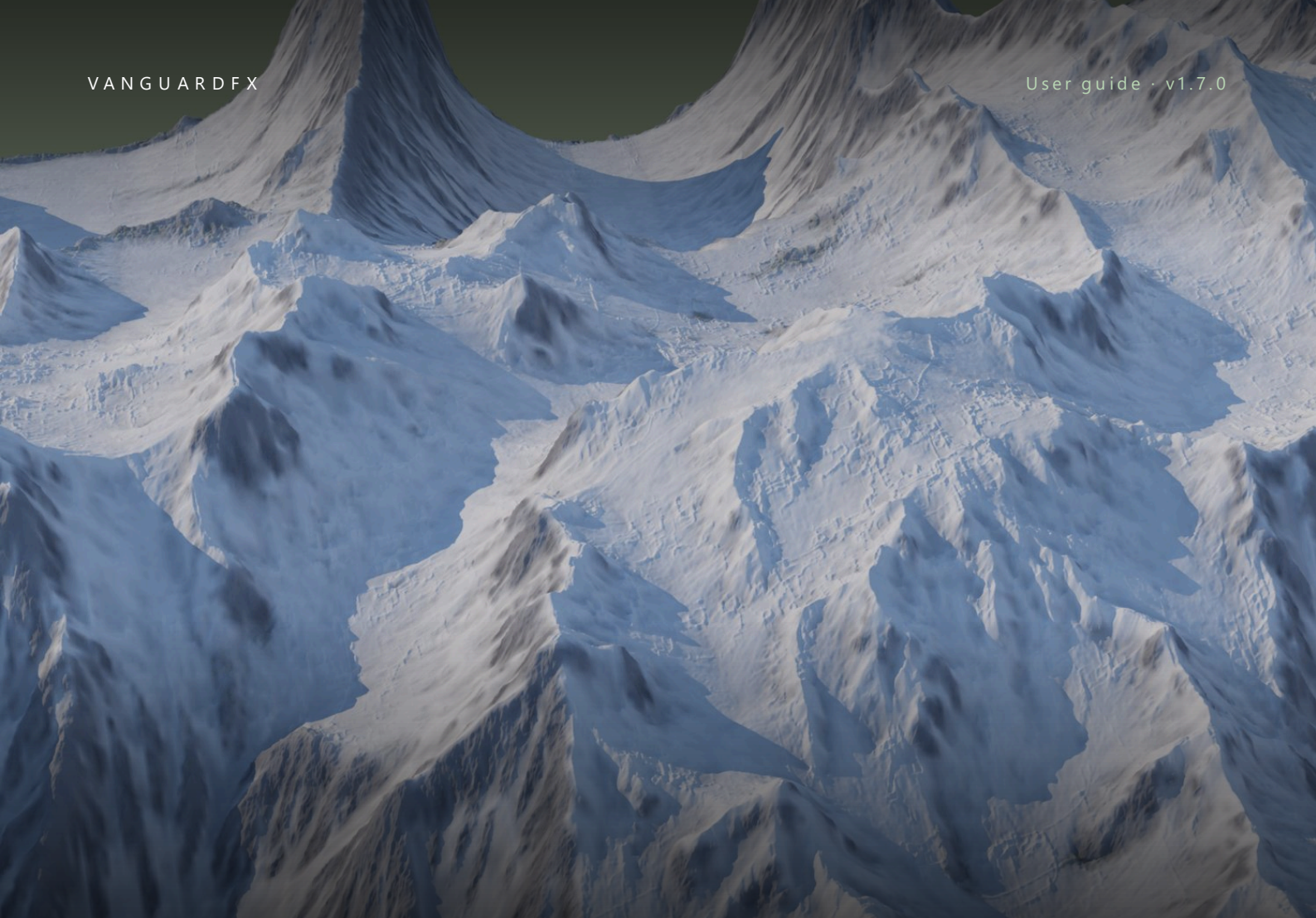


Vanguard TerrainFX

Terrain, erosion and rivers for 3ds Max - grown and carved on the GPU, textured and scattered by the same rules nature uses.

3DS MAX 2024 · 2025 · 2026 · 2027 | NVIDIA CUDA, WITH A CPU FALLBACK

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01 Getting started

TerrainFX builds a landscape the way nature does: it grows a landform from noise, lets millions of rain droplets, flowing water and gravity carve it on your GPU, then textures and scatters it by the same masks the erosion produced. Everything is live - change a value and the terrain re-solves in milliseconds.

