene2008/>

WHY IS THIS USEFUL?

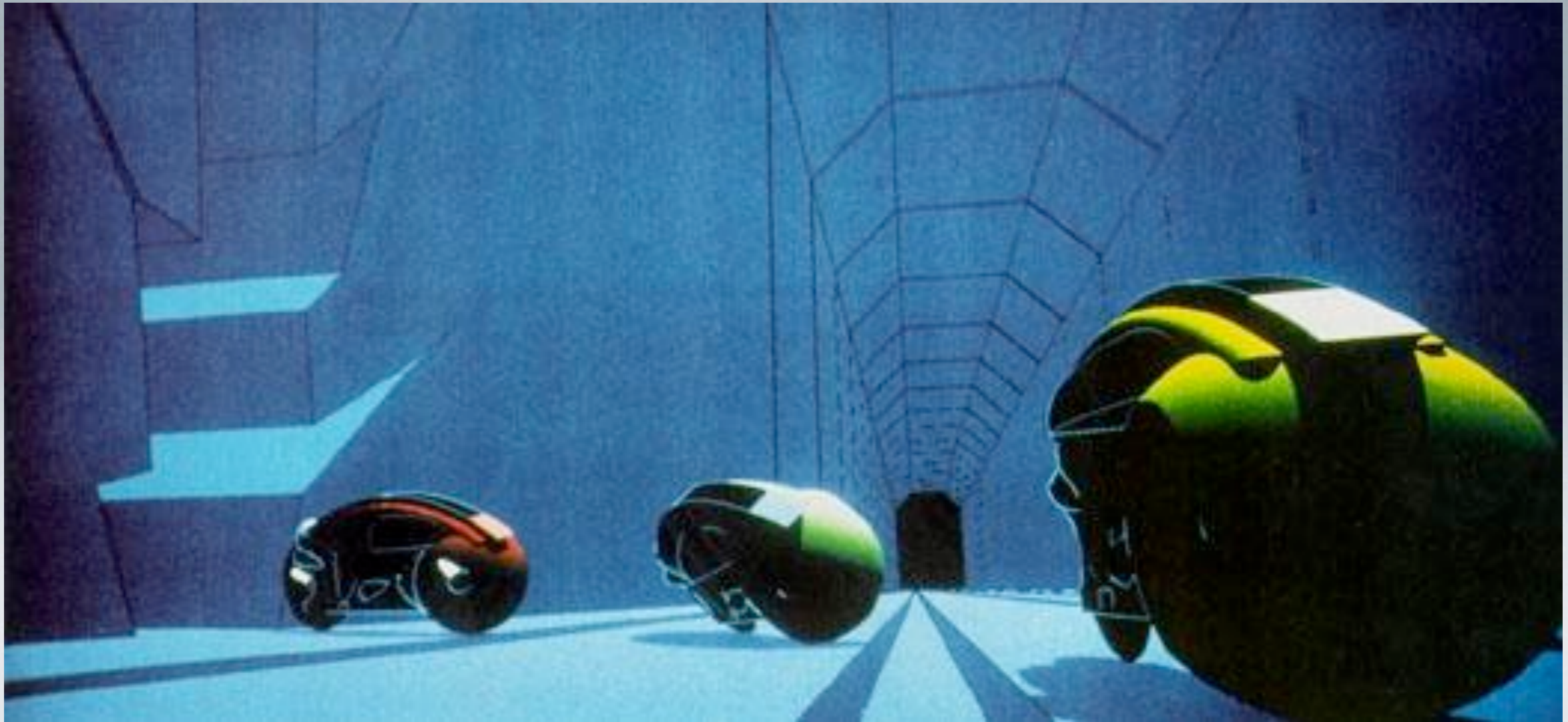


WHY IS THIS USEFUL?



More graphics detail
= More artist work

WHERE IT ALL STARTED



PROCEDURAL WORKFLOW

PROCEDURAL WORKFLOW

Use formulas, simulations or real world data

PROCEDURAL WORKFLOW

Use formulas, simulations or real world data

Simple operations combined into many

PROCEDURAL WORKFLOW

Use formulas, simulations or real world data

Simple operations combined into many

Generate lots of new data on-the-fly

PROCEDURAL WORKFLOW

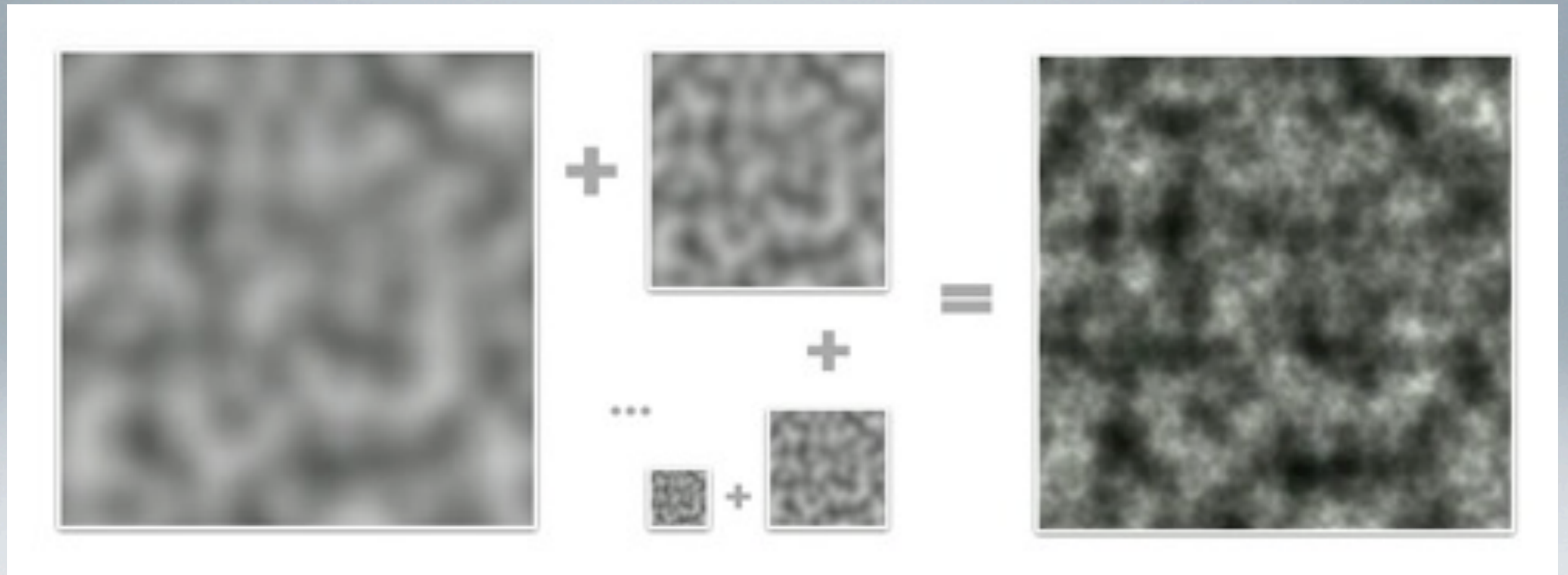
Use formulas, simulations or real world data

Simple operations combined into many

Generate lots of new data on-the-fly

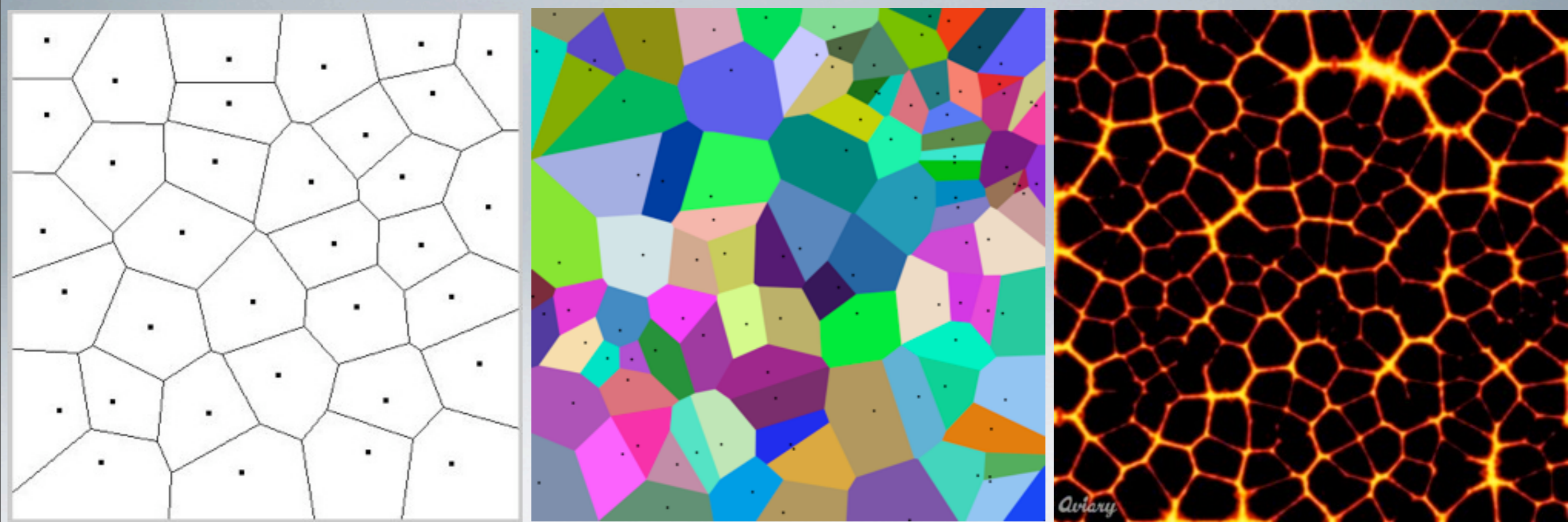
Artist interaction through parameters,
compositing, scripting, ...

NOISE



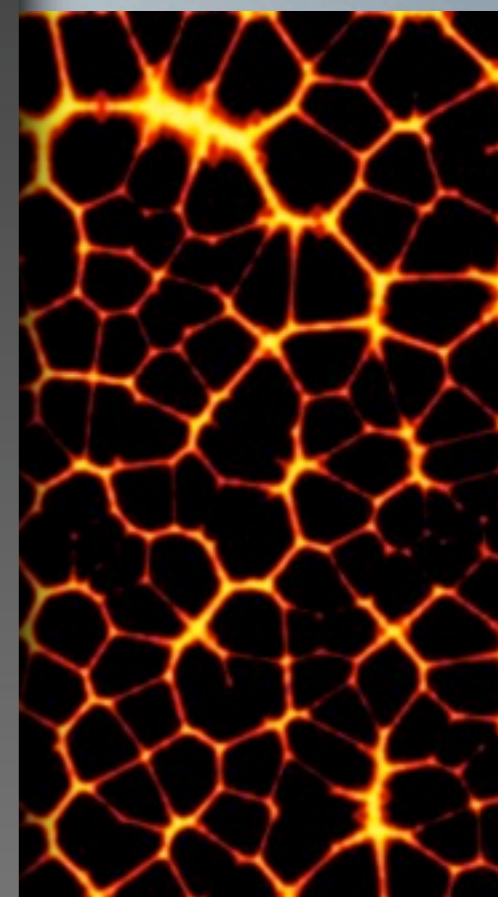
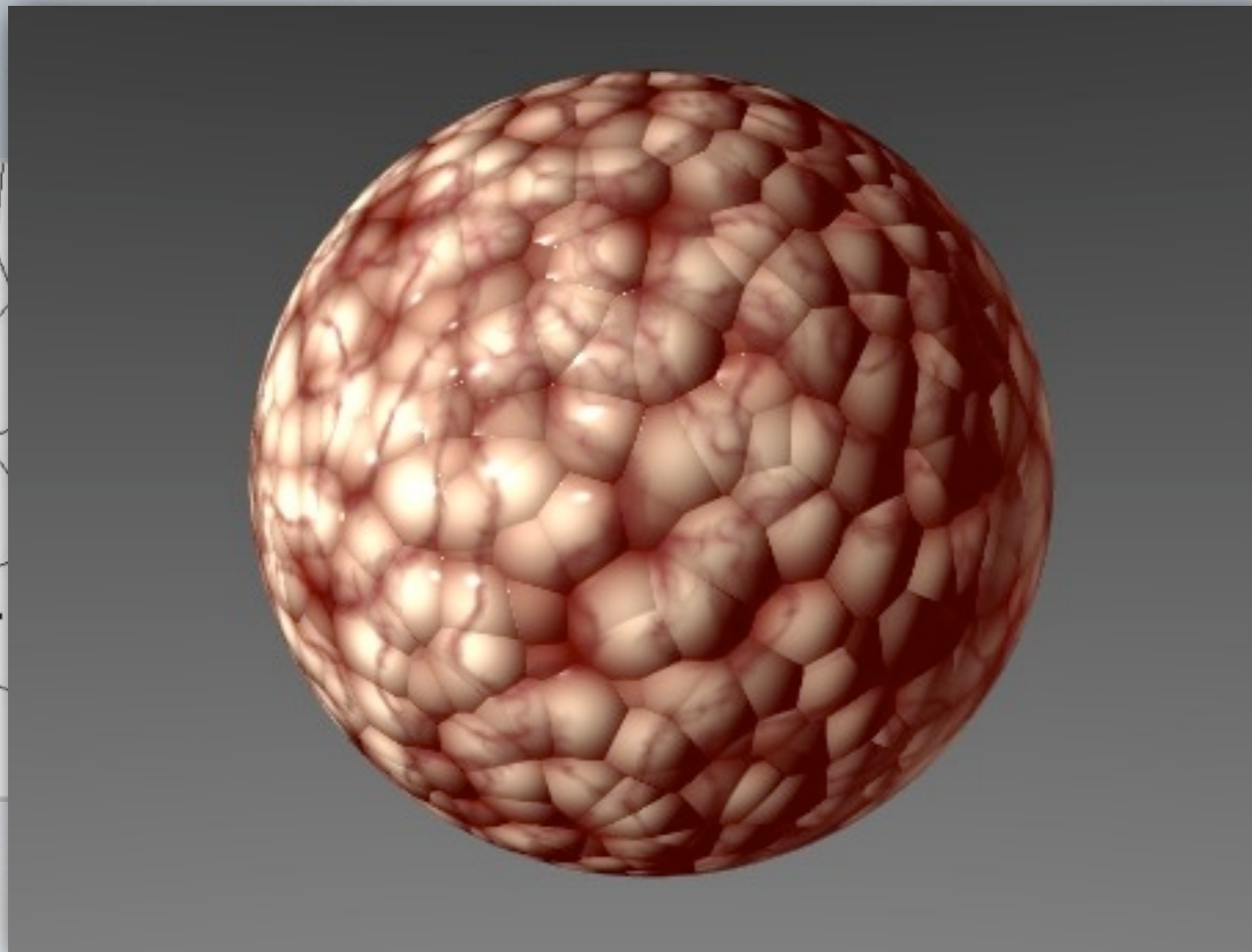
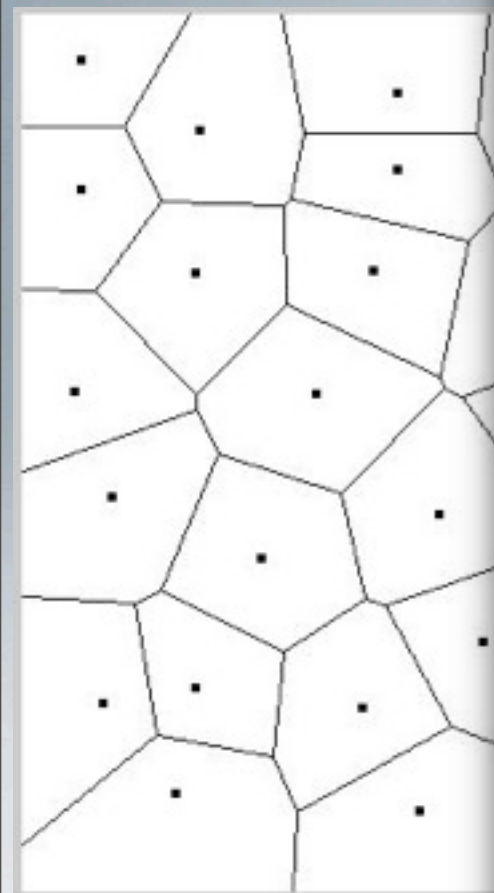
Perlin Noise → Fractal Brownian Motion

