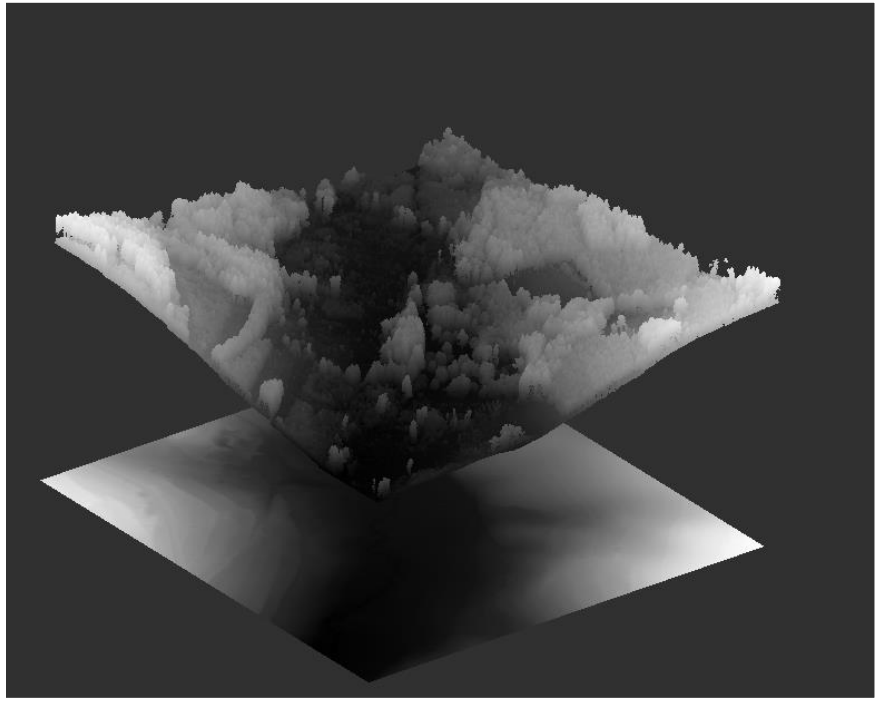
Airborne LIDAR tutorial

Creation of DTM, DSM and DHM



English version - 18/11/2022 - Created by L. Dietz and A. Piboule (ONF)

Contents

Click on the step to go directly to it

OBJECTIVE

Presentation of a processing chain that allows the creation of a digital terrain model (DTM), of a digital surface model (DSM) and a digital height model (DHM), from a Airborne LIDAR dataset, on plots.

REQUIRES

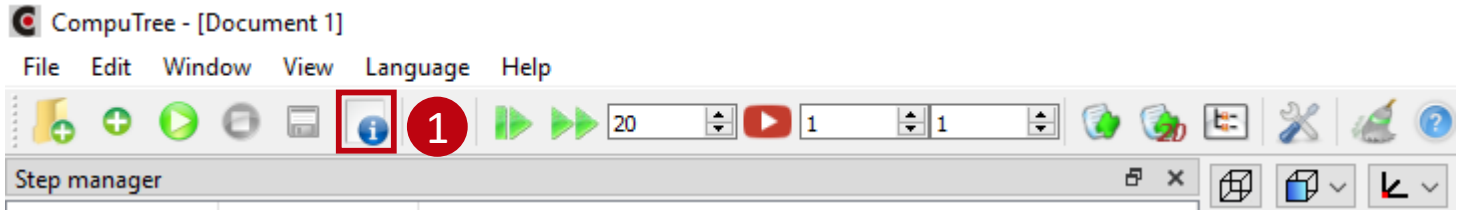
LAS files containing LIDAR point clouds corresponding to the plots. To avoid edge effects in the DTM, the point clouds should include a buffer area. The points must be classified (at least separation of ground/above ground points).

RESULTS

- Raster in GeoTIFF format for the digital terrain model
- Raster in GeoTIFF format for the digital surface model
- Raster in GeoTIFF format for the digital height model

How to cite this processing chain

The software and plugins used in this script are subject to intellectual property. For citing them, click, at the end of the creation of the script, on 1. This button allows you to export the script as a documented version.



The plugins used here :

- [**ONF Plugin**]
  Piboule Alexandre.2022. *ONF Plugin for Computree*. Office National des Forêts, RDI Department.
  ONF plugin web page.

- [**IGN-LIF Plugin**]
  Vega Cédric. 2017. *IGN-LIF Plugin forComputree*. Institut National de l'Information Géographique et Forestière, Laboratoire des Inventaires Forestiers.
  IGN-LIF plugin web page.

DTM computing method

The DTM can be calculated using two methods in Computree. The first method, to be preferred, is detailed in this tutorial, the second method is available at the end of the tutorial.

DTM METHOD 1: USE OF A TIN (TRIANGULATED IRREGULAR NETWORK)

This is a 2D triangulation of ground points. The value of each pixel of the DTM (resolution to be defined) corresponds to the altitude of the triangle located in the centre of the cell.

If possible, this method should be preferred as it provides a more refined DTM.

The calculation time increases with the point density and the chosen raster resolution.

DTM METHOD 2: DIRECT COMPUTING OF THE DTM FROM THE GROUND POINTS

For a given resolution, each pixel takes the altitude of the lowest point within its extent.

Less refined method than method 1, but the computation time is faster and constant whatever the point density and the raster resolution chosen.

Methods for computing DSM and DHM

DSM

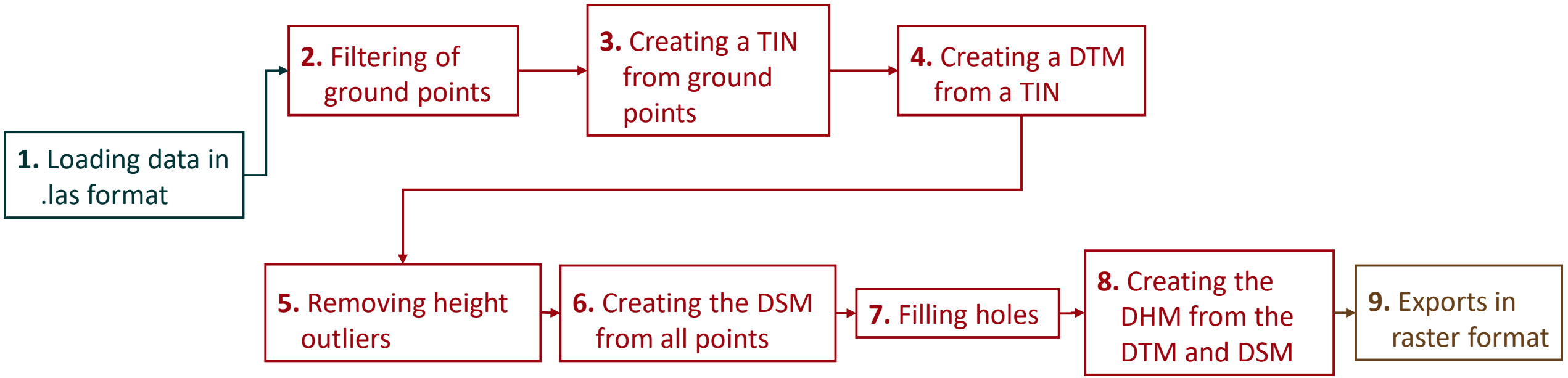
For a defined resolution, each pixel takes the value of the altitude of the highest point located within its extent. The resolution of the raster therefore has an impact on the accuracy of the DSM results.

DHM

The DHM is obtained by subtraction from DTM to DSM:

