

CLOUDS AND RIMS

KUSTAA VUORI



Niko 2: Little Brother, Big Trouble

- Sequel for Niko And The Way To The Stars
- Budget of 7.3 million €
- Coproduction between Finland, Germany, Denmark, Ireland.
- About 1200 shots



Requirements for the clouds

- Fast rendering.
- Rendering happens in PrMan.
- Visualization in viewport for layout purposes.
- Recyclable cloud elements.
- Much bigger scale than in Niko1
- Voxel resolution had to be fairly high (high in our scale!).



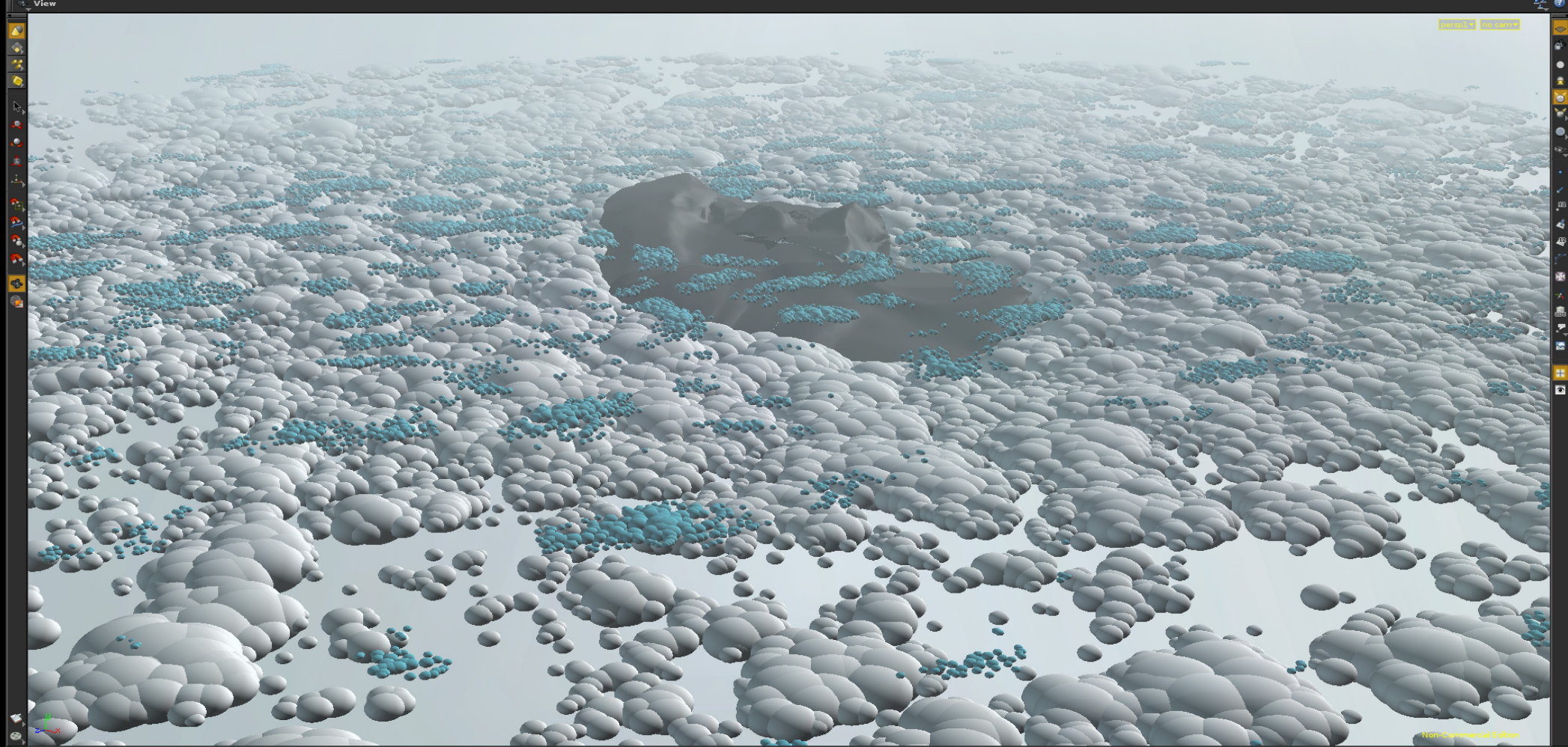
Modelling the clouds

- Part of the cloud elements were based on polygon models and others were procedurally generated.
- Volumetric displacement applied on top of base volumes to get billowing forms.
- Additional smear displacement was added on top to break up the initial forms.



Software menu bar with categories: Create, Modify, Model, Polygon, Deform, Texture, Character, Auto Rigs, Animation, Lights and Cameras, Create Particles, Drive Particles, Rigid Bodies, Particle Fluids, Fluid Containers, Populate Containers, Container Tools, Pyro FX, Cloth, Wires, Fur, Drive Simulation.

Scene View, Channel Editor, Render View, Composite View. Object name: obj.



Timeline and playback controls. Includes a timeline with markers at 24, 48, 72, 96, 120, 144, 168, 192, 216, and 240. Playback buttons for stop, play, and other functions.