CELLULAR PATTERNS



Voronoi Diagram

CELLULAR PATTERNS

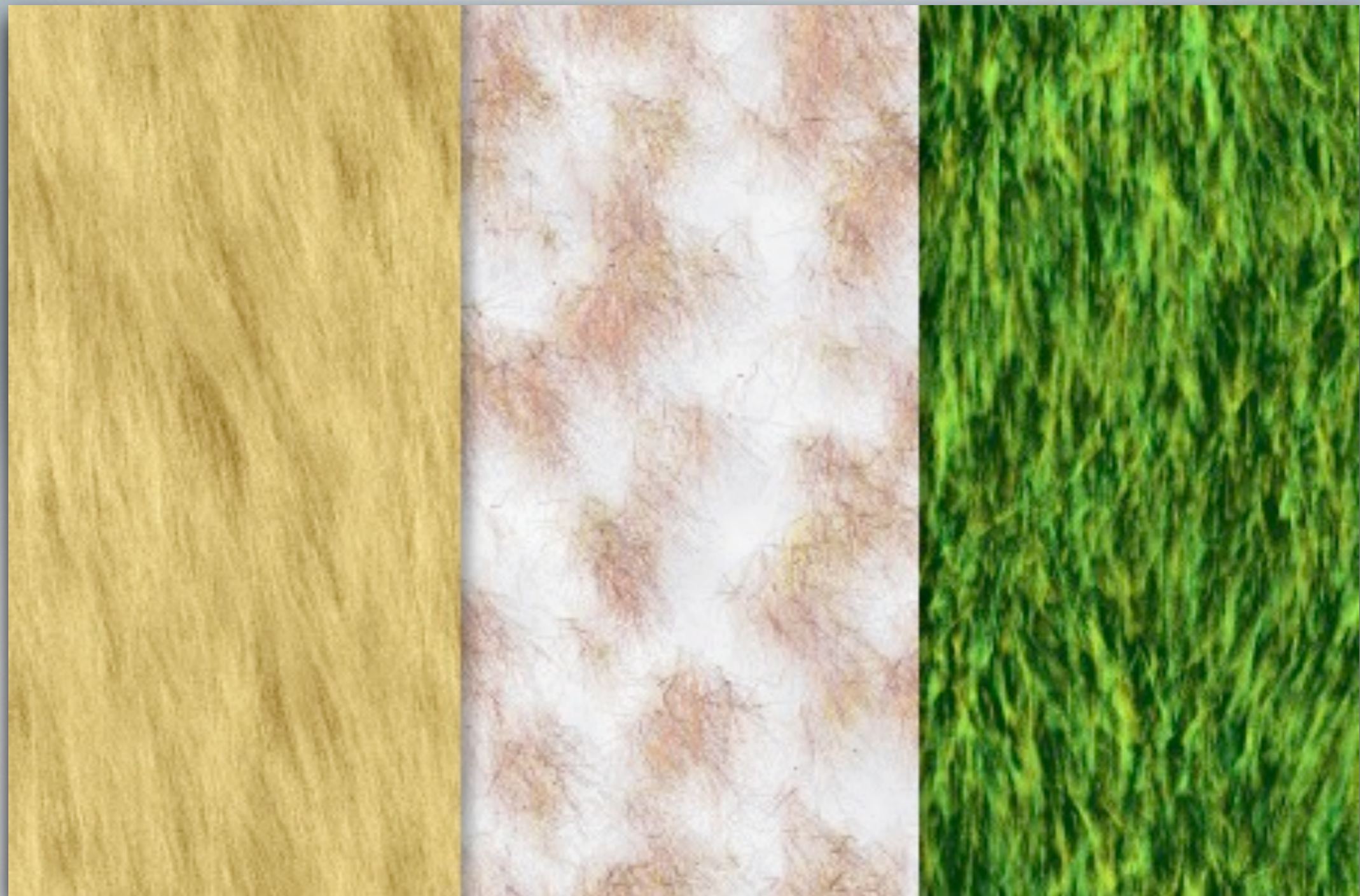


Voronoi Diagram

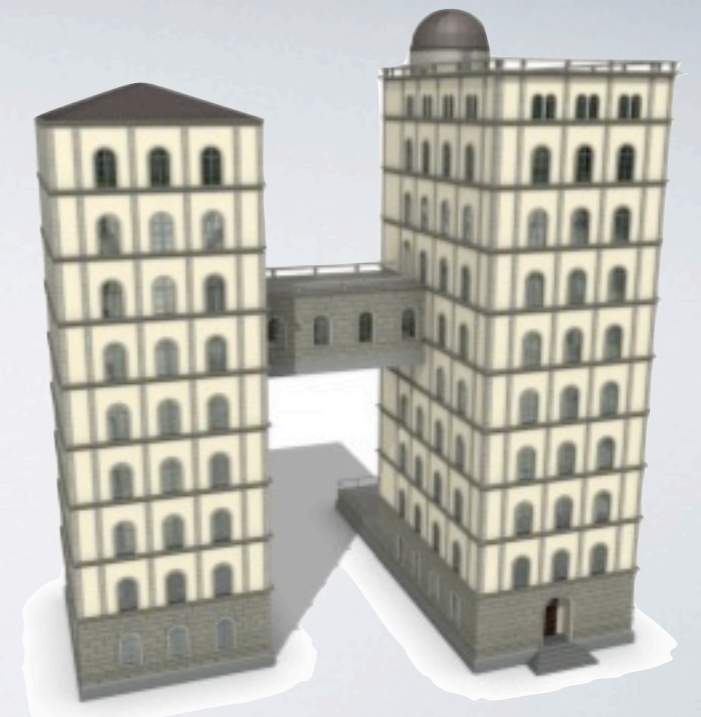
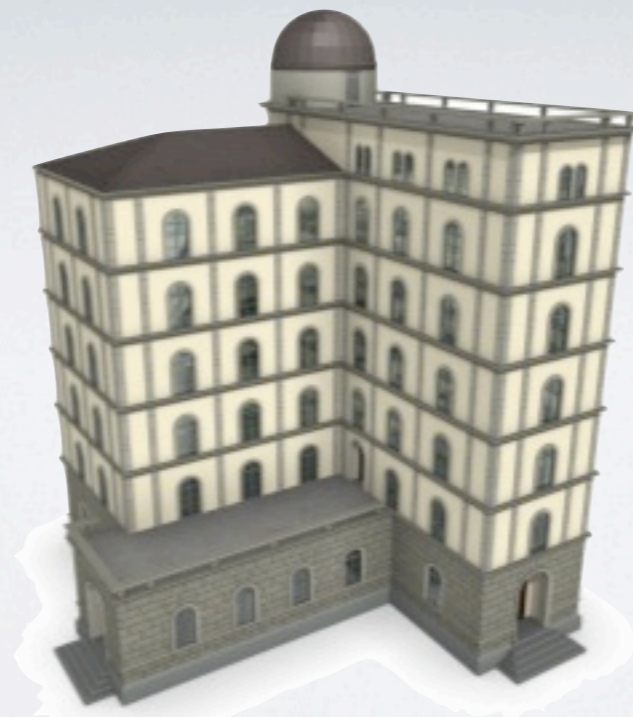
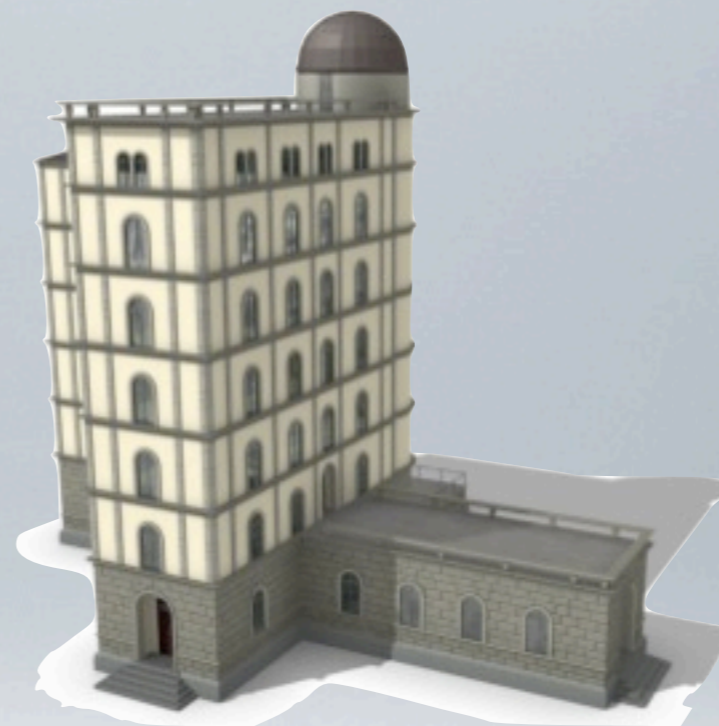
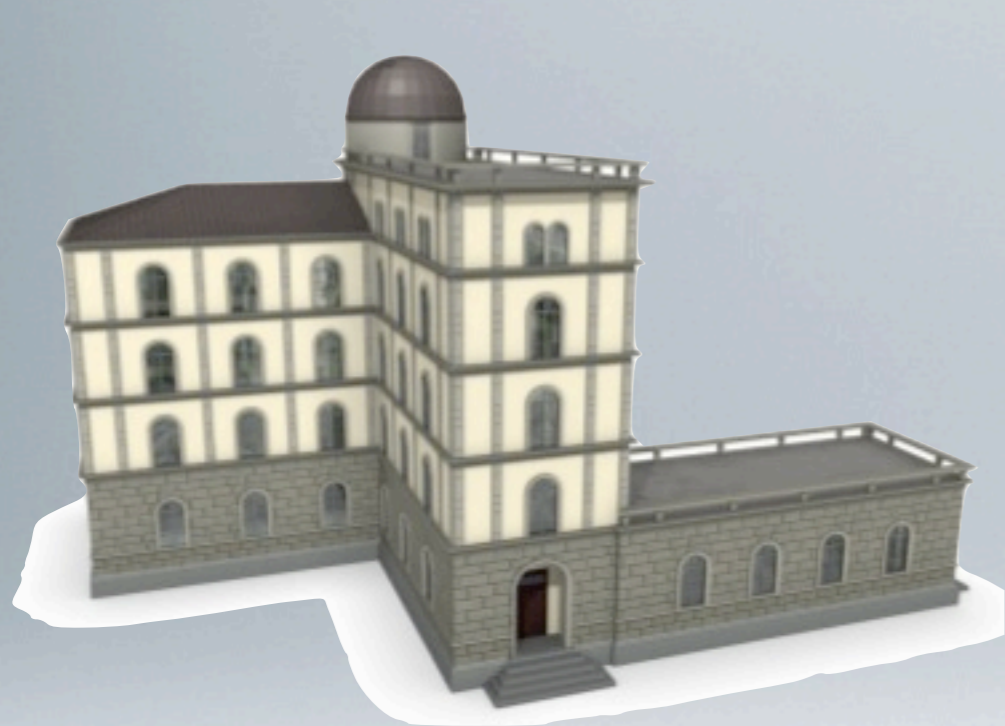
LAYERED EFFECTS