DHM = DSM - DTM

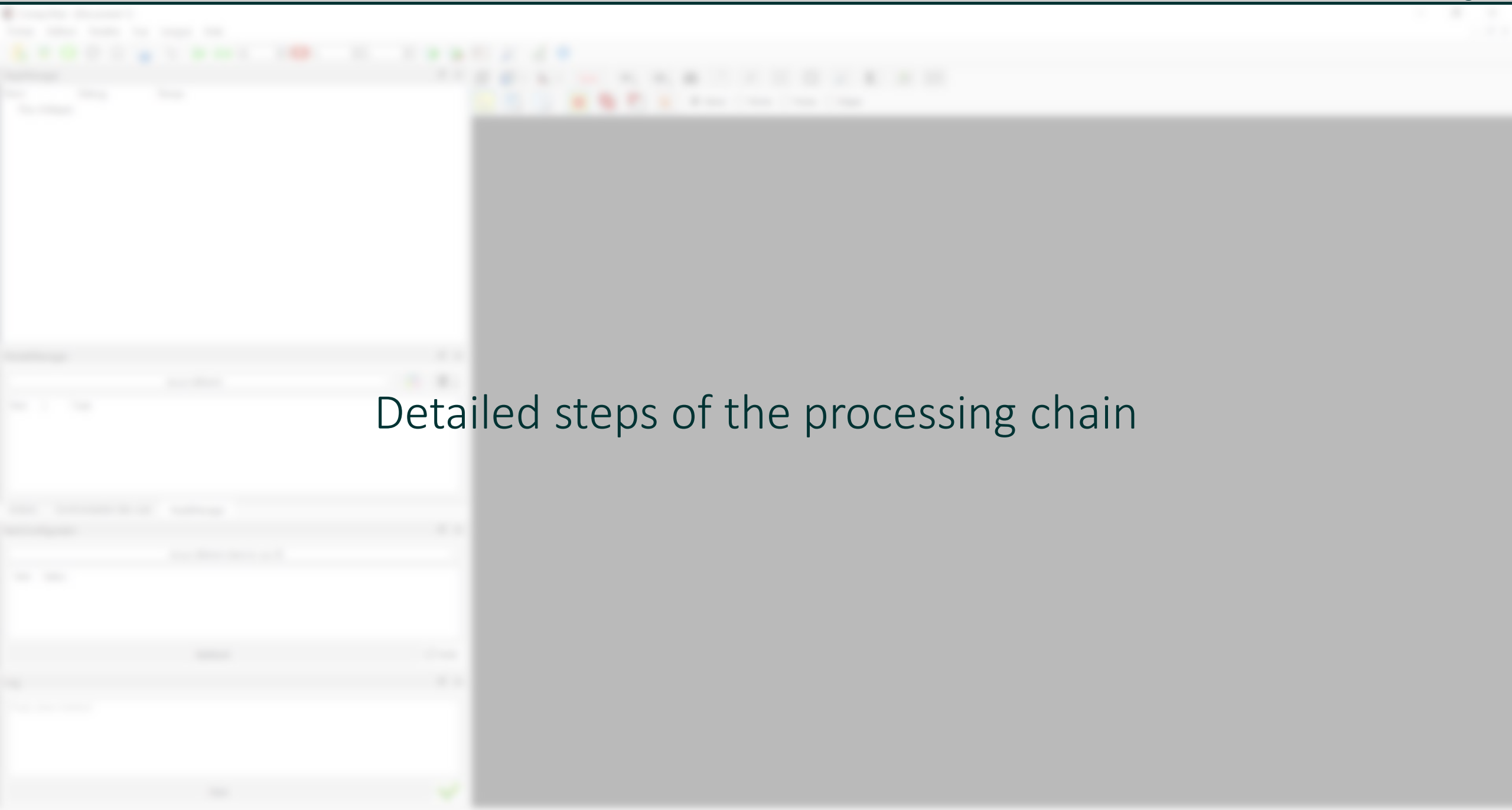
Main steps of the processing chain



I. Loading data

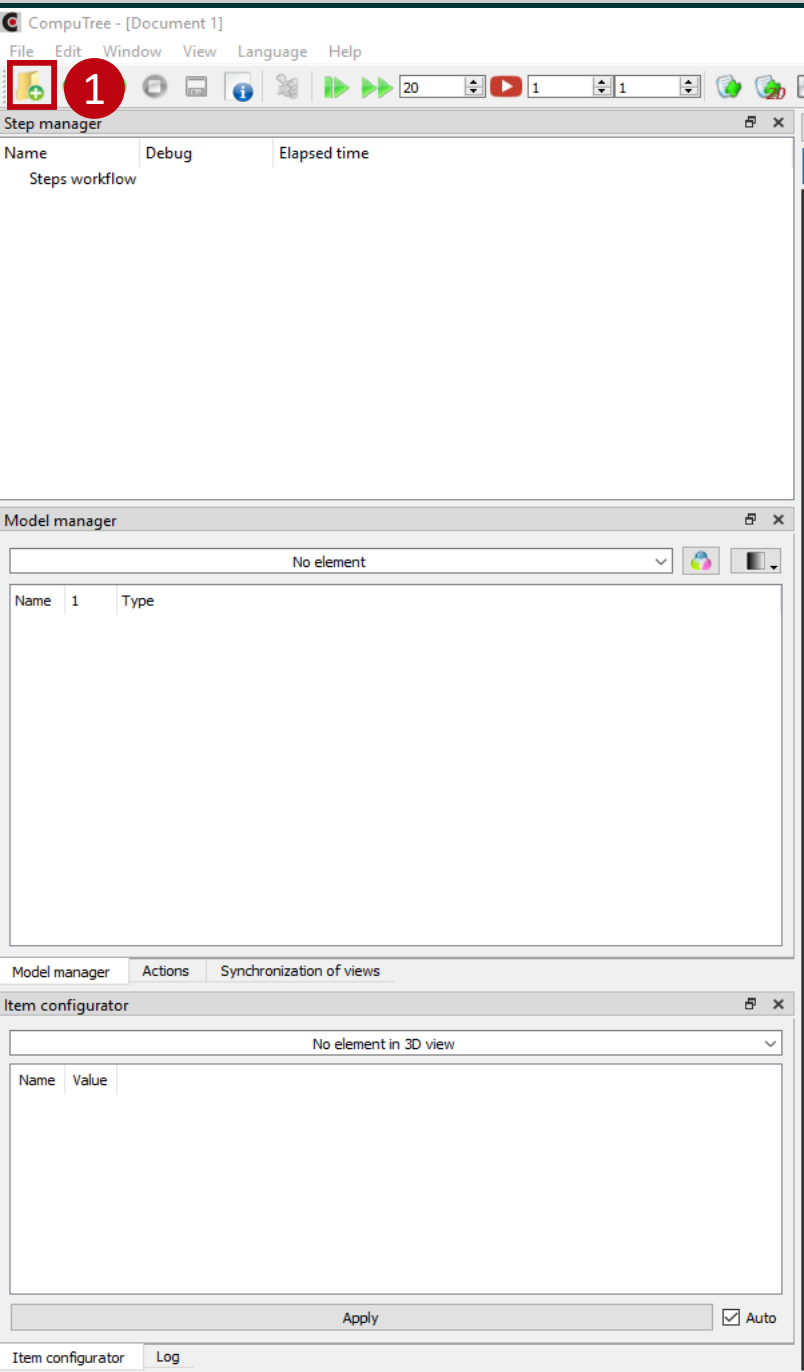
II. Creation of DTM, DSM and DHM

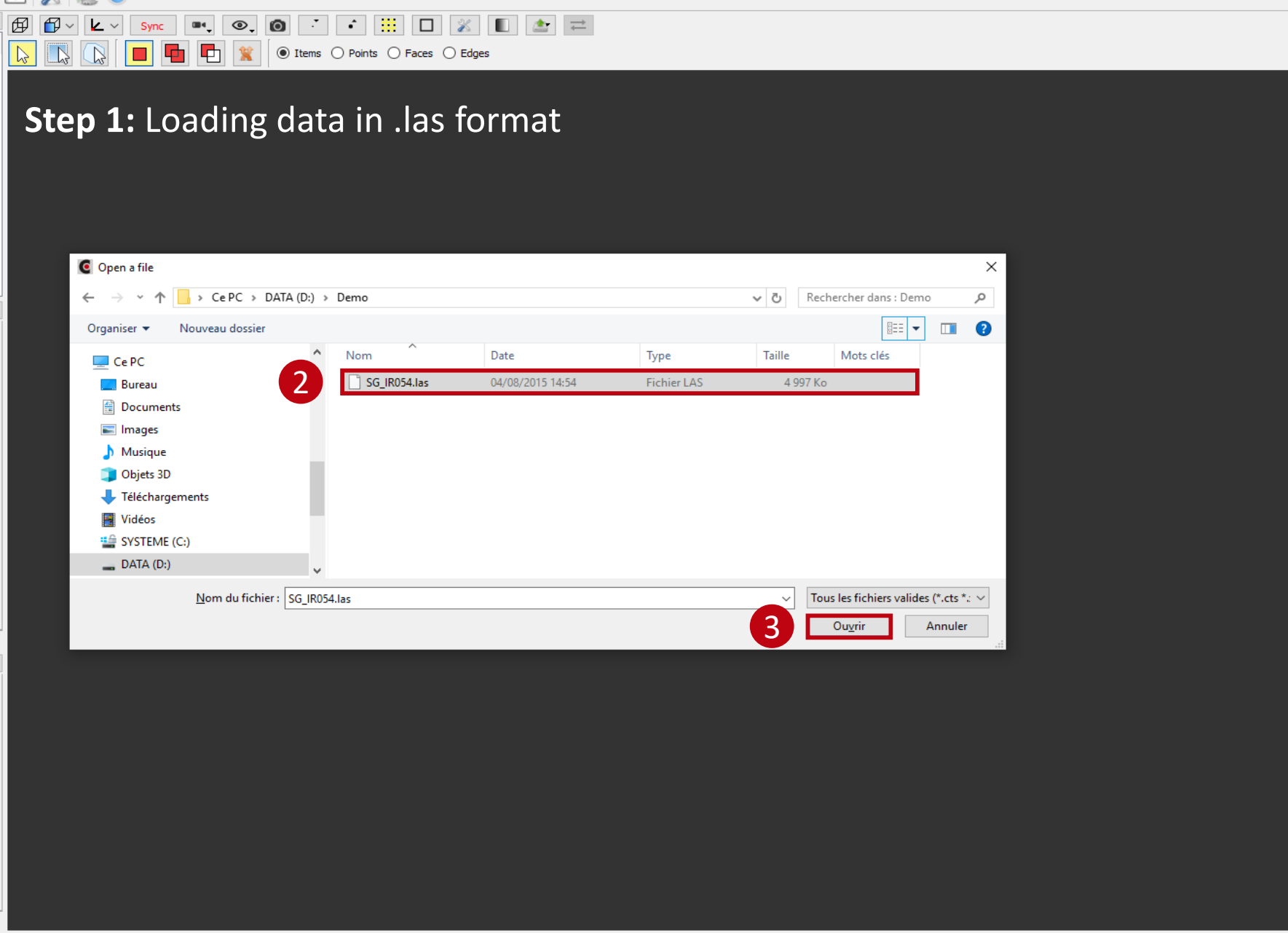
III. Export of DTM, DSM and DHM

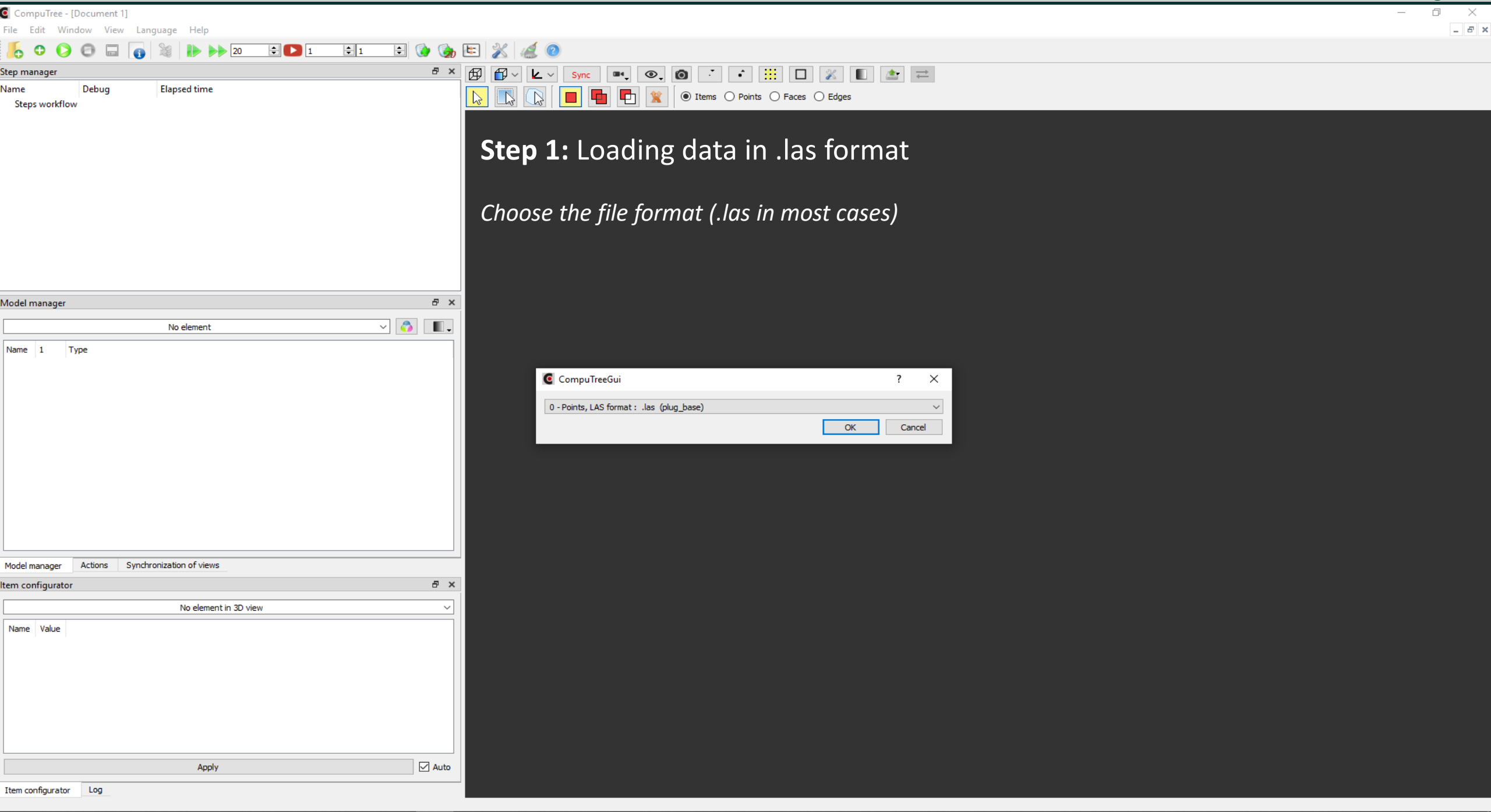


Detailed steps of the processing chain

Step 1: Loading data in .las format






CompuTree - [Document 1]
File Edit Window View Language Help
Step manager
Name Debug Elapsed time
Steps workflow
Model manager
No element
Name 1 Type
Model manager Actions Synchronization of views
Item configurator
No element in 3D view
Name Value
Apply
Auto
Item configurator Log
Sync
Items Points Faces Edges
Step 1: Loading data in .las format
Choose the file format (.las in most cases)
CompuTreeGui
0 - Points, LAS format : .las (plug_base)
OK
Cancel

CompuTree - [Document 1]

File Edit Window View Language Help

Step manager

Name | Debug | Elapsed time

Steps workflow

1 - Points, LAS format : .las (SG_IR054.las) 0h:0m:0s:350ms

Result

Model manager

Result (1)

Name	1	Type
Result		
Root Group		Group
Scene	☑	Point scene
LAS attributes		LAS point attributes
Return Number		Point CT_Reader_LASV2::PointCore6_10 attributes
Number of Returns		Point CT_Reader_LASV2::PointCore6_10 attributes
Classification Flags		Point CT_Reader_LASV2::PointCore6_10 attributes
Scanner Channel		Point CT_Reader_LASV2::PointCore6_10 attributes
Scan Direction Flag		Point CT_Reader_LASV2::PointCore6_10 attributes
Edge of Flight Line		Point CT_Reader_LASV2::PointCore6_10 attributes
Intensity		Point quint16 attributes
Classification		Point quint8 attributes
User Data		Point quint8 attributes
Point Source		Point quint16 attributes
Scan Angle		Point qint16 attributes

Model manager | Actions | Synchronization of views

Item configurator

Item with points

	Name	Value
1	Points	☑ Activate
2	Bounding Shape	☐ Activate
3	Centre of the Bounding Shape	☐ Activate

Apply ☑ Auto

Item configurator | Log

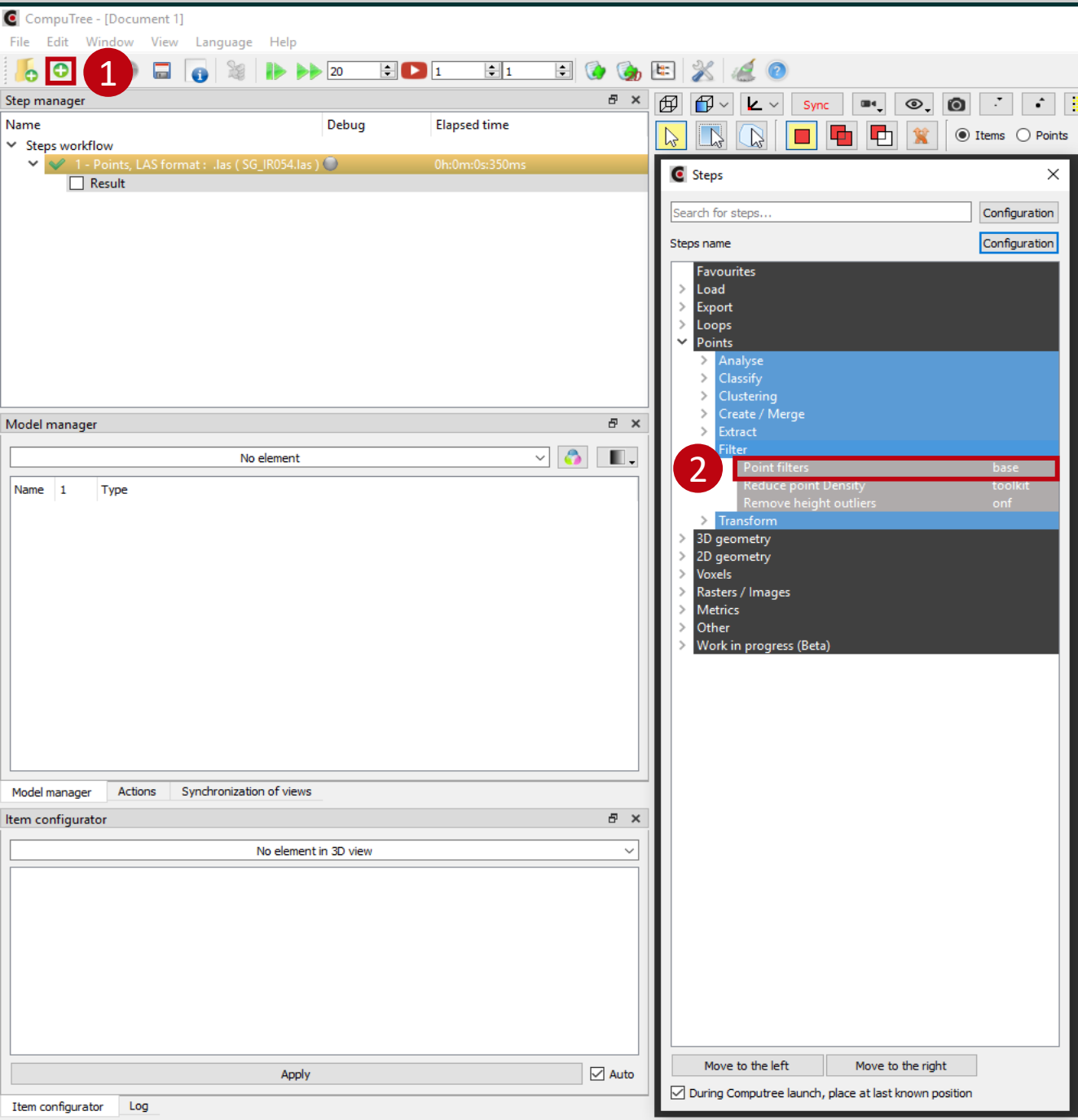
Sync

Items Points Faces Edges

Performing this step loads the data into memory.
It is possible to view the loaded data,
the steps are :

1. Start processing
2. Selection of results to be viewed
3. Data selection
4. Focus view on data

** The execution of the steps is not mandatory for the creation of the rest of the script*

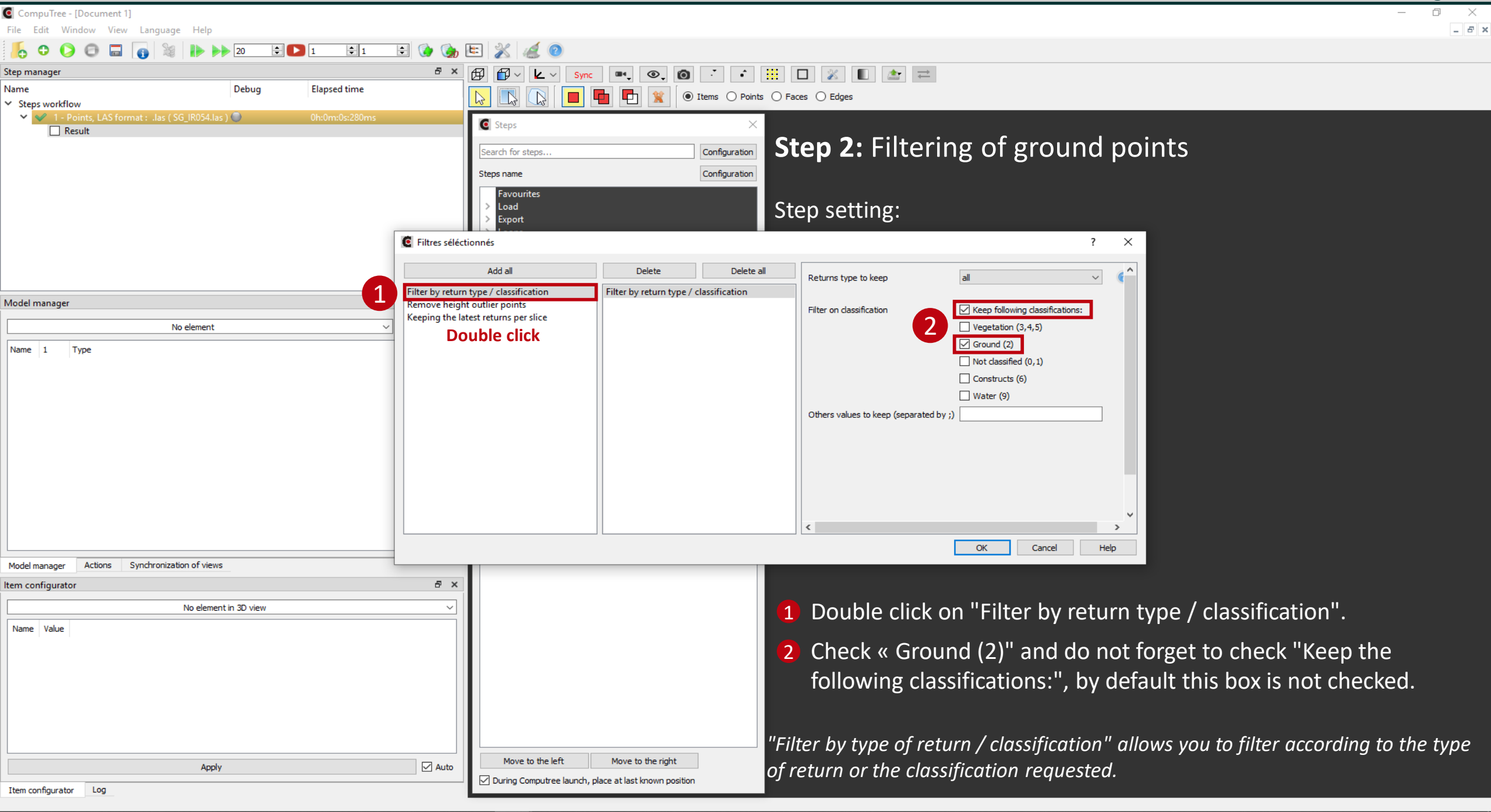


Step 2: Filtering of ground points

1. Open "Add a step".
   Go to the "Points" tab then "Filter".
2. Double click on "Point filters"

This step allows you to filter points according to different modalities (type of return, classification, outliers or last returns per slice).

Here, this step is used to isolate the ground points.



Step 2: Filtering of ground points

Step setting:

1. Double click on "Filter by return type / classification".
2. Check « Ground (2)" and do not forget to check "Keep the following classifications:", by default this box is not checked.

"Filter by type of return / classification" allows you to filter according to the type of return or the classification requested.

