

StormSystemHDABeta1.0 工具使用手册

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1. 产品介绍

Storm System 是业界首款基于气象学云动力模拟的云层制作工具，提供了层云、淡积云、浓积云、层积云、积雨云等多种云属的流体动力学效果的GPU实时仿真解决方案。Storm System 支持模拟真实的云翻滚、生成和消失的动力学效果，同时提供风场、碰撞物绕流功能。Storm Sytem通过发射器在一定海拔水平面发射不同空间分布的水蒸汽，在地面暖空气的带动下上升，同时在一定海拔转化为云。

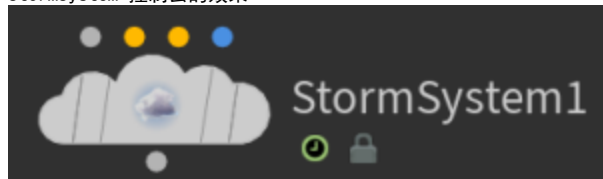
2. 节点及参数介绍

StormSystem工具主要分为两个节点：

AxField_Source 控制云生成区域及初始状态



StormSystem 控制云的效果



AxField_Source主要分为三个板块：范围，noise，发射

范围：控制发射器大小位置



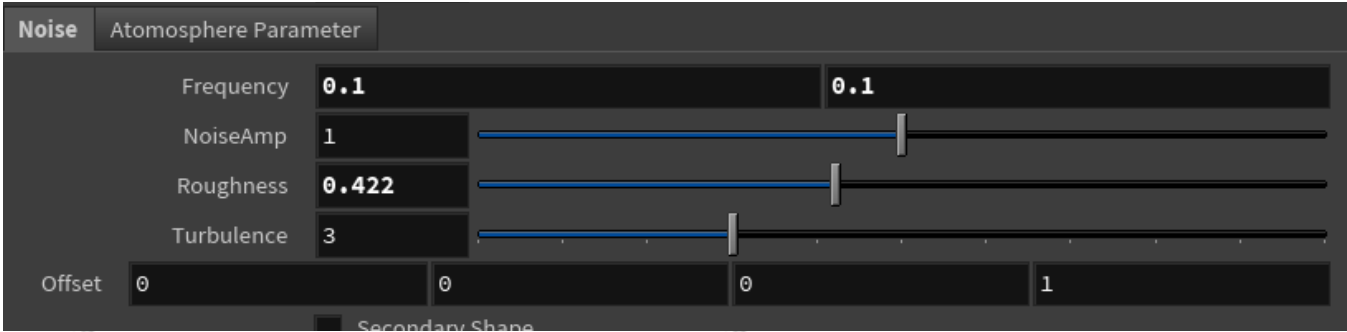
ProjectToTerrain 勾选后发射器会投射到高度场上，默认关闭

Center 调整发射器位置

Size 调整发射器XZ方向范围

Thickness 调整发射器Y方向厚度

Noise: 控制云发射的形状



Frequency 控制Noise大小

NoiseAmp 控制对比度

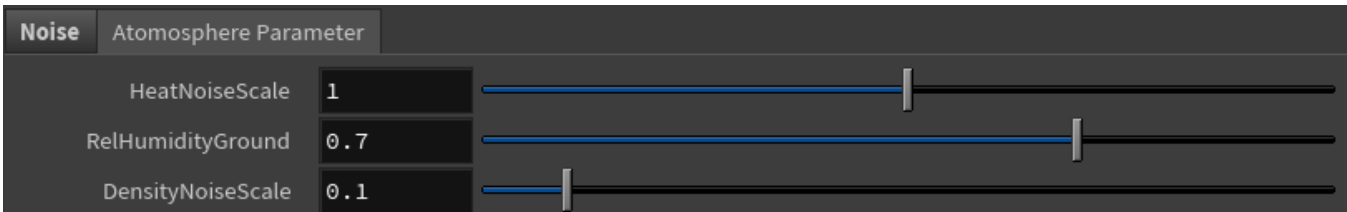
Roughness 控制粗糙度

Turbulence 控制noise迭代次数（细节）

Offset 控制noise的偏移

Secondary Shape 控制noise的剔除

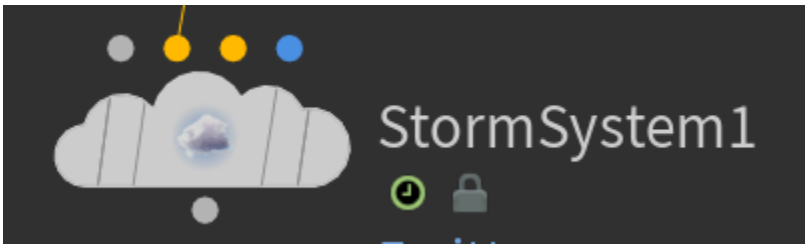
发射(Atomosphere Parameter)：控制云的生成参数



HeatNoiseScale 控制云高度

RelHumidityGround 控制云底高度

StormSystem主要分为5块：运算，范围，云调节，风场，显示，调用



接口1：暂未开放

接口2：发射器接口

接口3：暂未开放

接口4：输入高度场碰撞Geometry

运算

Export Asset

Run Simulation

Export Scene

SimulationRange

1

500

FileName

StormAtomsphere.v001.\$F4.vdb

SolverWorkspace

\$HIP/a137District/StormSys/\$HIPNAME/\$OS/

Export Asset 导出高度场（高度场变化后需要重新导出）

Run Simulation 开始计算生成云

SimulationRange 计算帧数（默认底部时间滑块）

FileName 导出云VDB的名称

SolverWorkspace 高度场和解算结果导出路径

范围 (Simulation)

Simulation

Atomosphere Parameter

Wind

Visualization

Advance

VoxelSize

0.5

Pivot

0

0

0

Size

100

10

100

Rotate

0

0

0

FPS

24

VoxelSize 控制云精度（精度为Size/VoxelSize，如上图云精度就是200*20*200）