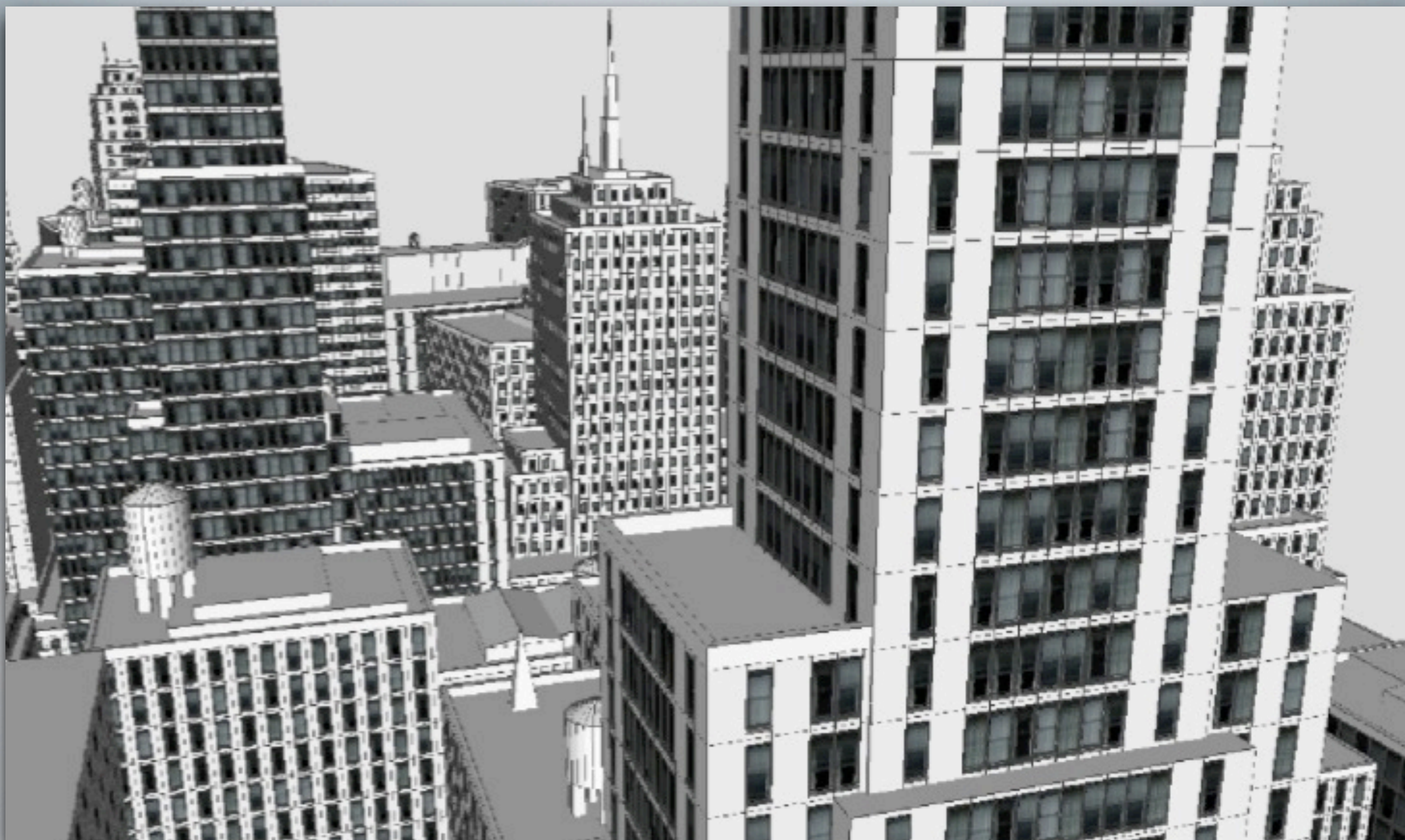
LAYERED EFFECTS



BUILDINGS



BUILDINGS



WHAT MAKES IT FUN?

WHAT MAKES IT FUN?

Use math and code in a tangible way

WHAT MAKES IT FUN?

Use math and code in a tangible way

Single effort, infinitely varied results

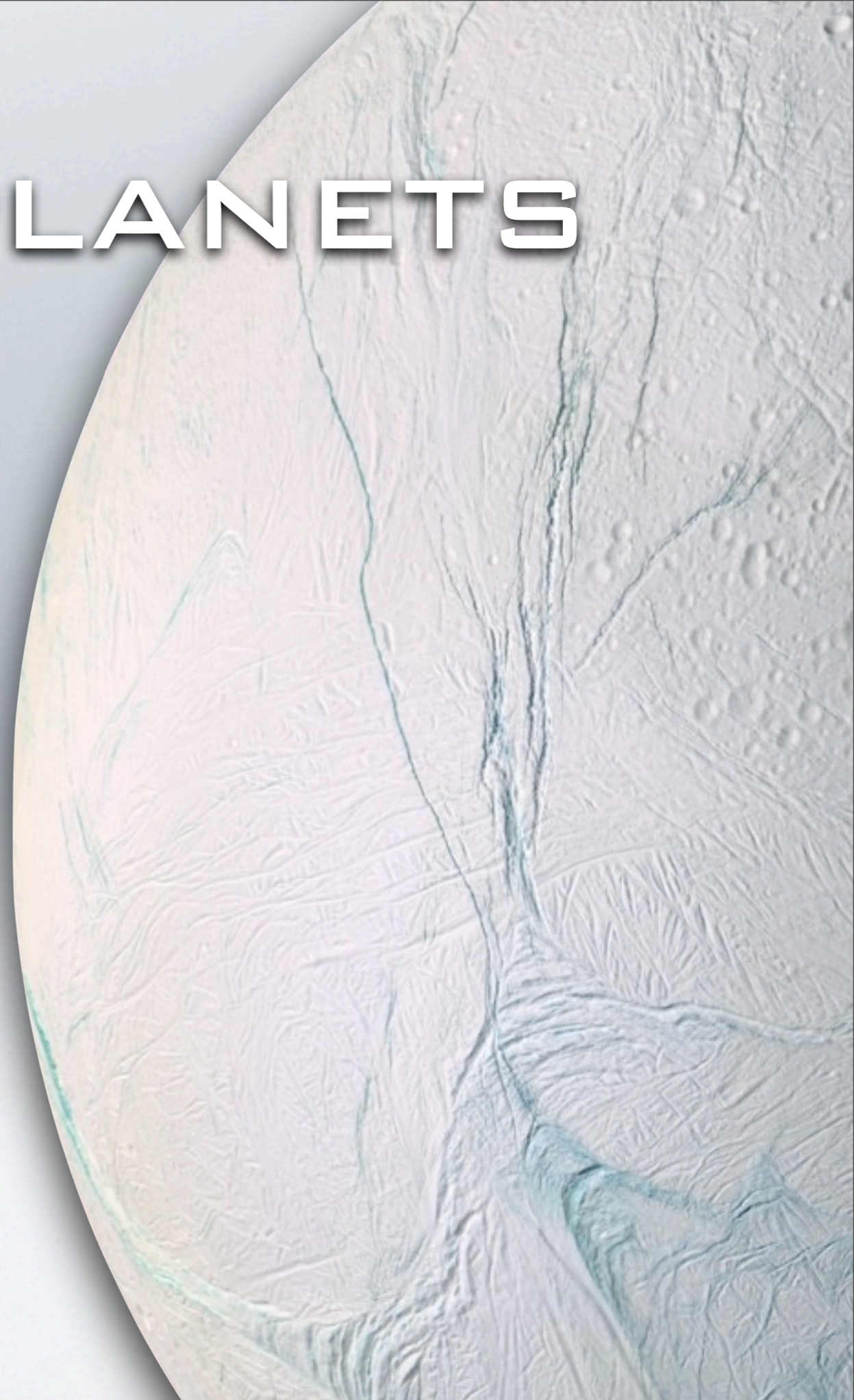
WHAT MAKES IT FUN?