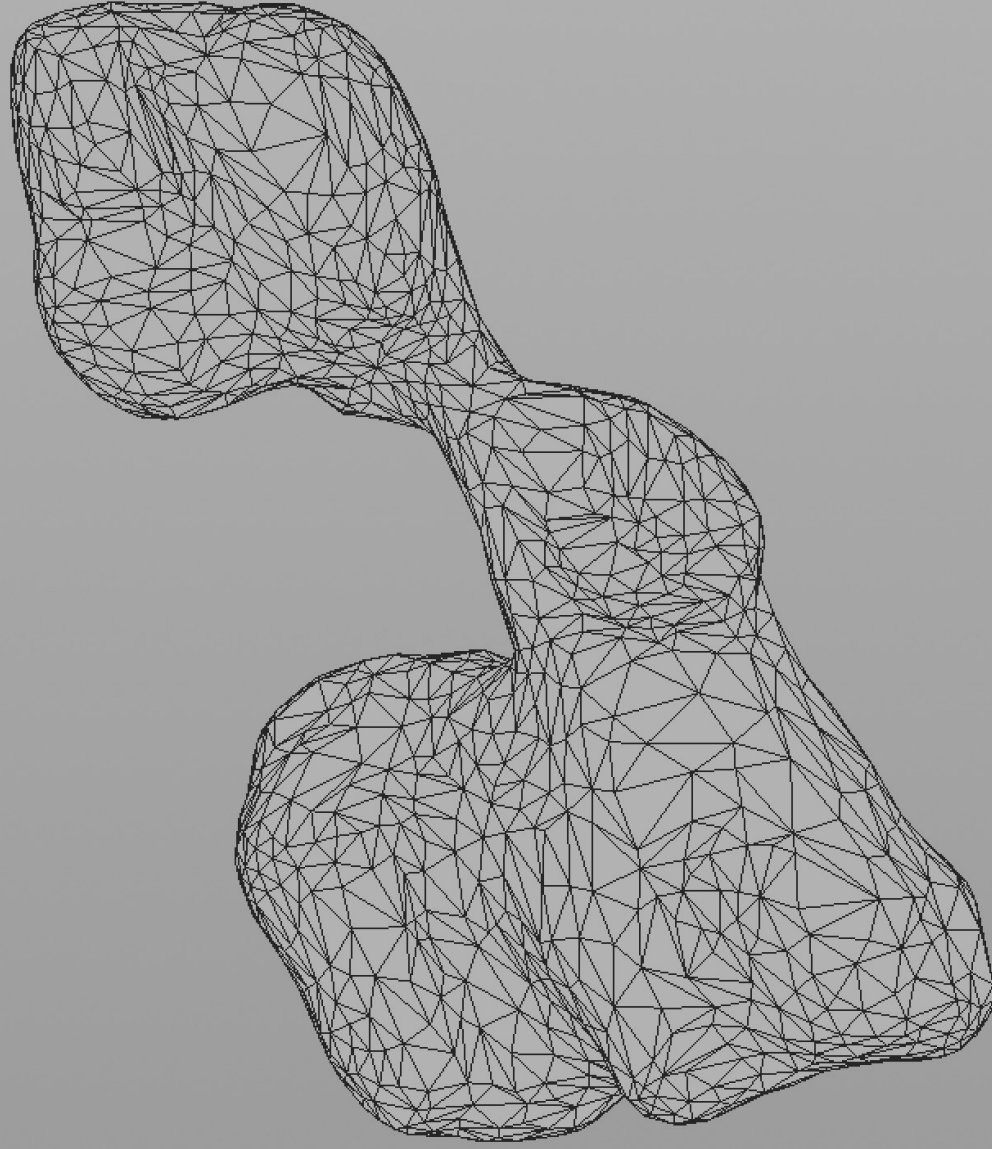
Non-Commercial Edition

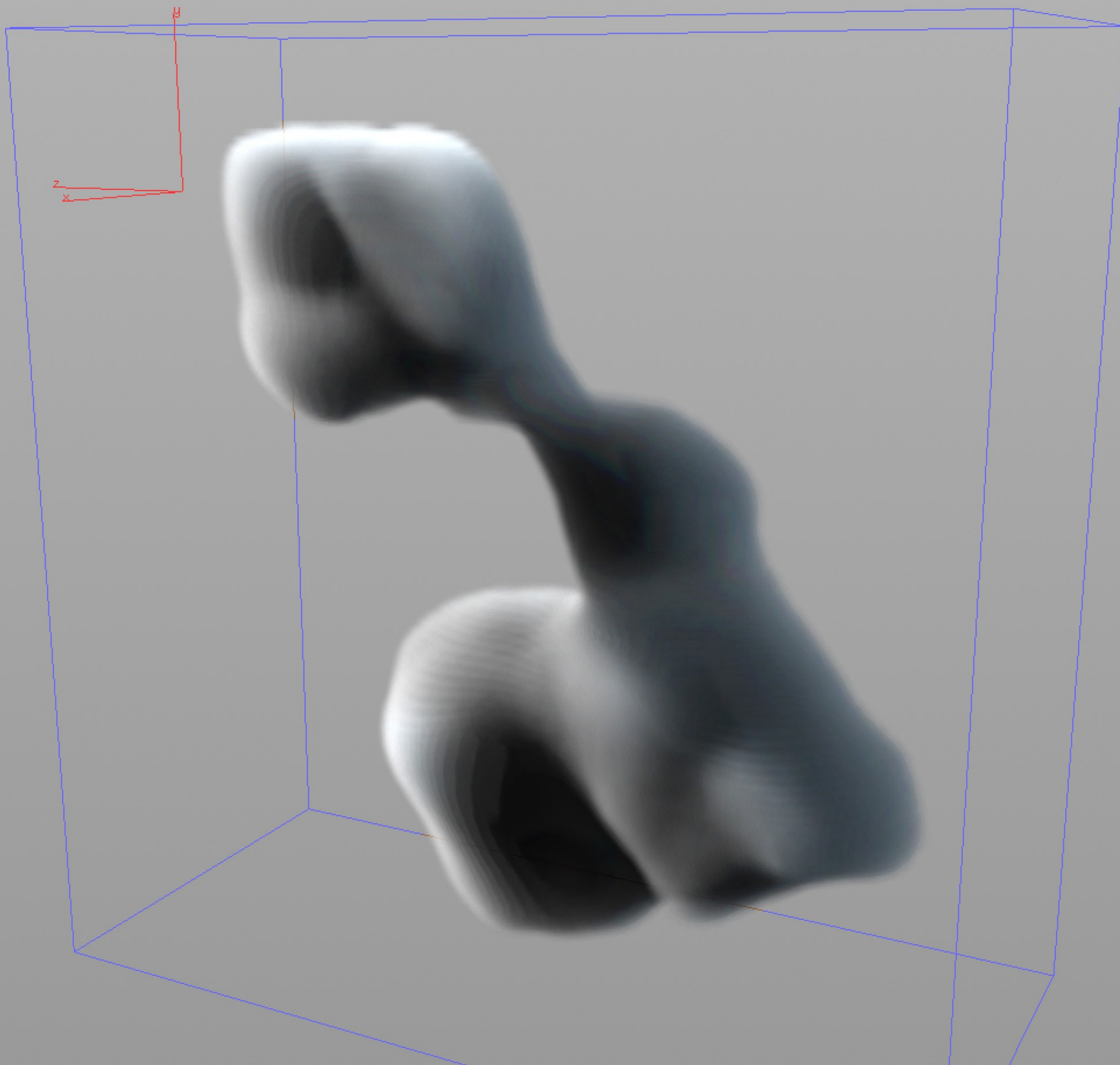
On Mouse Up

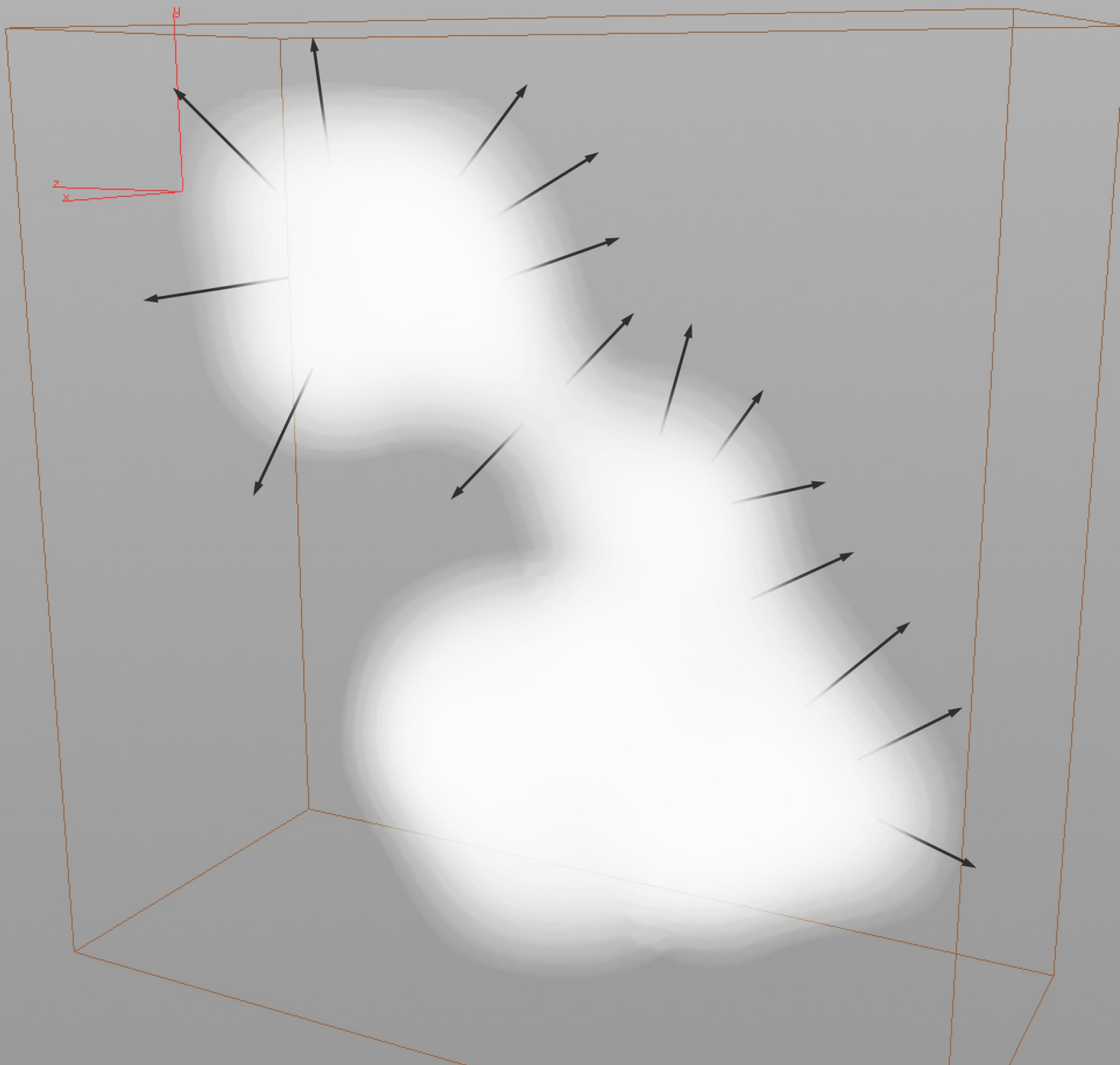