Pivot 云计算区域位移

Size 云计算区域大小

Rotate 云计算区域旋转

FPS 计算帧率（类似于高速摄影）

云调节 (Atomosphere Parameter)

Simulation

Atomosphere Parameter

Wind

Visualization

Advance

HeatEmitterAmp

1.5

AuthenticDomainHeight

5000

BuoyancyScale

10

Cloud Height Offset

0

HeatEmitterAmp 控制云整体发射的高度

AuthenticDomainHeight 云结算范围高度

BuoyancyScale 控制云翻滚速度

Cloud Height Offset 控制云上下偏移

风场 (Wind)

Wind Speed 1

Wind Intensity 0.5

Wind Direction 0

Wind Speed 风速度

Wind Intensity 风强度 (达到风速度所需要的快慢程度)

Wind Direction 风方向

显示 (Visualization)

The screenshot displays the Houdini interface with the **Simulation** tab selected. The interface is organized into several sections:

- Simulation Tab:** Contains tabs for **Atomosphere Parameter**, **Wind**, **Visualization**, and **Advance**.
- Parameters:**
 - ShowVoxelGrid:** A checkbox that is currently unchecked.
 - Minimum:** A slider set to 0.
 - Maximum:** A slider set to 0.001.
 - Density Scale:** A slider set to 1.
 - Shadow Scale:** A slider set to 0.5.
 - Shadow Color:** A color picker set to white, with three additional color swatches (red, green, blue) each set to 1.
- Smoke Section:**
 - Density Field:** A dropdown menu set to **mRCloudField**.
 - Density Ramp:** A ramp editor showing a gradient from black to white. It includes a **Diffuse Range** parameter set to 0 to 1.
 - Diffuse Ramp:** A ramp editor showing a gradient from black to white.
- AlphaCore Bridge:** A checkbox labeled **Use AlphaCore Bridge** is checked. Below it, the **AlphaCore.exe** path is set to **\$A137/AlphaCore.exe**.