Use math and code in a tangible way

Single effort, infinitely varied results

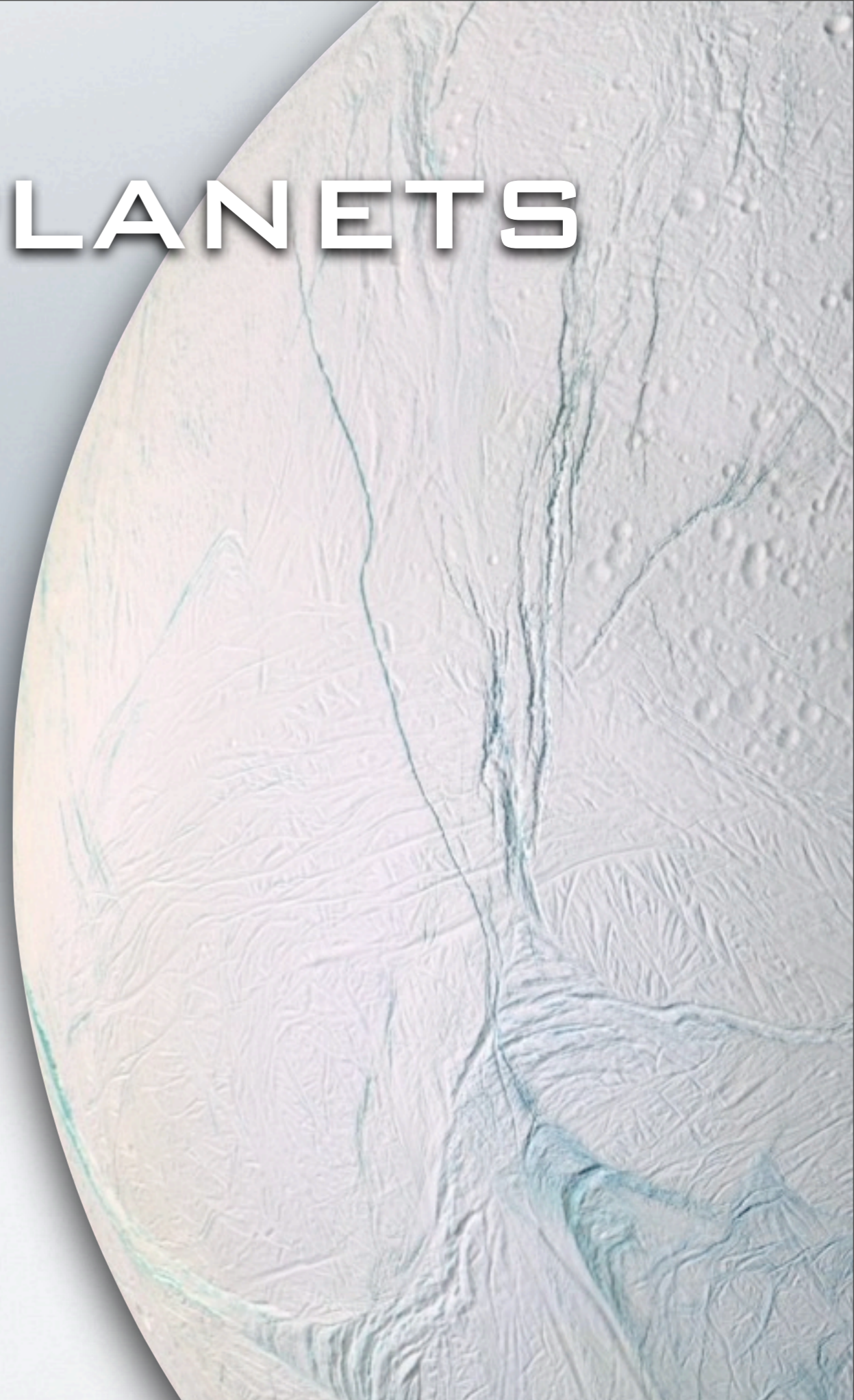
Valuable for (indie) games

MAKING PLANETS



MAKING PLANETS

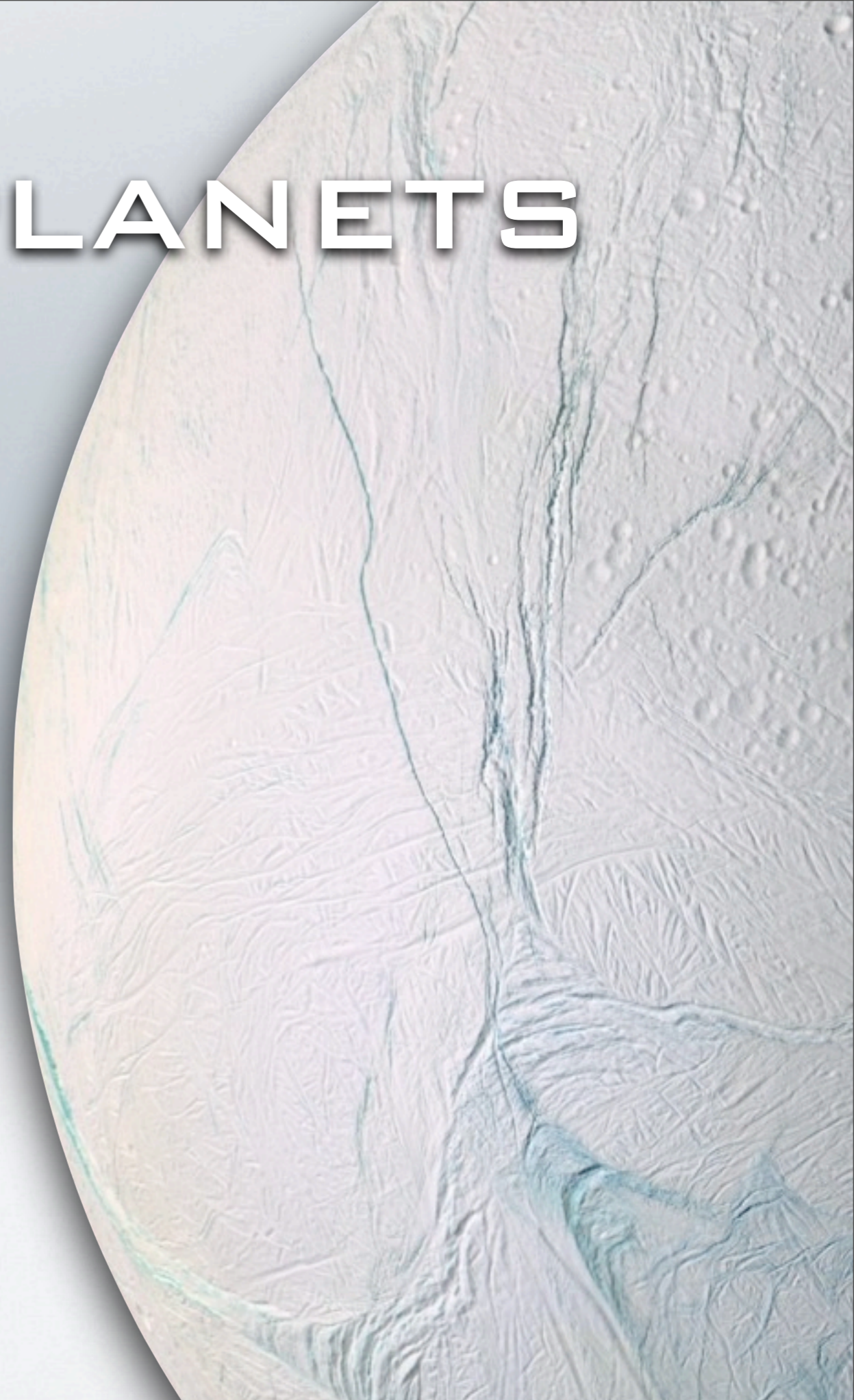
Make a convincing planet



MAKING PLANETS

Make a convincing planet

Viewable at all scales

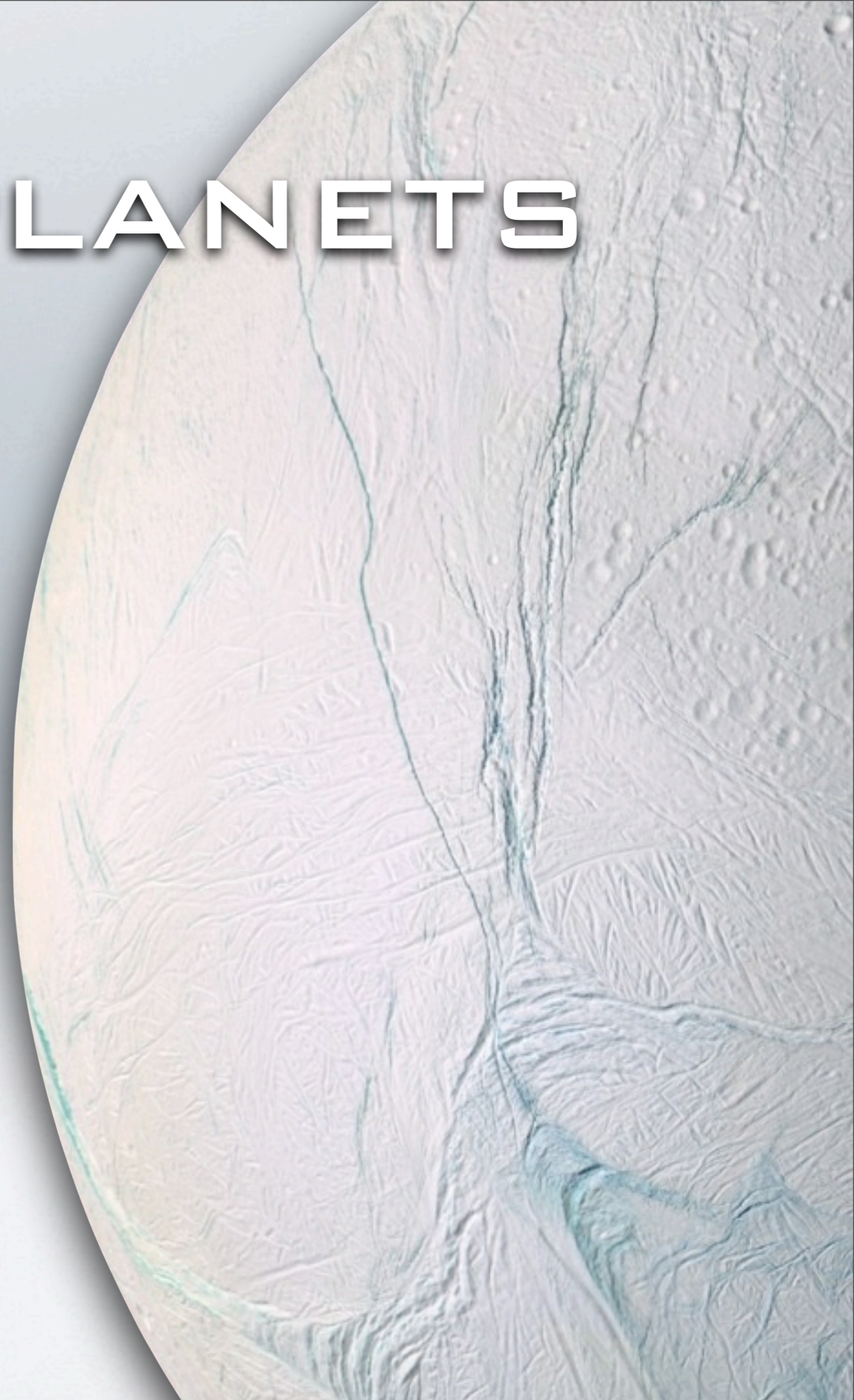


MAKING PLANETS

Make a convincing planet

Viewable at all scales

Renderable real-time



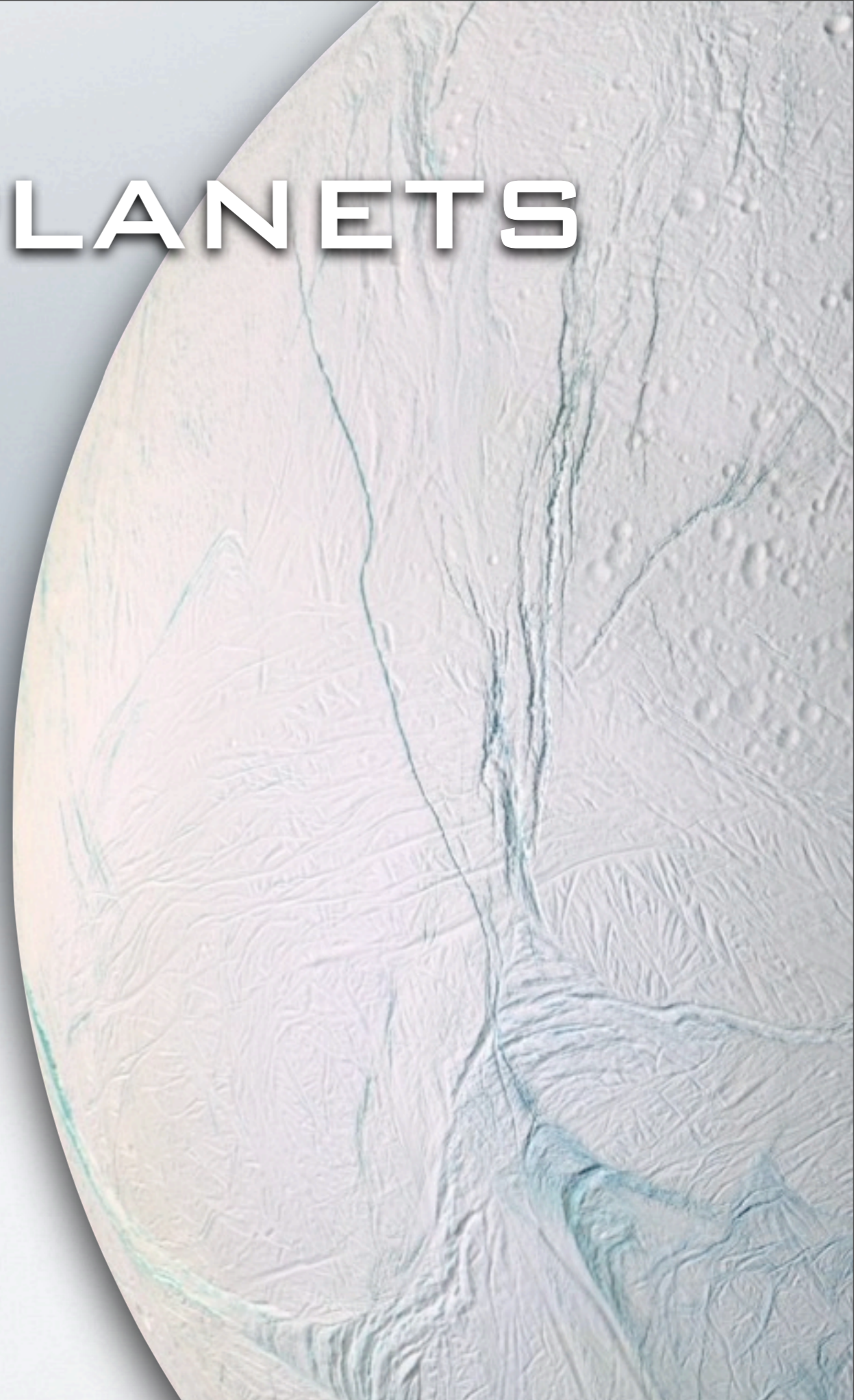
MAKING PLANETS

Make a convincing planet

Viewable at all scales

Renderable real-time

Generated on a desktop
CPU/GPU



OGRE ENGINE (C++)