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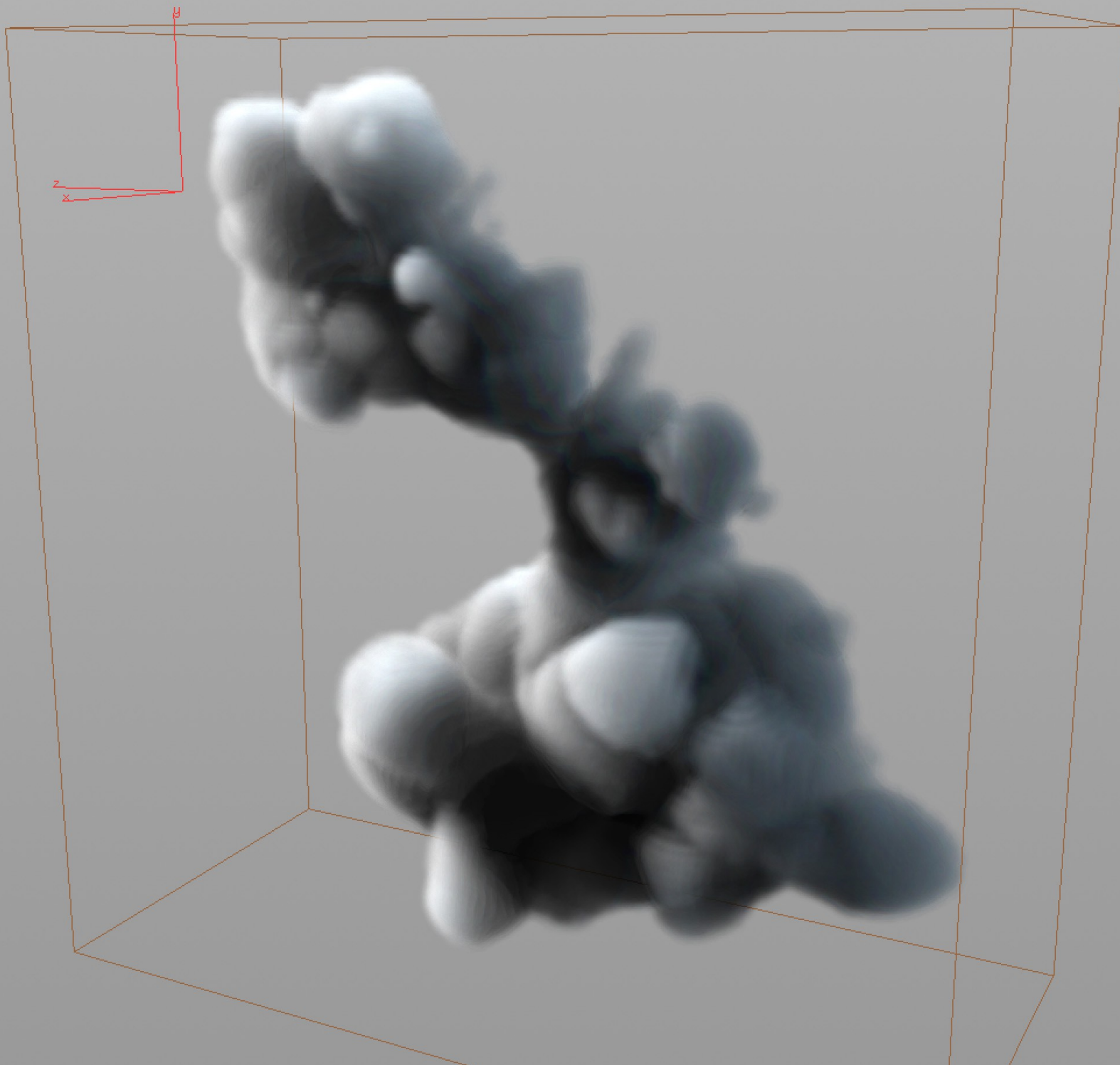
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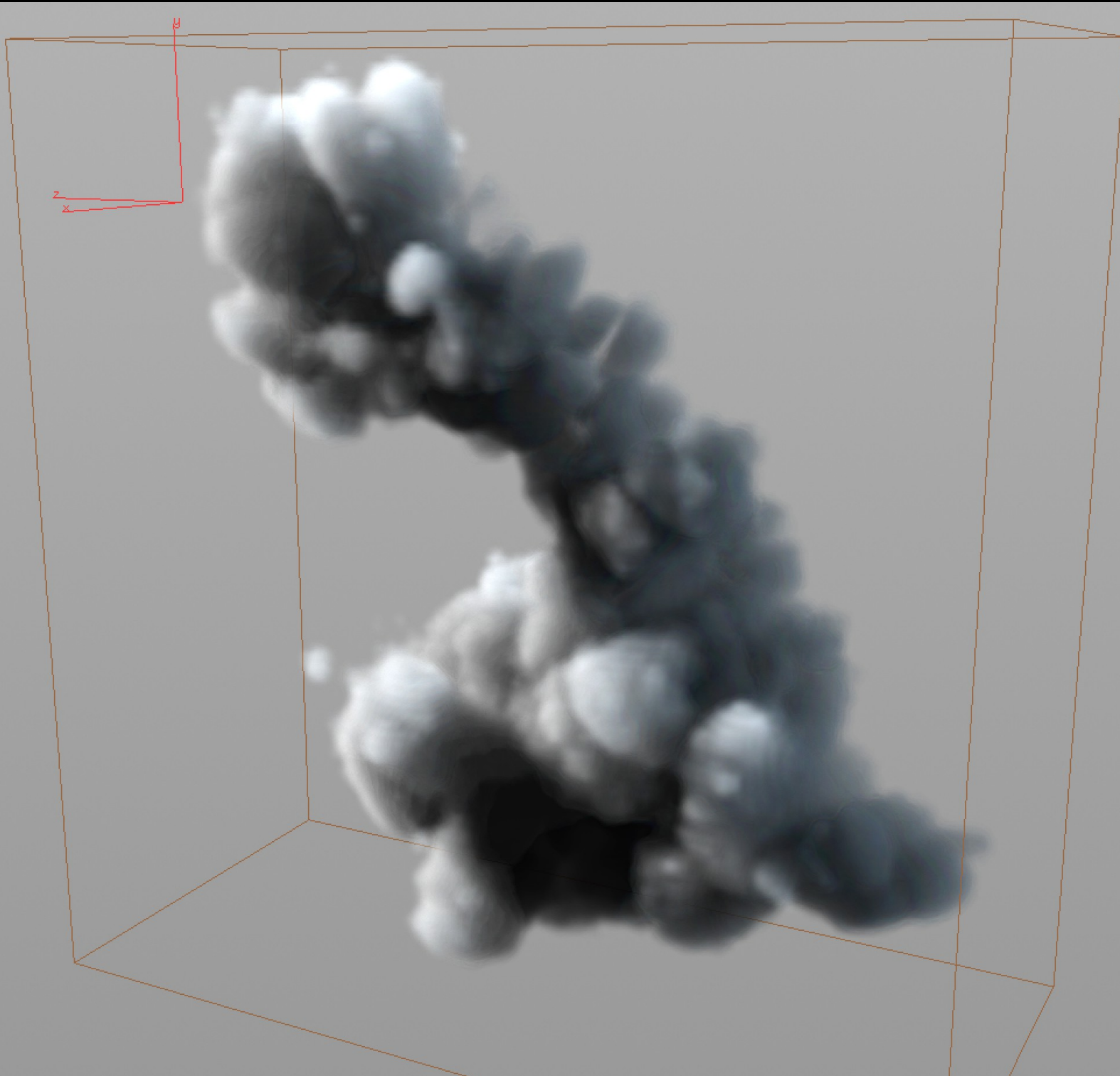