INSTALL

1. **Close every running 3ds Max.** A running Max keeps the plugin file locked (the installer offers to close it for you).
2. Run `VanguardFX_TerrainFX_Setup_v1.7.0.exe` and accept the administrator prompt - the plugin goes into each Max's `Plugins` folder.
3. Tick the Max versions you use. Only versions installed on this computer are offered.
4. Start 3ds Max. Updating later is the same: close Max, run the new installer.

WHERE IT APPEARS IN MAX

ITEM	WHERE TO FIND IT
VanguardTerrain	Create panel ▸ Geometry ▸ **VanguardFX**. Click for the centre, drag for the size.
VanguardTerrainScatter	Same category, or **Add scatter** in the terrain's Tools rollout.
VanguardTerrainMap	Material/Map Browser ▸ Maps ▸ **VanguardFX**, or **Make terrain material**.
VanguardFX badge	The ram and *VANGUARD TERRAINFX* beside the terrain's front corner. Click it to select the terrain; it never renders.

ACTIVATE YOUR LICENCE

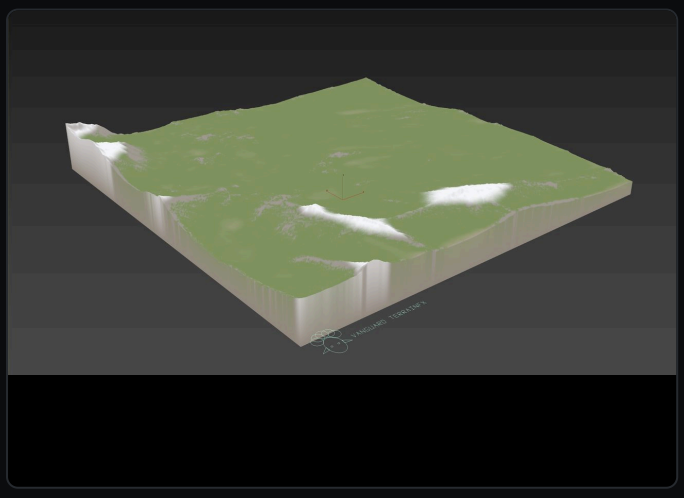
1. Select the terrain, open the **Modify** panel and expand **Vanguard TerrainFX - Licence**.
2. Press **Copy** beside *Your Hardware ID*. It identifies this computer.
3. Buy through **Get a licence** (or vanguardfx.pro) and give that Hardware ID.
4. Sign in at vanguardfx.pro ▸ **MY LICENCES** ▸ **DOWNLOAD LICENCE FILE**.
5. Press **Load file...** and pick it - or paste its text into the box and press **APPLY LICENCE**.

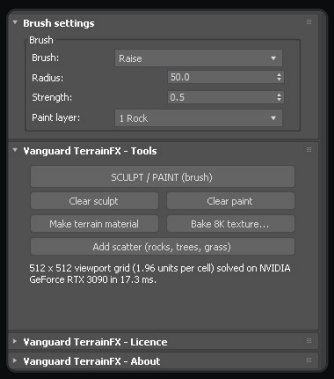
It works at once: *"Licence installed - no restart needed."* The rollout then shows how many days of updates your licence includes. If you paste the one-line licence *key* instead of the file, TerrainFX says so and keeps your old licence.

Without a licence everything runs as a preview so you can judge it:

Viewport grid	capped at 128 × 128
Hydraulic erosion	40 iterations
Render detail	off (no real-world grid, camera mesh or close-up detail)
Scatter	500 instances
Texture bake	1024 × 1024

The first time you touch a capped setting a message explains it, so a spinner never seems to "do nothing".

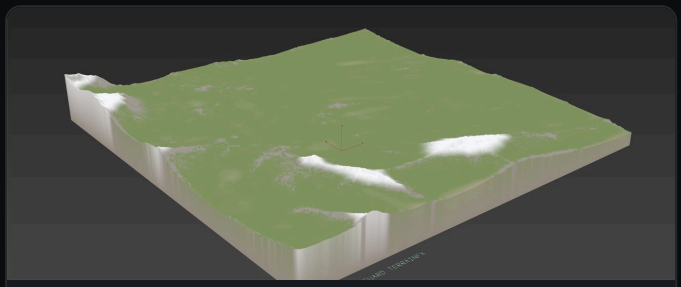




The Tools rollout: sculpt and paint, clear layers, make or bake the material, add a scatter. Its status line shows the grid, the device and the solve time.