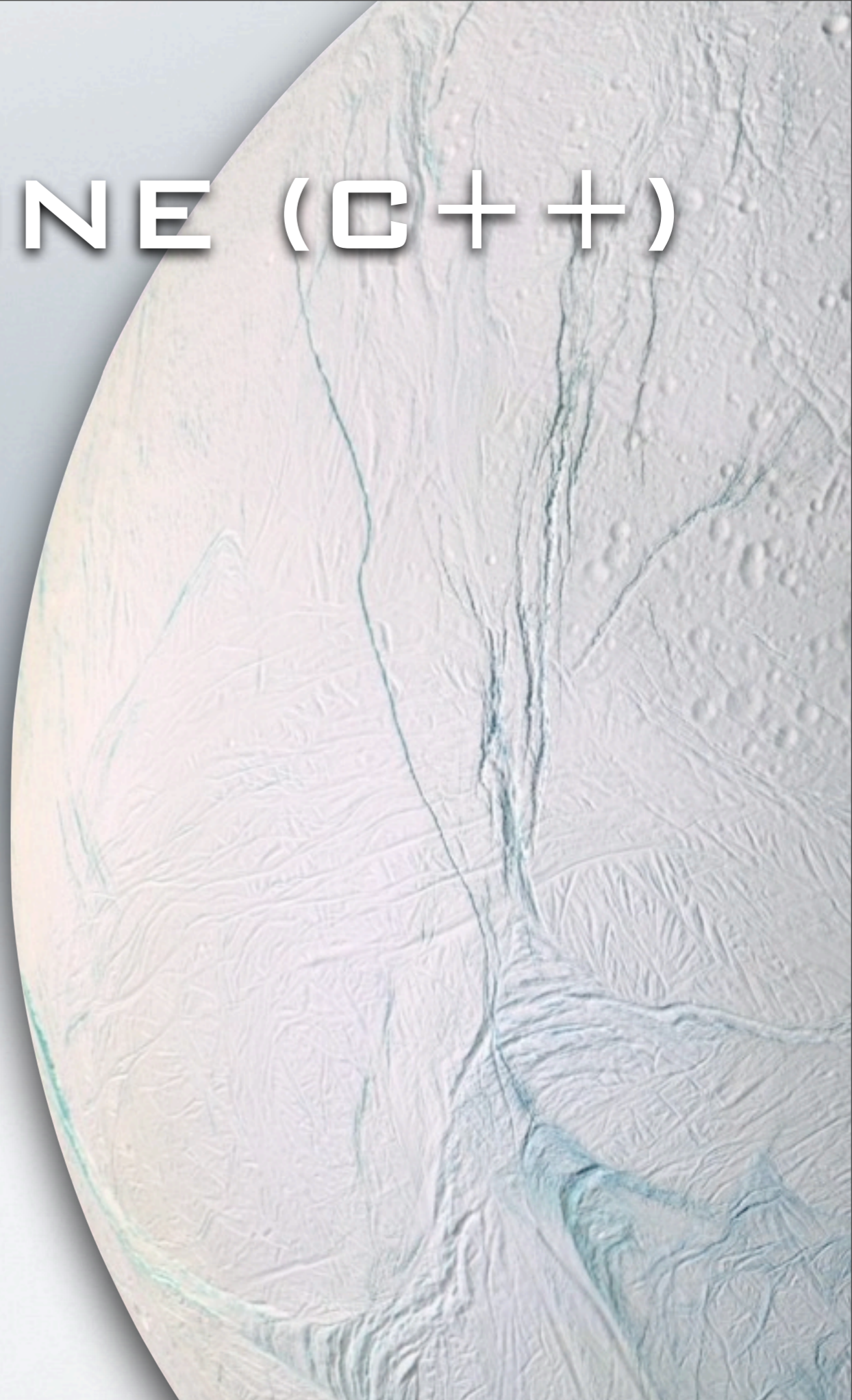
Ogre3D.org

LGPL (MIT soon)

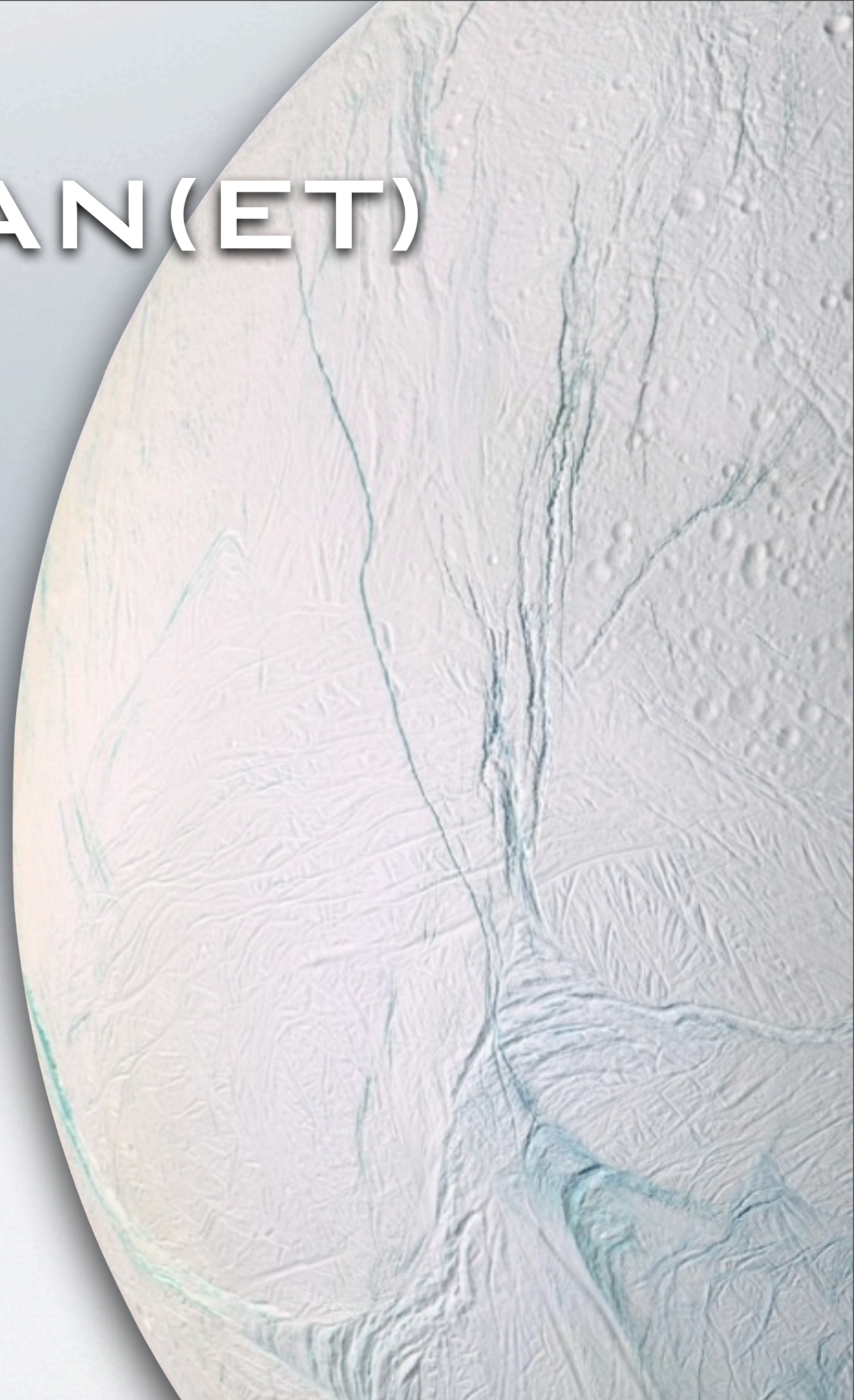
Cross platform

Shaders, HDR, etc

Torchlight

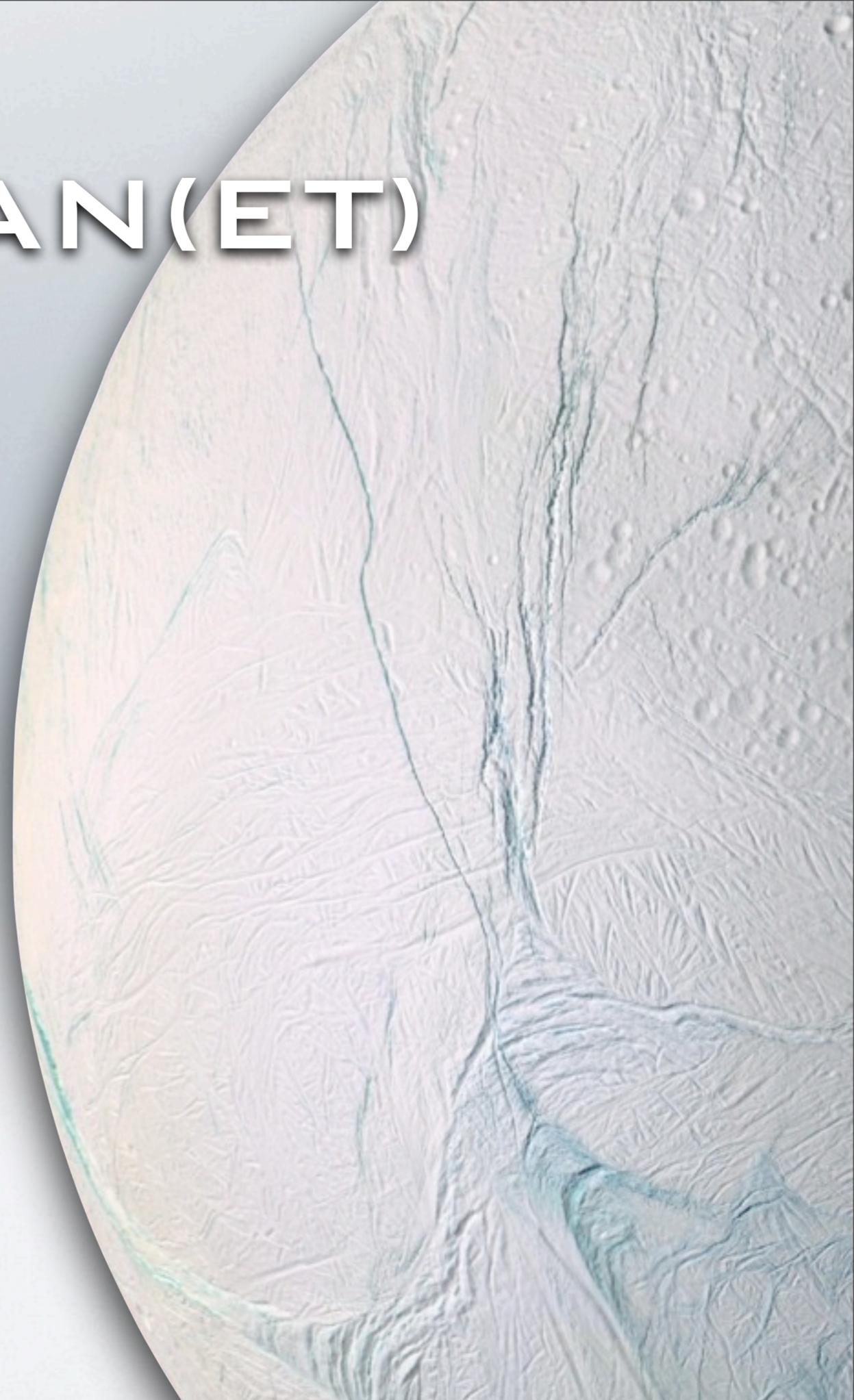


THE PLAN(ET)



THE PLAN(ET)

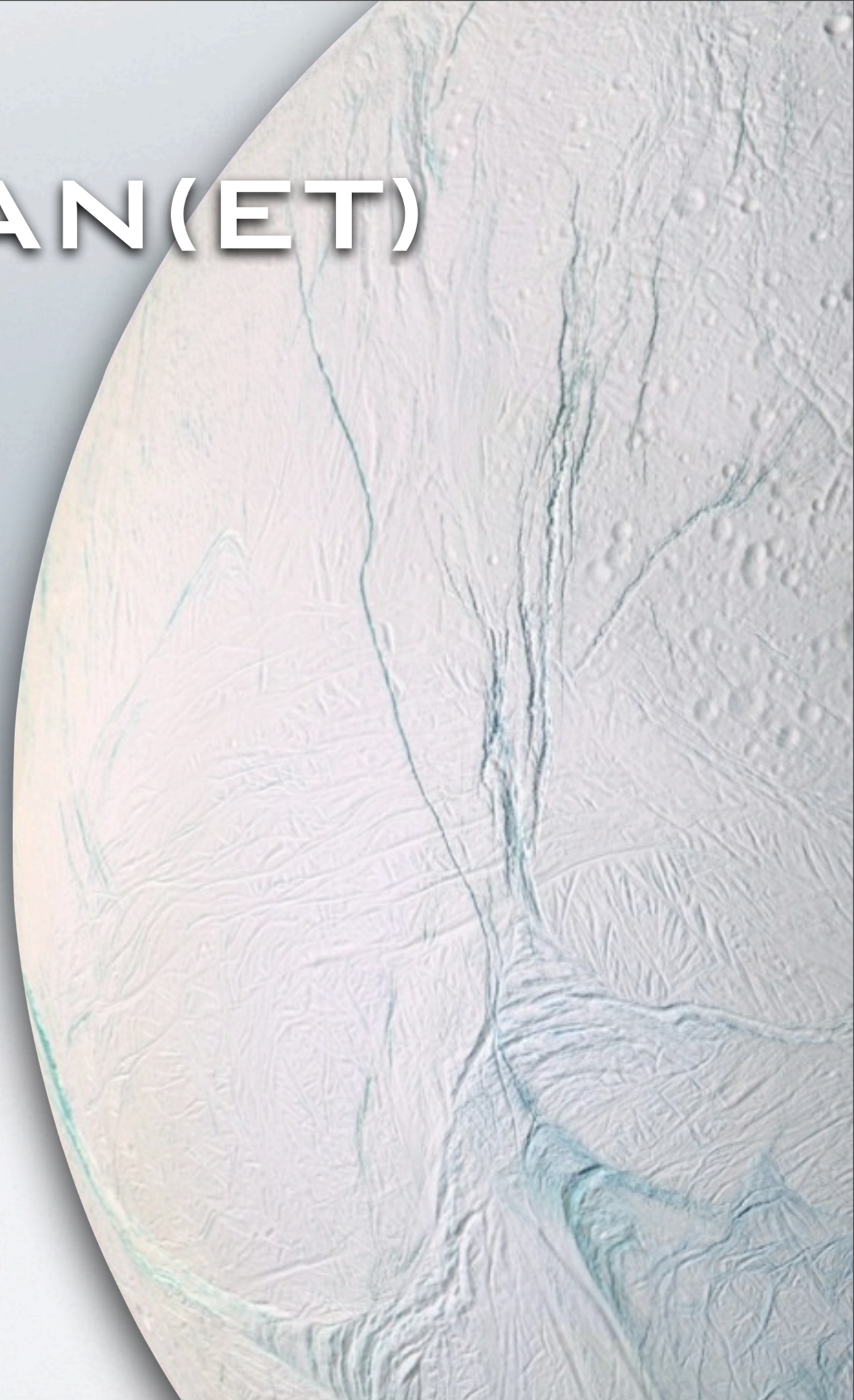
Outer space model



THE PLAN(ET)