Maximum 默认0.001

其它可参照houdini volumevisualization节点

Advance

Simulation

Atomosphere Parameter

Wind

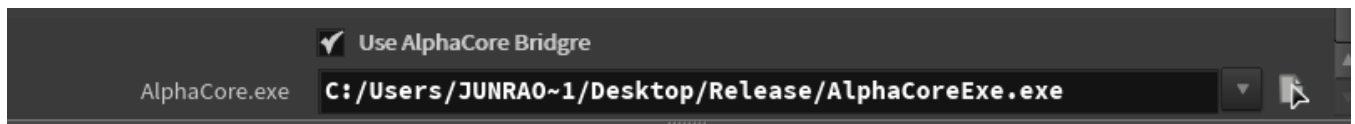
Visualization

Advance

AxCommand

AxCommand 输出速度场 (export_vel)

启用AlphaCore

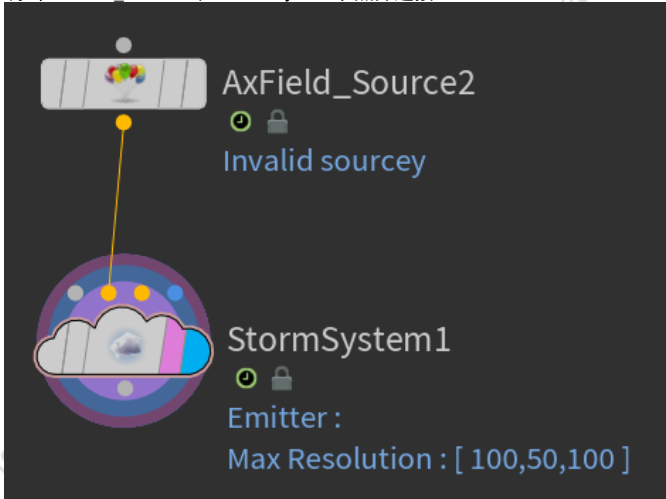


Use AlphaCore Bridge 启用AlphaCore桥工具

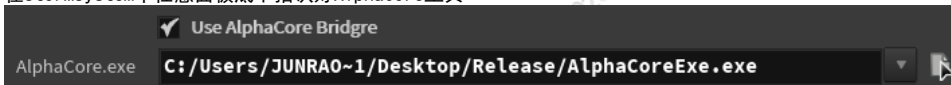
AlphaCore.exe 程序路径

3. 使用流程

- 调出AxField Source 和 StormSystem节点并连接上

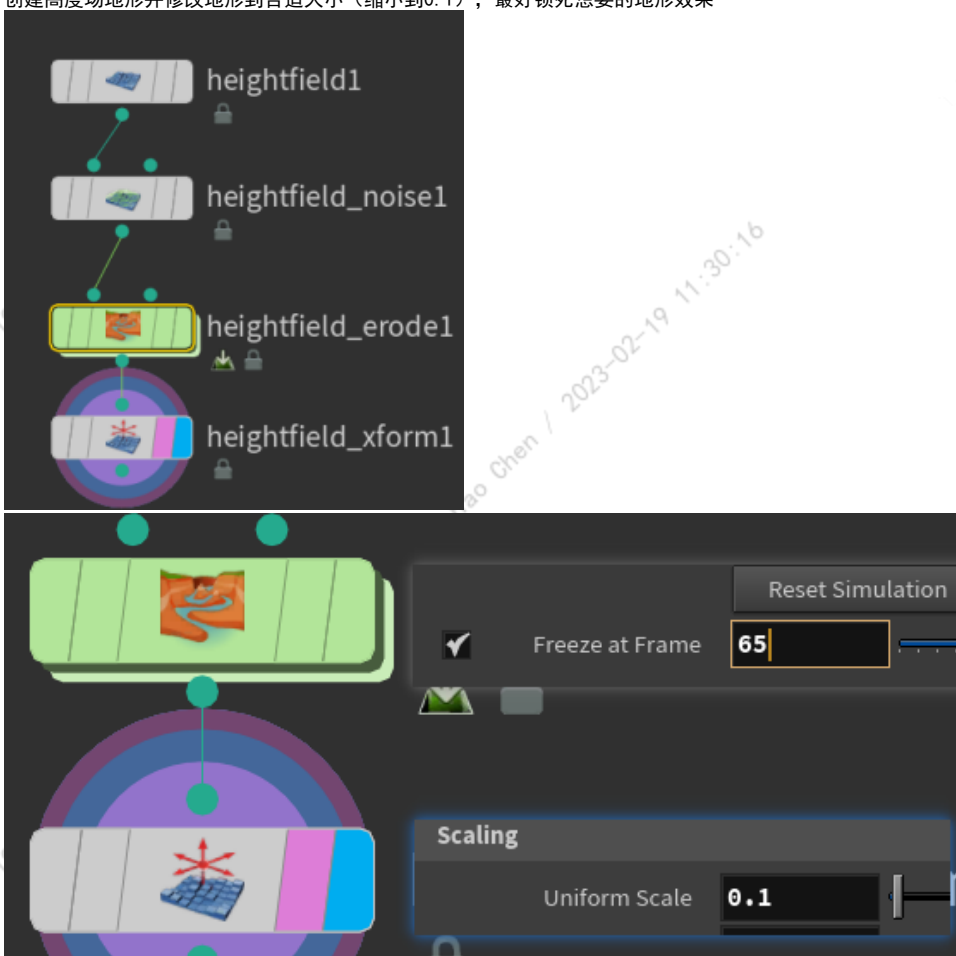


- 在StormSystem中任意面板底下指认好AlphaCore工具

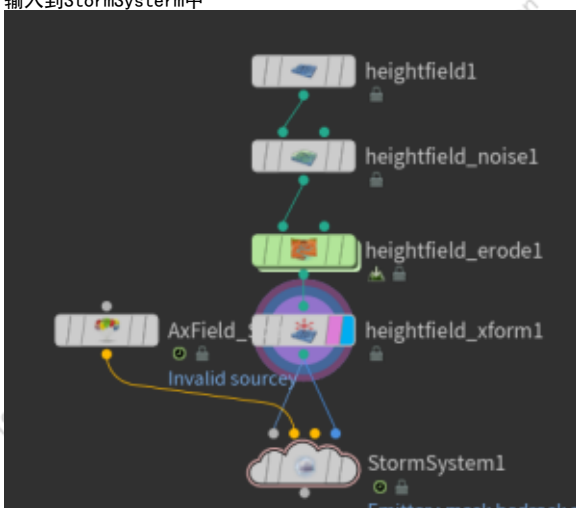


- 保存文件（以便后续输出高度场模型作为碰撞）

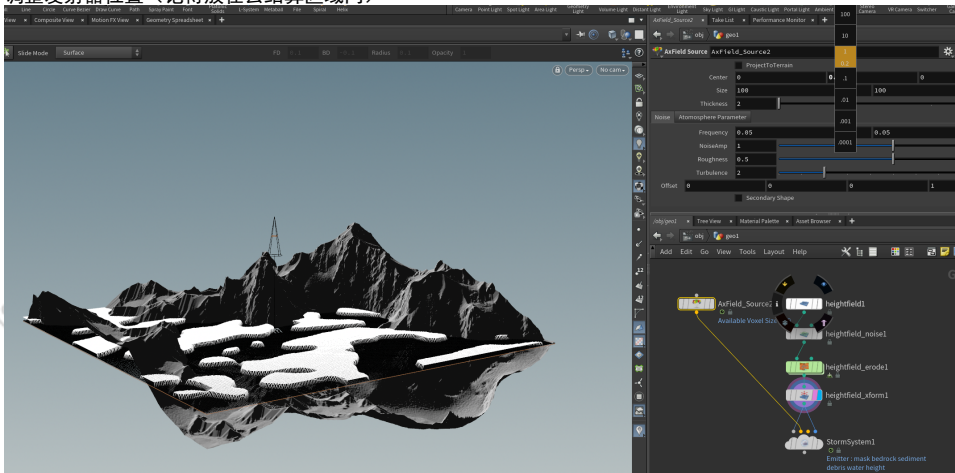
- 创建高度场地形并修改地形到合适大小（缩小到0.1），最好锁死想要的地形效果



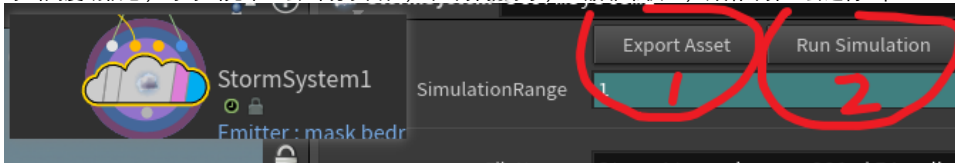
- 输入到StormSystem中



- 调整发射器位置（记得放在云结算区域内）



- 导出高度场信息，等导出完毕（会出现小白框，不计算就好了，一般非常快），开始计算（会运行AlphaCoreExe）



```

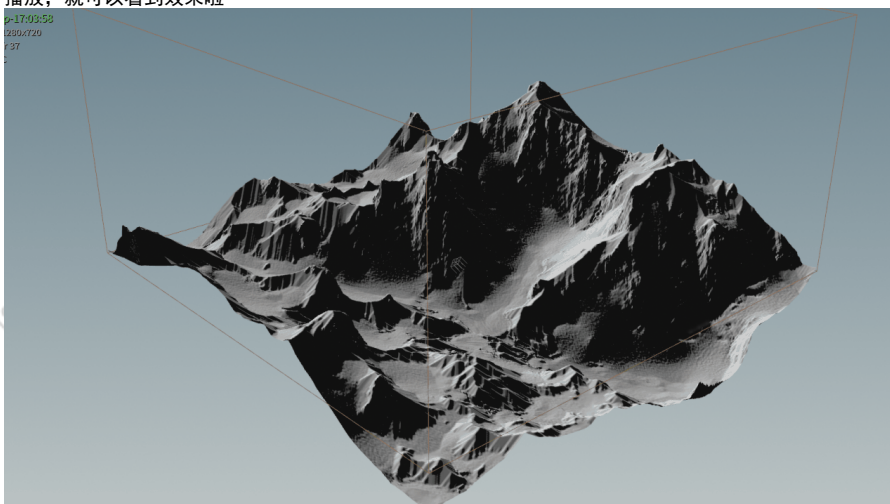
C:\Users\JUNRAO-1\Desktop\Release\AlphaCoreExe.exe
[2023-02-18 16:57:14.11] [ INFO ] AlphaCore::GeometryHelper::AxGeometryToOpenVDB | Get Filed mRCLOUDField.z
[2023-02-18 16:57:14.11] [ WARNN ] AddFieldToVDBGrids | Field mRCLOUDField.z is nullptr