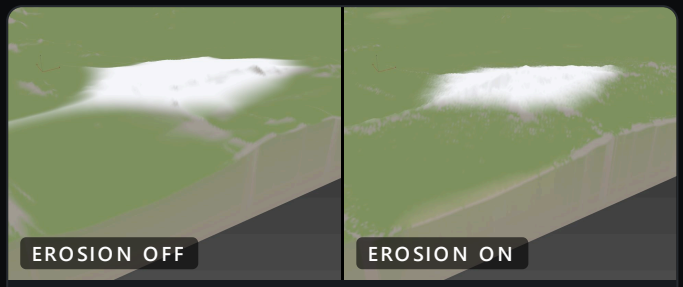
02 Your first result in 5 steps

From an empty scene to a rendered, textured, rock-strewn mountain in about two minutes. Every picture below is the real viewport or a real render.



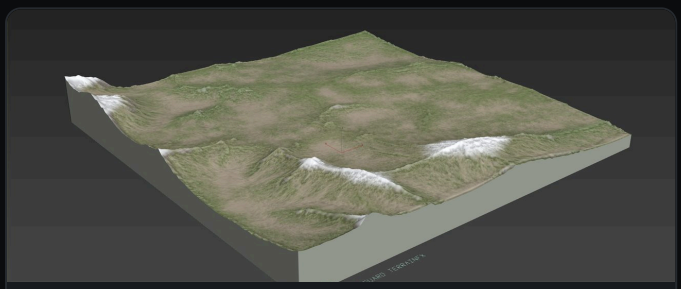
1 Create the terrain

Create ▸ Geometry ▸ VanguardFX ▸ **VanguardTerrain**. Click in the Top viewport for the centre and drag to set **Size**. It solves immediately; the status line reports e.g. "*512 x 512 viewport grid solved on NVIDIA GeForce RTX 3090 in 17 ms*".



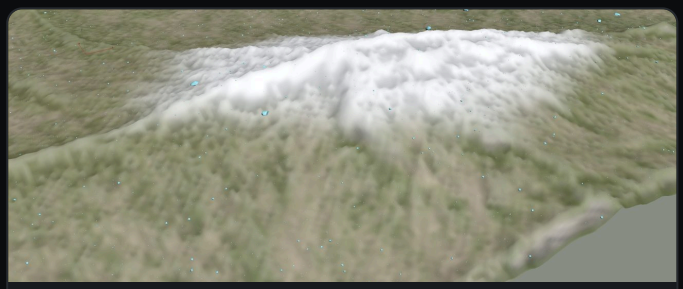
2 Choose a landform, let it erode

Pick a **Landform** (alpine, hills, dunes, canyon, volcano, plains) and try a few **Seed** values. Erosion is on by default - droplets cut gullies, flowing water moves sediment, gravity settles screes. More **Droplets** and **Iterations** carve deeper.



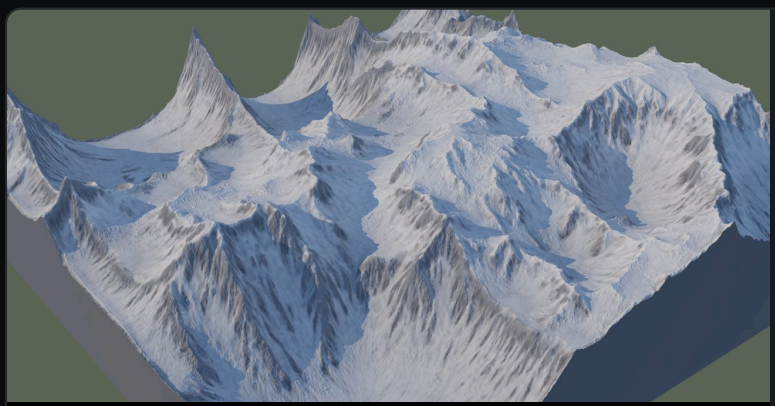
3 Make the material

Tools ▸ **Make terrain material**. It assigns a Physical Material whose Base Color is a **VanguardTerrainMap**: grass, rock, sand, snow and riverbed placed by slope, height, water and sediment. Press **M** to edit its rules and colours.



4 Scatter rocks - and your trees

Tools ▸ **Add scatter**. **Auto rocks** drops boulders, rocks and pebbles where geology puts them: talus fans, cliff feet, gullies. Add your own trees under **Objects**; **Count** is how many you get.



5 Render

Open **Render detail / Cap** and tick **Render at real-world resolution**. Set **Render cell size** to the detail you want (1 = one-metre cells in a metre scene). Renders then get the full-resolution terrain, a mesh that is densest near the camera and the procedural close-up detail.