Outer space model

Add surface detail
recursively

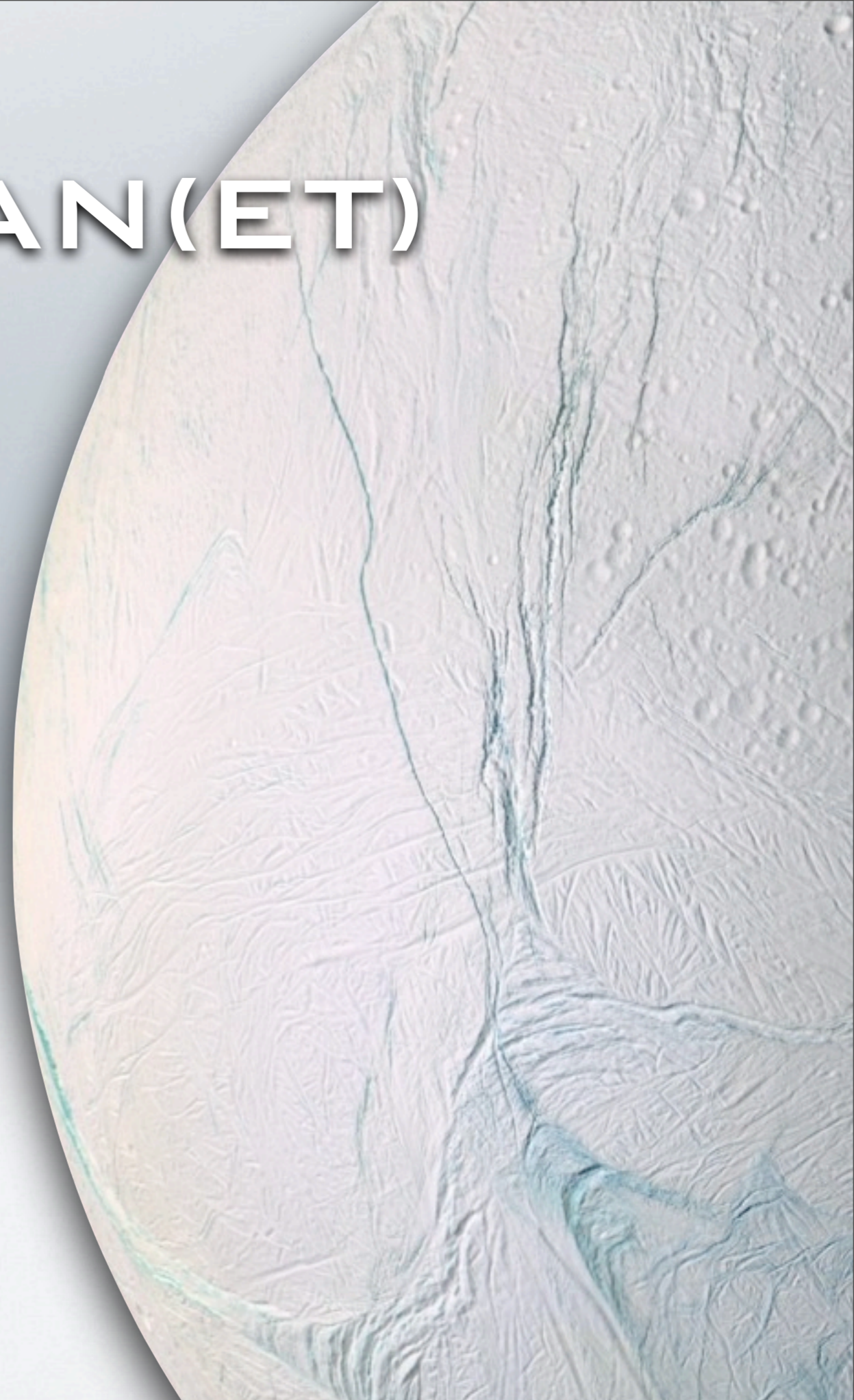


THE PLAN(ET)

Outer space model

Add surface detail
recursively

Add atmosphere, clouds



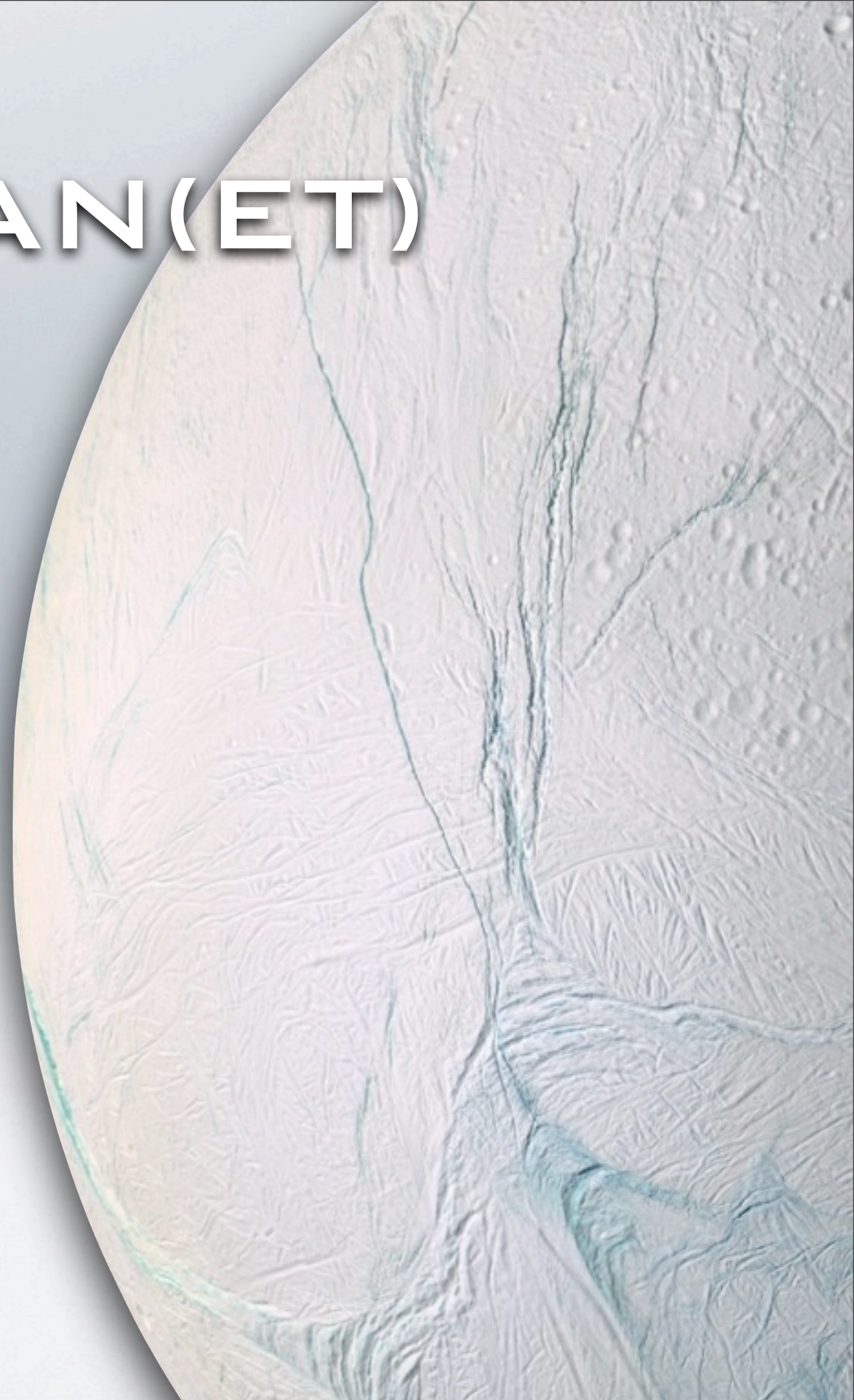
THE PLAN(ET)

Outer space model

Add surface detail
recursively

Add atmosphere, clouds

Add ground-level details



THE PLAN(ET)

