## **Blender 2.49b** How to generate 3D-images?

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### **1** Installation

Blender can be download from the open source community website: http://www.blender.org/download/get-blender/

Please check installation instructions there. 'Python' is not essential to generate 3D-images with 'Blender'.

## 2 Image and data preparation in Present

In Present open the txt-file with: File  $\rightarrow$  Open  $\rightarrow$  choose your txt-file to import it.

Load two images, for instance Topo and UKelvin.

Export the Topo-image as STL-file: File  $\rightarrow$  Export  $\rightarrow$  Save as type: .StL

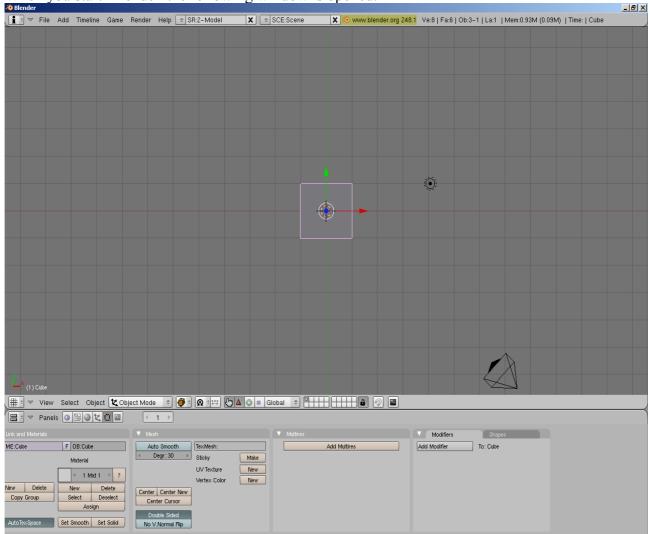
Save the UKelvin-image as JPEG-file: File  $\rightarrow$  Save as  $\rightarrow$  Save as type: .jpg

In 'Blender' the STL-file (Topo) is used to generate the 3D-image and the JPEG-file is used to colorize the image.

## **3** Blender Tutorial

#### 3.1 Import of the STL-file

When you start 'Blender' the following window is opened:



# Erase the cube with Entf (right mouse button) $\rightarrow$ Erase selected Object(s).

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⑦ OK?			te.	I	
	)bject(s)	6			

File  $\rightarrow$  Import  $\rightarrow$  STL...  $\rightarrow$  choose your STL-file to import it.

File Add Timeline Game Reno	ier Help 韋 S	R:2-Model	×	SCE:Scene
New	Ctrl X			
Open	F1			
Open Recent				
Recover Last Session				
Save	Ctrl W			
Save As	F2			
Compress File				
Save Rendered Image	F3			
Screenshot Subwindow	Ctrl F3			
Screenshot All	Ctrl Shift F3			
Save Game As Runtime				
Save Default Settings	Ctrl U			
Load Factory Settings				
Append or Link	Shift F1			
Append or Link (Image Browser)	Ctrl F1			
Import	•	VRML 1.0		
Export	+	DXF		
External Data	•	STL		2
Quit Blender	Cur Q	3D Studio (.3ds) AC3D (.ac)		PN -

Your STL-object is called Mesh in 'Blender'. If the Mesh is too big press N or Object  $\rightarrow$  Transform Properties: Press Link Scale (change X, Y, Z proportionally) and set DimX = 10; DimY and DimZ will be readjust automatically.

So, the whole Mesh should be visible.

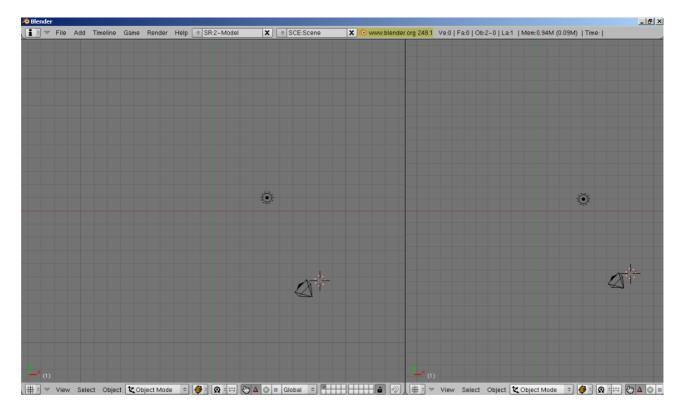
#### 3.2 Creating a second window

To open a new window you have to right click on the black line between the upper and lower window-part. Your mouse should show the following arrow:

Choose Split Area to create the second window.