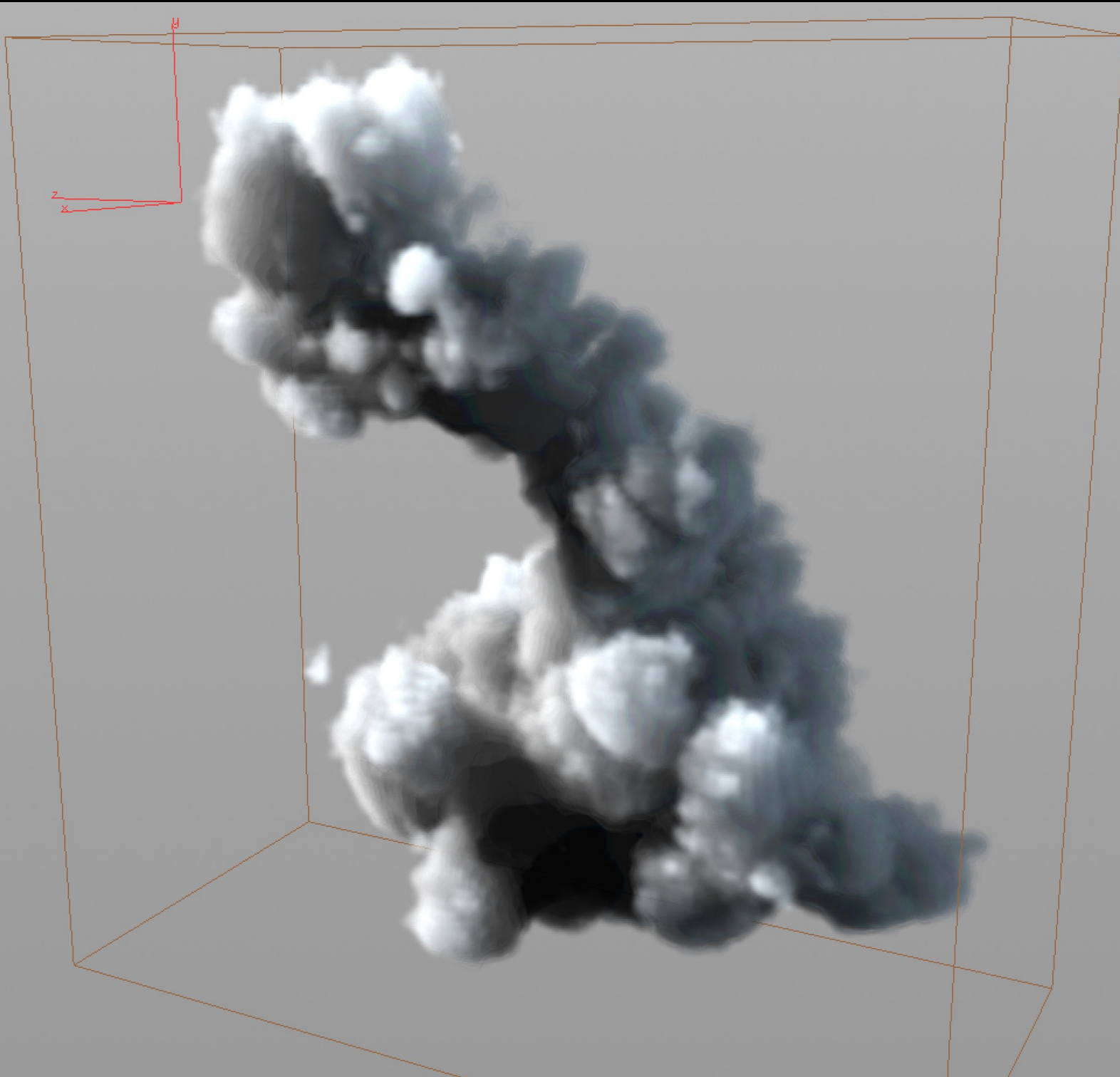








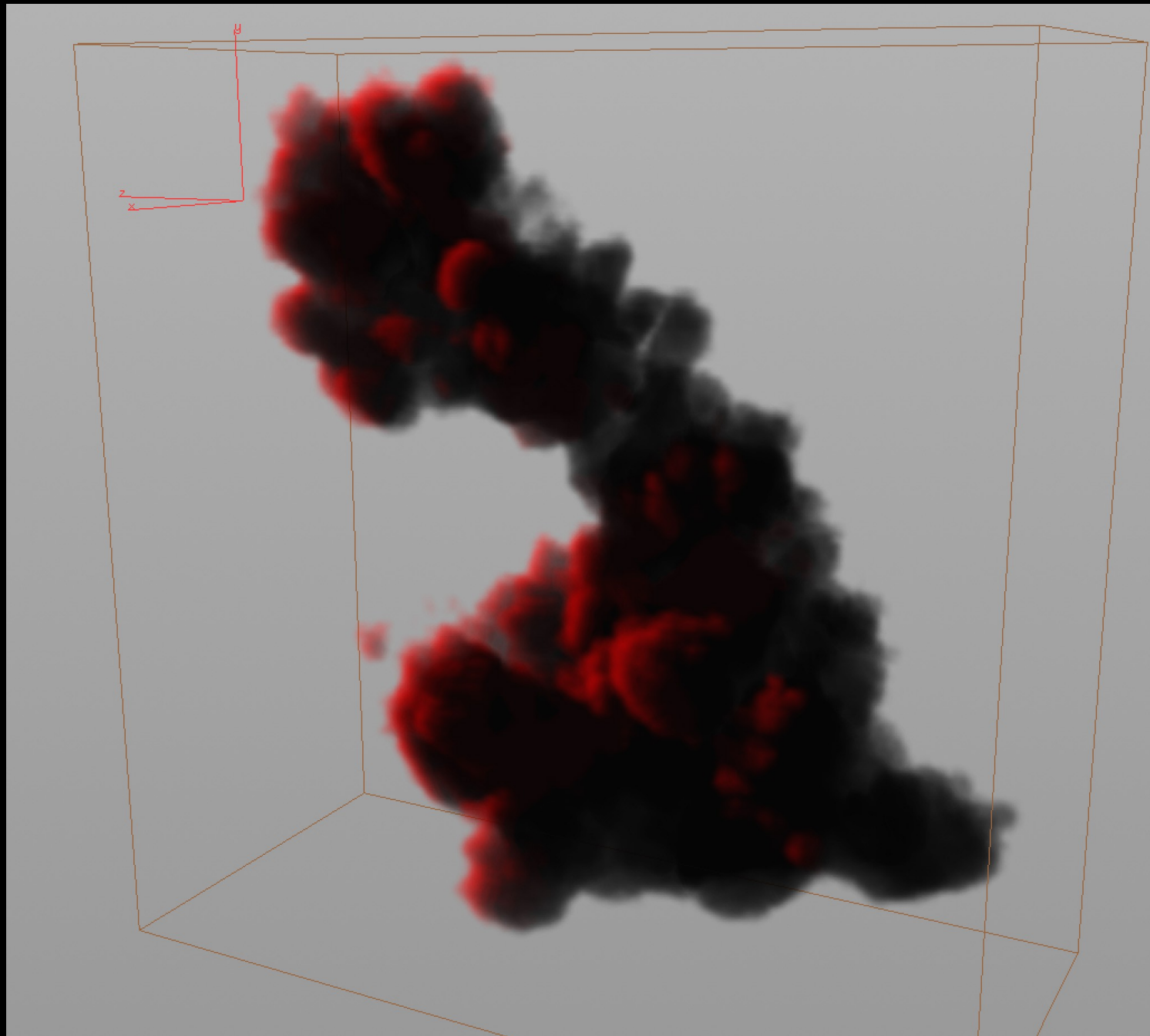




Lighting the clouds

- All lighting was baked in Houdini to voxels.
- One directional light and one environment light.
- Directional light was calculated with bakeVolumeSop.
- Cast shadows from set were added with volumeVop.
- Environment light was calculated from multiple point sources.