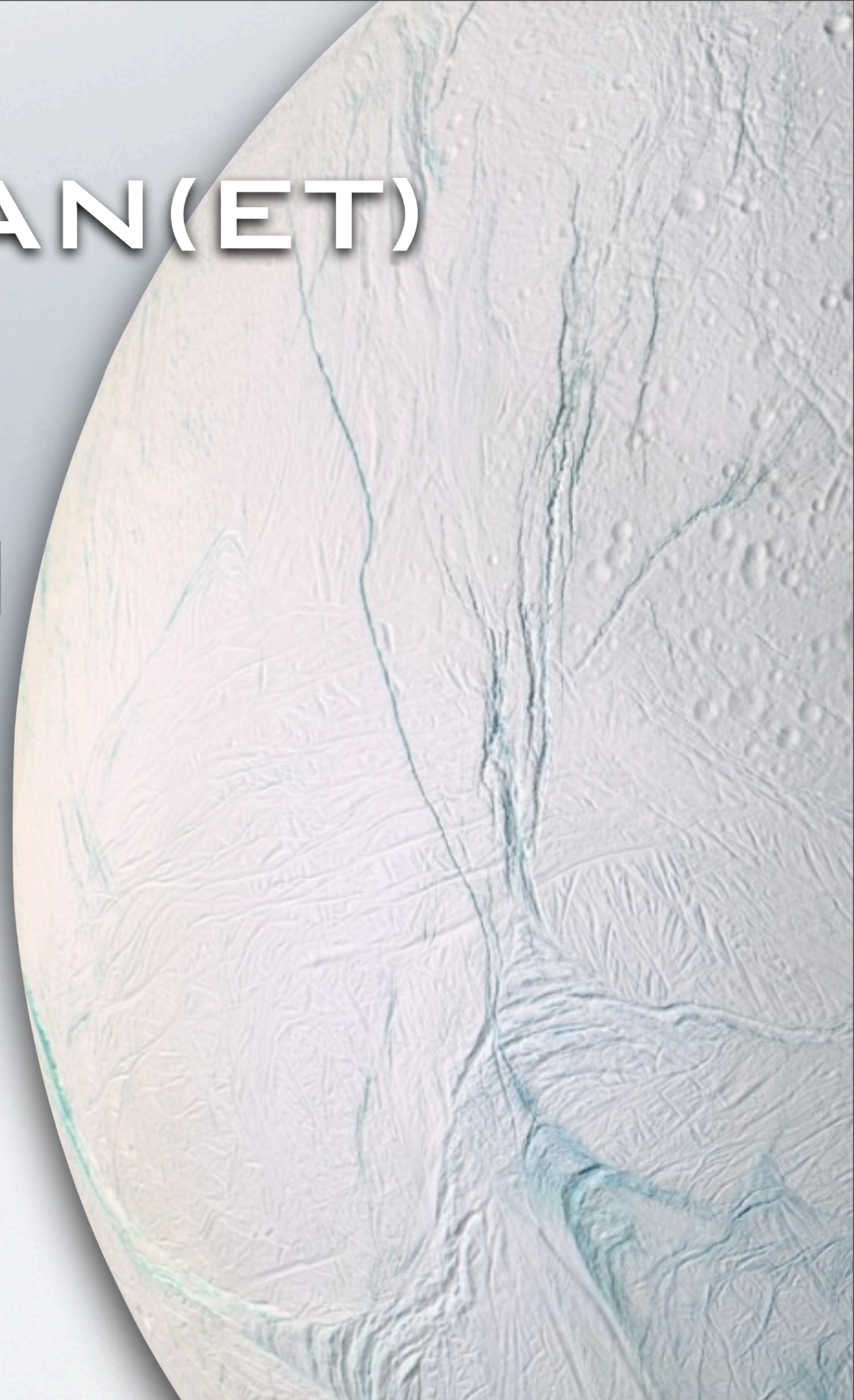
Outer space model



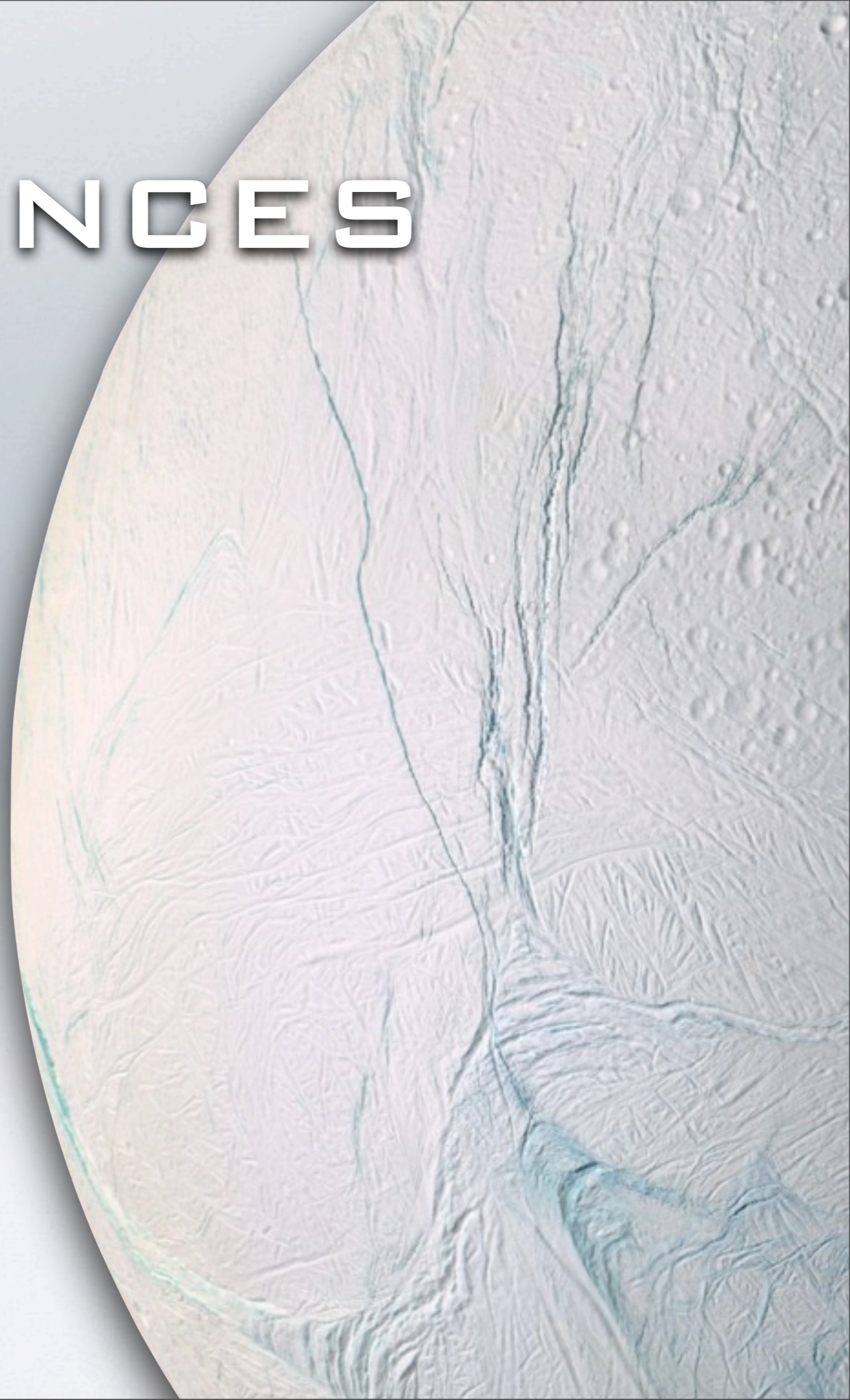
Add surface detail
recursively

Add atmosphere, clouds

Add ground-level details

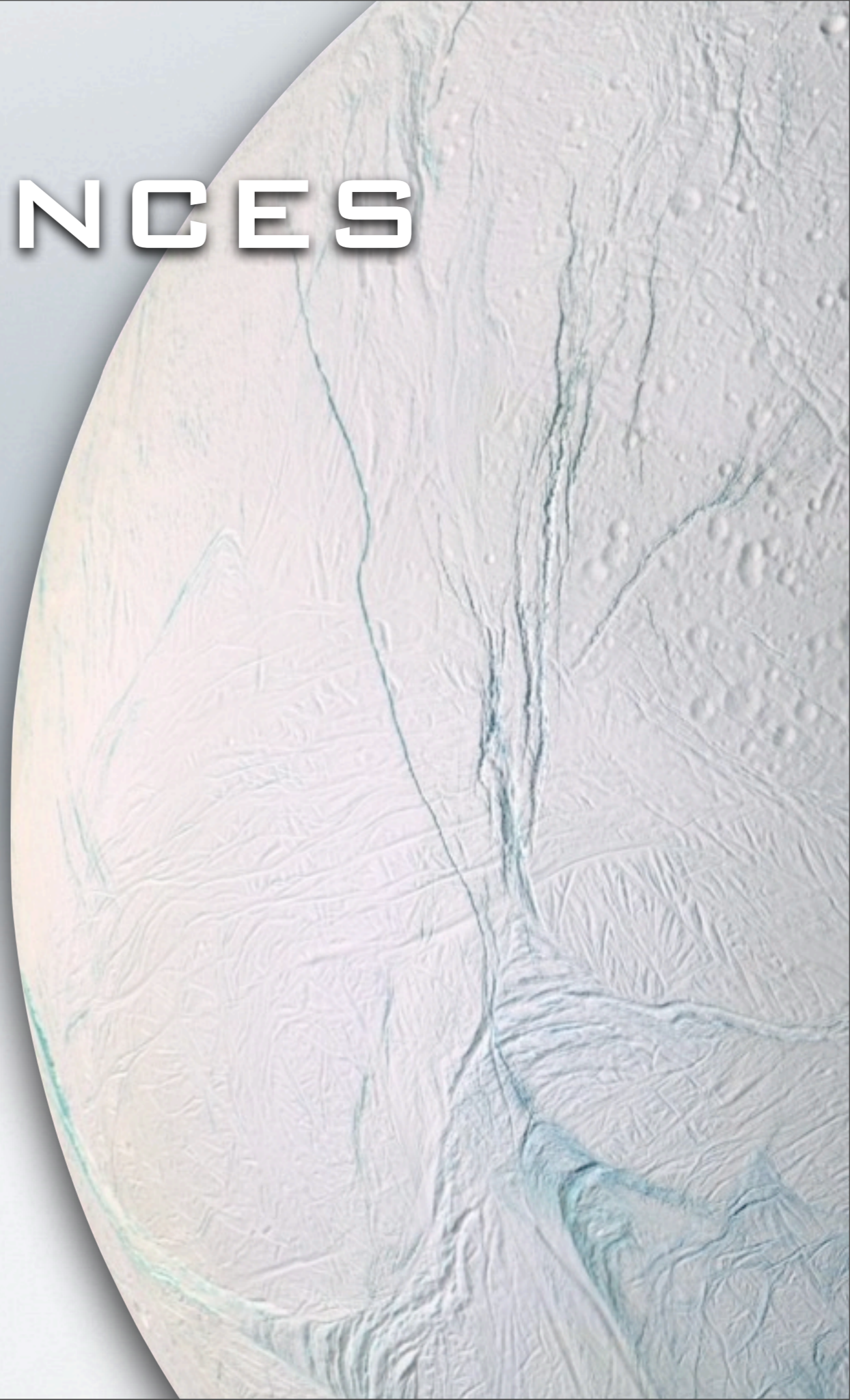


REFERENCES



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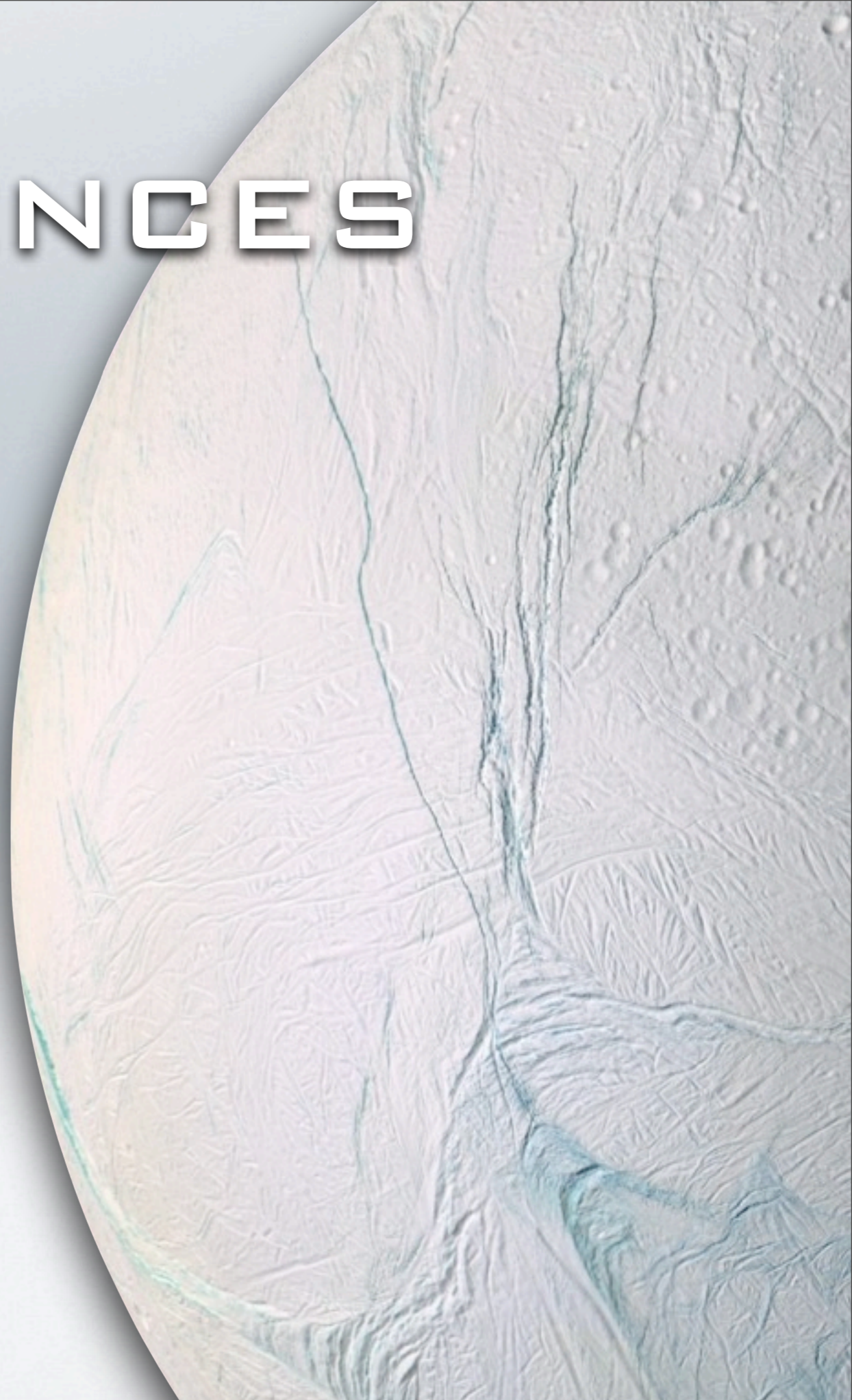
VTerrain.org



REFERENCES

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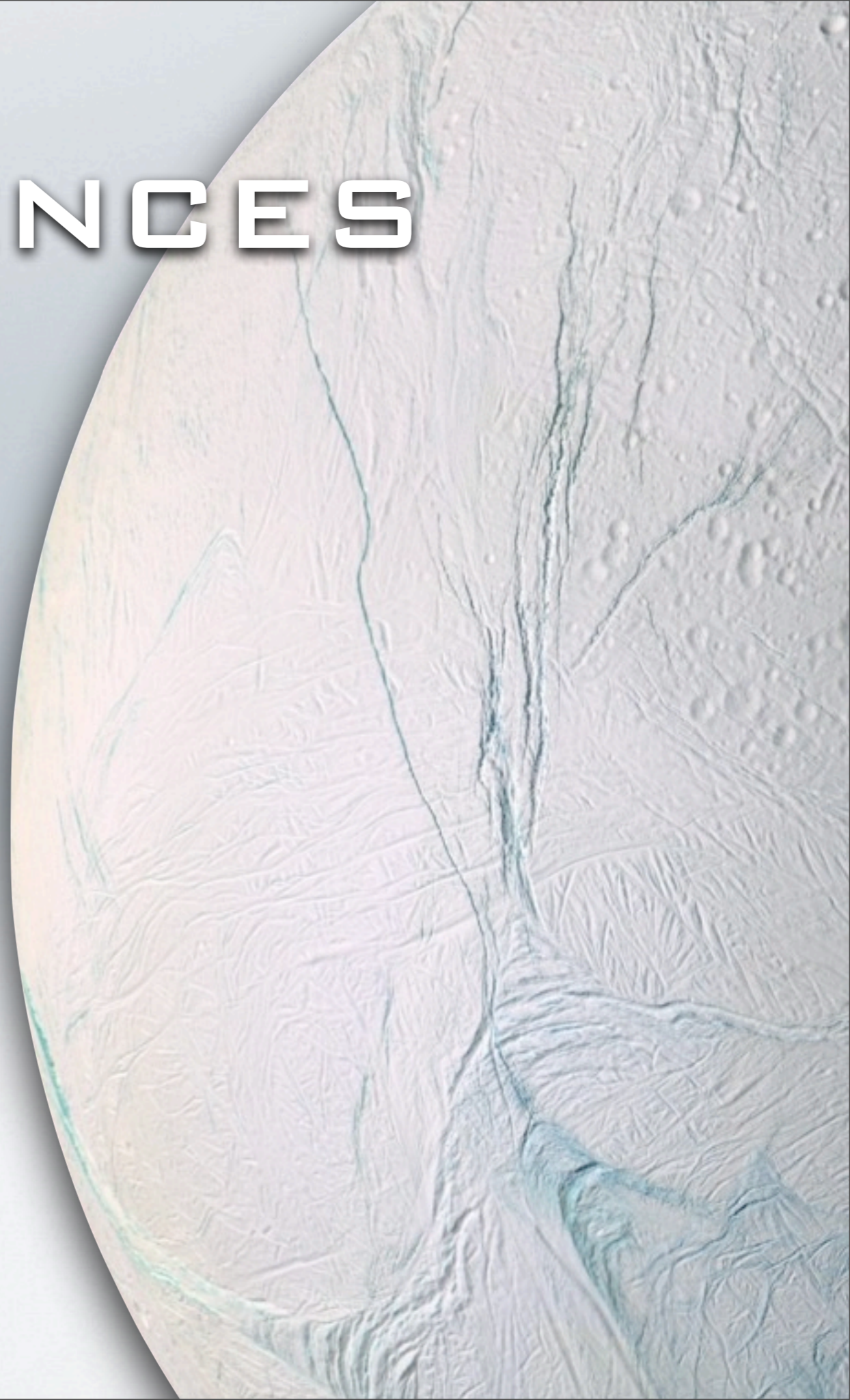