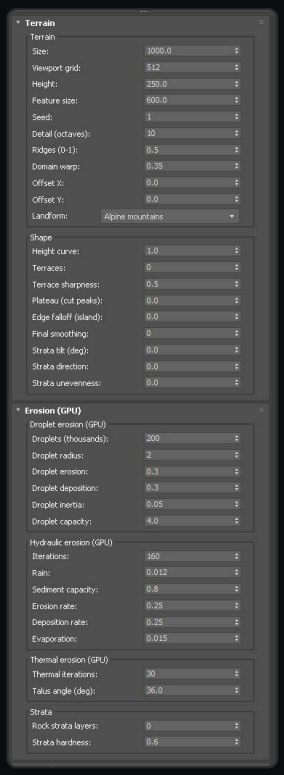
Render with **Vanguard Render** (recommended) or any renderer. The viewport stays light the whole time - only the render pays for the detail.

Shown: the Alpine recipe from page 7, Vanguard Render, 2560 × 1440.

03 Every control explained

The Modify panel of **VanguardTerrain**, rollout by rollout, top to bottom. Distances are in scene units; "0-1" values are fractions of the terrain's height.

CONTROL	RANGE · DEFAULT	WHAT IT DOES - AND WHEN TO CHANGE IT
TERRAIN ROLLOUT ▸ TERRAIN		
Size	1-10,000,000 · 1000	Width of the square terrain. Set it to the real size (e.g. 6000 for 6 km in a metre scene).
Viewport grid	16-2048 · 512	Vertices per side while you work. 512-1024 is plenty; the render has its own grid.
Height	0-1,000,000 · 250	Highest possible peak above the base.
Feature size	1-10,000,000 · 600	Size of the main mountains. Smaller = more, narrower ranges.
Seed	0-99999 · 1	A different landscape with the same character.
Detail (octaves)	1-14 · 10	Layers of finer noise. 10-12 for mountains; 4-6 for soft land.
Ridges (0-1)	0-1 · 0.5	Rounded hills at 0, sharp crests at 1.
Domain warp	0-2 · 0.35	Bends the shapes so ranges flow and curl. 0.3-0.6 looks natural.
Offset X / Y	±10,000 · 0	Slides the landscape under the square, in feature sizes. Frame a peak.
Landform	list · Alpine	Alpine, Rolling hills, Desert dunes, Canyon / mesa, Volcano, Plains.
TERRAIN ROLLOUT ▸ SHAPE		
Height curve	0.2-5 · 1	Above 1: flatter valleys, sharper peaks. Below 1: raised, rounded land.
Terraces	0-64 · 0	Number of rock steps; 10-20 for mesas and canyons.
Terrace sharpness	0-1 · 0.5	Soft benches at 0, cliff-and-shelf steps at 1.
Plateau (cut peaks)	0-0.95 · 0	Flattens the top fraction of the height into tablelands.
Edge falloff (island)	0-1 · 0	Lowers the land toward the edges - an island or a hero massif.
Final smoothing	0-50 · 0	Smoothing passes after erosion; 1-3 softens noisy ground.
Strata tilt (deg)	0-60 · 0	Tilts the terrace layers like dipping sedimentary rock.
Strata direction	±360 · 0	Compass direction the layers dip toward.
Strata unevenness	0-1 · 0	Varies layer thickness so steps break up.
EROSION (GPU) ▸ DROPLET EROSION		
Droplets (thousands)	0-20,000 · 200	Rain drops traced downhill; they cut gullies and stream networks. 500-900 for heroes.
Droplet radius	1-6 · 2	Width each drop erodes. Larger = broader channels.
Droplet erosion	0-1 · 0.3	How hard drops cut.
Droplet deposition	0-1 · 0.3	How fast they drop sediment - fans and valley floors.
Droplet inertia	0-0.95 · 0.05	Low: water follows every bump. High: long, straight runs.
Droplet capacity	0-20 · 4	Sediment a drop can carry. Higher = deeper gullies.
EROSION (GPU) ▸ HYDRAULIC EROSION (FLOWING WATER)		
Iterations	0-5000 · 160	Steps of the water simulation. 200-400 for a weathered look.
Rain	0-0.2 · 0.012	Water added per step. More = wetter, broader valleys.
Sediment capacity	0-10 · 0.8	Material the water can carry.
Erosion rate	0-1 · 0.25	How fast water picks up ground.
Deposition rate	0-1 · 0.25	How fast it lets it settle.
Evaporation	0-0.5 · 0.015	Water lost per step; higher keeps erosion local.
EROSION (GPU) ▸ THERMAL EROSION · STRATA		
Thermal iterations	0-2000 · 30	Gravity passes: steep ground crumbles into screes.
Talus angle (deg)	5-85 · 36	Steepest stable slope. Lower = softer land, higher = taller cliffs.
Rock strata layers	0-100 · 0	Alternating hard and soft bands the water erodes unevenly - ledges.
Strata hardness	0-1 · 0.6	How much harder the hard bands are.



