

Terraman is a suite of tools to setup a pipeline between Maya, Terragen and World Machine.

The script initially was written to compensate for the differences in scale between meshes output by Terragen and World Machine to bring them into a unified environment in Maya, and has grown to include controls to output camera and object animation.

Camera and object animations can be easily set up in Maya with the more sophisticated tools on hand and the results output to Terragen.

This version of the script has had a major re-write and is not backwards compatible with older versions.

INSTALLATION

- Copy the **terraman** folder to your Maya scripts directory. This folder contains a sub folder named **icons** and these scripts:
 - terraMan.mel
 - tgAnim.mel
 - tgGeo.mel
 - tgLoadModules.mel
 - tgUtils.mel
- Add the script path to your *Maya.env*:
 - `MAYA_SCRIPT_PATH = C:\Users\<YOUR USER NAME>\Documents\maya\2013-x64\scripts\terraman\;`
- Replacing <YOUR USER NAME> with your details and version of Maya.
- If MAYA_SCRIPT_PATH already exists in your Maya.env, append the path to the end of any other entries, using a semi-colon to separate.
- Add these lines to your userSetup.mel :
 - `source "tgUtils"; tgUtils();`
- To open in Maya - run this in the script editor
 - `terraMan;`

VIEWPORT BUTTON

When exporting camera or object animations the script disables the Maya viewport. This stops Maya from updating the viewport while the script is executing, which speeds up the process considerably.

However, it is difficult to predict all scenarios that might cause the script to fail when exporting (especially when exporting geometry animation).

If the script does fail at this point, and the viewport is not restored, click the blue *View Port* button at the top right of the script to restore the viewport.

WORLD TAB

Terrains in .obj format are imported via this panel, which supports .obj output from Terragen and World Machine.

PARAMETERS

- **Terrain Type** - Choose from Terragen Micro Exporter or World Machine formats. The script unifies any type of mesh to the same scale and orientation on import.
- **Scale** - Choose from five preset scales ranging from real world (1:1) to 1:10000. Recommended scale is 1:100, which, based on a typical mesh export from World Machine of a terrain (8 by 8 kilometres) - produces a mesh 8000 units square. The script assumes working units in Maya are the default 1 unit = 1 centimetre.
- **Maintain terrain mult on reload** - If a terrain needs to be scaled in a more precise way, the *terrain mult* attribute on the master terrain Group can be adjusted. Check this box to ensure this value is not initialised when the terrain is reloaded or replaced. Group objects (animated or not) under the terrain group to ensure they scale along with the master terrain. It would be good practice to decide on the terrain mult before creating complex scenes.
- **World Machine Coordinate** - World Machine can export a terrain mesh in a number of scale coordinates. Change the coordinate to match that output by World Machine. The script defaults to *Normalized* which is the default setting for the World Machine mesh output device.
- **Import** - Selects the .obj file and loads it into a scene. The terrain is controlled by its master terrain group. Do not move the terrain out of this group - it controls many functions in the script.
- **Reload** - If the terrain is modified outside of Maya, use this to reload the updated mesh.
- **Replace World** - Replaces the terrain attached to the current terrain group. Select the type of terrain *replacing* the current version in the Terrain type option menu, or leave the same if upgrading the terrain to different version of the same type.

A NOTE ABOUT MESH FORMATS

- At present, the script uses the Wavefront .obj format to import meshes into Maya. This is most robust and widely used format for exchanging mesh data between 3d programs.
- All meshes output by the Micro exporter have duplicated vertices and these should be cleaned, in most cases halving the file size on disk. This can be done in Maya or using an external mesh editor such as Meshlab.
- The Micro Exporter in Terragen has an option to include Texture cords which aren't really useful in the context of this script and should be turned off (will reduce mesh file size).

TERRAIN PLANE

This creates a simple Maya plane placed and scaled to match either an imported terrain .obj or create a free standing plane. This can be useful in a few ways:

- The plane can be exported to a sculpting program such as Mudbox and displaced using a Vector Displacement map (VDM) output from Terragen. This will ensure that the displacement map will create a mesh at the correct scale.
- The plane could also be used in conjunction with a VDM to displace directly inside Maya, for instance using a renderer such as Arnold or Vray.
- **Origin** - Set the coordinate for the centre of the Terrain Plane. This should be the X and Z coordinates of the camera used to bake a vector map from in Terragen.
- **Scale** - Sets the scale (square extents) of the Terrain plane.

- The *Origin* and *Scale* fields are enabled when the input Terrain type is set to Terragen Micro or a free standing plane is desired. If the Terrain Type is World Machine, the script can detect the size and position of the terrain automatically.
- **Export Terrain Plane** – Exports the plane to the /data folder of the current Maya project.
- The script only supports one Terrain Plane.