CompuTree - [Document 1]

File Edit Window View Language Help

1

Step manager

Name	Debug	Elapsed time
Steps workflow		
1 - Points, LAS format : .las (SG_IR054.las)		0h:0m:0s:350ms
Result		
2 - Point filters		0h:0m:0s:82ms
Result/CT_AbstractResult/CT_ResultGroup		

2

Model manager

Result/CT_AbstractResult/CT_ResultGroup (2)

Name	1	Type
User Data	☐	Point quint8 attributes
Point Source	☐	Point quint16 attributes
Scan Angle	☐	Point qint16 attributes
GPS Time	☐	Point double attributes
Color	☐	Point color attributes
Red	☐	Point quint16 attributes
Green	☐	Point quint16 attributes
Blue	☐	Point quint16 attributes
Wave Packet Descriptor Index	☐	Point quint8 attributes
Byte Offset To Waveform Data	☐	Point quint64 attributes
Waveform Packet Size In Bytes	☐	Point quint32 attributes
Return Point Waveform Location	☐	Point float attributes
NIR	☐	Point quint16 attributes
File header	☐	LAS Header
Ground	☑	Point scene

3

Model manager | Actions | Synchronization of views

Item configurator

Item with points

	Name	Value
1	Points	☑ Activate
2	Bounding Shape	☐ Activate
3	Centre of the Bounding Shape	☐ Activate

Apply ☑ Auto

Item configurator | Log

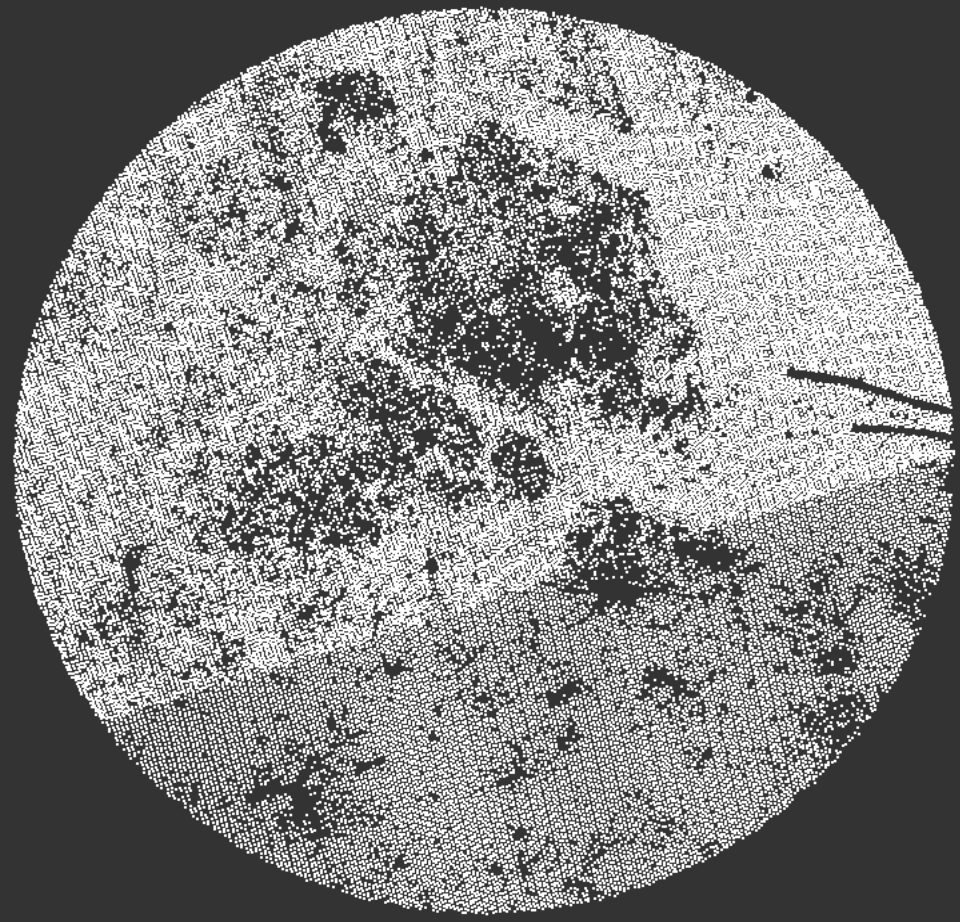
4

5

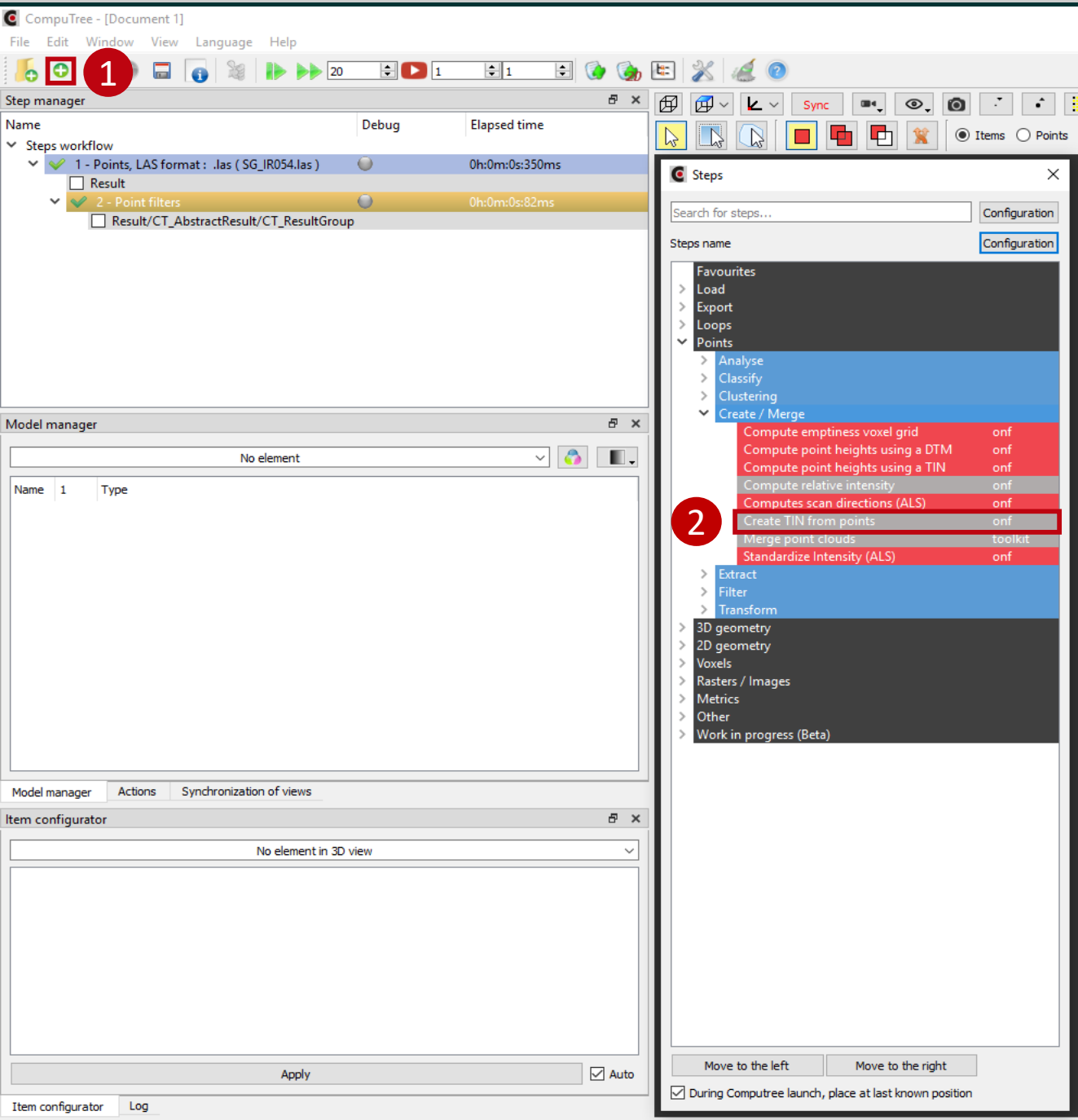
Sync

Items Points Faces Edges

It is possible to view the filtered ground points.



** The execution of the steps is not mandatory for the creation of the rest of the script*



Step 3: Creating a TIN from ground points

1. Open "Add a step".
   Go to the "Points" tab and then "Create / Merge".
2. Double click on "Create TIN from points".

This step creates a Triangulated Irregular Network (TIN) from the ground points.

Configuration des résultats d'entrée of step "Create TIN from points".

Name of the results	Step	Help
Ground points		
(2) Point filters		

1

Step 3: Creating a TIN from ground points

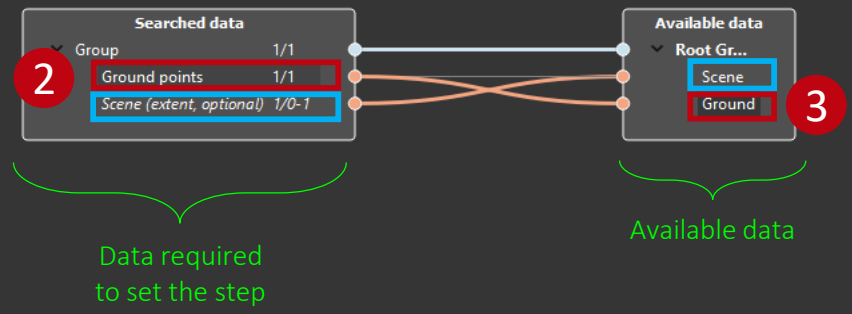
The "searched data" ground points must be linked to the "available data" ground.

1. Select results (*tick the appropriate box*)

   Then, as many times as there are searched elements:

   2. Select the required data (*click on the name of the data wanted*)
   3. Select among the data entries, the one to be used (*click on the name of the available data*)

4. Validate the choice



This window appears when there is more than one compatible input data to set up the step. In this case, it is necessary to manually indicate the input data to be used.
Here there are two pieces of data being searched:

- *The ground points which will be used to build the TIN*
- *The extent to define the area covered by the TIN. The complete scene must be selected*

4 OK Cancel

CompuTree - [Document 1]

File Edit Window View Language Help

1

Step manager

Name	Debug	Elapsed time
Steps workflow		
1 - Points, LAS format : .las (SG_IR054.las)		0h:0m:0s:350ms
Result		
2 - Point filters		0h:0m:0s:82ms
Result/CT_AbstractResult/CT_ResultGroup		
3 - Create TIN from points		0h:0m:2s:302ms
Result/CT_AbstractResult/CT_ResultGroup		

2

Model manager

Result/CT_AbstractResult/CT_ResultGroup (3)

Name	1	Type
Point Source	☐	Point quint16 attributes
Scan Angle	☐	Point qint16 attributes
GPS Time	☐	Point double attributes
Color	☐	Point color attributes
Red	☐	Point quint16 attributes
Green	☐	Point quint16 attributes
Blue	☐	Point quint16 attributes
Wave Packet Descriptor Index	☐	Point quint8 attributes
Byte Offset To Waveform Data	☐	Point quint64 attributes
Waveform Packet Size In Bytes	☐	Point quint32 attributes
Return Point Waveform Location	☐	Point float attributes
NIR	☐	Point quint16 attributes
File header	☐	LAS Header
Ground	☐	Point scene
TIN	☑	2D triangulation

3

Model manager | Actions | Synchronization of views

Item configurator

Triangulation2D

	Name	Value
1	Bounding Shape	☐ Activate
2	Centre of the Bounding Shape	☐ Activate
3	Point size (Bounding Shape)	10
4	Points	☑ Activate
5	Edges	☑ Activate

Apply ☑ Auto

Item configurator | Log

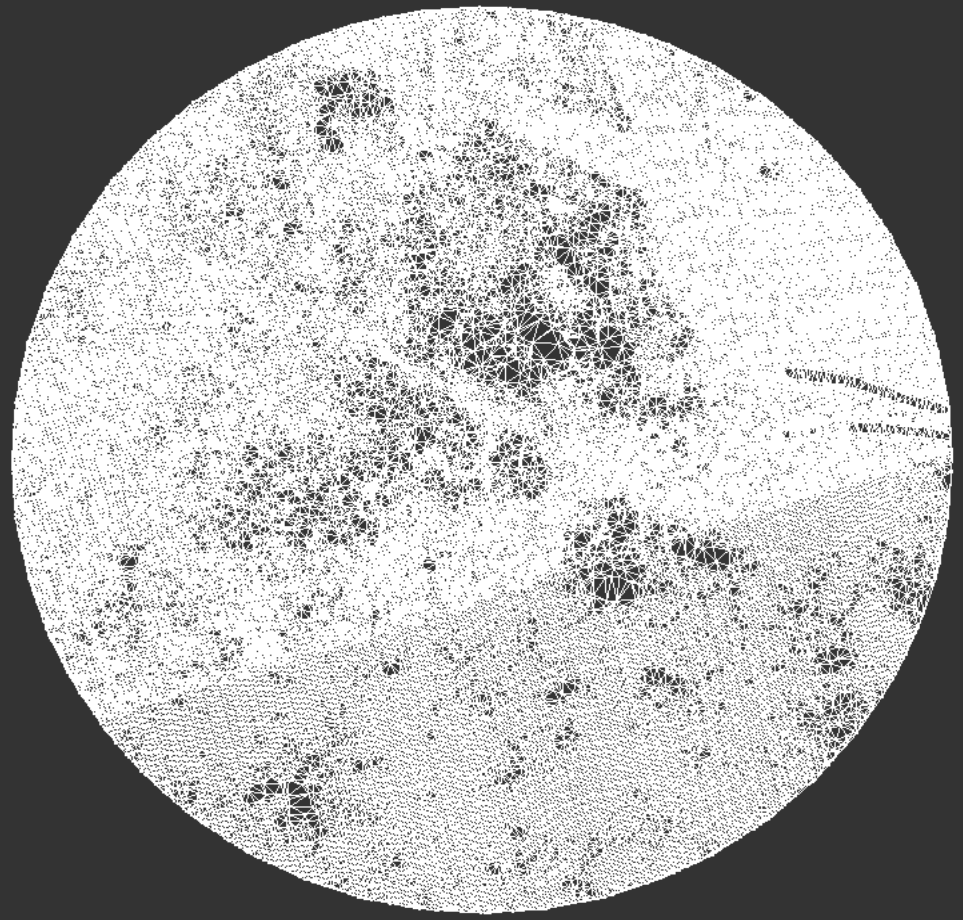
4

5

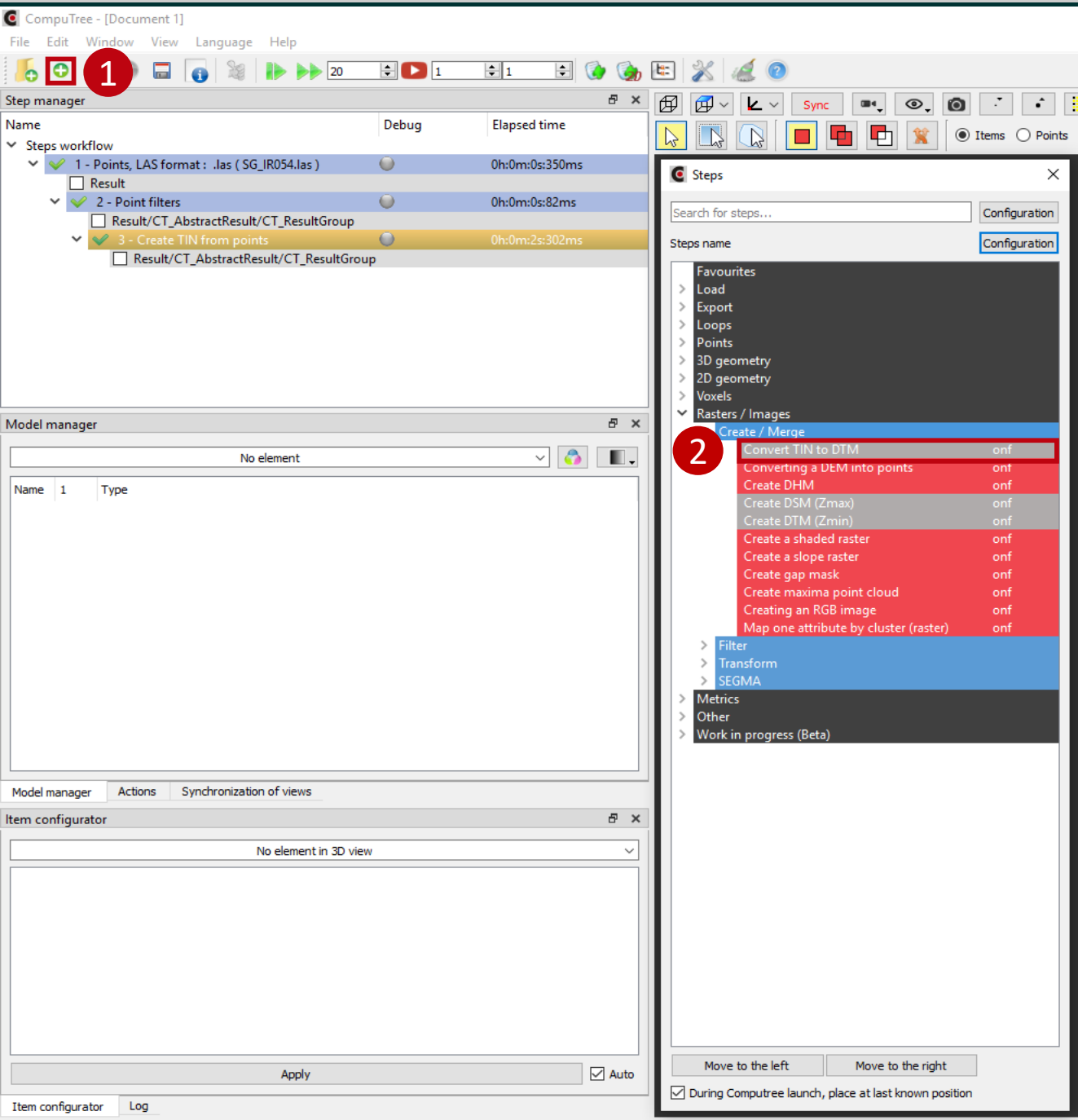
Sync

Items Points Faces Edges

It is possible to view the TIN created from the ground points.



** The execution of the steps is not mandatory for the creation of the rest of the script*



Step 4: Creating a DTM from a TIN

1. Open "Add a step".
   Go to the "Rasters / Images" tab, then "Create / Merge".
2. Double click on "Convert TIN to DTM".

This step creates a DTM (raster) from the TIN.

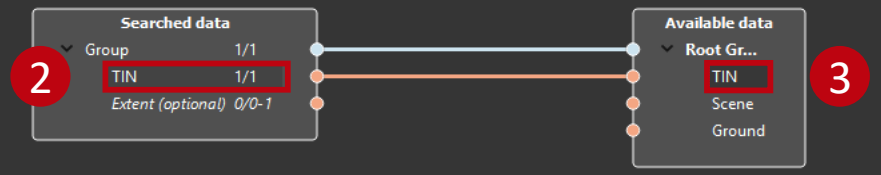
Configuration des résultats d'entrée of step "Convert TIN to DTM".