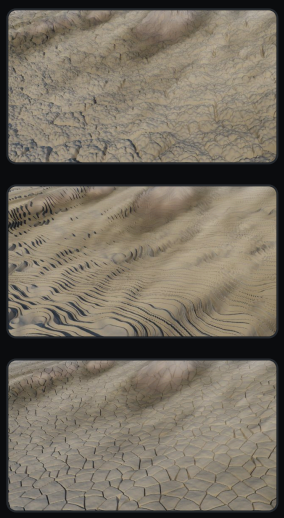
The Terrain and Erosion (GPU) rollouts as they look in 3ds Max.

> **Speed.** A 512 × 512 terrain with 300 erosion steps solves in 84 ms on an RTX 3090; the same on the CPU takes about 10 s, with an identical result.

CONTROL	RANGE · DEFAULT	WHAT IT DOES - AND WHEN TO CHANGE IT
RIVER / PREVIEW ▸ RIVER		
River spline	a shape · none	Pick a spline; a river is carved along it, its bed forced downhill. Only shapes are accepted.
River width	0-100,000 · 40	Width of the channel.
River depth	0-100,000 · 12	How deep it cuts below the banks.
RIVER / PREVIEW ▸ PREVIEW COLOURS		
Snow line (0-1)	0-1.01 · 0.72	Snow height in the viewport preview colours only (the material has its own).
RENDER DETAIL / CAP ▸ RENDER DETAIL		
Use GPU (CUDA)	on	Solve on the NVIDIA GPU. Off = CPU, same result, slower.
Render at real-world resolution	off	**Tick this for final renders.** Renders get their own fine grid and the close-up detail below.
Render cell size	0.01-100,000 · 1	Spacing of the render grid. Size ÷ cell = vertices per side (max 4096).
Fine detail amount	0-2 · 1	The small-scale noise the viewport grid is too coarse to hold, added back.
Fine settling steps	0-1000 · 20	A short gravity pass on the fine grid so the new detail settles.
RENDER DETAIL / CAP ▸ CLOSE-UP DETAIL		
Dense near the camera	on	Spends the render mesh where the camera looks: cm-scale up close, coarse far away.
Camera mesh grid	256-4096 · 3072	Vertices per side of that camera mesh. Lower it for quick previews.
Detail height	0-100,000 · 6	Height of the procedural crags, lumps, ripples and drifts. 0 = off.
Detail size	0.01-1,000,000 · 40	Size of the largest close-up feature. Smaller = busier ground.
Detail style	list · Natural	Natural (per material layer), Rocky cells, Layered shale, Wind ripples, Cracked ground, Eroded streaks.
Detail seed	0-99999 · 0	A different random variant of the same style.
RENDER DETAIL / CAP ▸ DISPLACEMENT MAP		
Displace map	any map · none	Your own displacement: Noise, Cellular, a bitmap... mid-grey = no change. Noise/Cellular use world position.
Map height	±100,000 · 0	How far white raises and black lowers the ground. 0 = off.
Map tile size	0.01-1,000,000 · 20	Real-world size of one repeat of a 2D map (bitmaps).
RENDER DETAIL / CAP ▸ CAP		
Cap (closed solid)	on	Closes the terrain with walls and a base (material ID 2) - a solid block for hero shots.
Base thickness	0-1,000,000 · 20	Depth of the block below the lowest ground.
BRUSH SETTINGS		
Brush	list · Raise	Raise, Lower, Smooth, Flatten, Paint layer, Erase paint.
Radius	0.1-1,000,000 · 50	Brush size in scene units.
Strength	0-1 · 0.5	How much each dab changes.
Paint layer	list · 1 Rock	Which of 8 painted layers: 1-4 rock, grass, sand, snow; 5-8 your own (see Painted layers).
Hardness · Edge noise	0-1 · 0.4 / 0	Hard or soft brush edge; noise makes the edge ragged and natural.
Paint detail	1024-4096 · 2048	Resolution of the paint over the whole terrain. Changing it keeps what is painted.
VANGUARD TERRAINFX - TOOLS		
SCULPT / PAINT	button	Brush mode. Drag on the terrain to paint; right-click to stop. One stroke = one undo.
Clear sculpt / paint	buttons	Removes all sculpting, or all painted layers (undoable).
Make terrain material	button	Builds and assigns the Physical Material + VanguardTerrainMap. Press M to see it.
Bake 8K texture...	button	Bakes the material to an 8192 px PNG and applies it as a Physical Material.
Add scatter	button	Creates a VanguardTerrainScatter on this terrain and selects it.