CAMERA/OBJECT TAB

Provides tools to ensure camera animations scale correctly on export to Terragen, as well a setting up some complex camera rigs. ***Currently not tested with non square pixel or anamorphic ratios.***

When a camera rig is created, it creates a control group which enables the camera to export at the right scale to Terragen, and rescale itself if the terrain master scale is changed. Do not move the camera or any of the nodes created out of the master camera group. All cameras have a switchable rule of thirds display to aid in composition. Animated *dolly* and *glide* cameras also have a speed display when selected.

If you have a version of Jakob Steffensen's afiLocator installed, the Dolly and Glide camera rigs will load with more informative locator shapes. If not, standard Maya locators will be used.

Jacobs's plug-in can be found at:

<https://www.creativecrash.com/maya/plugin/afilocator>

<http://www.anim.dk/opensource/afiLocatorNode/>

PARAMETERS

- **Camera Name** – Name for the camera rig. The script will warn you if you use a name for a rig already present in the scene.
- **Create Camera Rig Basic** – A simple camera setup. To animate, just transform the camera directly as you would any Maya camera.
- **Create Camera Rig Projection** – A simple camera setup for camera projections. This does not have any frustum ornaments or speed displays.
- **Create Camera Rig Dolly** – Emulates a standard studio camera rig set up with a dolly transport and pan, tilt, elevation and dutch manipulators to control the camera. This is to aid in moving the camera in a real world manner and produce more realistic camera animations. When the camera is created, all controls are on a node called <camera rig name>_CONTROL, which is selected after creation of the camera. No other node or the parent of this group should be used to animate the camera.
- **Create Camera Rig Glide** - Creates a rig attached to a nurbs curve for path based animations. As with the Camera Rig Dolly, all controls to animate the rig are on <camera rig name>_CONTROL node, which is selected after the rig has been created. One advantage of this rig is that the pan, tilt and dutch controls are independent of the motion path controls, so you could animate a camera being operated from within a helicopter, panning independently of the helicopters flight path. To use, create a nurbs curve for the path, ensure it is selected and create the Glide camera.
- **NOTE:** If there are to be more than one Glide cameras in a scene, a unique curve should be created for each camera, even if they share the same path. The script will prompt to duplicate a curve if it used by another camera rig.
- **Duplicate and Bake Camera** – Creates a copy of the camera baked from the controls and animations on a rig. Useful for fine tuning a glide rig camera. Select any node in the camera group to use this function. The script creates a camera with the suffix *bake*.
- **Set Camera Rig Key** – Sets an animation key for all relevant controls on the selected rig. As with the duplicate function any node in the rig can be selected to use this function.

- **Match Film Aspect Ratio to Render Aspect Ratio** – This will match the film gate of the Maya camera to aspect ratio of the render.
- **On Camera Controls** – These controls are located on the Camera node :
 - **Master Scale** – This controls the display scale of the camera. This is set automatically by the script according to the scale of the terrain. This ensures the camera icon is sized in proportion to the scale of the terrain and hence is visible. It can be set to an arbitrary value if desired.
 - **Rule of Thirds View** – Provides a Rule of Thirds view like the one in Terragen to aid in composition.
 - **Rule of Thirds Mult** – Adjusts the distance of the Rule of Thirds geometry to be visible inside the clipping planes of the camera. This is adjusted automatically by the script, but can be adjusted manually.

A NOTE ABOUT CAMERA FILM BACKS

- The term *film back* relates to the area of the image exposed in a real world camera. In today's digital cameras, this is the cameras sensor size.
- The film back size can affect the angle of view of the camera. A DSLR with a sensor size of 36mm x 24mm and a lens of focal length 50mm will have an angle of view of 65°. An APS-C DSLR, *with the same lens* will have an angle of view of 46°. This difference in the angle of view is also known as the *crop factor*.
- A camera with a sensor size of 36mm x 24mm is known as *full frame* and its crop factor is 1.0. In the above example the APS-C camera has a crop factor of approximately 1.5.
- Knowing these values are crucial when match-moving a real world camera to use in CG. However, for purely CG scenes, film backs can be ignored and a default film back can be used.
- In Terragen, the default camera is setup as a full frame camera with a sensor size of 36 x 24mm. It also uses horizontal field of view to determine the viewing angle.
- Changing the horizontal fov changes the focal length of the camera and vice versa.
- The Terraman script is designed to import camera data from Terragen assuming these default values are used when exporting the .chan data from Terragen. It was designed that was to minimise setup steps when exporting cameras to back and forth between Maya and Terragen to make the process transparent to the user.
- When Terragen exports .chan data it only exports the position, rotation and vertical field of view (calculated internally from the cameras horizontal field of view). But does not include any information about the cameras film back.
- This is why the Terraman script assumes certain values when importing Terragen camera data, as it has no extra information to adjust the Maya camera. The values are:
 - Use Horizontal FOV.
 - Film Aperture – 36mm by 24mm.
- Alternate film apertures can be used, but the values in mm (or inch conversions for Maya versions pre 2015) should be entered manually in the Maya camera.
- Finally, as the cameras setup by the Terraman script are default starting values, the render area of the camera might change if the gate is changed from Resolution Gate to Film Gate Mayas viewport.
- By default, the Terraman cameras are designed to use the Resolution Gate (therefore matching the render output.) If it is desired that the Resolution Gate and the Film gate should match, click the *Match Film Aspect Ratio to Render Aspect Ratio* control in the script.
- This will change the film back of the Maya camera to match the render aspect ratio, and convert the focal length so the angle of view is preserved.
- Conversely when importing a .chan file from Maya to Terragen the Terragen camera defaults to using Vertical FOV. This is the default for importing .chan data in Terragen.
- To sum up, use the defaults when transferring camera data back and forth between Terragen and Maya and the cameras will match.