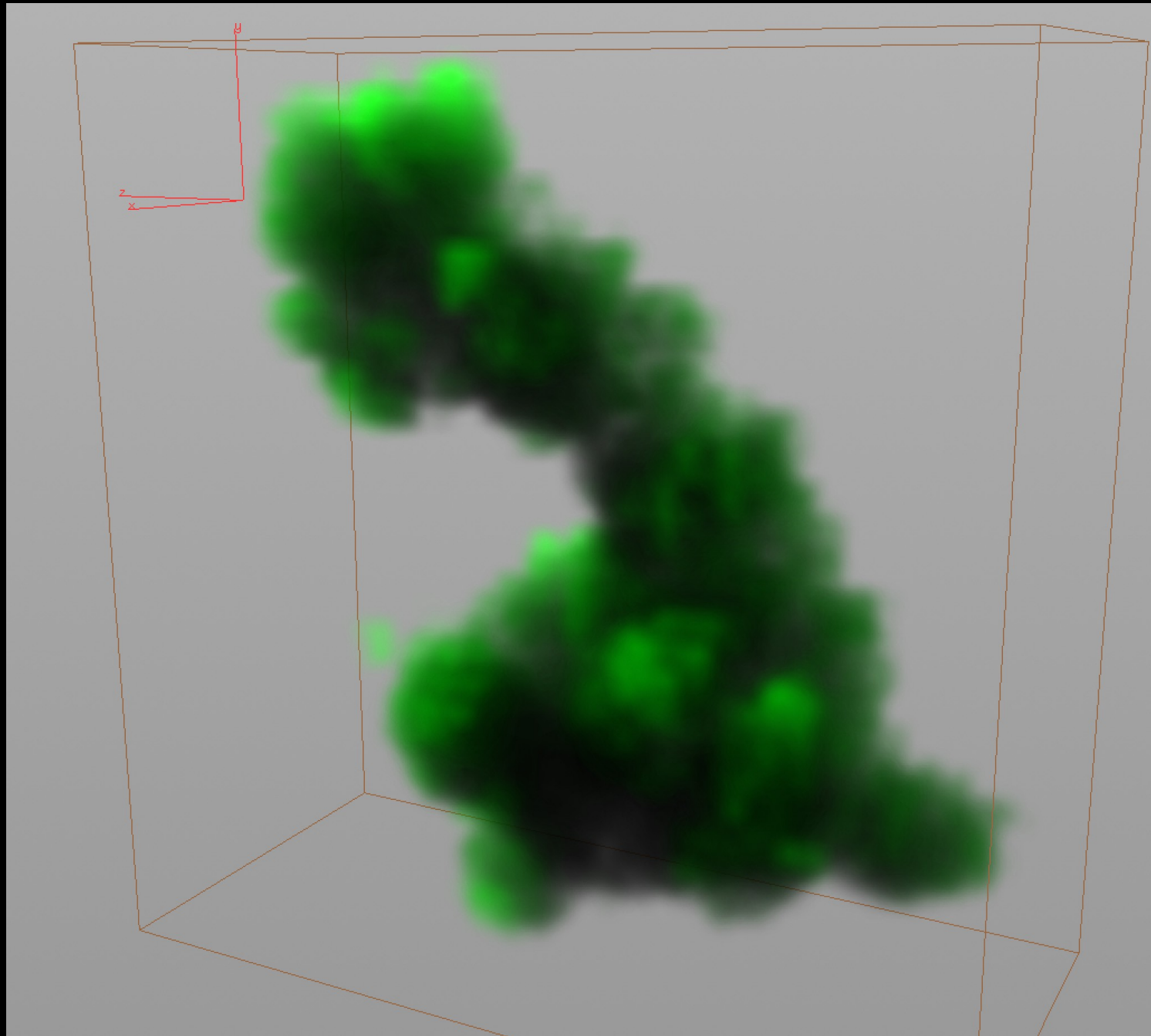


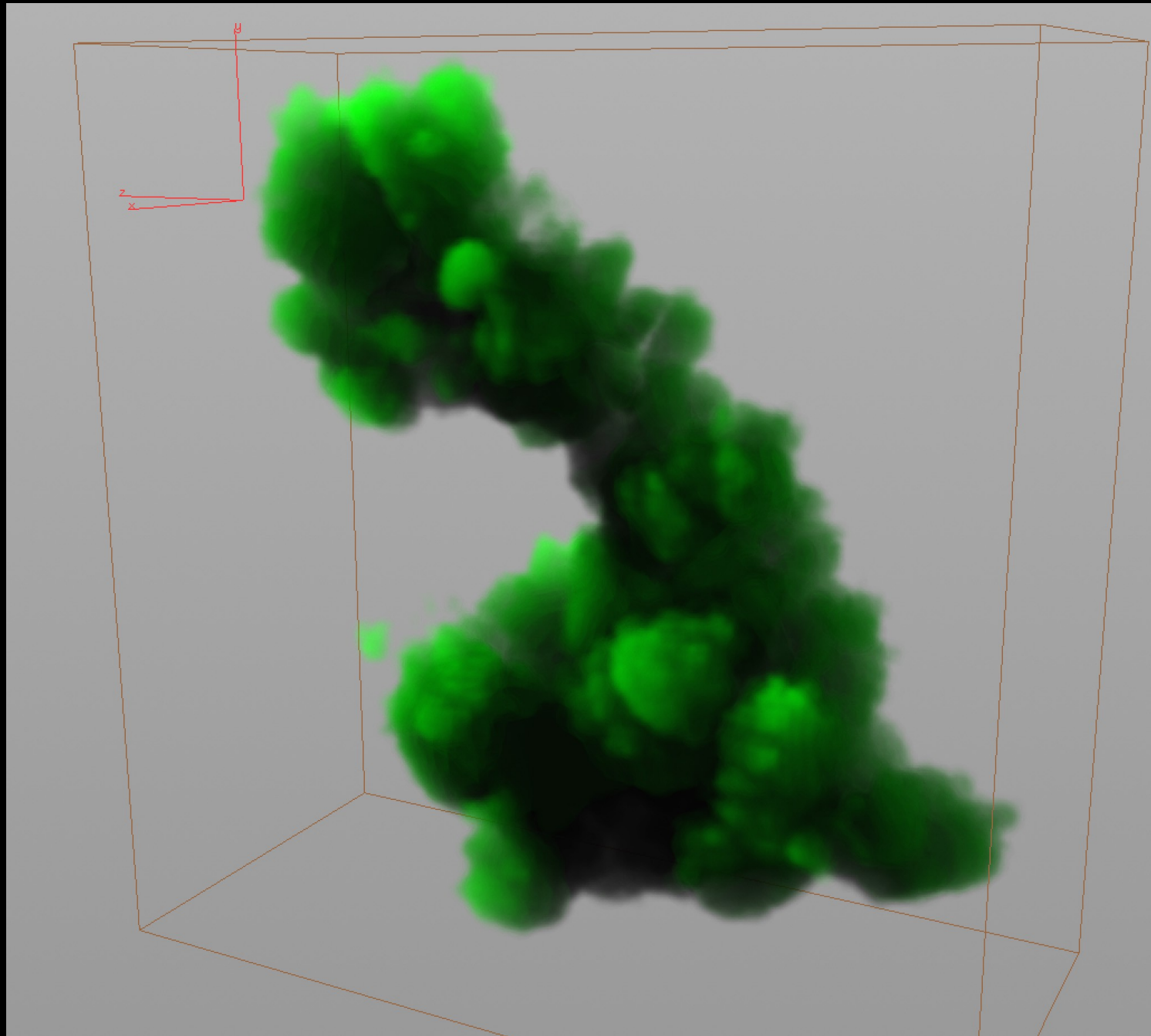


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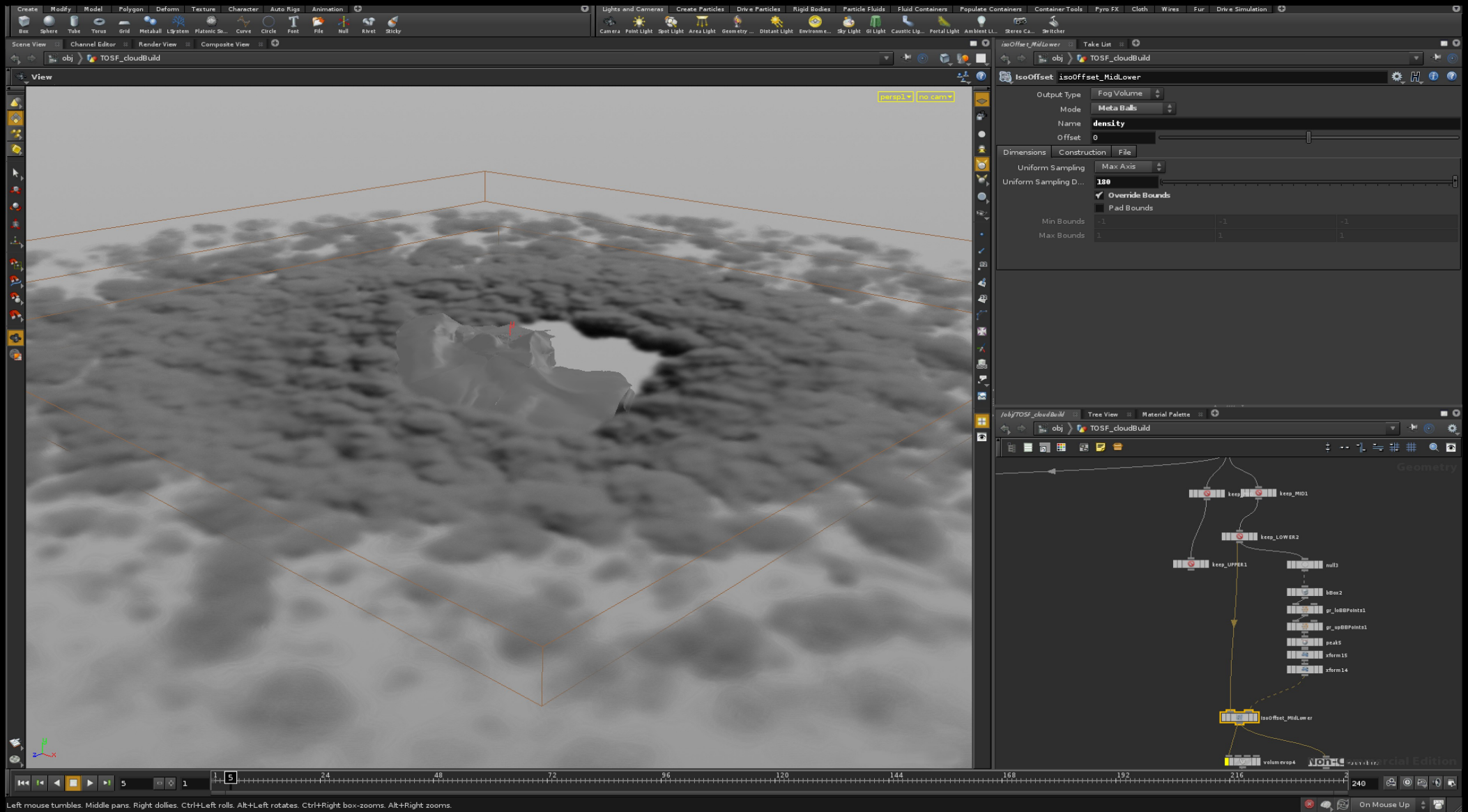




Matte clouds

- The furthest clouds were rendered to matte planes in houdini.
- Cloud volumes were split into depth layers
- Fast to build new lightbakes.



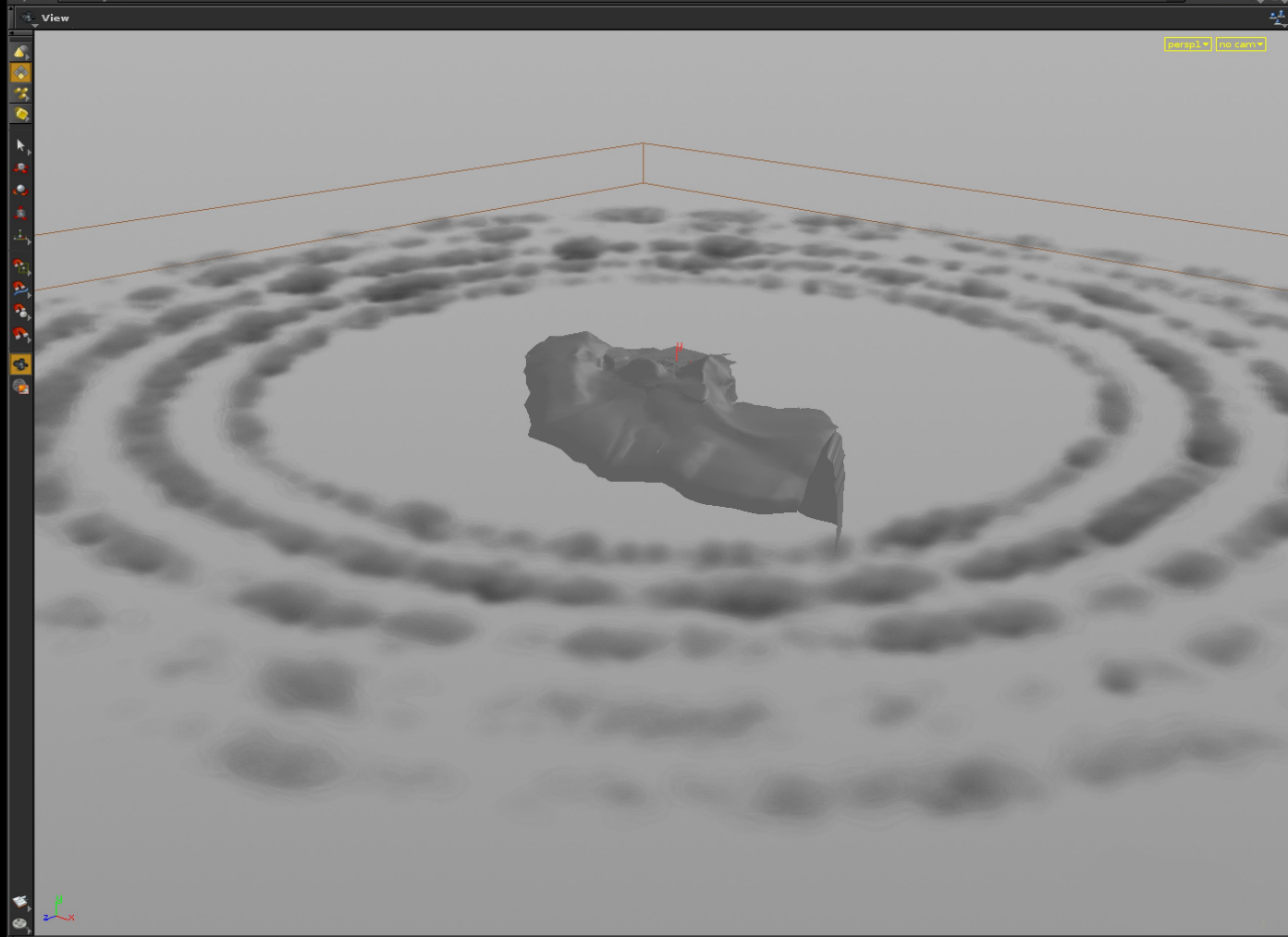


Left mouse tumbles. Middle pans. Right dollies. Ctrl+Left rolls. Alt+Left rotates. Ctrl+Right box-zooms. Alt+Right zooms.

Create Modify Model Polygon Deform Texture Character Auto Rigs Animation Lights and Cameras Create Particles Drive Particles Rigid Bodies Particle Fluids Fluid Containers Populate Containers Container Tools Pyro FX Cloth Wires Fur Drive Simulation

Box Sphere Tube Torus Grid Metaball LSystem Plateonic S... Curve Circle Font File Null Kinet Sticky Camera Point Light Spot Light Area Light Geometry... Distant Light Environment... Sky Light GI Light Caustic Lig... Portal Light Ambient Li... Stereo Ca... Switcher

Scene View Channel Editor Render View Composite View obj TOSF_cloudBuild



Volume VOP vol.Vop_densityFade4

Vex Setup Volume Bindings

Vex Source Myself

Shop Path

Script null

Re-load VEX Functions

Compiler vcc -r -q \$VOP_INCLUDEPATH -o \$VOP_OBJECTFILE -e \$VOP_ERRORFILE \$VOP_SOURCEFILE