River / Preview and Render detail / Cap.



Detail styles as real geometry in Vanguard Render: rocky cells, layered shale, cracked ground.

> **The brush.** Sculpting is added *before* erosion, so a ridge you draw gets gullies cut into it. Paint layers feed the material and the scatter's *Mask*, and the material in the viewport updates as you paint. Both are saved in the .max file.

CONTROL	RANGE · DEFAULT	WHAT IT DOES - AND WHEN TO CHANGE IT
VANGUARDTERRAINMAP ▸ SOURCE		
Terrain	a terrain	The terrain whose masks it reads (set for you by Make terrain material).
Output	list · Colour	The full colour, or one mask in black and white: each layer, slope, height, wetness, deposition, river, flow, cavity, ridges, talus, close-up detail height.
VANGUARDTERRAINMAP ▸ RULES		
Rock from / Full rock at	0-90° · 30 / 42	Slope where rock starts to show and where it covers everything.
Sand on deposits	0-5 · 1	Sand where the erosion laid down sediment.
Snow line (0-1)	0-1.01 · 0.72	Height snow starts; 1.01 = no snow.
Snow feather	0.001-1 · 0.06	Softness of the snow line.
Snow slides off at	0-90° · 50	Slopes steeper than this stay bare.
Wet darkening	0-1 · 0.35	Darkens ground where water collected.
Break up edges	0-1 · 0.5	Noise along every boundary so layers never meet on a clean line.
Sediment in channels	0-3 · 1	Pale washed sediment down the gullies.
Crevice / Edge	0-1 · 0.5 / 0.3	Crevice darkening and edge highlights - reads detail from far away.
Strata bands / contrast	0-400 · 40 / 0.35	Coloured layer bands in rock, following any strata tilt.
Close-up colour detail	0-2 · 0.5	Shades crests lighter, cracks darker - matches the close-up geometry.
Triplanar maps on cliffs	on	Layer maps on steep faces are projected from the side, so rock textures never stretch.
Height blend	0-1 · 0.5	Where layers meet, the higher one in its own texture shows - edges follow the detail, no smears.
Viewport texture	512-4096 · 1024	Size of the material in the viewport; made on every core, and only the brushed area is redrawn while you paint.
PAINTED LAYERS ROLLOUT · PAINT 1-8		
Colour / Map / Tile	per layer	Each painted layer's own look - any map. Layers 1-4 feed rock, grass, sand, snow until given a map.
GRASS · ROCK · SAND · SNOW · RIVERBED (EACH LAYER)		
Colour / Map	colour · none	A flat colour (given natural variation), or any map - e.g. a rock texture.
Tile size	0.01-1,000,000 · 200	Real-world size one repeat of that map covers.
VANGUARDTERRAINSCATTER ▸ AUTOMATIC ROCKS		
Auto rocks	list · Natural debris	Off, Natural debris (cliff foot + channels), Riverbed stones, Desert gravel, Everything (dense).
Density	0-20 · 1	Multiplies how many rocks. Watch the face count above 5.
Rock size (1 = metres)	0.001-10,000 · 1	Scale of the built-in rocks: 1 suits a metre scene; use 100 in centimetres.
Rock shapes	1-64 · 12	Number of different rock models.
OBJECTS · PLACEMENT		
Objects	Add / Remove	Your own trees, bushes, rocks; each gets its own material ID.
Terrain	a terrain	The terrain to scatter on.
Count	0-10,000,000 · 2000	How many of your objects are placed (up to 200 tries each).
Seed / Min spacing	· 1 / 0	A different layout / the closest two objects may be.
RULES · TRANSFORM · DISPLAY		
Slope from / to	0-90° · 0 / 35	Only on slopes in this range.
Height from / to	0-1 · 0 / 0.75	Only at heights in this range (0 lowest, 1 highest).
Avoid river	0-1 · 1	Keeps objects out of the river channel.
Mask · Invert	list · None	Painted layers 1-8, Auto grass / rock / sand / snow, wetness or deposition.
Scale min / max	0.001-100 · 0.8 / 1.2	Random size of each copy.
Rotation · Tilt	0-360 · 360 / 0	Random spin around up, and random lean.
Align to slope · Sink	0-1 · 0.3 / 0	0 = upright (trees), 1 = follow the ground (rocks). Sink pushes into it.
Viewport % · boxes	0-100 · 10	Share shown while you work, or bounding boxes. Renders always get all.