RESAMPLE

- Provides quick access to Maya standard resample functions.

CAMERA EXPORT

Exports the Maya camera for use in Terragen. Select any node in the camera group to use this function.

- **Camera Type** – Export to the Nuke *CHAN* format. The .chan export writes out a simple text file that can be imported directly into a Terragen camera.
- The advantage of exporting to this format is that only the animation data is transferred between programs, and existing camera or animated nodes can be preserved, negating the need to import new nodes when an animation is updated.

OBJECT EXPORT

Exports animation from a selected object to a .chan for import into Terragen.

- **Export Chan from Selected Object** – Select a single object or group to export the .chan data for use in Terragen. This only exports the animation data and must be used in conjunction with *Export Animated Object*.
- **Export Animated Object** – Exports the selected geometry as an .obj file to load in to Terragen. In order for the animation data from the .chan file to load correctly, the object must be at the world origin when exporting. The script temporarily resets the position of the selected node while exporting, and then restores the original position and animation after export. To facilitate this, it is important not to freeze the objects transforms away from the world origin position.
- **Export Static Object** – Exports static objects (such as trees, houses etc) in position for import into Terragen.
- **Bake Animated Hierarchy (Experimental)** – Separates out an animated hierarchy into separate groups according to the animation for each branch in the node tree. Each animated group can then be exported to Terragen and the component parts of the animation can be preserved.

A NOTE ABOUT OBJECT ANIMATION

- There is currently only one way to import an animated object into Terragen, which is to import an .obj file for the geometry and a separate .chan file for its animation.
- This limits the complexity of animation that can be imported into Terragen.
- Take an example of an animated aeroplane with a rotating propeller. If the all the geometry for the plane is exported as one .obj, the propeller animation will be lost as Terragen will treat the imported geo as one mesh object. The geometry will have to be exported as two separate .obj files and individual .chan files loaded into each imported .obj in Terragen to preserve the animation.
- To help with this, a feature called *Bake Animated Hierarchy* can separate the geometry according to how it is animated. In the above example, as the propeller animates independently of the fuselage of the plane, it will be separated into its own group which can then be exported.
- The feature will re-group the geometry. ***Save a backup if you need to restore the original hierarchy.***
- This feature is very experimental at the moment. My animation experience is limited, so the animation export functions might not be as flexible as they could be at present. If anyone has any suggestions or find any bugs in the script, please feel free to contact me at cristie@metronet.co.uk.

CAMERA IMPORT

Imports a .chan file exported from a Terragen camera. This will only import into *Camera Rig Basic* setup.

- Note: If you need to export a camera from Terragen with an animated focal length, you will need to set a key for the *Use horizontal fov* parameter at each frame the focal length was keyed at. This is because Terragen takes the Horizontal fov value to write to the .chan file.

CONVERT TAB

A simple conversion tool, written before the FBX features were introduced. An example use would be to place a locator in Maya at the same position as a null in Terragen. Select a locator in Maya, enter the coordinates from the Terragen null and press *Convert* – the locator will snap to the Terragen null position and rotation.

SUSSEGTED WORKFLOWS

- While Terraman can create a World at a variety of scales, the suggested scene scale to work at is 1:100.
- Scale 1:10 would be useful if character assets have been scaled to work in an environment where the scene scale is a useful compromise between environment and character.
- Scale 1:1 could be useful if working with small areas of terrain and characters modelled to a real world scale of 1 maya unit to 1 cm. This ensures cg lighting follows the real world inverse square law.
- The smaller World scales of 1:1000 and 1:10000, are provided for convenience and might be useful if a very large area of terrain is needed.
- Create the model at the world origin in Maya, with all transforms at zero. Then animate, setting key frames. This ensures that when the object is exported as an .obj its transforms can be re-set to world temporarily before exporting.
- Don't freeze translate or rotation transforms on objects to be animated. Scale transforms can be frozen, as they don't get exported via the .chan export.
- If you use the terrain mult feature, parent any objects you wish to export under the main terrain group, before scaling the terrain.
- If an object has moving parts (such as the aeroplane propeller example), export the moving parts separately from the main geometry.