Name of the results	Step	Help
TIN		
	(3) Create TIN from points	

1

Step 4: Creating a DTM from a TIN

Select TIN and unselect the extent. This option is used for cases with a predefined extent (e.g. extent of a tile)



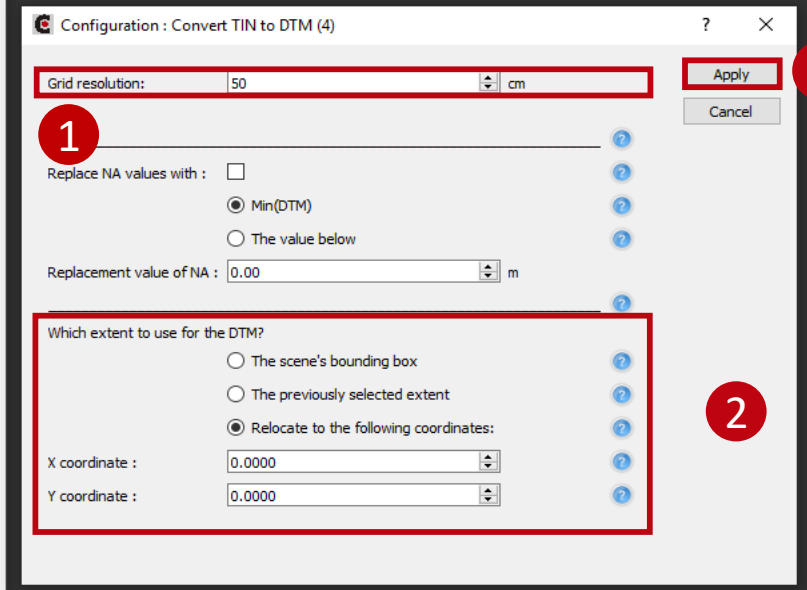
4

OK Cancel

Step 4: Creating a DTM from a TIN

Step setting:

1 Choose the resolution of the raster, 2 check "Relocate to the following coordinates" for the corner setting and 3 apply.



The choice of the extent to be used for the DTM, defines the spatial setting of the raster.

CompuTree - [Document 1]

File Edit Window View Language Help

1

Step manager

Name	Debug	Elapsed time
Steps workflow		
1 - Points, LAS format : .las (SG_IR054.las)		0h:0m:0s:350ms
Result		
2 - Point filters		0h:0m:0s:82ms
Result/CT_AbstractResult/CT_ResultGroup		
3 - Create TIN from points		0h:0m:2s:302ms
Result/CT_AbstractResult/CT_ResultGroup		
4 - Convert TIN to DTM		0h:0m:0s:506ms
Result/CT_AbstractResult/CT_ResultGroup		

2

Model manager

Result/CT_AbstractResult/CT_ResultGroup (4)

Name	1	Type
Scan Angle	☐	Point qint16 attributes
GPS Time	☐	Point double attributes
Color	☐	Point color attributes
Red	☐	Point quint16 attributes
Green	☐	Point quint16 attributes
Blue	☐	Point quint16 attributes
Wave Packet Descriptor Index	☐	Point quint8 attributes
Byte Offset To Waveform Data	☐	Point quint64 attributes
Waveform Packet Size In Bytes	☐	Point quint32 attributes
Return Point Waveform Location	☐	Point float attributes
NIR	☐	Point quint16 attributes
File header	☐	LAS Header
Ground	☐	Point scene
TIN	☐	2D triangulation
DTM	☑	Raster<float>

3

Model manager | Actions | Synchronization of views

Item configurator

Raster<float>

	Name	Value
1	Bounding Shape	☐ Activate
2	Centre of the Bounding Shape	☐ Activate
3	Point size (Bounding Shape)	10
4	Raster mode	☑ Activate
5	Raster mode: Set the Z level	☐ Activate

Apply ☑ Auto

Item configurator | Log

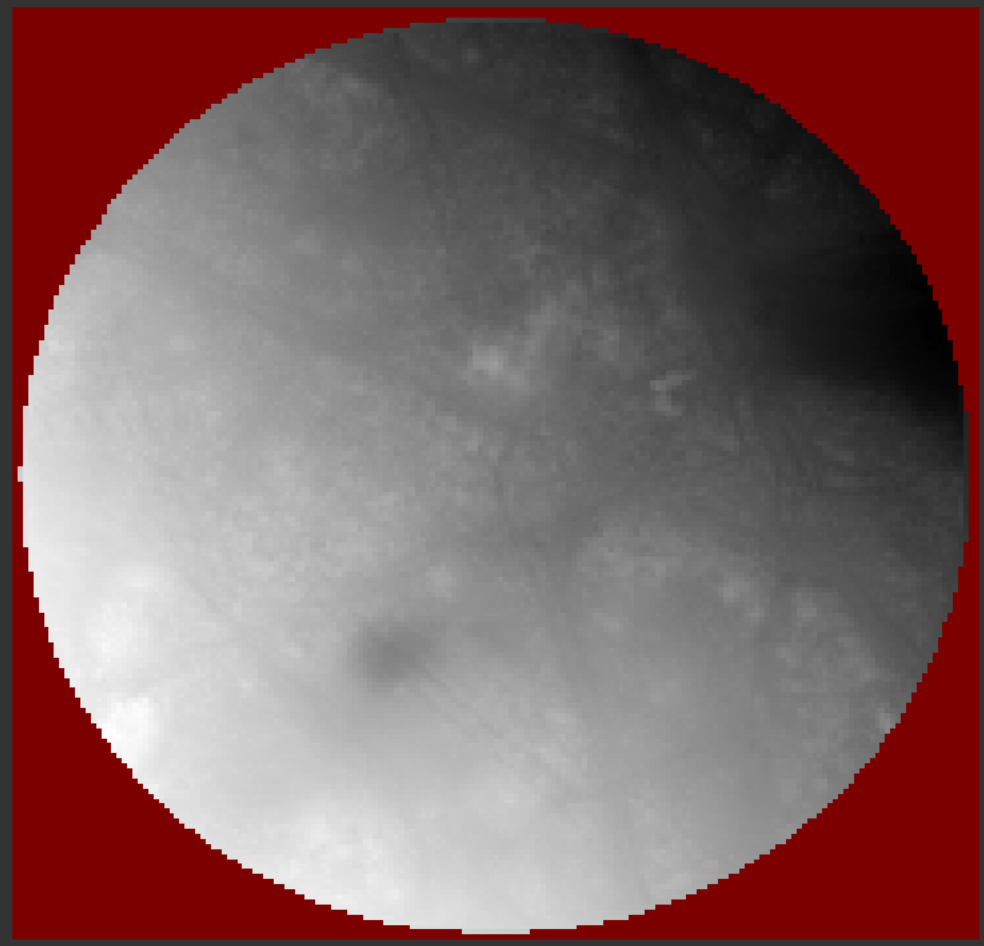
4

5

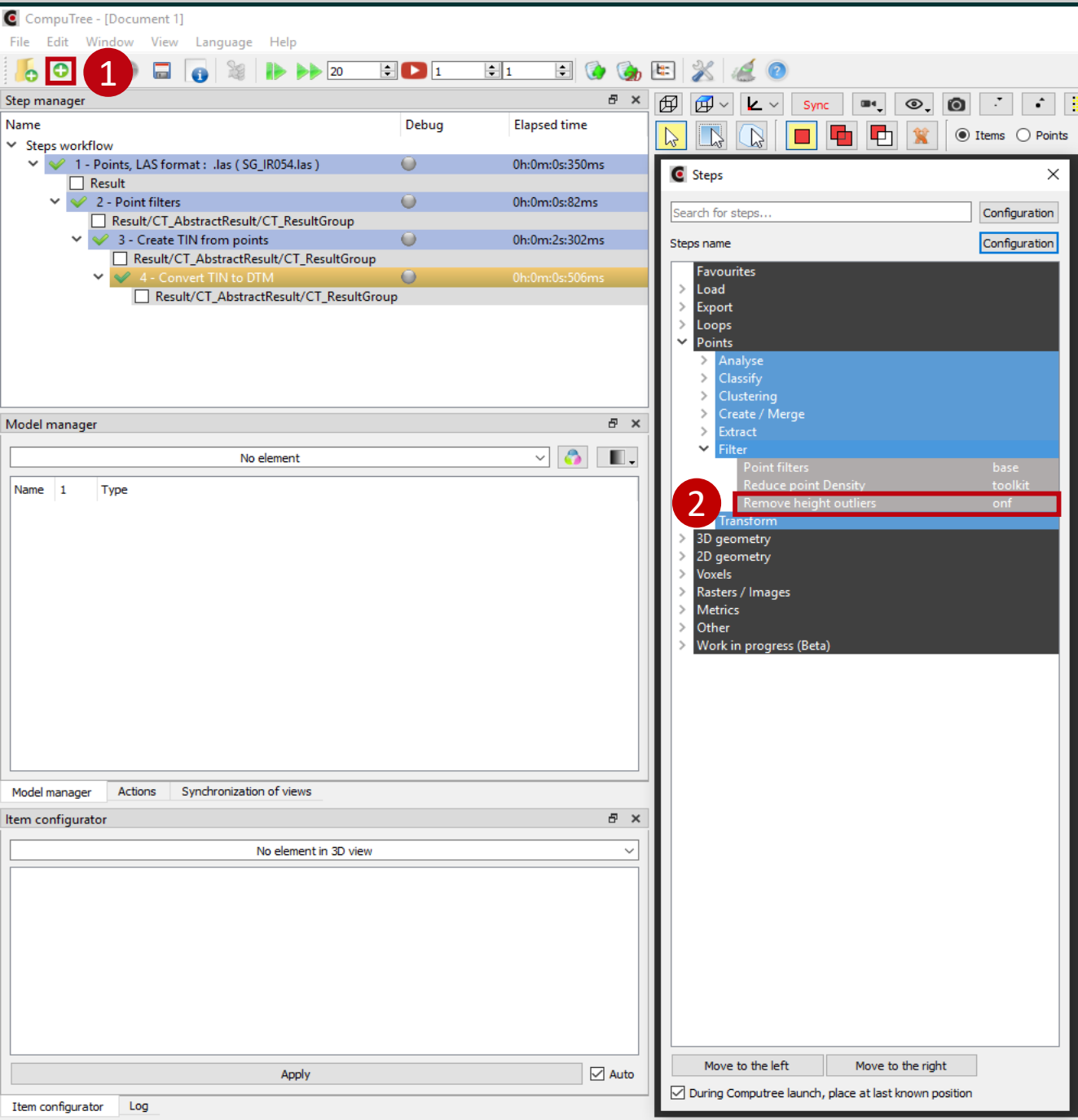
Sync

Items Points Faces Edges

It is possible to view the created DTM.



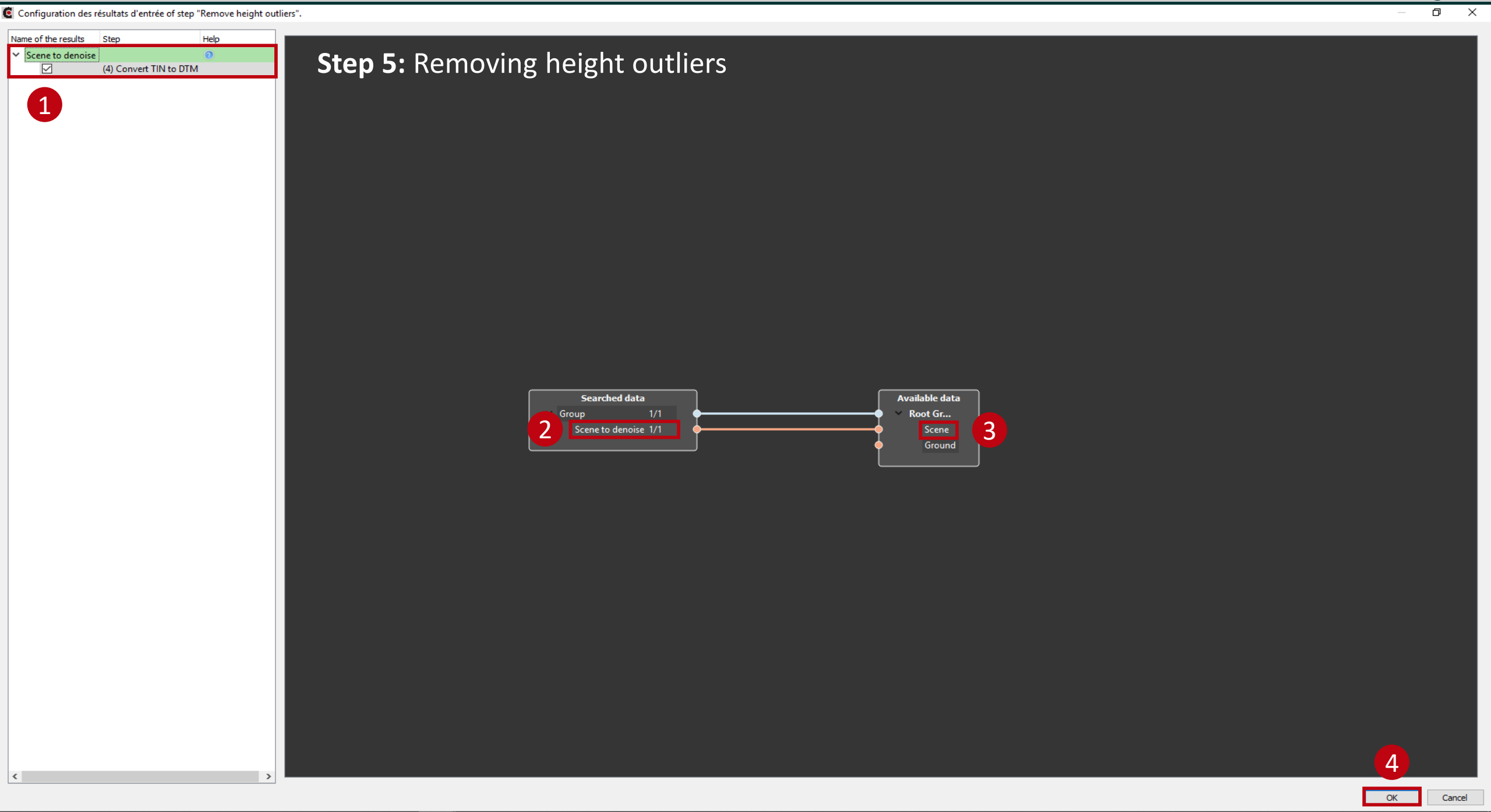
** The execution of the steps is not mandatory for the creation of the rest of the script*

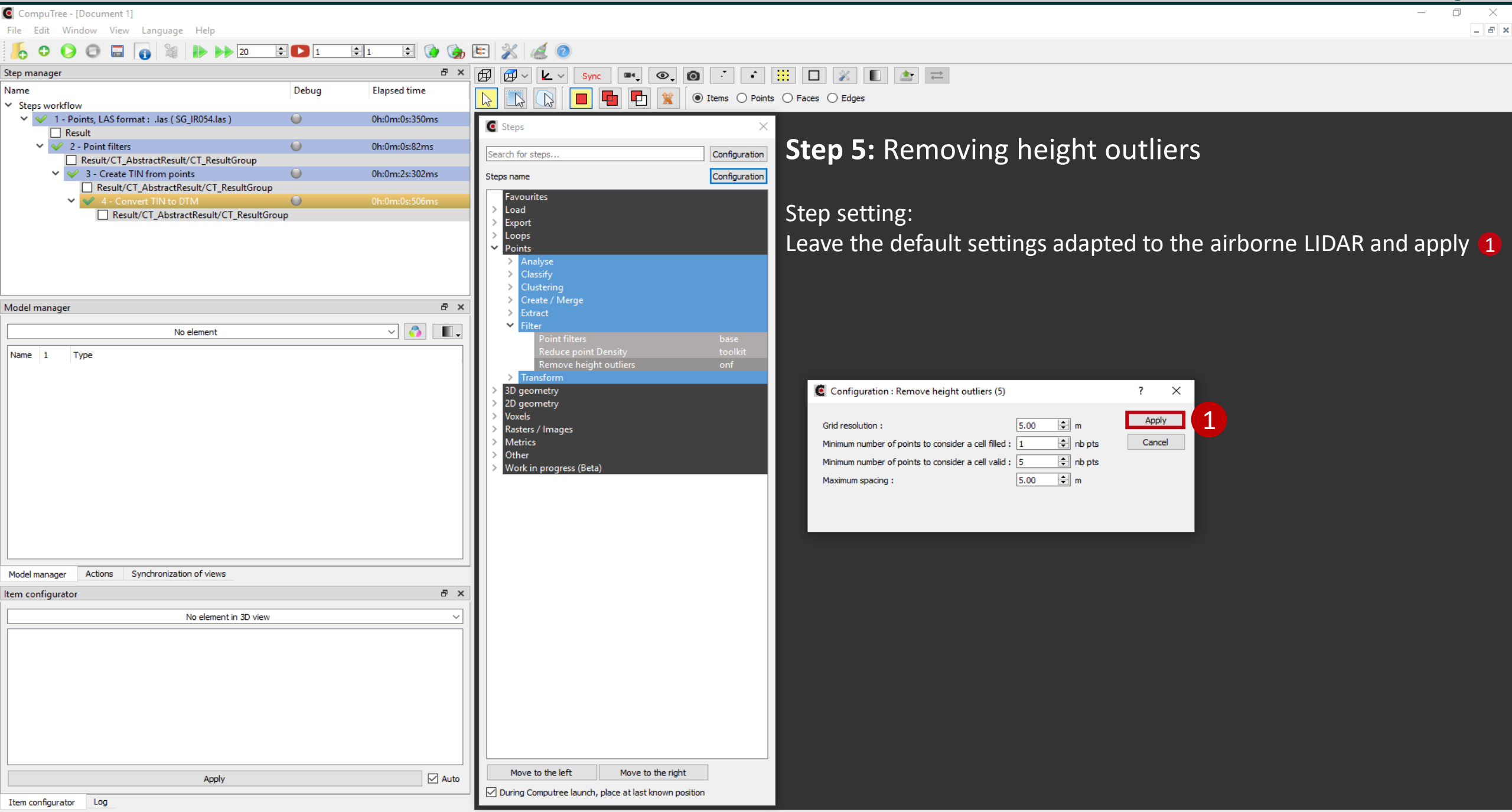


Step 5: Removing height outliers

1. Open "Add a step".
   Go to the "Points" tab then "Filter".
2. Double click on "Remove height outliers".

This step removes any outliers that may be located above the point cloud.