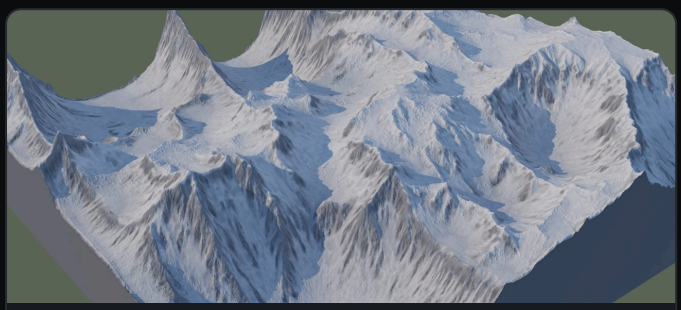
VanguardTerrainMap in the Material Editor.



VanguardTerrainScatter. Its status line counts your objects and the rocks separately.

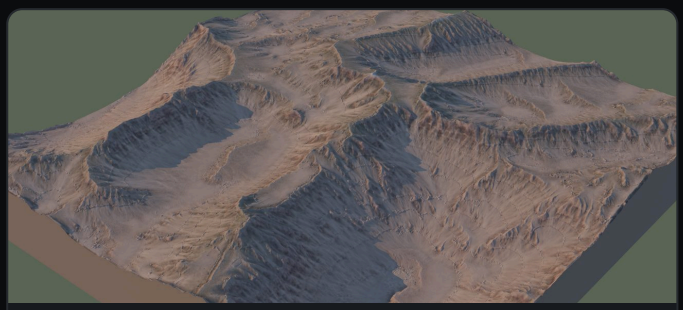
04 Recipes

The exact settings behind the renders on vanguardfx.pro. Scene units are metres; anything not listed stays at its default. Each one ends with **Render at real-world resolution** on, and was rendered in Vanguard Render.



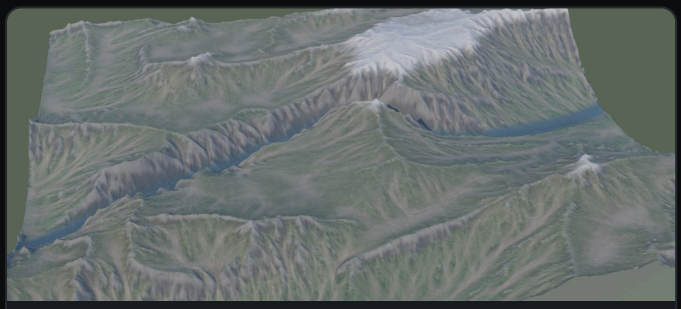
Alpine range

Terrain	Size 6000 · Height 1700 · Feature size 2200 · Grid 1024 · Seed 3
Shape	Detail 12 · Ridges 0.7 · Warp 0.5 · Height curve 1.2
Erosion	Droplets 700 · Iterations 300 · Thermal 25 · Talus 40
Cap	On · Base thickness 300
Material	Snow line 0.62 · Sediment in channels 1.6 · rock 72,72,78 · snow 240,242,246
Render	Cell size 2 · Vanguard Render sun 28° elevation, haze 0.3



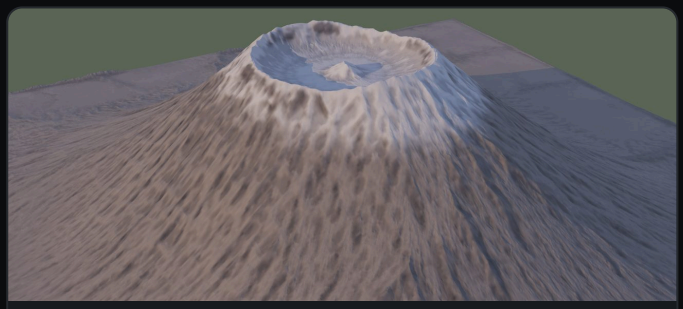
Sandstone canyon

Terrain	Size 2400 · Height 420 · Feature size 1100 · Grid 1024 · Seed 11
Shape	Detail 12 · Ridges 0.55 · Warp 0.6 · Terraces 16 · Sharpness 0.8 · Strata tilt 5 · direction 30 · unevenness 0.6
Erosion	Droplets 600 · Iterations 200 · Thermal 30 · Talus 34
Material	Snow line 1.01 (none) · Strata bands 60 · contrast 0.45 · colours from 178,122,84 (grass) to 140,88,62 (rock)
Scatter	Auto rocks Natural debris · Density 1 · Cap base 120 · Cell 0.8



River valley

Terrain	Size 4000 · Height 900 · Feature size 1800 · Grid 1024 · Seed 21
Shape	Ridges 0.5 · Warp 0.45
Erosion	Droplets 500 · Iterations 400 · Thermal 20
River	A smooth spline across the terrain (5 knots) · Width 70 · Depth 35
Material	Snow line 0.85 · Sediment 0.8 · riverbed 40,70,80
Scatter	Auto rocks Natural debris · Density 0.6 · Cap base 200 · Cell 1.33