L× (1) Mesh			
∰t マ Viev	v Select ( Split Area 🕽	Dbject	🗶 Object N
📑 🕈 🔻 Pan	Split Area Join Areas	) <u>z</u> (	<u>i</u> 🖂
ink and Materials	No Header		

A movable grey line appear in the window. Set the grey line at the place where both windows have the desired size. Confirm your adjustment with one click left.



### 3.3 Import of the JPEG-image

Change the window type in the right window with following button:

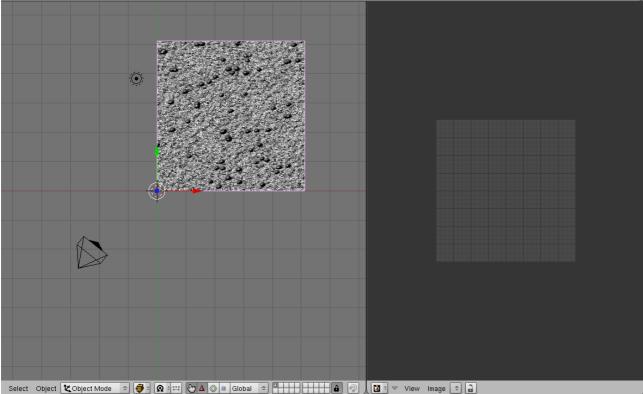
<u></u>

Choose the adjustment UV/Image Editor (Shift + F10).

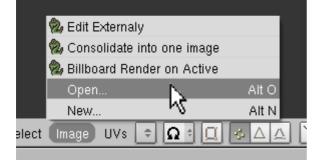
🗱 Video Sequence Edito	r
📓 UV/Image Editor	
🔁 NLA Editor	
🔏 Action Editor	
🔛 Ipo Curve Editor	
# 3D View	
🗰 🔻 View Select	0

#### Left and right window look like this: Add Timeline Game Render Help + SR:2-Model X +

Add Timeline Game Render Help 🗢 SR:2-Model 🗙 🗢 SCE:Scene 🗶 💿 www.blender.org 249.2 Ve:1566726 | Fa:522242 | Ob:3-1 | La:1 | Mem:157.75M (0.09M) | Time: | Mes



To open the JPEG-image click in the right window on Image  $\rightarrow$  Open... or press Alt + O.



Please use images in JPEG-format, otherwise Blender doesn't open it perhaps.

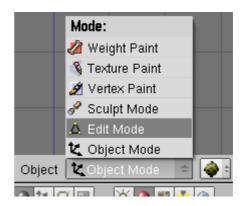
#### 3.4 Project JPEG-image on the Mesh

Select your Mesh (left window) clicking with the right mouse button on it. The Mesh is selected if there is a pink line around it.

Choose the 3D View.

🙎 Action	Editor		
树 Ipo Cu	irve Edi	tor	
# 3D Vie	ew		
	View	Select	Object
	Panels	9 🗄	<u>ا</u> کا 🖸

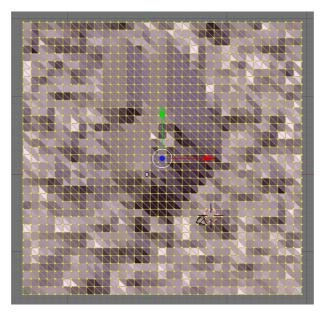
Click on Object Mode to choose the Edit Mode.



Select all with Select  $\rightarrow$  Select/Deselect All or press A.

Random	
Inverse	Ctrl I
Select/Deselect All	A
Border Select	в
Select Mesh 🛕 Edit Mode	÷ 🏟 🕯
. @ 🖂 🕑 🖄 🔤 😽 🎒	1 💐 👶 🙆

All corners and edges of your Mesh are shown in yellow.



Press U (left window) and choose Project From View (Bounds).