Force Compile

maxDist 171.5

remap

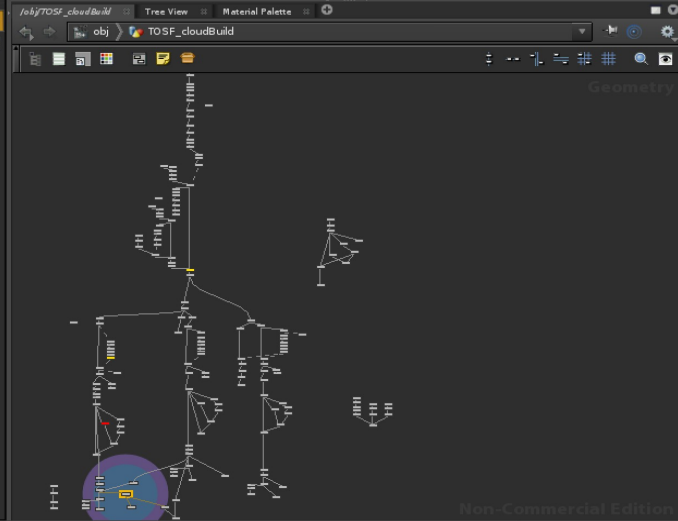
Point No. 16

Position 0.892727

Value 0

Interpolation Linear

Bind Each to Density



5 1 5 24 48 72 96 120 144 168 192 216 240

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On Mouse Up

Matte clouds

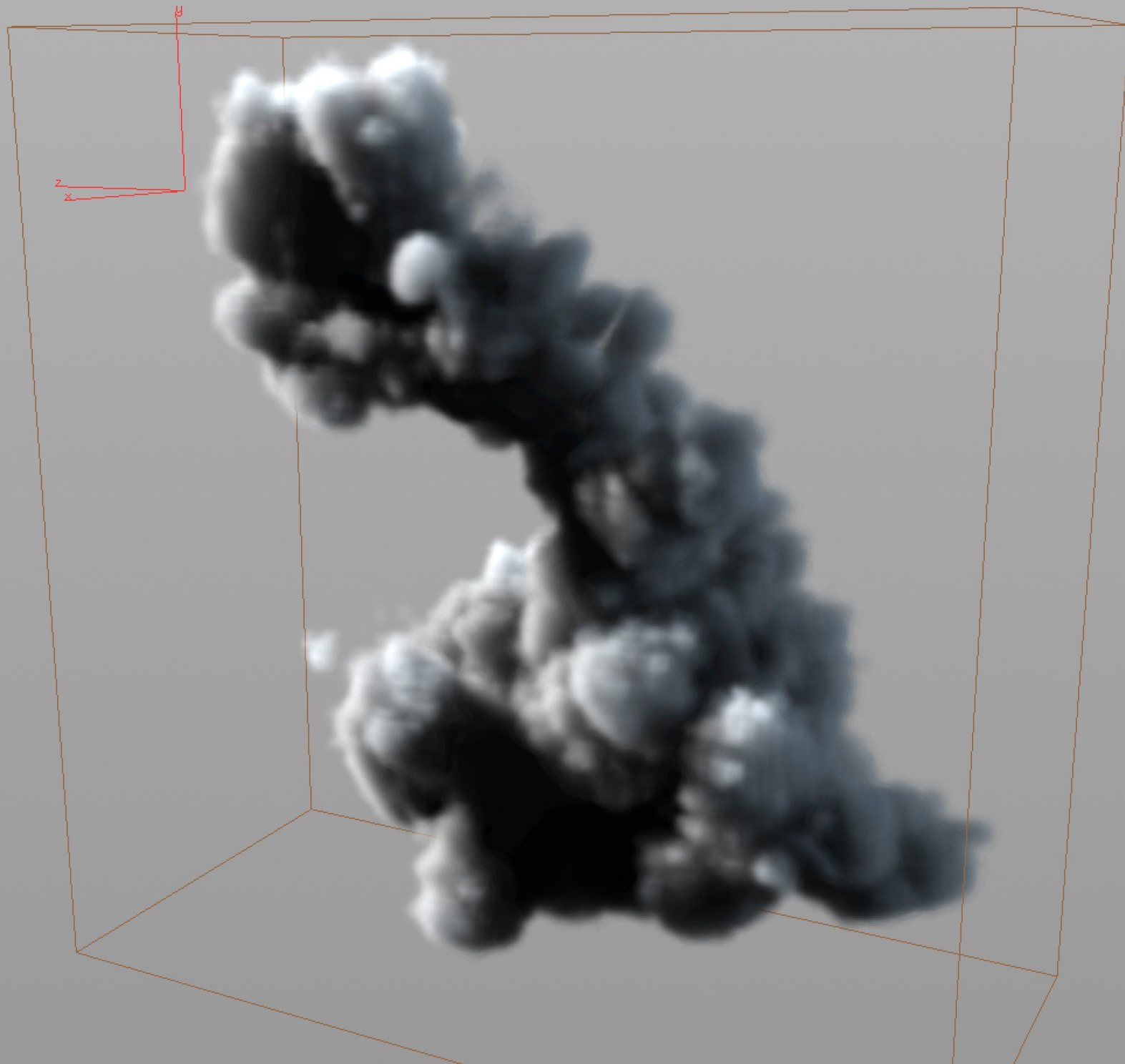
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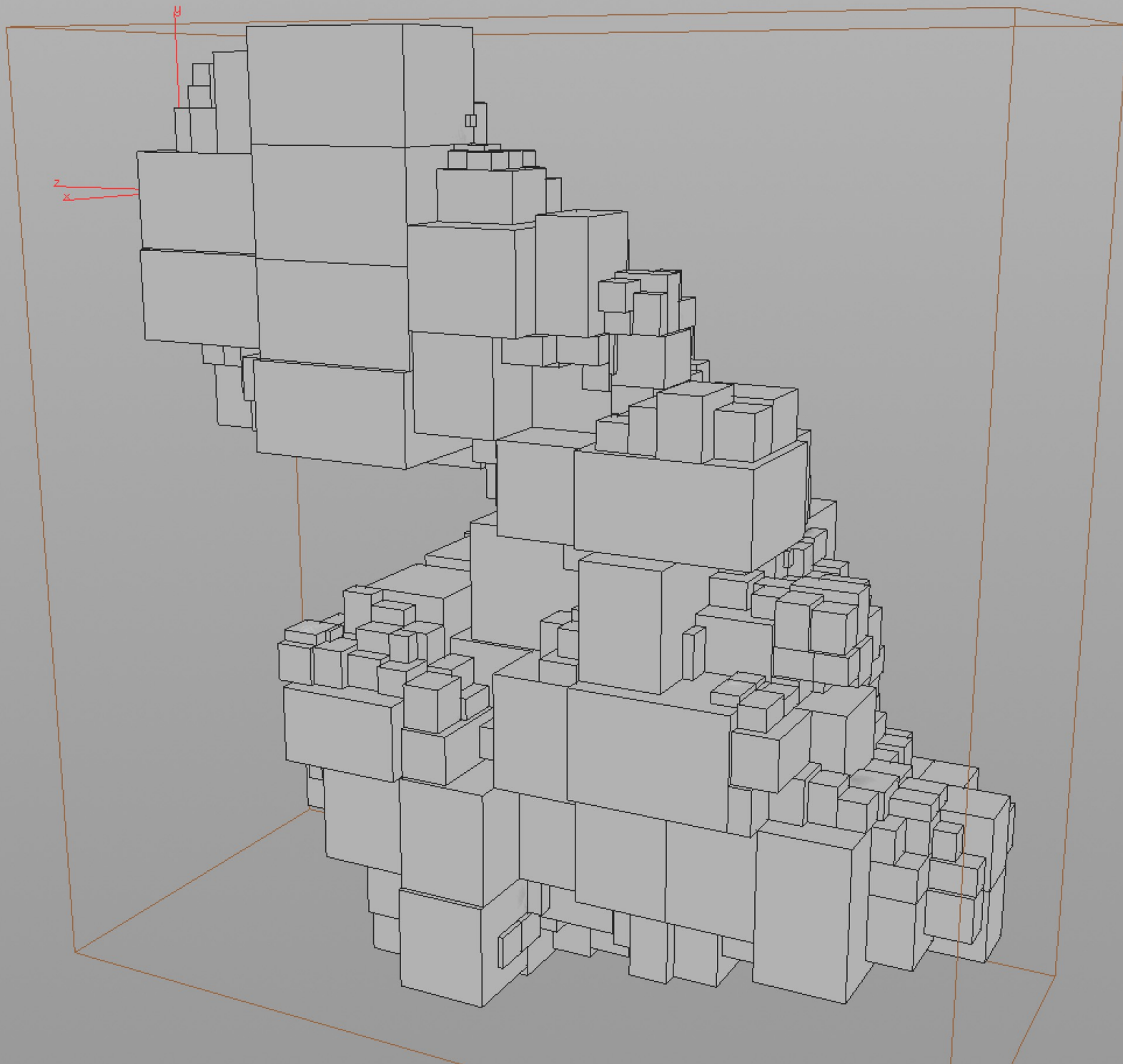


From Houdini to Maya & PrMan

- PythonSop took care of splitting big voxel grids into smaller grids and removing empty ones.
- same sop exported the voxels to prman RiVolume primitives.
- Proxy geo with lightbake vertexcolors was exported for layout.