[2023-02-18 16:57:14.13] [ INFO ] AlphaCore::GeometryHelper::AxGeometryToOpenVDB | Write OpenVDB File : D:/houdini/al37D
istrict/StormSys/untitled_test/StormSystem1/StormAtomsphere.v001.0492.vdb
[2023-02-18 16:57:14.13] [ INFO ] AxGeometry::Save | Save Fields D:/houdini/al37District/StormSys/untitled_test/StormS
stem1/StormAtomsphere.v001.0492.vdb succ
[2023-02-18 16:57:14.14] [ INFO ] AxSimWorld::runSimulationTask | backend: CUDA
[2023-02-18 16:57:14.14] [ INFO ] AxSimWorld::Step | Frame : 493 Substep : 1 of 1
[2023-02-18 16:57:14.14] [ WARNN ] AxOP_FieldSource::sourceProcEmitterDevice | AxOP_FieldSourcing_Emitter
[2023-02-18 16:57:14.14] [ WARNN ] AxStorage(float)::DeviceMalloc | noiseField.voxels DeviceRegistered!
[2023-02-18 16:57:14.14] [ WARNN ] AxOP_FieldWindForce::OnUpdateDevice | AxOP_FieldWindForce
[2023-02-18 16:57:14.24] [ INFO ] AlphaCore::GeometryHelper::AxGeometryToOpenVDB | Get Filed mRCLOUDField
[2023-02-18 16:57:14.26] [ INFO ] AlphaCore::GeometryHelper::AxGeometryToOpenVDB | Get Filed mRCLOUDField.x