#### UV Calculation

Unwrap

Cube Projection Cylinder from View Sphere from View

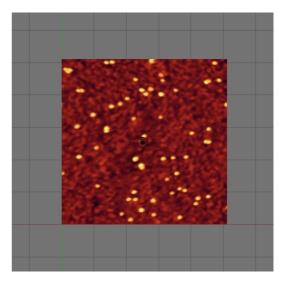
Project From View

Project from View (Bounds)

#### Reset

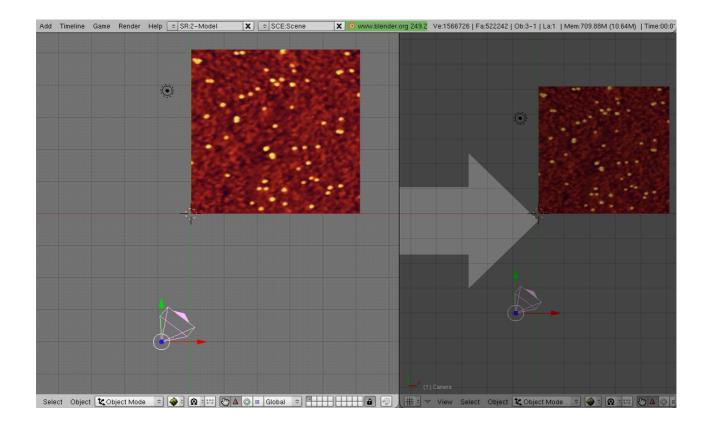
Click project from face Follow Active (quads) Lightmap UVPack Unwrap (smart projections) Accordingly in the UV/Image Editor of the right window a consistent pattern of the image arise.

To project the image on the Mesh press Alt + Z. Change the left window into Object Mode. Hence, the Mesh should become colored.



#### 3.5 Editing the view of the Mesh

Close the right window. For this click with the right mouse button on the black line between the two windows and choose Join Areas. Select with the arrow which window should disappear. In this picture it is the right one:



With the following instructions you got the possibility for editing the view of the Mesh in your own way.

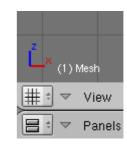
To select an object, the camera or the lamp press with the right mouse button on it.

 $\rightarrow$  In the Object Mode an object is selected if there is a pink line around it.

 $\rightarrow$  In the Edit Mode it is selected if the corners and edges are yellow.

In the bottom left corner you can see which object is selected:

- STL-object is called Mesh
- camera = Camera
- lamp = Lamp



To select all objects (inclusive camera and lamp) press A or Select  $\rightarrow$  Select/Deselect All.

Random	
Inverse	Ctrl I
Select/Deselect All	A
Border Select	в
Select Object 🗶 C	)bject Mode

Changing properties of the Mesh press N or Object  $\rightarrow$  Transform Properties.

- LocX, Y, Z are in this example 0, so the bottom left corner of the mesh is in the middle of the net
- RotX, Y, Z define the rotation of the Mesh
- ScaleX, Y, Z and DimX, Y, Z show the size of the Mesh

S	Duplicate	Shift D 🗙 🔻 Transform Properties
	Delete Keyframe	Alt I OB: Mesh Par:
	Insert Keyframe	LocX: 0.000 A RotX: 0.000
	Snap	► a < LocZ: 0.000 > a < RotZ: 0.000 >
)	Clear/Apply	Cale X: 0.040 Dim X: 10.000
	Mirror	Scale 2: 39.103     Scale 2: 39.103
	Transform	Link Scale
•	Transform Properties	N N N N N N N N N N N N N N N N N N N
ed	Object 🗶 Object Mode	🗢 🏟 🕆 🕵 👬 🔁 🖢 🗠 💷 Global 🗢

• Link Scale can be used to change the size proportionally

With DimZ you can alter the Mesh in z-direction. The larger DimZ the larger become expansion in z-direction. If DimZ is "0" your Mesh is in 2D.