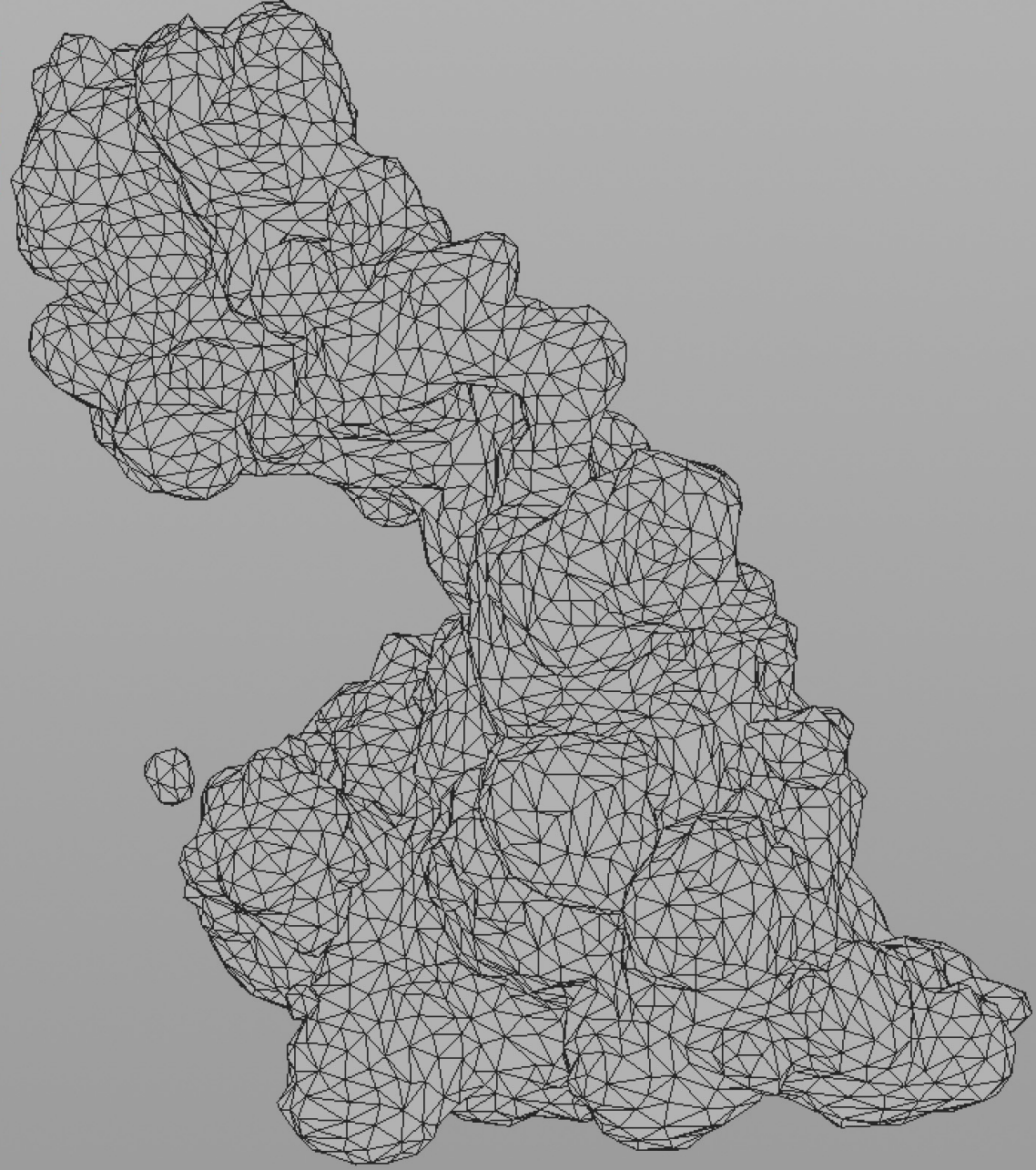


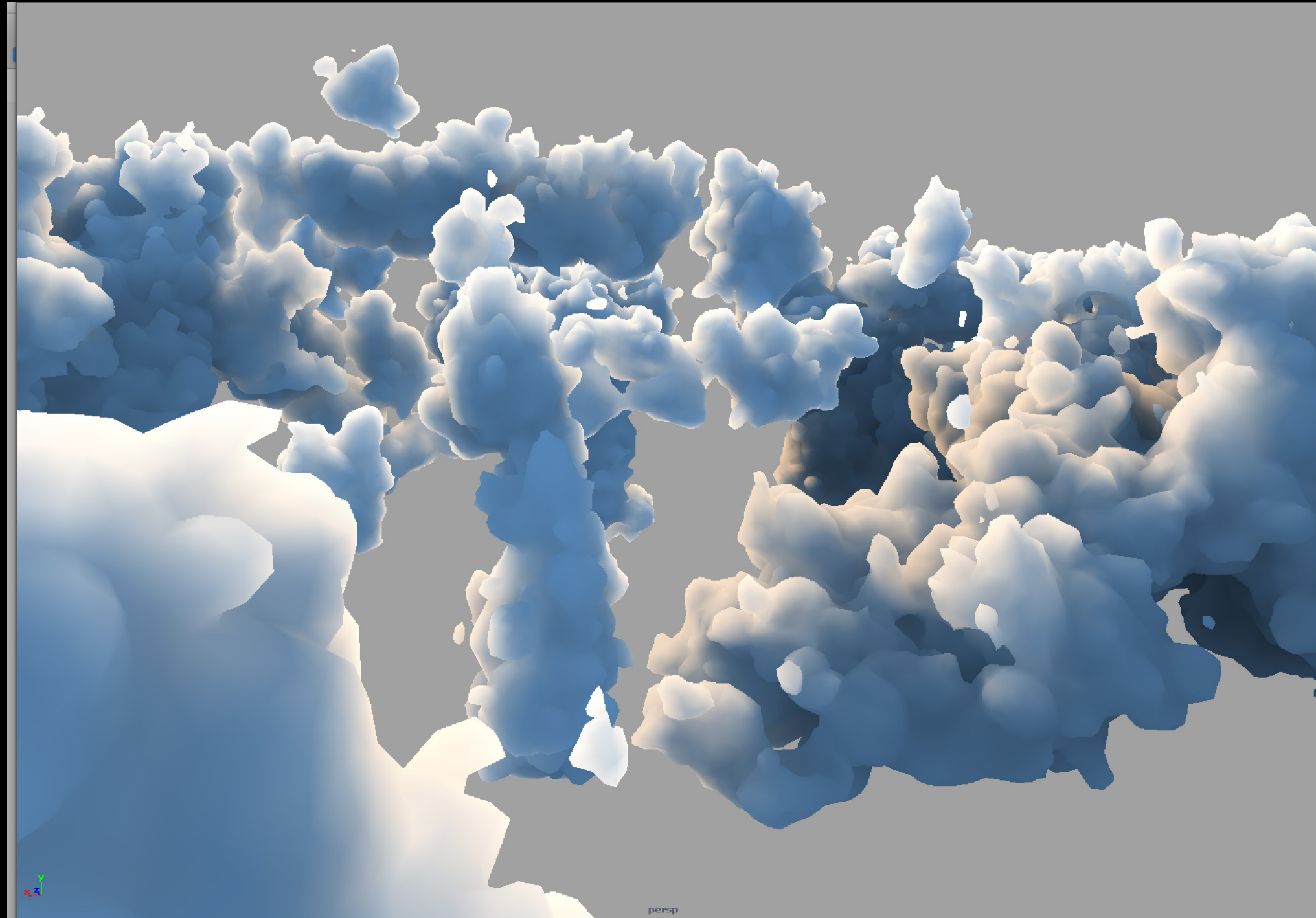


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Channel Box / Layer Editor

Channels Edit Object Show

Attribute Editor Channel Box / Layer Editor

Display Render Anim

Layers Options Help

1.00

1.00 1 24 24.00 48.00 No Anim Layer No Character Set

persp

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

1.00

1.00 1 24 24.00 48.00 No Anim Layer No Character Set

Rendering the clouds

- Each small voxel grid was rendered out as delayedReadArchive.
- Minimum calculations in rendering.
- Additional detail was added in shader.
- Memory challenges.





Building the mood

- Baked light was rendered out as separate channels.
 - R = keyLight
 - G = envLight
 - B = depthPass
- Recycling, different moods were built from same data in nuke.








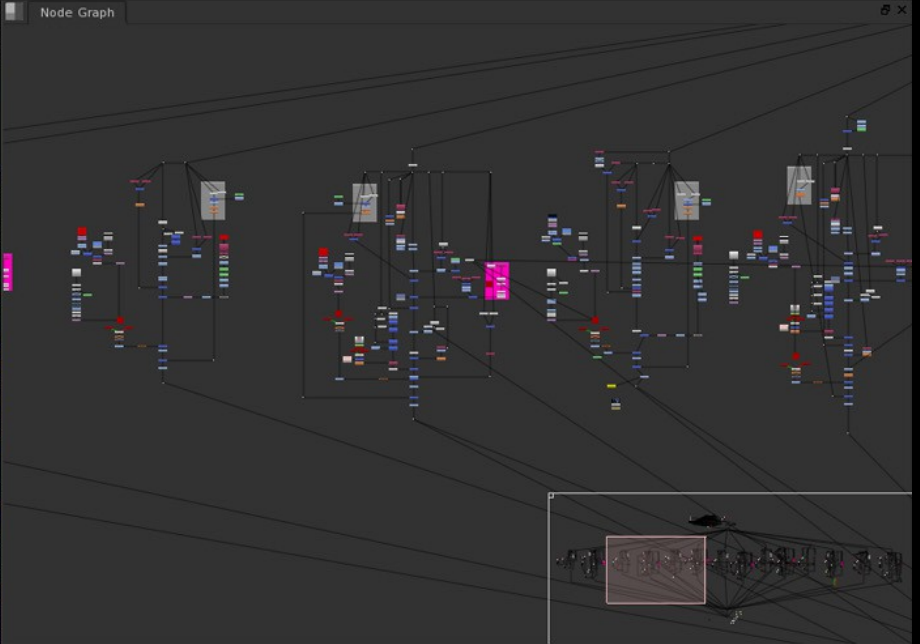
0900_01_012.nk [modified] - Nuke

File Edit Layout Viewer Render Cache Help RV

rgba rgba.alpha RGB A Scene4 B Scene4 +2 3D default sRGB IP



Node Graph



Properties

TransformGeo5

TransformGeo Look Node

display unchanged selectable

render unchanged

transform normals

transform order SRT

rotation order ZXY

translate x 0 y -650 z 0

rotate x 0 y 90 z 0

scale x 1 y 1 z 1

uniform scale 0.7

skew x 0 y 0 z 0

pivot x 0 y 0 z 0

Local matrix

Niko2_rend 1600x890 bbox: 0 0 1600 890 channels: rgba.cloud.red.cloud.gree x=1214 y= 676 0.00000 0.00000 0.00000 0.00000 H: 0 S:0.00 V:0.00 L: 0.00000

1326 fps 24

Custom 1305 1245 1250 1300 1350 1400 1415









Backlighting



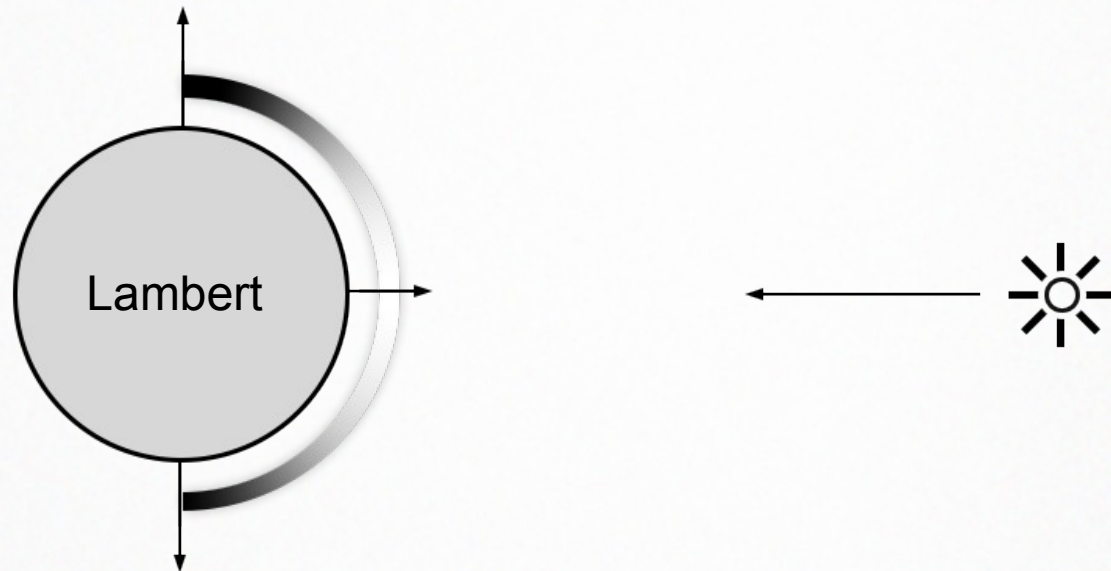
Backlighting hardsurfaces

- Backlighting was essential visual tool in our film and shaders needed to support that.
- On characters fur and feather gave nice backlight and hard surfaces had to match that visually.
- We wanted to improve our snow shading from Niko1.