[2023-02-18 16:57:14.27] [ WARNN ] AddFieldToVDBGrids | Field mRCLOUDField.x is nullptr
[2023-02-18 16:57:14.27] [ INFO ] AlphaCore::GeometryHelper::AxGeometryToOpenVDB | Get Filed mRCLOUDField.y
[2023-02-18 16:57:14.27] [ WARNN ] AddFieldToVDBGrids | Field mRCLOUDField.y is nullptr
[2023-02-18 16:57:14.27] [ INFO ] AlphaCore::GeometryHelper::AxGeometryToOpenVDB | Get Filed mRCLOUDField.z
[2023-02-18 16:57:14.27] [ WARNN ] AddFieldToVDBGrids | Field mRCLOUDField.z is nullptr
[2023-02-18 16:57:14.29] [ INFO ] AlphaCore::GeometryHelper::AxGeometryToOpenVDB | Write OpenVDB File : D:/houdini/al37D
istrict/StormSys/untitled_test/StormSystem1/StormAtomsphere.v001.0493.vdb
[2023-02-18 16:57:14.29] [ INFO ] AxGeometry::Save | Save Fields D:/houdini/al37District/StormSys/untitled_test/StormS
stem1/StormAtomsphere.v001.0493.vdb succ
[2023-02-18 16:57:14.30] [ INFO ] AxSimWorld::runSimulationTask | backend: CUDA
[2023-02-18 16:57:14.30] [ INFO ] AxSimWorld::Step | Frame : 494 Substep : 1 of 1