The numeric pad of your keyboard is used to change the perspective of Mesh, camera and lamp:

- G moves the object
- S increased or decreased the object
- R rotates the object
- 7 shows the top view
- 0 shows the camera view
- 1 shows the front, 3 one side
- 2 and 8 rotate the view up and down
- 4 and 6 rotate the view left and right
- Alt and left mouse button rotate the view over X, Y and Z
- F12 shows the Render view
- with + and you can zoom, also possible with the mouse wheel

### 3.6 Adjustment of camera and lamp

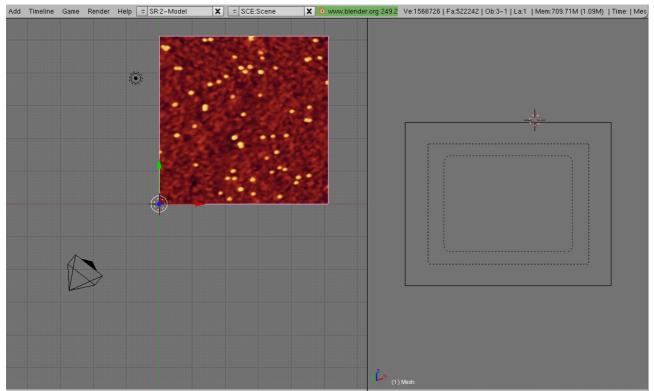
At first create a new second window.

The right window should show the view through the camera (Press 0).

If the camera view only show a grey picture the camera isn't targeted on the object. If the cameraview only show a black picture the lamp is placed on the wrong site so that the object isn't illuminated.

The left window is used to change the camera and the lamp in the 3 planes (X, Y, Z). For this always take a look at the right window to check out the perfect view.

Maybe at first left and right window look like the following:

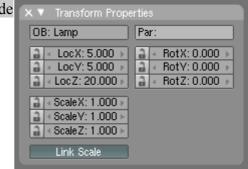


Select Mode Object Kobject Mode Object Kobject Mode Object Kobject Mode Object Kobject Kobject Mode Object Kobject Mode Object Kobject Mode Object Kobject Mode Object Mode Object Kobject Kobject Mode Object Mode Object Kobject Mode Object Mode Object Kobject Mode Object Mode Object Kobject Kobject

Try to find your Mesh through the camera view in the right window by correct positioning of camera and lamp in the left window. Use the following instructions and settings.

A short introduction for positioning of camera and lamp is given in "youtube".

Select lamp with the right mouse button when the Object Mode is on. Movement of the lamp could be affected with G, S, R and the numeric pad of your keyboard. Changing properties could be done with Object  $\rightarrow$  Transform Properties (N). For a first positioning of the lamp transfer these properties.



With F5 adjustments for the lamp could be done. There are five different lamp-typs:

- Lamp creates an omnidirectional point light source; intensity decreases with higher distance
- Area creates a directional area light source; capable for ambient light
- Spot creates a directional cone light source; light is emitted in a specific direction
- Sun creates a constant direction parallel ray light source; intensity is the same and light is emitted in a specific direction
- Hemi creates a 180° constant light source

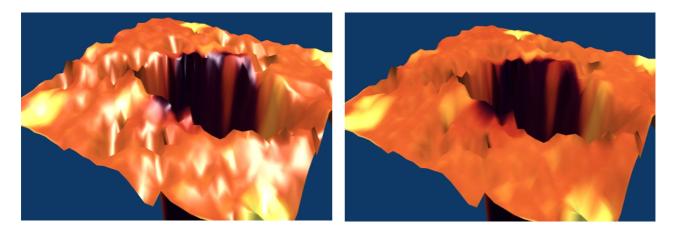
The window Preview shows the adjustment of the selected lamp.

Preview	▼ Lamp	Shadow and Spot Sky/Atmosphere
Lamp Area		Ray Shadow
Spot Sun Hemi	Layer         Negative         No Diffuse         No Specular	Only Shadow Layer

Choose the lamp-typ Sun with following adjustments:

Explanation of some buttons:

- Energy affects the intensity (useful button making your rendered picture brighter or darker)
- R, G, B affects the colors red, green and blue (if necessary)
- Ray Shadow shadows are shown (if necessary)
- No Specular luminescent areas vanish like the following pictures show:



Select camera with the right mouse button when the Object Mode is on. Movements could be affected with G, S, R and the numeric pad of your keyboard. Changing properties could be done with Object  $\rightarrow$  Transform Properties (N). For a first positioning of the camera transfer these properties.