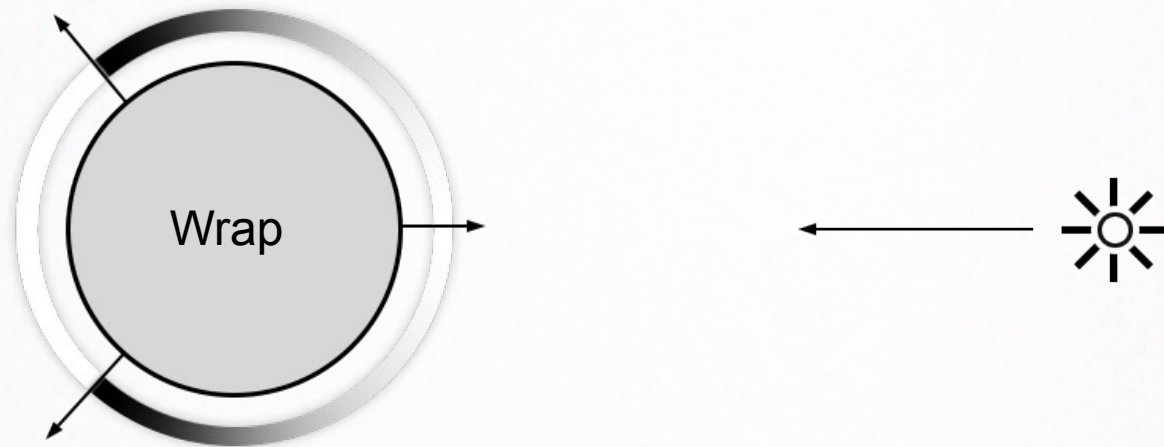
Wrap light

- Light response is wrapped behind the terminator.
- Problem with shadows.



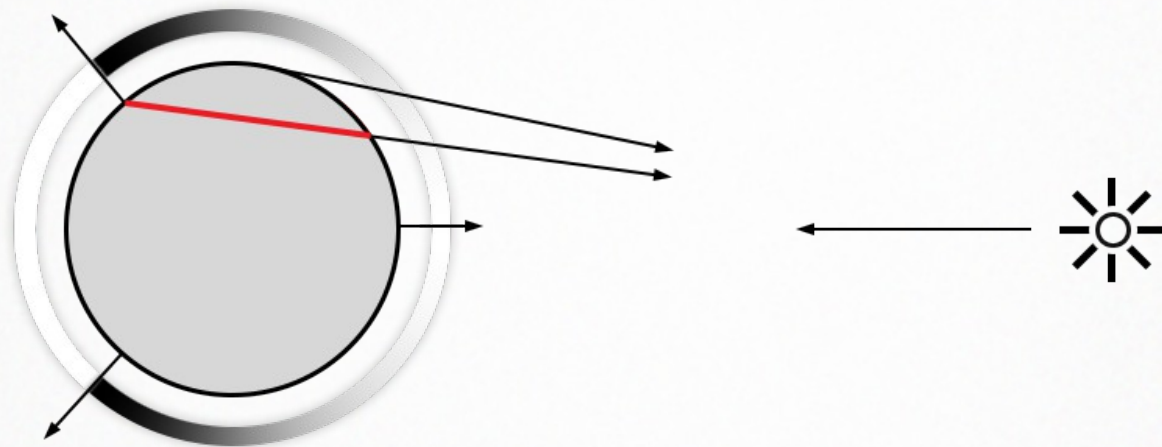
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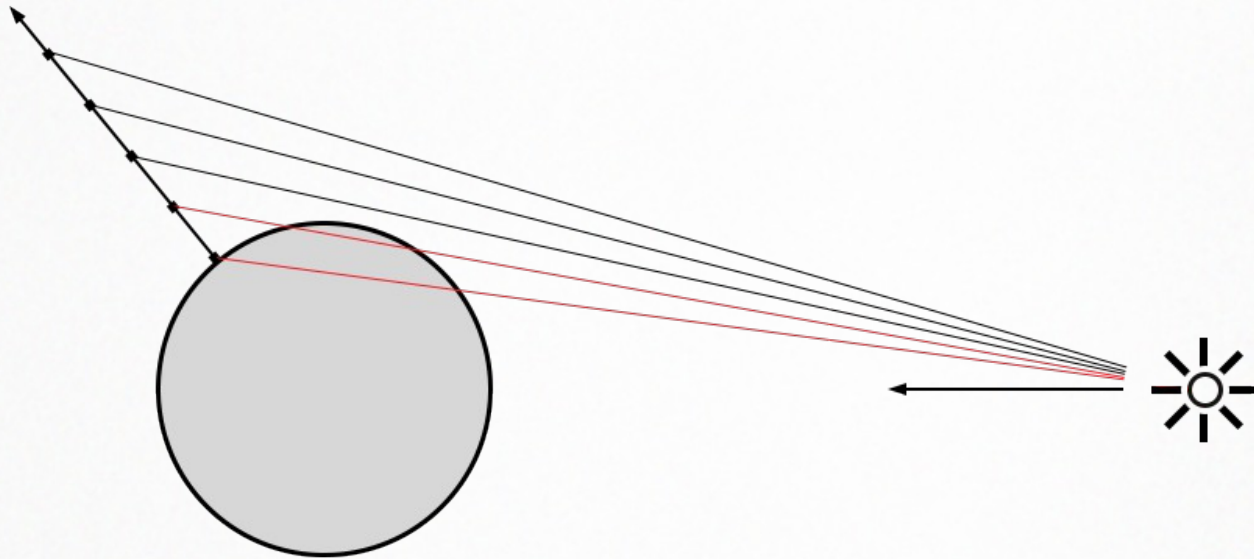
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Shadow sampling offset

- Instead of sampling shadow from one shading point we sample along the surface normal.







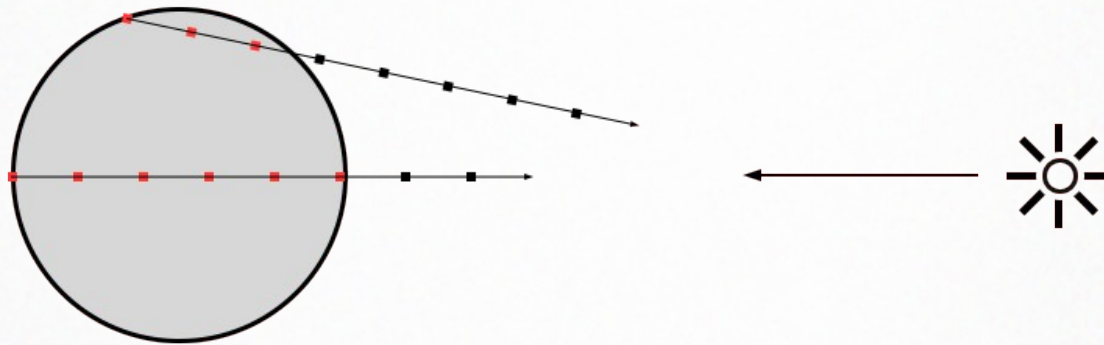
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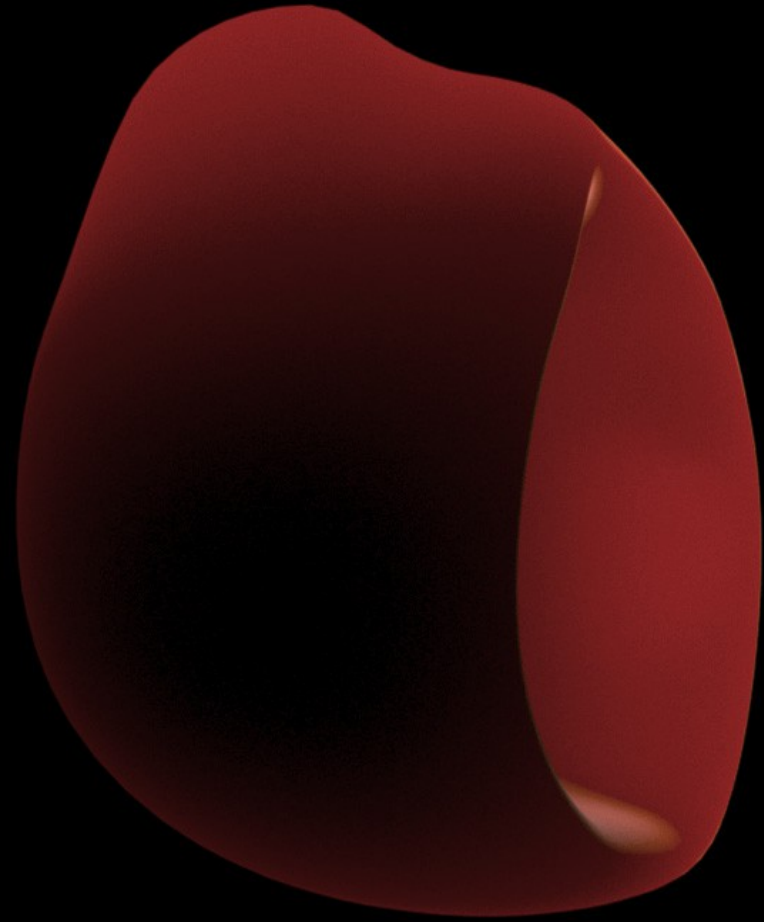
- Offset was done in lightShader.
- Offset settings are defined in surfaceShader and passed to lightShader.
- Materials can have unique sampling offsets and this can also be texture mapped.



Scattering with sampling offset

- Same technique used on different purpose.
- "Single scatter"
- Sampling along lightVector.
- Important to jitter along the offset vector.







Hit on rendertime?



Thanks!



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