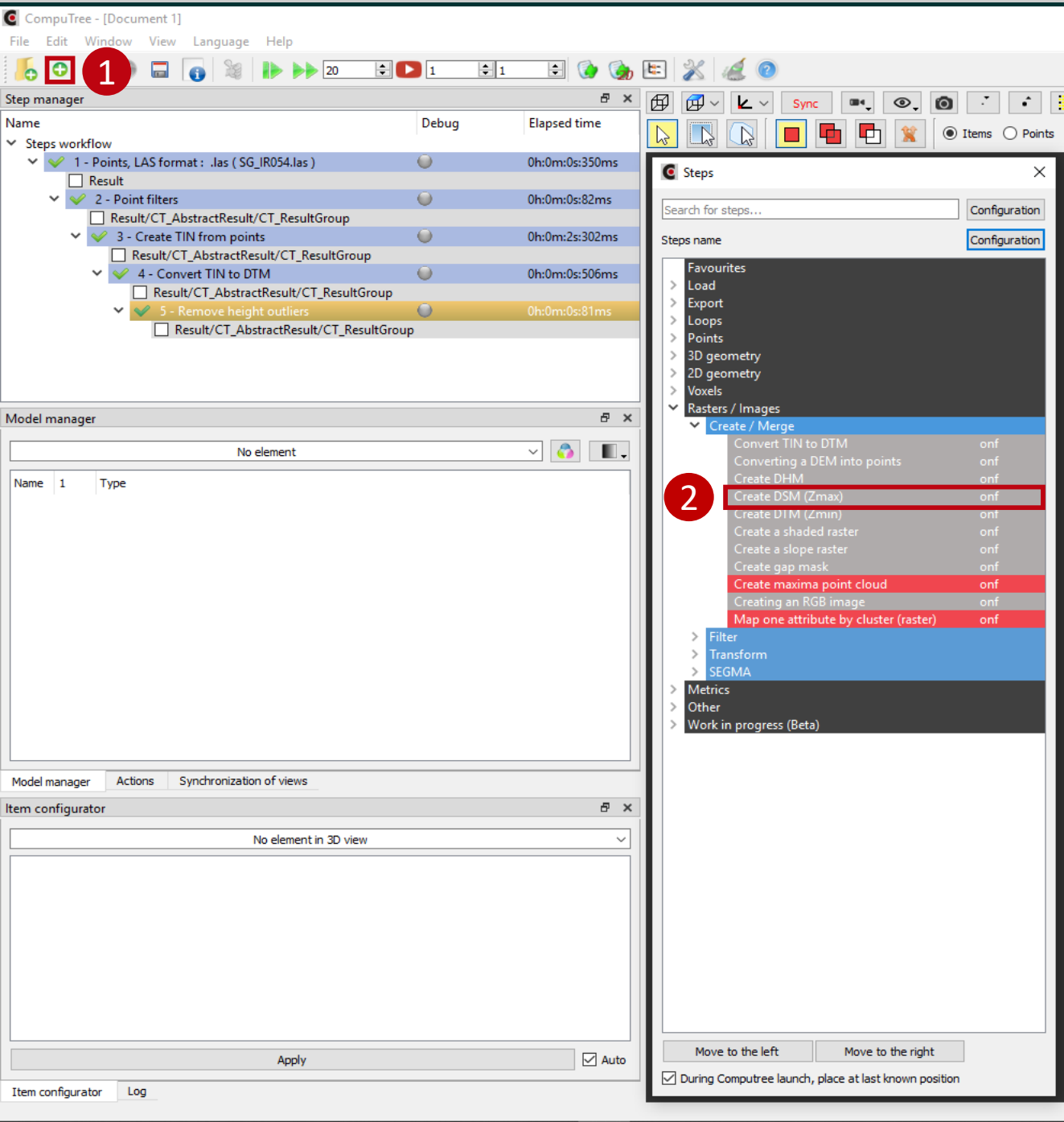

Configuration des résultats d'entrée of step "Remove height outliers".
Name of the results
Step
Help
Scene to denoise
(4) Convert TIN to DTM
1
Step 5: Removing height outliers
Searched data
Group 1/1
Scene to denoise 1/1
2
Available data
Root Gr...
Scene
Ground
3
4
OK
Cancel



Step 5: Removing height outliers

Step setting:

Leave the default settings adapted to the airborne LIDAR and apply 1



Step 6: Creating the DSM from all points

1. Open "Add a step".
   Go to the "Rasters / Images" tab, then "Create / Merge".
2. Double click on "Create DSM (Zmax)"

This step creates the DSM from the unstructured point cloud produced in step 5, from the complete point cloud.

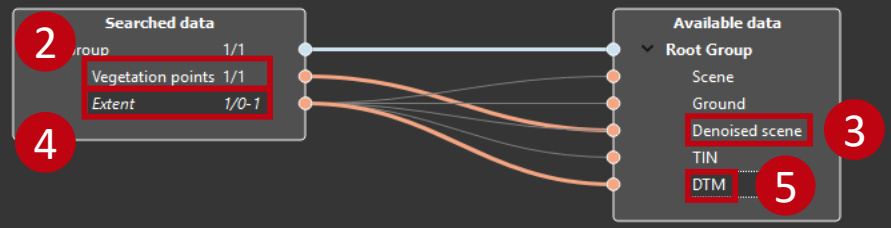
Configuration des résultats d'entrée of step "Create DSM (Zmax)".

Name of the results	Step	Help
Vegetation points		
	(5) Remove height outliers	

1

Step 6: Creating the DSM from all points

Select the denoised point scene and the DTM for the extent.



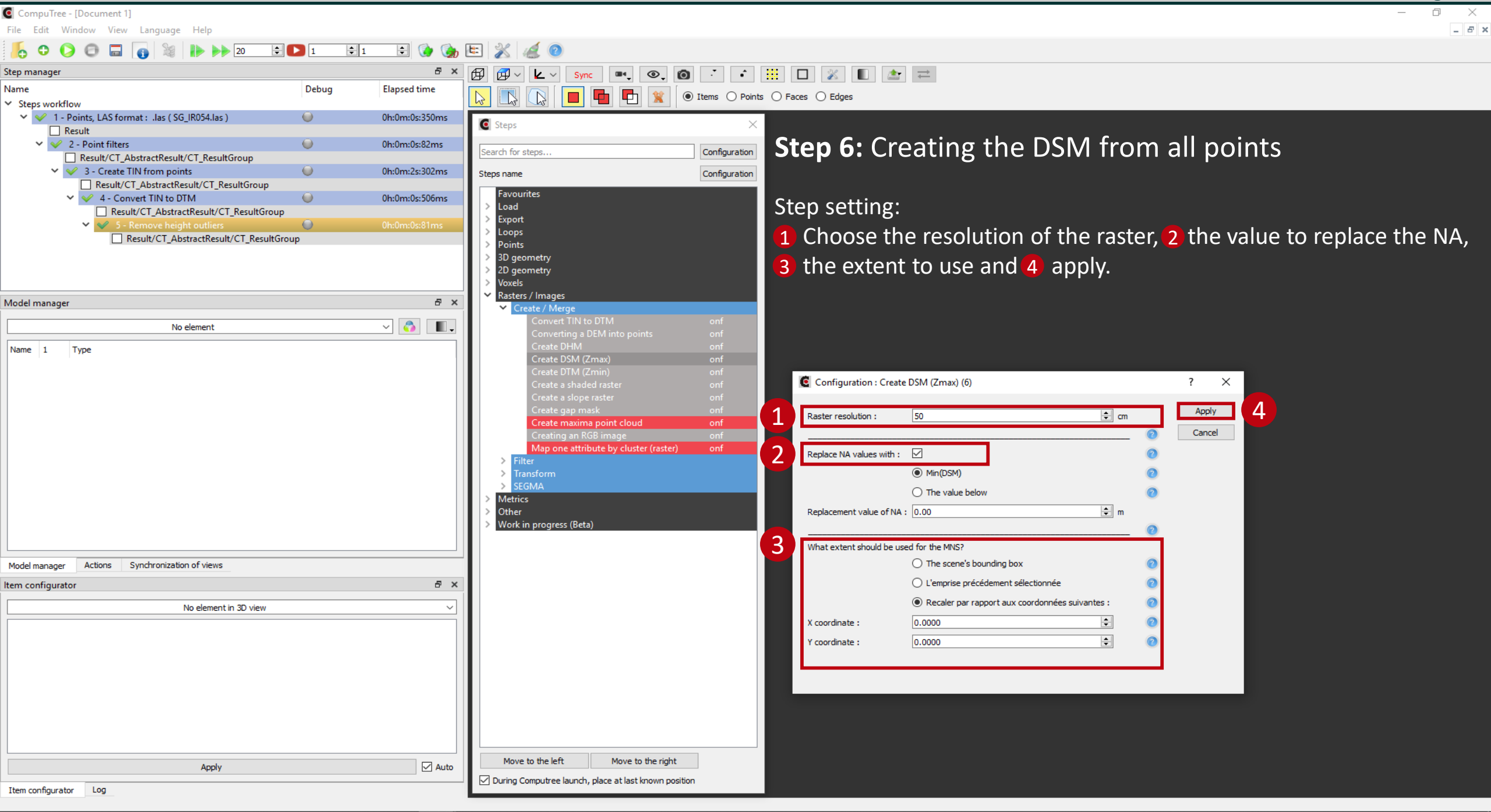
6

OK Cancel

Step 6: Creating the DSM from all points

Step setting:

1 Choose the resolution of the raster, 2 the value to replace the NA, 3 the extent to use and 4 apply.



CompuTree - [Document 1]

File Edit Window View Language Help

1

Step manager

Name	Debug	Elapsed time
Steps workflow		
1 - Points, LAS format : .las (SG_IR054.las)		0h:0m:0s:350ms
Result		
2 - Point filters		0h:0m:0s:82ms
Result/CT_AbstractResult/CT_ResultGroup		
3 - Create TIN from points		0h:0m:2s:302ms
Result/CT_AbstractResult/CT_ResultGroup		
4 - Convert TIN to DTM		0h:0m:0s:506ms
Result/CT_AbstractResult/CT_ResultGroup		
5 - Remove height outliers		0h:0m:0s:81ms
Result/CT_AbstractResult/CT_ResultGroup		
6 - Create DSM (Zmax)		0h:0m:0s:14ms
Result/CT_AbstractResult/CT_ResultGroup		

2

Model manager

Result/CT_AbstractResult/CT_ResultGroup (6)

Name	1	Type
Color	☐	Point color attributes
Red	☐	Point quint16 attributes
Green	☐	Point quint16 attributes
Blue	☐	Point quint16 attributes
Wave Packet Descriptor Index	☐	Point quint8 attributes
Byte Offset To Waveform Data	☐	Point quint64 attributes
Waveform Packet Size In Bytes	☐	Point quint32 attributes
Return Point Waveform Location	☐	Point float attributes
NIR	☐	Point quint16 attributes
File header	☐	LAS Header
Ground	☐	Point scene
TIN	☐	2D triangulation
DTM	☐	Raster<float>
Denoised scene	☐	Point scene
DSM	☑	Raster<float>

3

Model manager | Actions | Synchronization of views

Item configurator

Raster<float>

	Name	Value
1	Bounding Shape	☐ Activate
2	Centre of the Bounding Shape	☐ Activate
3	Point size (Bounding Shape)	10
4	Raster mode	☑ Activate
5	Raster mode: Set the Z level	☐ Activate

Apply ☑ Auto

Item configurator | Log

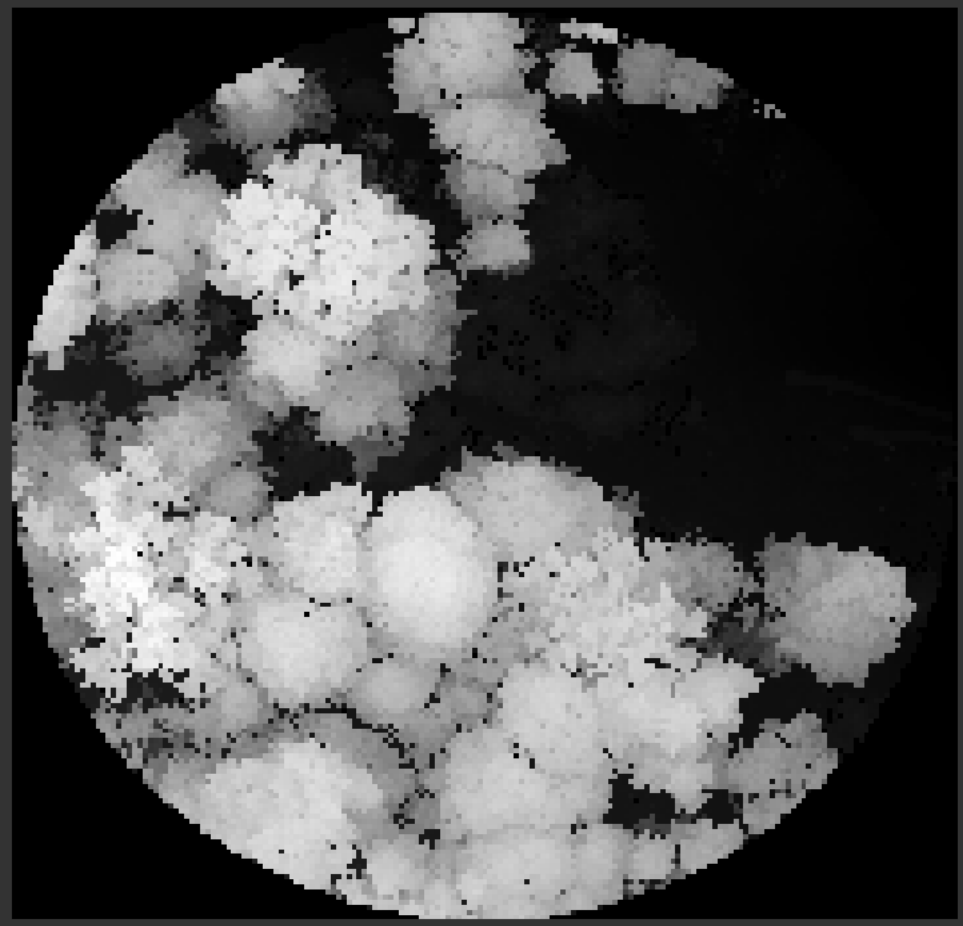
4

5

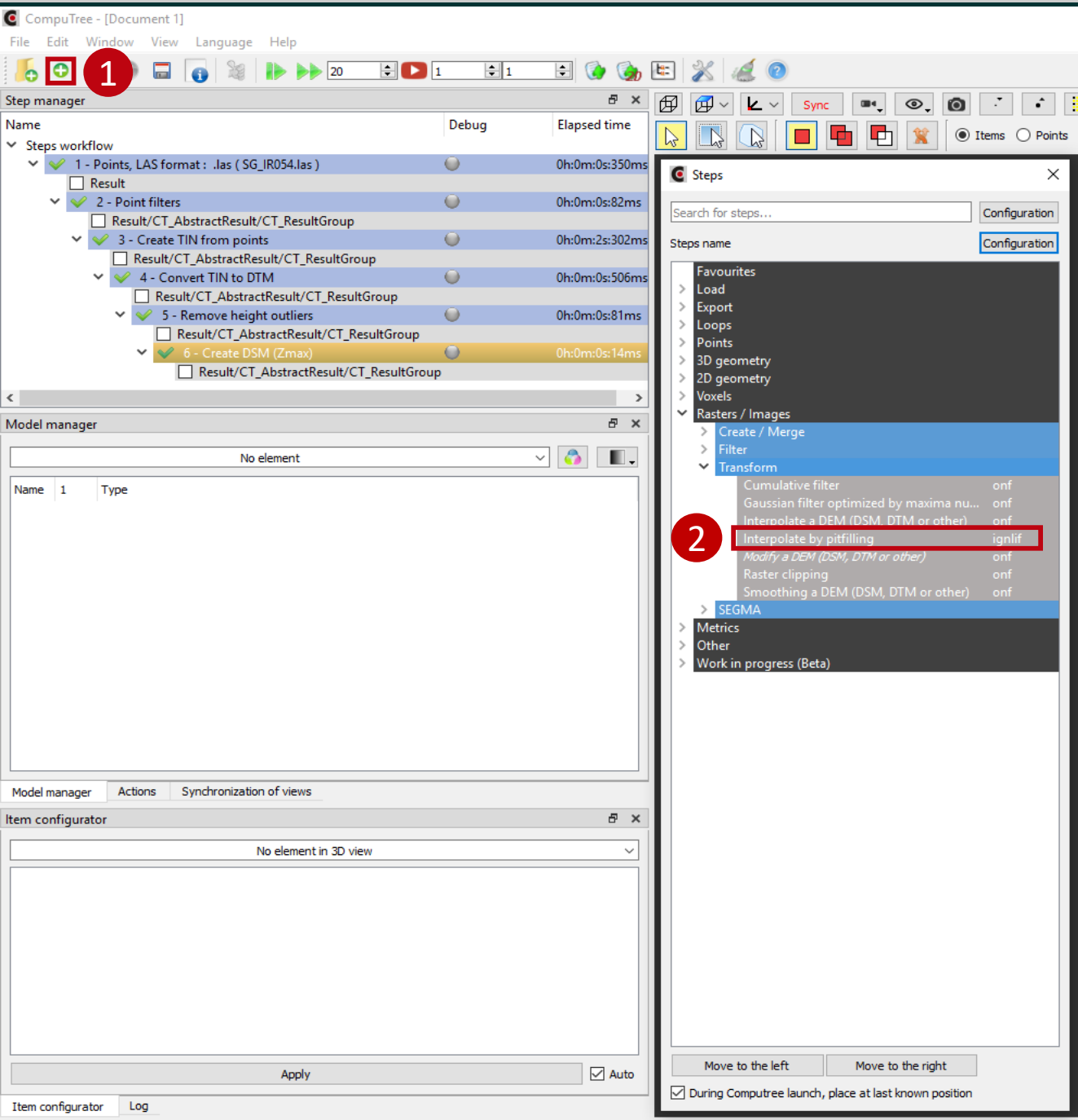
Sync

Items Points Faces Edges

It is possible to view the created DSM.