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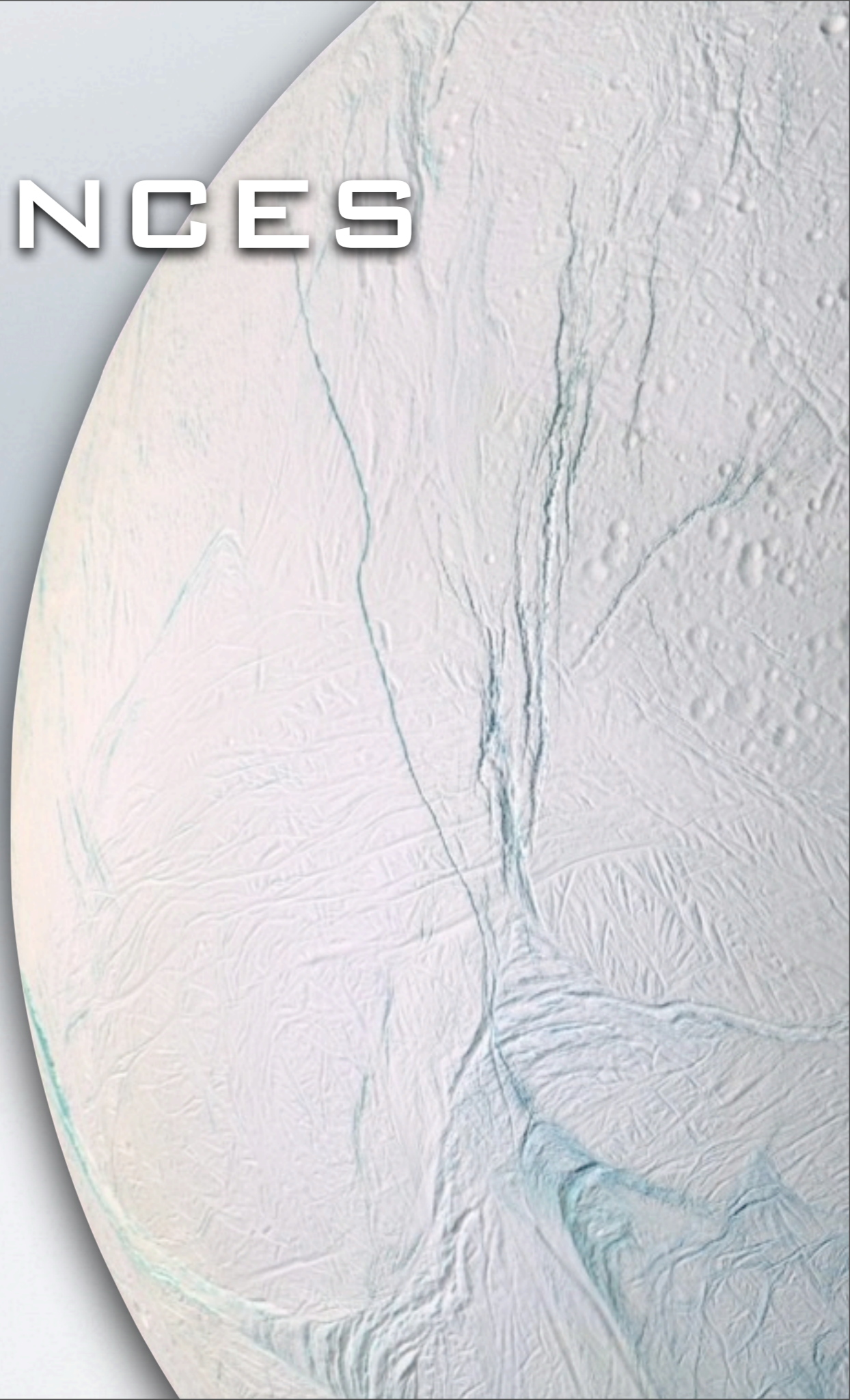
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Developer.NVidia.com



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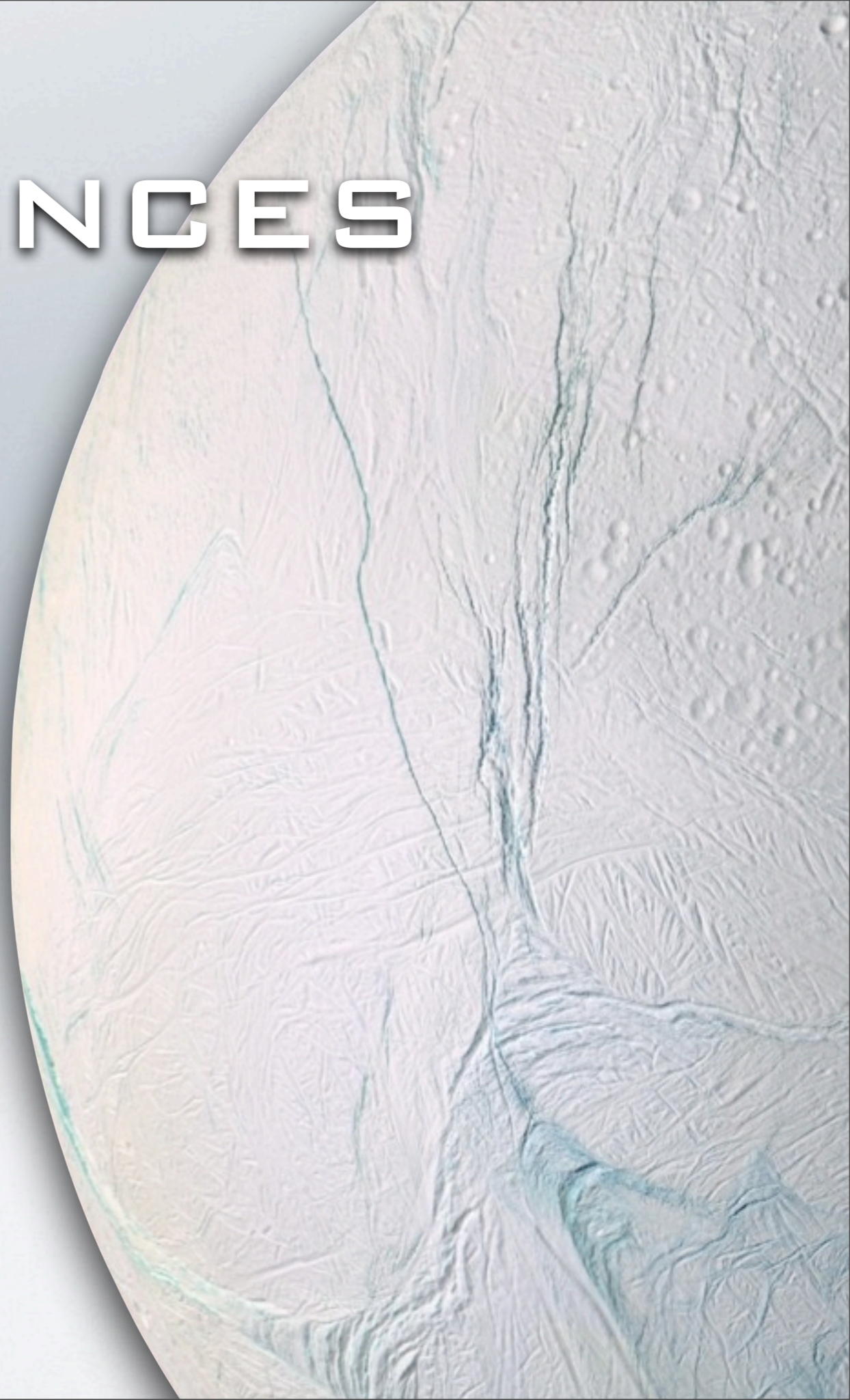
VTerrain.org

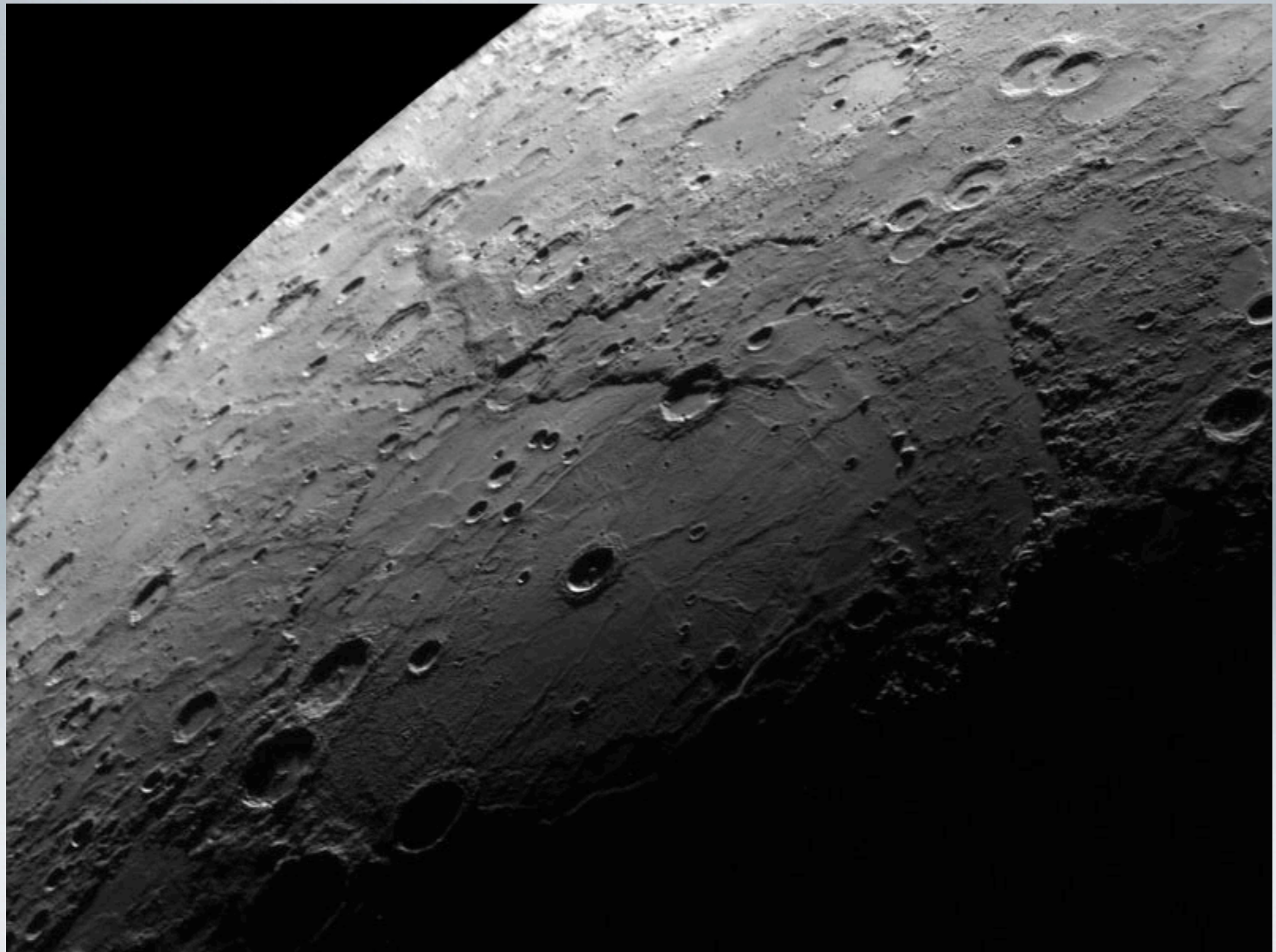
GameDev.net

Pouet.net

GPU Gems -
Developer.NVidia.com

Creating Spherical Worlds -
Maxis, Siggraph 07





DEMO

Rocky moon / Asteroid

DEV JOURNAL

acko.net