	🗙 🔻 Transform Prop	erties
2	OB: Camera	Par:
	LocX: 10.967	<ul> <li>■ RotX: 44.965 ■</li> <li>■ RotY: 6.755 ■</li> <li>■ RotY: 24.712</li> </ul>
	a < LocZ: 11.136 →	a ∢ RotZ: 24.712 →
	A ≤ Scale V: 1.000 >	
	Link Scale	

With F9 adjustments for the camera could be done. Transfer the following setting:

Explanation of some buttons:

- Lens affects the magnification; the larger the value the nearer the view
- Clipping Start/End affects the range of the camera that means which parts of the object are rendered
- Limits angle of view and range of the camera are shown

	🔻 Camera		
	Lens:	Show:	
	◄ Lens: 39.00 ► D	Limits	Mist
	Orthographic	Name	Title Safe
	◄ Dof Dist: 0.00 →	Passepartout	
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e			
	Clipping Start/End:	I ≤ Size: I	0.500 📃 🕨
a	◄ Start: 0.10  →	Shift:	
	✓ End: 100.00 ►	₹ X: 0.00 ►	< Y: 0.00 ▶

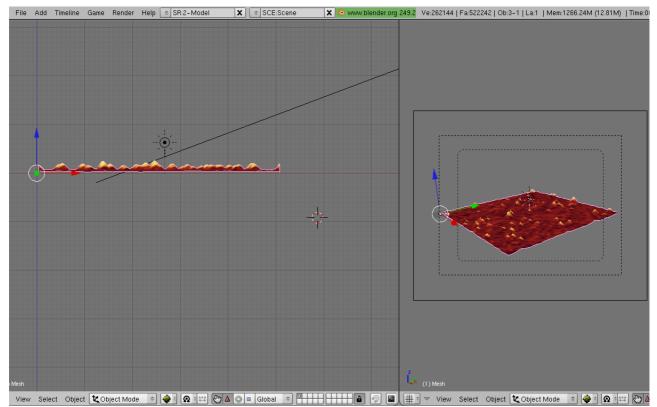
The top view (number 7) and the front view (number 1) give an overview where camera and lamp are located.

 File
 Add
 Timeline
 Game
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 Image: Second Se

Left and right window should look like the following after a successful positioning:

View Select Object Cobject Mode : Co



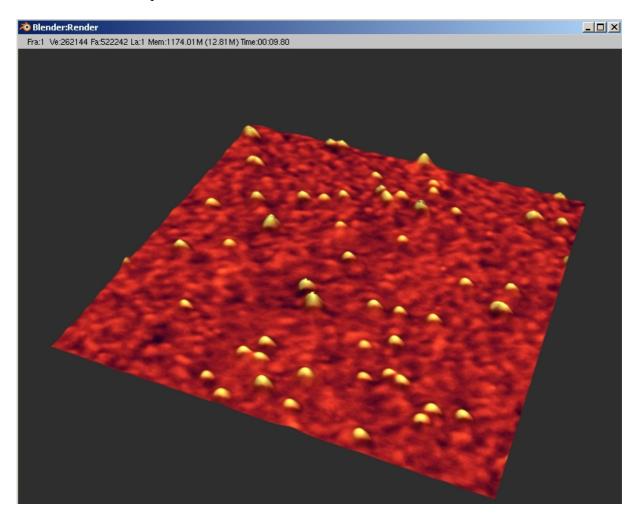
The left window show the front view of the Mesh (number 1). With this view you can also change the distance between lamp and Mesh.

If you are ready positioning camera and lamp press F12 to take a look at the rendered picture. As you can see it is without any color.

To colorize the Render view select the Mesh in the left window. Press F5 in the Buttons	🗶 Object Mode 🗢 🎯 🕯 🔞 🕬 🐨 🗠 💿 🗉 Gl		
window and click on Add New in the Links and Pipeline panel.	፲⊠ ※●≝∻⊛ <1 >		
	Links and Pipeline		
	Link to Object  Add New ME:Mesh Add new data block 0 Mat 0		

Click on Tex Face in the Material panel.	Material		Ramps		F	Links and F	Pipeline		
the material punct.				**		Link to Object		×⇔	F
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	RGB HSV	Col R 0. Spe G 0. Mir B 0. DYN A 1.	800			Render Pipelin Halo Full Osa Radio		insp Strands Traceab	Zoff

The colorized rendered picture look like this:



If the rendered picture is too dark, select the lamp, press F5 and increase the value for energy.