** The execution of the steps is not mandatory for the creation of the rest of the script*



Step 7: Filling holes

1. Open "Add a step".
   Go to the "Rasters / Images" tab and then "Transform".
2. Double click on "Interpolate by pitfilling"

This step fills in the gaps corresponding to missing values by interpolating from neighbouring pixels.

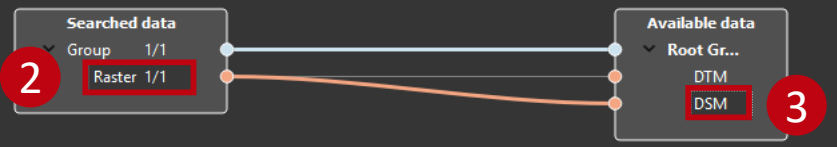
Configuration des résultats d'entrée of step "Interpolate by pitfilling".

Name of the results	Step	Help
Raster		
	(6) Create DSM (Zmax)	

1

Step 7: Filling holes

Select the DSM.



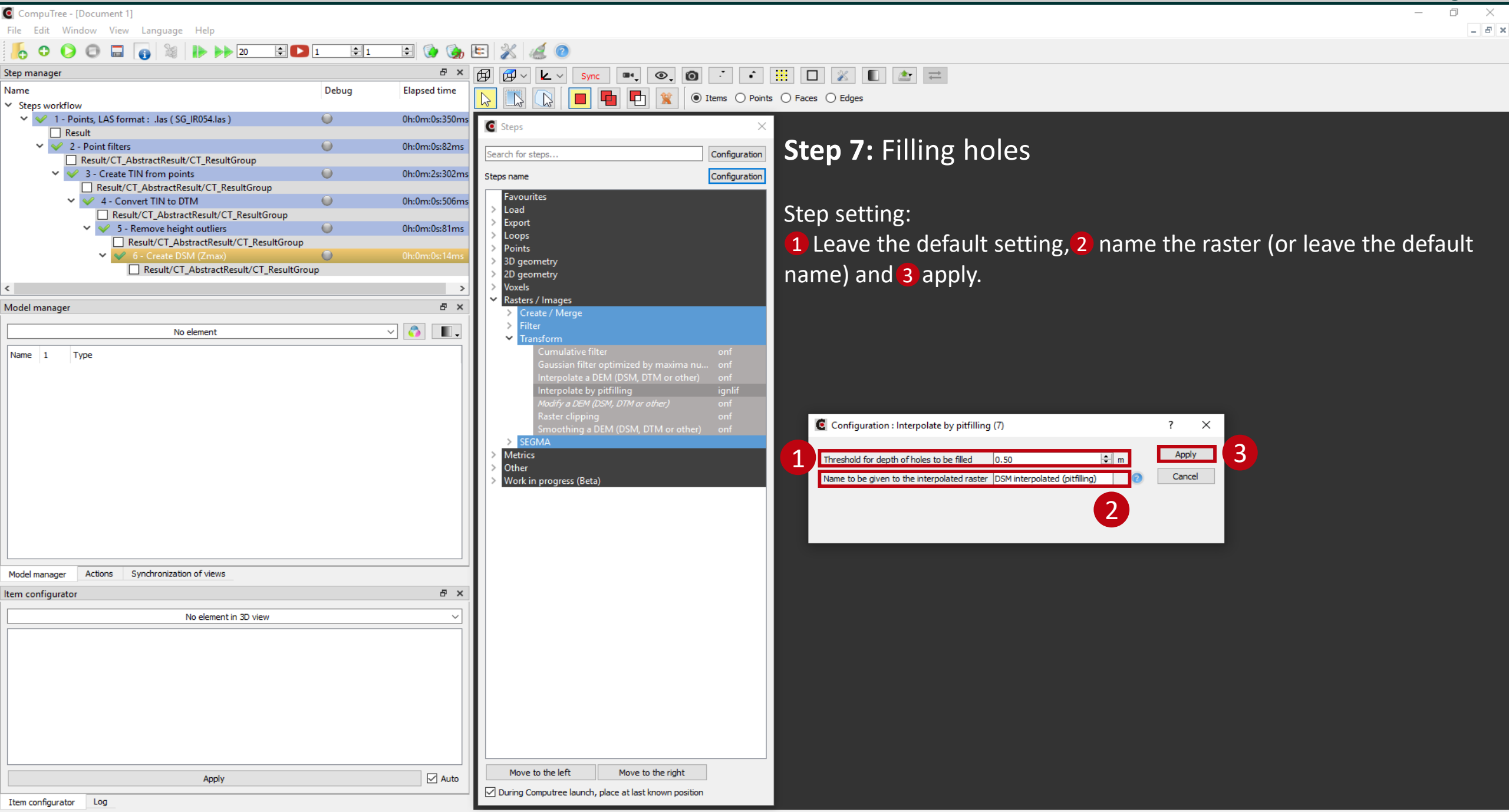
4

OK Cancel

Step 7: Filling holes

Step setting:

1 Leave the default setting, 2 name the raster (or leave the default name) and 3 apply.



CompuTree - [Document 1]

File Edit Window View Language Help

1

Step manager

Name	Debug	Elapsed t
Result		
2 - Point filters		0h:0m:0s
Result/CT_AbstractResult/CT_ResultGroup		
3 - Create TIN from points		0h:0m:2s
Result/CT_AbstractResult/CT_ResultGroup		
4 - Convert TIN to DTM		0h:0m:0s
Result/CT_AbstractResult/CT_ResultGroup		
5 - Remove height outliers		0h:0m:0s
Result/CT_AbstractResult/CT_ResultGroup		
6 - Create DSM (Zmax)		0h:0m:0s
Result/CT_AbstractResult/CT_ResultGroup		
7 - Interpolate by pitfilling		0h:0m:0s
Result/CT_AbstractResult/CT_ResultGroup		

2

Model manager

Result/CT_AbstractResult/CT_ResultGroup (7)

Name	1	Type
Red	☐	Point quint16 attributes
Green	☐	Point quint16 attributes
Blue	☐	Point quint16 attributes
Wave Packet Descriptor Index	☐	Point quint8 attributes
Byte Offset To Waveform Data	☐	Point quint64 attributes
Waveform Packet Size In Bytes	☐	Point quint32 attributes
Return Point Waveform Location	☐	Point float attributes
NIR	☐	Point quint16 attributes
File header	☐	LAS Header
Ground	☐	Point scene
TIN	☐	2D triangulation
DTM	☐	Raster<float>
Denoised scene	☐	Point scene
DSM	☐	Raster<float>
DSM interpolated (pitfilling)	☑	Raster<float>

3

Model manager | Actions | Synchronization of views

Item configurator

Raster<float>

	Name	Value
1	Bounding Shape	☐ Activate
2	Centre of the Bounding Shape	☐ Activate
3	Point size (Bounding Shape)	10
4	Raster mode	☑ Activate
5	Raster mode: Set the Z level	☐ Activate

Apply ☑ Auto

Item configurator | Log

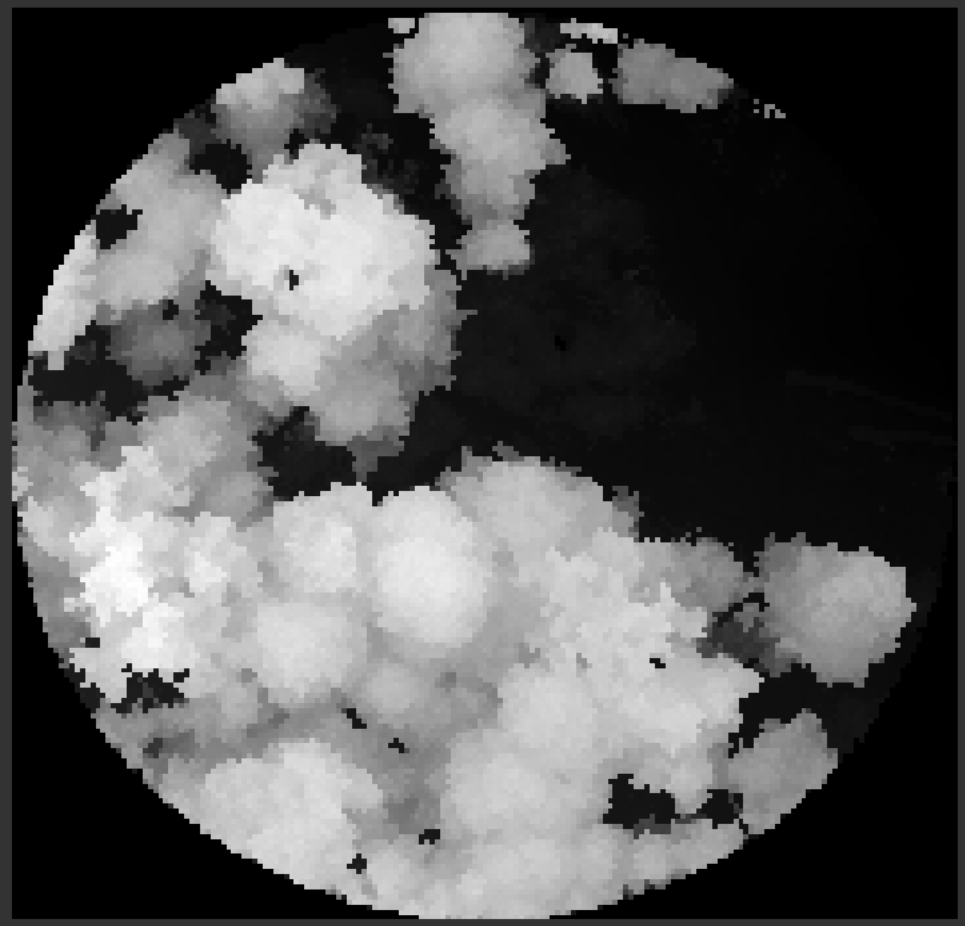
4

5

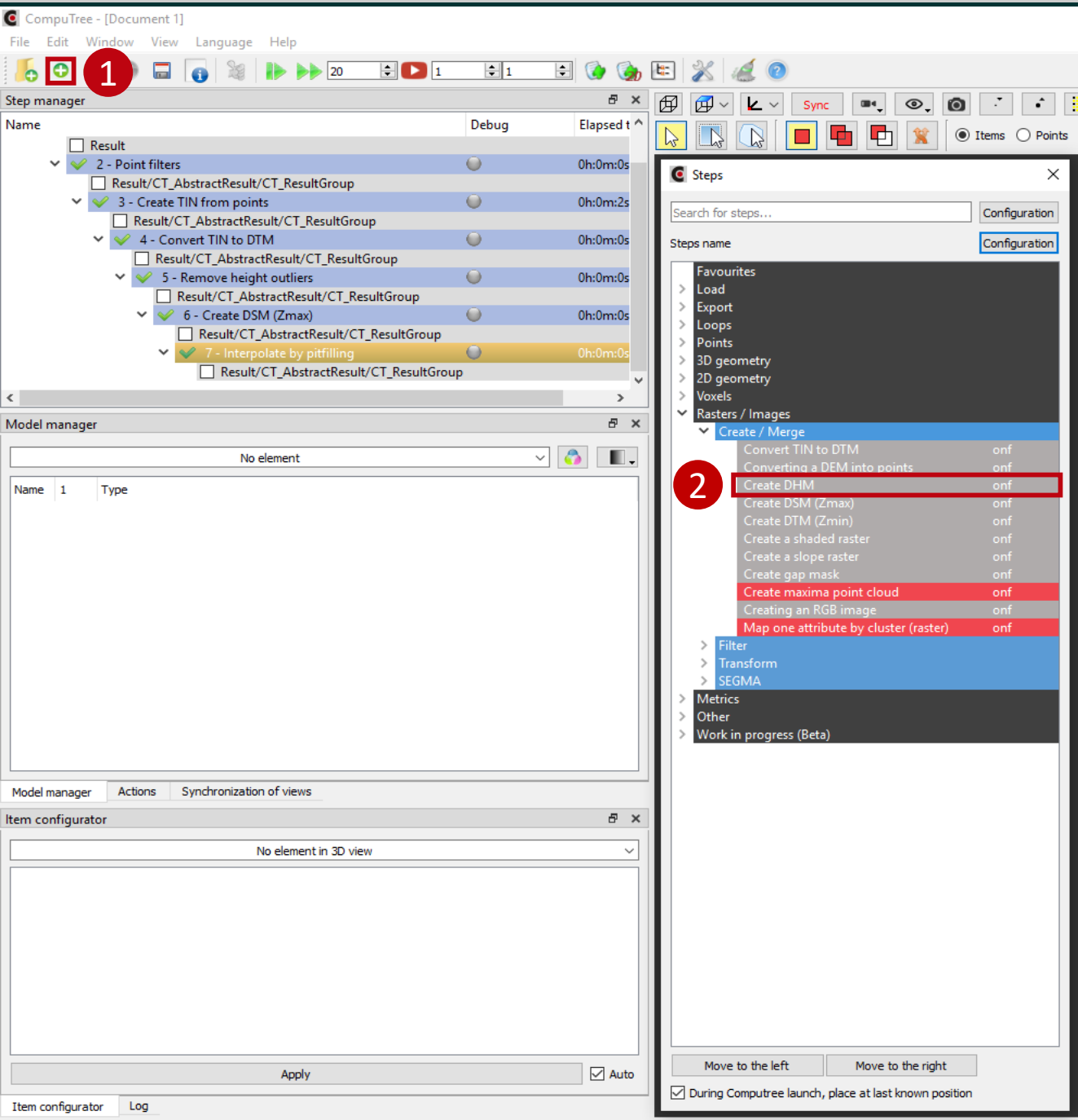
Sync

Items Points Faces Edges

It is possible to view the DSM with the missing value holes filled.



** The execution of the steps is not mandatory for the creation of the rest of the script*



Step 8: Creating the DHM from the DTM and DSM

1. Open "Add a step".
   Go to the "Rasters / Images" tab, then "Create / Merge".
2. Double click on "Create DHM"

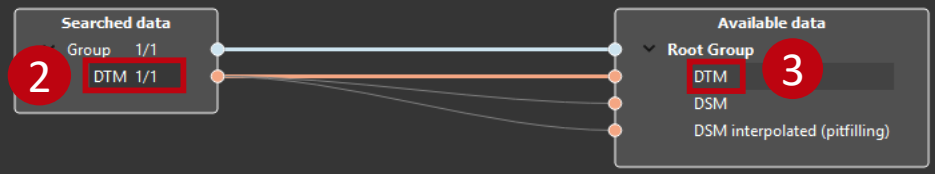
Configuration des résultats d'entrée of step "Create DHM".

Name of the results	Step	Help
DTM		
	(7) Interpolate by pitfilling	
DSM		
	(7) Interpolate by pitfilling	

1

Step 8: Creating the DHM from the DTM and DSM

Choose the DTM.



OK Cancel

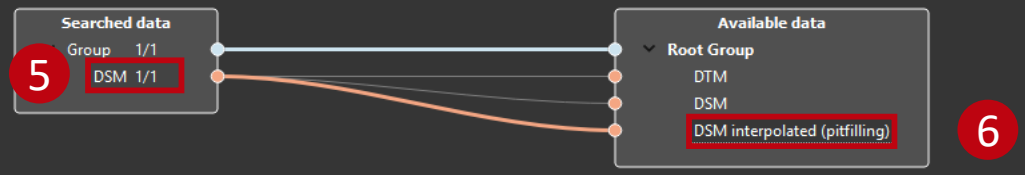
Configuration des résultats d'entrée of step "Create DHM".

Name of the results	Step	Help
DTM		
	(7) Interpolate by pitfilling	
DSM		
	(7) Interpolate by pitfilling	

4

Step 8: Creating the DHM from the DTM and DSM

Select the DSM with the holes filled.