[2023-02-18 16:57:14.30] [ WARNN ] AxOP_FieldSource::sourceProcEmitterDevice | AxOP_FieldSourcing_Emitter
[2023-02-18 16:57:14.30] [ WARNN ] AxStorage(float)::DeviceMalloc | noiseField.voxels DeviceRegistered!
[2023-02-18 16:57:14.31] [ WARNN ] AxOP_FieldWindForce::OnUpdateDevice | AxOP_FieldWindForce
[2023-02-18 16:57:14.42] [ INFO ] AlphaCore::GeometryHelper::AxGeometryToOpenVDB | Get Filed mRCLOUDField
[2023-02-18 16:57:14.44] [ INFO ] AlphaCore::GeometryHelper::AxGeometryToOpenVDB | Get Filed mRCLOUDField.x
[2023-02-18 16:57:14.44] [ WARNN ] AddFieldToVDBGrids | Field mRCLOUDField.x is nullptr
  
```

- 等待计算完毕（AlphaCoreExe不再运算）

```

[2023-02-18 16:57:14.143] [ INFO ] AlphaCore::GeometryHelper::AxGeometryToOpenVDB | Write OpenVDB File : D:/houdini/al37D
istrict/StormSys/untitled_test/StormSystem1/StormAtomsphere.v001.0500.vdb
[2023-02-18 16:57:14.143] [ INFO ] AxGeometry::Save | Save Fields D:/houdini/al37District/StormSys/untitled_test/StormS
stem1/StormAtomsphere.v001.0500.vdb succ
请按任意键继续. . .
  
```

- 播放，就可以看到效果啦



- 现在我们可以去调自己想要的效果，比如我们可以再加一点风