Volcano

Terrain	Landform Volcano · Size 5000 · Height 1600 · Feature size 1600 · Grid 1024 · Seed 5
Shape	Ridges 0.6 · Warp 0.4
Erosion	Droplets 900 · Iterations 300 · Thermal 30
Material	Snow line 0.8 · Sediment 1.2 · Strata bands 25 · contrast 0.45 · rock 46,42,42
Render	Cap base 250 · Cell 1.67 · low sun, 16° elevation

Make your own. Start from the closest recipe, then change one thing at a time: **Seed** for a new layout, **Feature size** for scale, **Droplets** for how weathered it looks, **Talus angle** for how steep the cliffs can stand. Keep **Viewport grid** at 512-1024 while you design; the render grid does the rest.

05 Rendering & export

Vanguard Render (recommended, tested): with *Render at real-world resolution* on, the terrain hands it a mesh built for its camera, with close-up detail as real geometry - no bump map needed. The material is evaluated on that mesh, so it is sharp where the camera looks.

Any other renderer that renders standard Max geometry and maps gets the render-grid terrain and the VanguardTerrainMap. If a renderer shows the terrain flat or grey, press **Bake 8K texture...**: it writes a PNG and applies it as a Physical Material with a Bitmap, which every renderer reads.

Texture export (1.7.0). Tools ▸ **EXPORT TEXTURE SET** writes colour, normal, AO, 16-bit height (PNG + .r16), roughness and every mask at 1024-16384 into one folder (4K ≈ 2 min, 8K ≈ 9 min on an RTX 3090 machine), and can apply them as a ready Physical Material. Settings: the *Texture export* rollout.

Masks for compositing. There is no separate render element per mask. Set a copy of the map's **Output** to a mask and use it in a blend material, or write it to an image without touching your material:

```
VanguardTerrainTools.bake m 4096 @"C:\out\rock.png"
```

Map channels carry the masks into any shader through a Map Channel or Vertex Color map: vertex colour = preview · ch 1 = UVW 0-1 over the terrain · ch 2 = slope, height, wetness · ch 3 = deposition, river, snow · ch 4-5 = painted layers.

Typical stills: Render cell = Size ÷ 3000, Camera mesh grid 3072, Detail height 6, Detail size 40 (metres). Vanguard Render: anti-aliasing 64, denoise on.

Export to FBX/OBJ. Collapse or Snapshot gives the viewport-grid mesh: raise **Viewport grid** (up to 2048) first. Outside a render, other VanguardFX plugins (Crowd, Fire, Tornado, Shatter, Fluid, Weather) read that light mesh too.

06 Troubleshooting & FAQ

I change Viewport grid or Iterations and nothing happens.
That is the preview limit (128 grid, 40 iterations) on a machine without a licence. Load your licence - no restart needed.

My render looks exactly like the viewport.
Tick *Render at real-world resolution* and set Render cell size. The status line then shows "Last render grid".

Max closed when I pressed Make terrain material.
Fixed in 1.4.1: the button no longer opens the Material Editor. The crash came from another renderer's material preview - update Vanguard Reclaim (1.5.4) and Vanguard Render (1.8.33).

I added a tree to Scatter and see none.
Check the status line: it counts your objects and the rocks separately. A narrow Mask leaves little room (it says so), and Viewport % shows only a share - renders always get all.

I paint a layer and the viewport does not change.
Fixed in 1.5.0. Since 1.7.0 only the brushed area is redrawn, so painting stays fast at any texture size.

Crowd people end up under a capped terrain.
Fixed in Vanguard Crowd 1.0.21: nobody starts on the terrain's hidden base any more.

"Deferred DLL ... time stamp is different".
The plugin was updated while that Max was open. Restart Max.

The rocks are huge, or invisible.
Rock size is in metres-scene units: in a centimetre scene set it to 100.

The river does nothing.
Pick a spline (not a mesh) that crosses the terrain in plan view. The status line says "River carved."; raise Width and Depth for large terrains.

No NVIDIA card?
Untick Use GPU or just run it: the CPU gives the same terrain, only slower. Keep the Viewport grid lower while you design.

07 Requirements & licence

3DS MAX
2024, 2025, 2026 or 2027 on Windows 10 / 11, 64-bit.

GPU
NVIDIA with CUDA and a current driver recommended. CPU fallback included.

LICENCE
One licence, one computer (Hardware ID). Updates for your licence term; the installed build keeps working after it.

SUPPORT
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