5

6

7

OK

Cancel

CompuTree - [Document 1]

File Edit Window View Language Help

1

Step manager

Name	Debug	Elaps
Result/CT_AbstractResult/CT_ResultGroup		
3 - Create TIN from points		0h:0r
Result/CT_AbstractResult/CT_ResultGroup		
4 - Convert TIN to DTM		0h:0r
Result/CT_AbstractResult/CT_ResultGroup		
5 - Remove height outliers		0h:0r
Result/CT_AbstractResult/CT_ResultGroup		
6 - Create DSM (Zmax)		0h:0r
Result/CT_AbstractResult/CT_ResultGroup		
7 - Interpolate by pitfilling		0h:0r
Result/CT_AbstractResult/CT_ResultGroup		
8 - Create DHM		0h:0r
Result/CT_AbstractResult/CT_ResultGroup		

2

Model manager

Result/CT_AbstractResult/CT_ResultGroup (8)

Name	1	Type
Green	☐	Point quint16 attributes
Blue	☐	Point quint16 attributes
Wave Packet Descriptor Index	☐	Point quint8 attributes
Byte Offset To Waveform Data	☐	Point quint64 attributes
Waveform Packet Size In Bytes	☐	Point quint32 attributes
Return Point Waveform Location	☐	Point float attributes
NIR	☐	Point quint16 attributes
File header	☐	LAS Header
Ground	☐	Point scene
TIN	☐	2D triangulation
DTM	☐	Raster<float>
Denoised scene	☐	Point scene
DSM	☐	Raster<float>
DSM interpolated (pitfilling)	☐	Raster<float>
DHM	☑	Raster<float>

3

Model manager | Actions | Synchronization of views

Item configurator

Raster<float>

	Name	Value
1	Bounding Shape	☐ Activate
2	Centre of the Bounding Shape	☐ Activate
3	Point size (Bounding Shape)	10
4	Raster mode	☑ Activate
5	Raster mode: Set the Z level	☐ Activate

Apply ☑ Auto

Item configurator | Log

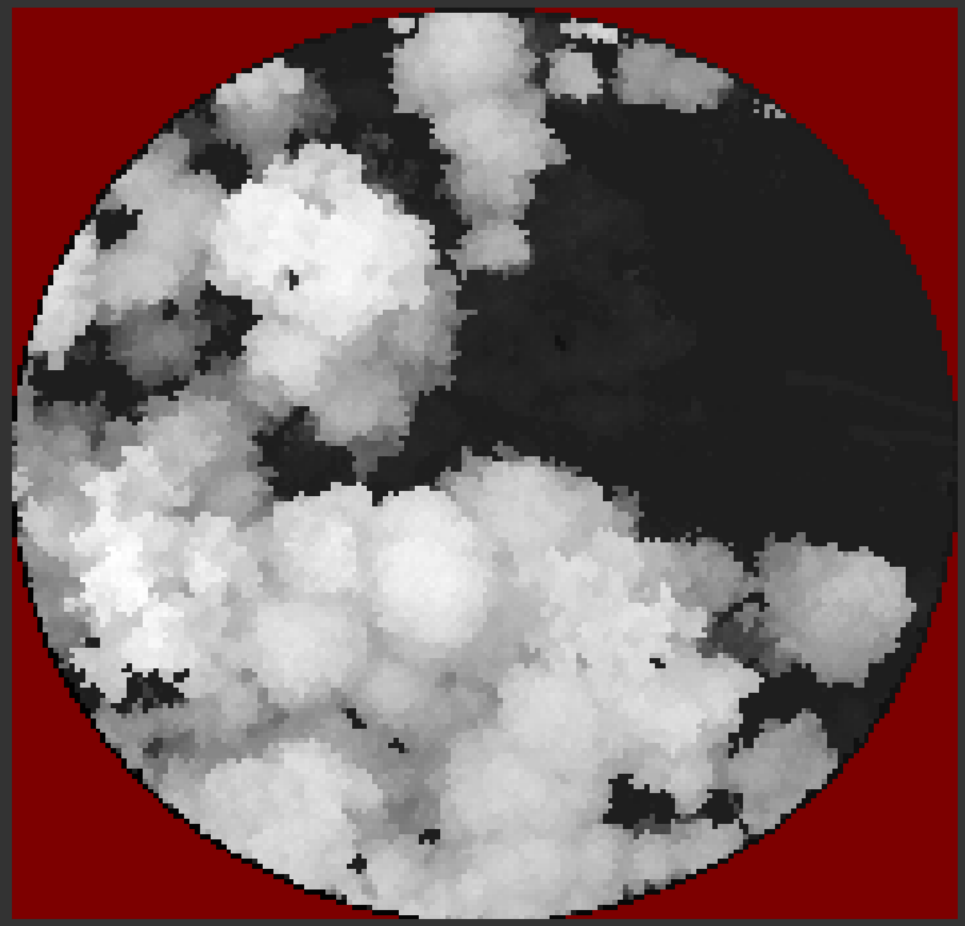
4

5

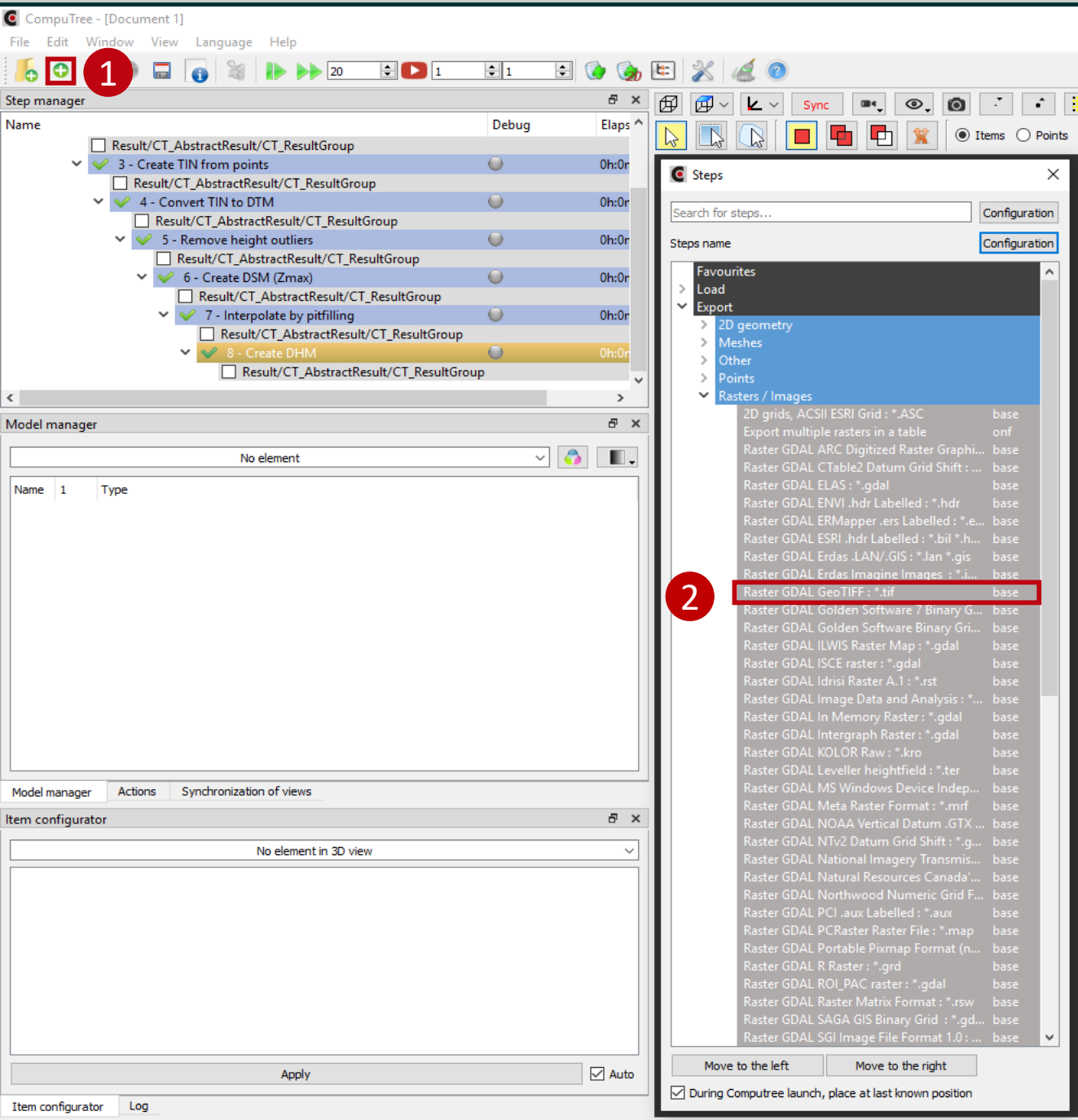
Sync

Items Points Faces Edges

It is possible to view the DHM created.



** The execution of the steps is not mandatory for the creation of the rest of the script*



Step 9: Exports in raster format (DTM)

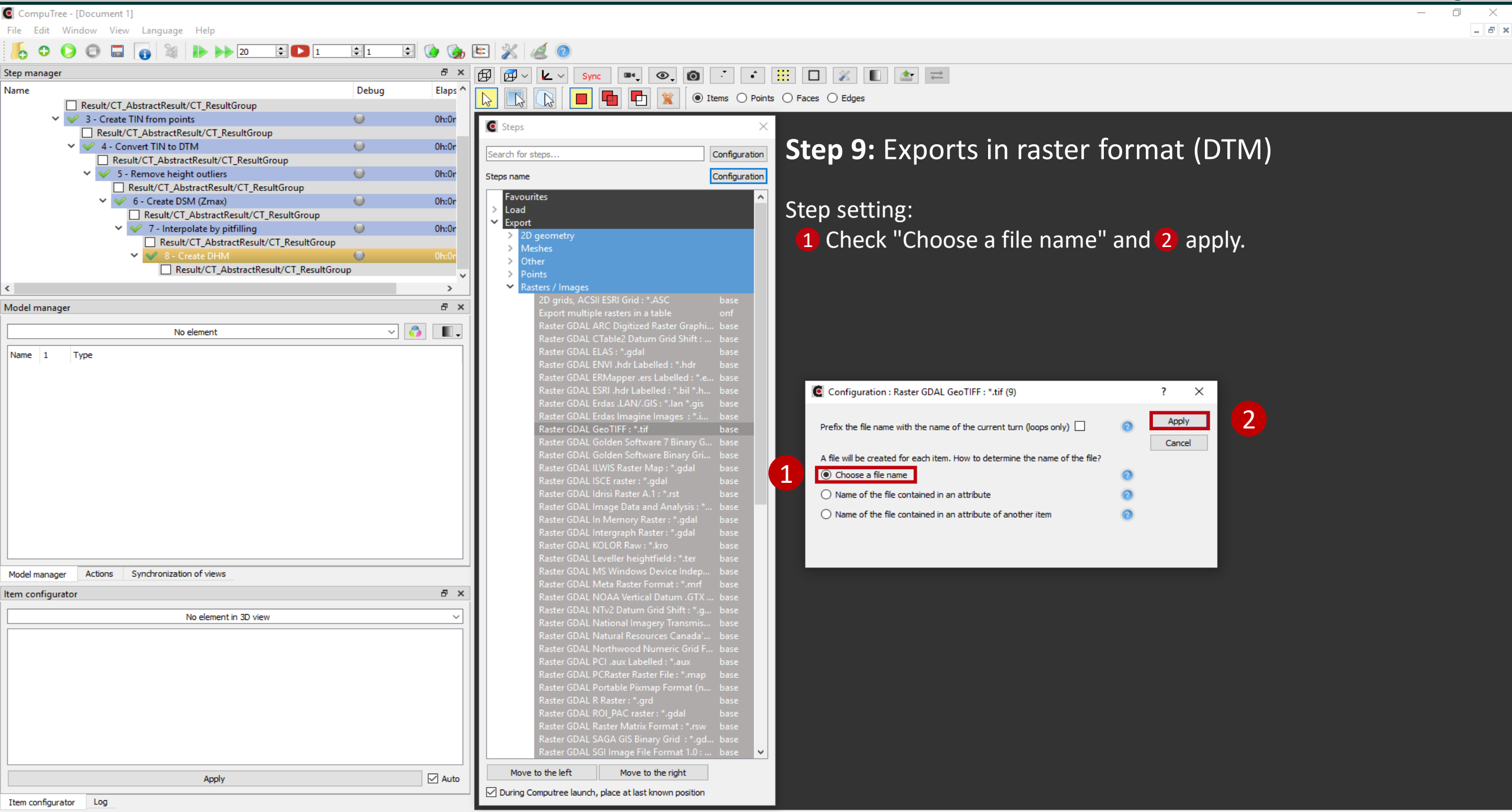
1. Open "Add a step".
   Go to the "Export" tab and then "Export".Rasters/Images
2. Double click on "Raster GDAL GeoTIFF : *.tif"

Several file formats are available to export the produced raster. In this example, the export is done in GeoTIFF (.tif)

Step 9: Exports in raster format (DTM)

Step setting:

1 Check "Choose a file name" and 2 apply.



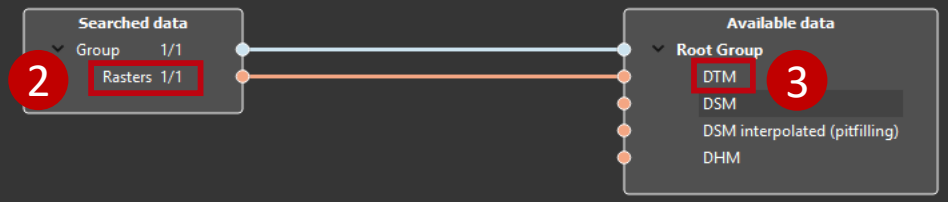
Configuration des résultats d'entrée of step "Raster GDAL GeoTIFF : *.tif".

Name of the results	Step	Help
Result (Export: Raster GDAL GeoTIFF)		
☑	(8) Create DHM	
☐	(7) Interpolate by pitfilling	
☐	(6) Create DSM (Zmax)	
☐	(5) Remove height outliers	
☐	(4) Convert TIN to DTM	

1

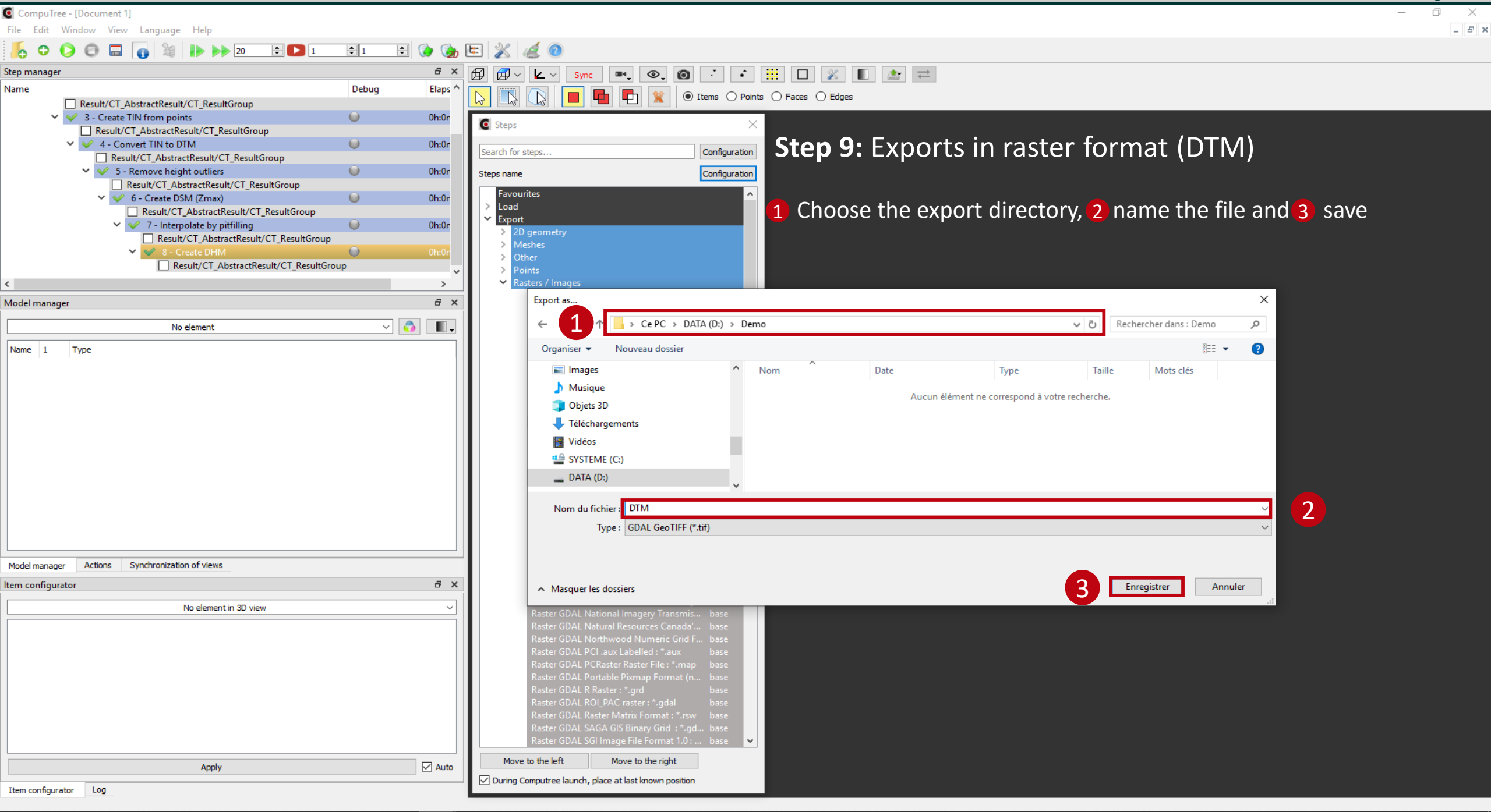
Step 9: Exports in raster format (DTM)

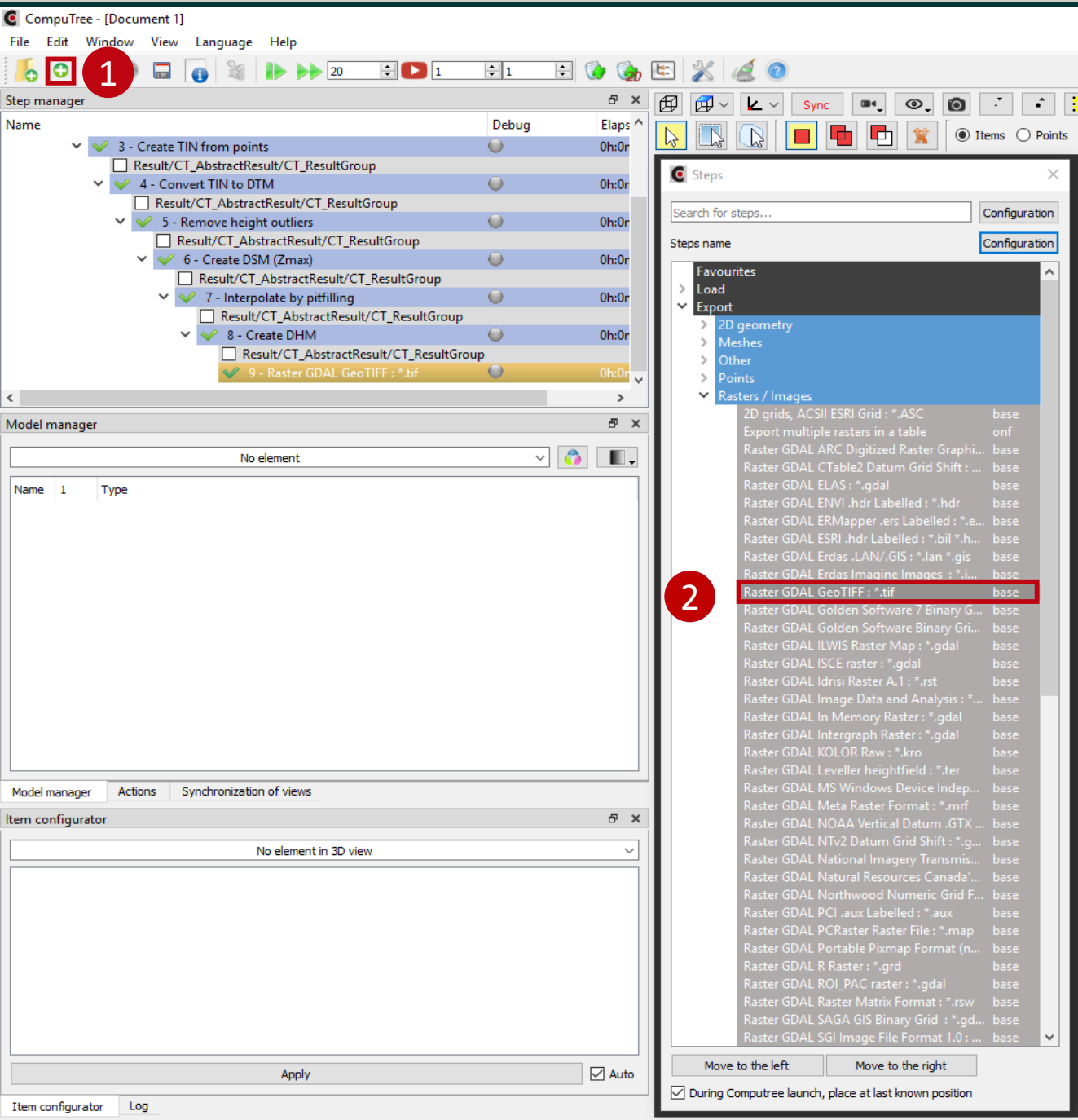
Indicate which raster to export, here the DTM.