Save the rendered picture with F3.

#### 3.7 How to improve the quality of the rendered picture?

For the improvement of the quality close the Render view. Select the Mesh testing the following settings. After each setting check with the Render view (F12) if it really improves your picture-quality.

The background color could be changed with F5. Press F5 a few times till following setting is opened:

▼ Preview		Vorld	
	Blend		XF
	Paper		
	Real	HoR 0.057	ZeR 0.100
		HoG 0.221	ZeG 0.100
		HoB 0.400	ZeB 0.100
		AmbR 0.000	
		Amb G 0.000	Exp 0.00
		AmbB 0.000	Range 1.00

for grey: HoR 0.204 HoG 0.204 HoB 0.204

In the Render settings (F10) you can also use an image as background.

Instead of *l*/backbuf you can insert your own image. Set a checkmark behind the file-name.

Output	Render Layers
/tmp\	
Extensions	Touch No Overwrite
🗢 No Set Scene	
I ■ Dither: 0.000 ► Edg	e Edge Settings
🚱 Threads: 4 🛛 Disa	ole Tex Free Tex Images
Save Buffe	

To smooth your Mesh tab into Edit Mode and press W.

In this menu choose Remove Doubles to erase unnecessary corners. Afterwards choose Set Smooth to erase edges and make the surface smooth.

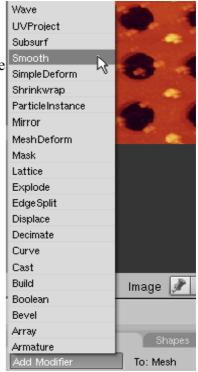
#### Specials Subdivide Subdivide Multi Subdivide Multi Fractal Subdivide Smooth Merge Remove Doubles Hide Reveal Select Swap Flip Normals Smooth Bevel Set Smooth Set Solid Blend From Shape Propagate To All Shapes Select Vertex Path

F9 opens the panel where you can add a modifier, for example Smooth.

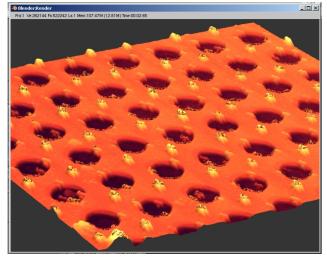
#### Add Modifier $\rightarrow$ Smooth

Transfer the following setting to adjust Factor and Repeat which make your Mesh smoother.

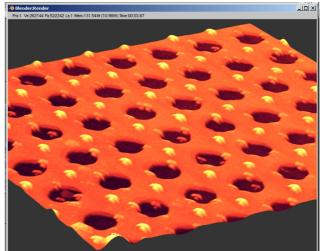
Add Modifier     To: Mesh       ▼ Smooth     □       X     V       Z     Apply	-
X Y Z Apply	
✓ Factor: 1.500 ► Copy	
VGroup:	



#### before modifying



#### after modifying



F5 opens a panel where you can alter reflection and transparency.

Left column:

Ray Mirror switches the reflection on and off Ray Mir affects the power of the reflection Fresnel affects the dependence of the angle of view Fac regulates how strong Fresnel take effect Gloss changes the gloss of the surface Depth affects the number of reflections (how many times a beam is reflected)

Right column:

Ray Transp switches the transparency on and off IOR equates to refraction index of the material Fresnel affects the angle dependence

Fac regulates how strong Fresnel take effect

Gloss affects how focused or out of focus refractions are

Shaders Mirror Transp SSS			
Ray Mirror	Ray Transp		
Ray Mir: 0.00	IOR: 1.00		
Fresnel: 0.0	Fresnel: 0.0		
Fac: 1.00	Fac: 1.25		
Gloss: 1.000	Gloss: 1.000		
Aniso: 0.000			
	✓ Depth: 2 ▶		
I ■ Depth: 2 →	Filter: 0.000		