4

OK Cancel


CompuTree - [Document 1]
File Edit Window View Language Help
Step manager
Name
Debug
Elaps
Result/CT_AbstractResult/CT_ResultGroup
3 - Create TIN from points
4 - Convert TIN to DTM
5 - Remove height outliers
6 - Create DSM (Zmax)
7 - Interpolate by pitfilling
8 - Create DHM
Model manager
No element
Name
1
Type
Model manager
Actions
Synchronization of views
Item configurator
No element in 3D view
Apply
Auto
Item configurator
Log
Sync
Items
Points
Faces
Edges
Steps
Search for steps...
Configuration
Steps name
Configuration
Favourites
Load
Export
2D geometry
Meshes
Other
Points
Rasters / Images
Raster GDAL National Imagery Transmis... base
Raster GDAL Natural Resources Canada'... base
Raster GDAL Northwood Numeric Grid F... base
Raster GDAL PCI .aux Labelled : *.aux base
Raster GDAL PCRaster Raster File : *.map base
Raster GDAL Portable Pixmap Format (n... base
Raster GDAL R Raster : *.grd base
Raster GDAL ROI_PAC raster : *.gdal base
Raster GDAL Raster Matrix Format : *.rsw base
Raster GDAL SAGA GIS Binary Grid : *.gd... base
Raster GDAL SGI Image File Format 1.0 : ... base
Move to the left
Move to the right
During Computree launch, place at last known position
Step 9: Exports in raster format (DTM)
1 Choose the export directory, 2 name the file and 3 save
Export as...
1
Ce PC › DATA (D:) › Demo
Rechercher dans : Demo
Organiser
Nouveau dossier
Images
Musique
Objets 3D
Téléchargements
Vidéos
SYSTEME (C:)
DATA (D:)
Nom
Date
Type
Taille
Mots clés
Aucun élément ne correspond à votre recherche.
Nom du fichier : DTM
Type : GDAL GeoTIFF (*.tif)
2
Masquer les dossiers
3
Enregistrer
Annuler



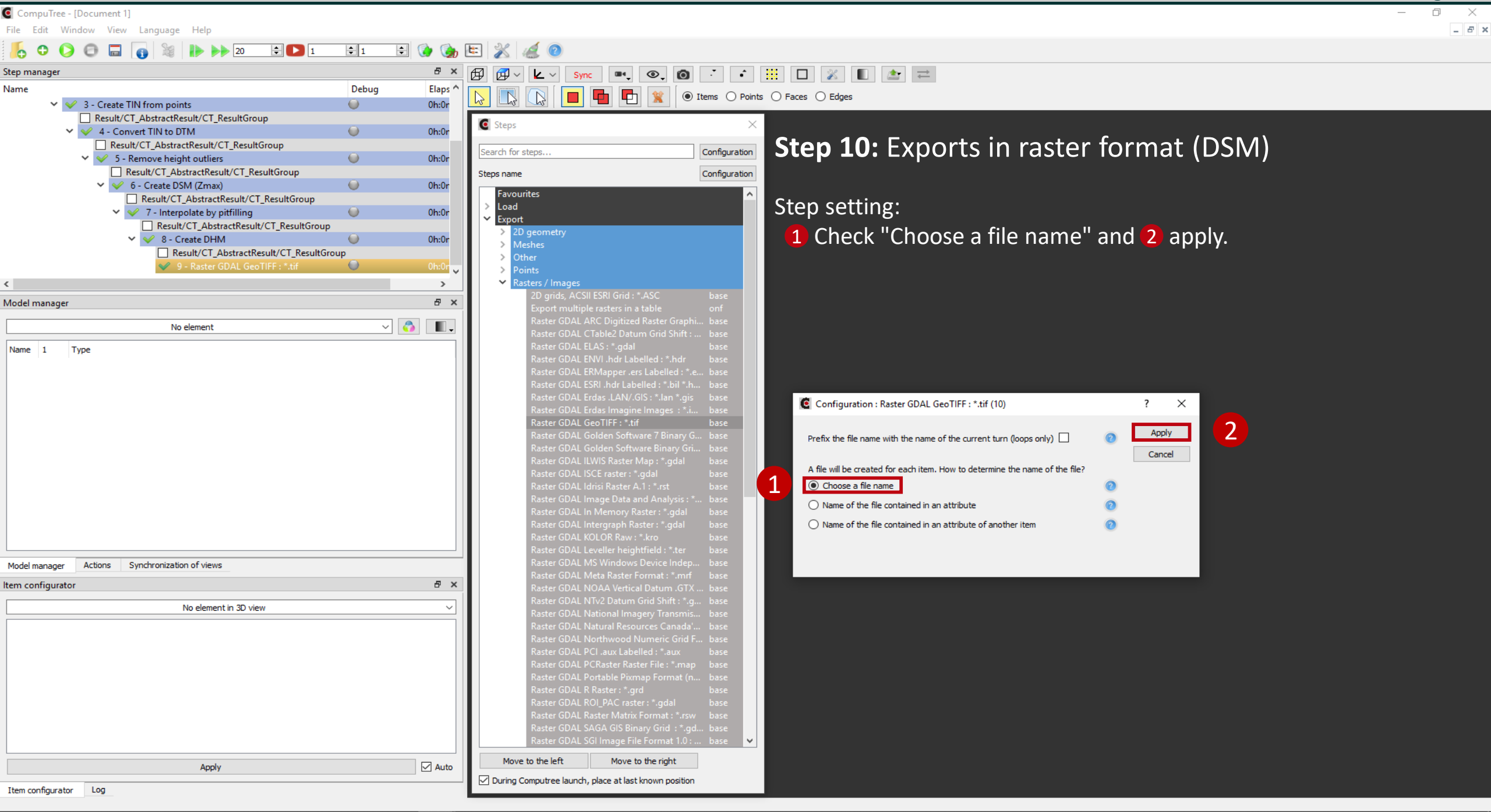
Step 10: Exports in raster format (DSM)

1. Open "Add a step".
   Go to the "Export" tab and then "Rasters/Images".
2. Double click on "Raster GDAL GeoTIFF : *.tif"

Step 10: Exports in raster format (DSM)

Step setting:

1 Check "Choose a file name" and 2 apply.



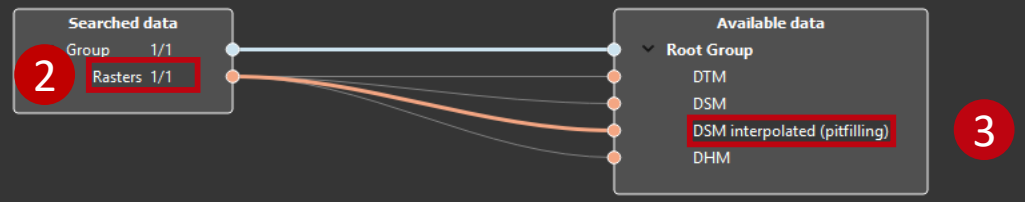
Configuration des résultats d'entrée of step "Raster GDAL GeoTIFF : *.tif".

Name of the results	Step	Help
Result (Export: Raster GDAL GeoTIFF)		
☑	(8) Create DHM	
☐	(7) Interpolate by pitfilling	
☐	(6) Create DSM (Zmax)	
☐	(5) Remove height outliers	
☐	(4) Convert TIN to DTM	

1

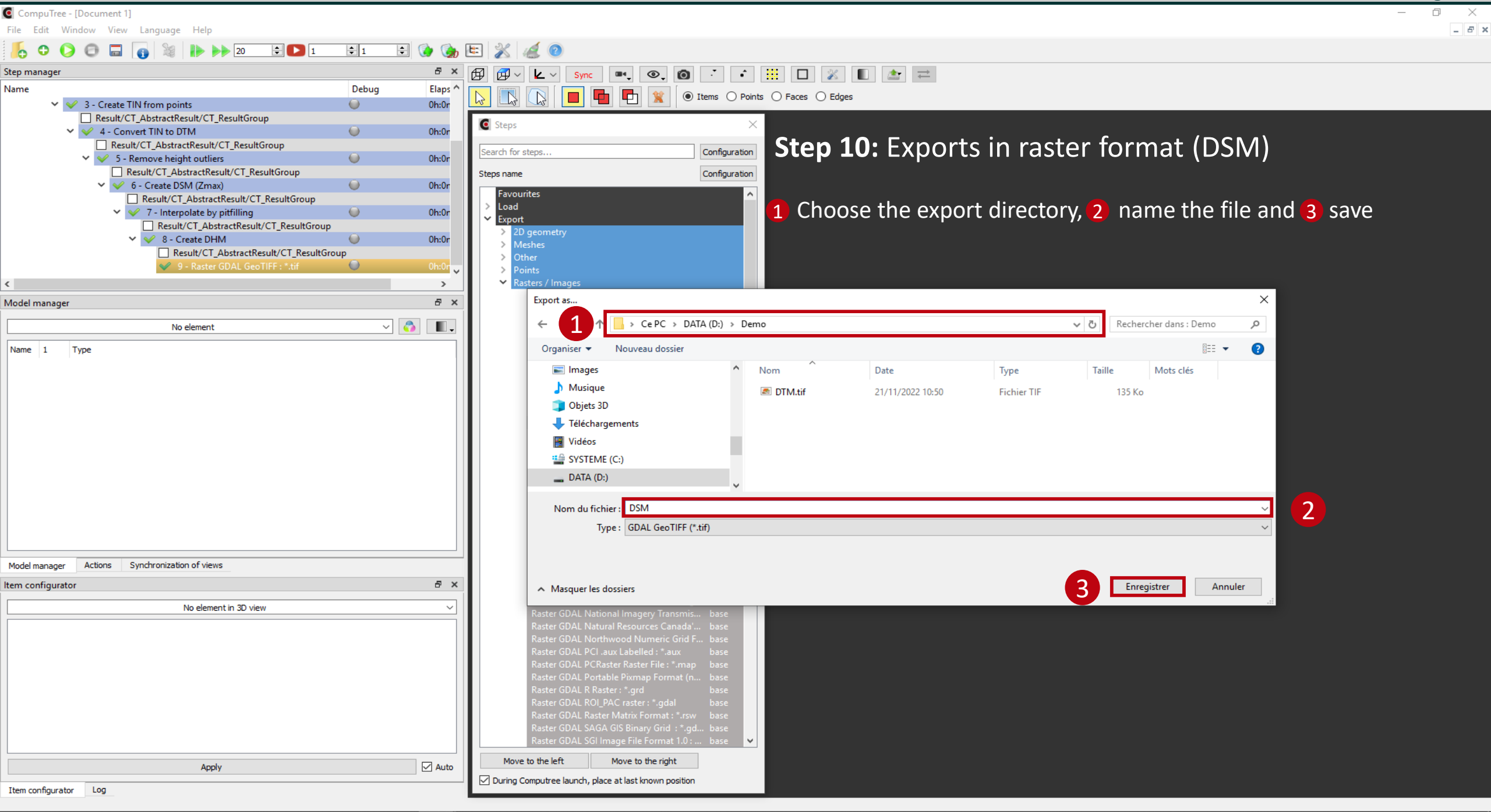
Step 10: Exports in raster format (DSM)

Indicate which raster to export, here the DSM.



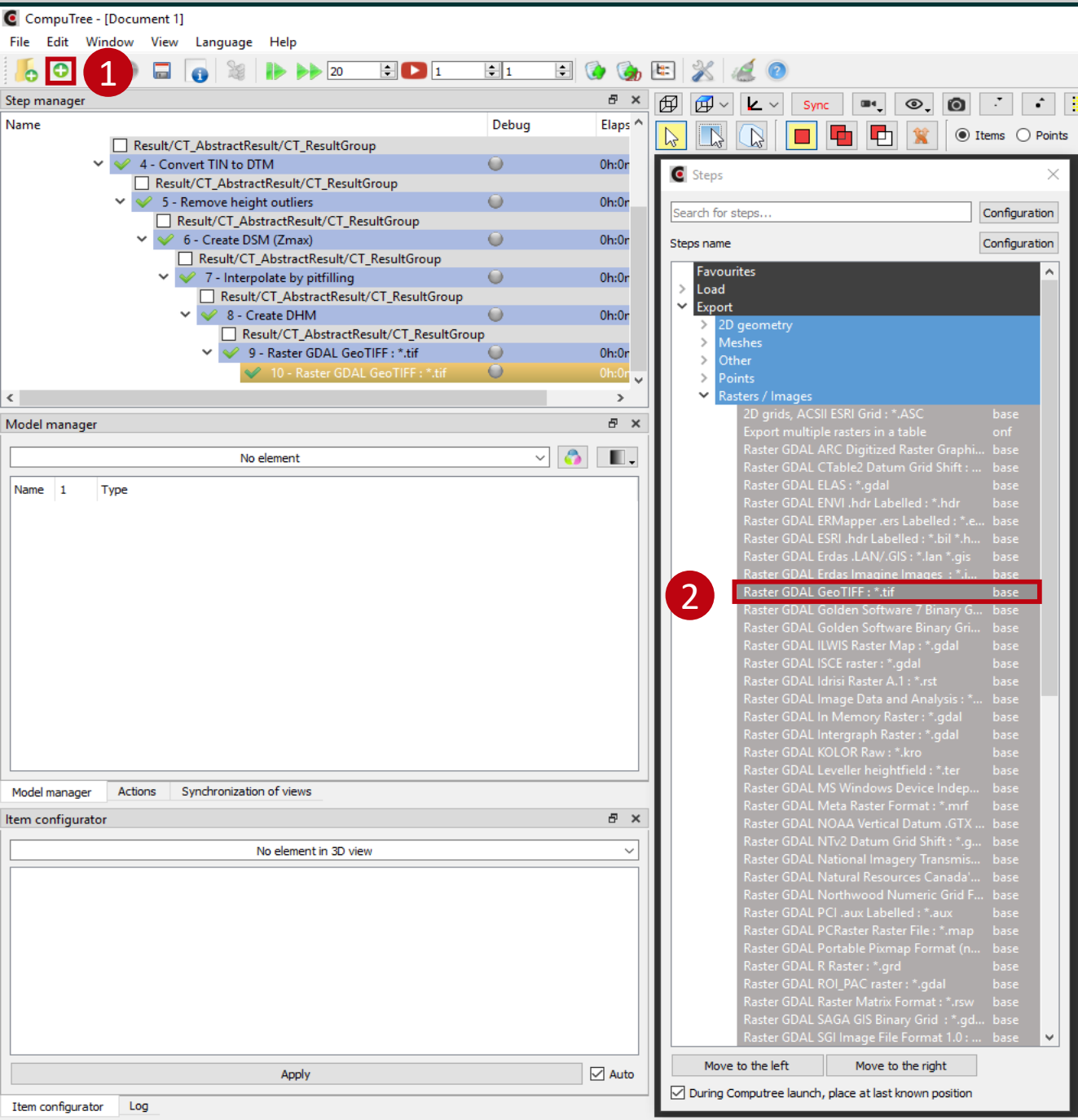
4

OK Cancel



Step 10: Exports in raster format (DSM)

1 Choose the export directory, 2 name the file and 3 save



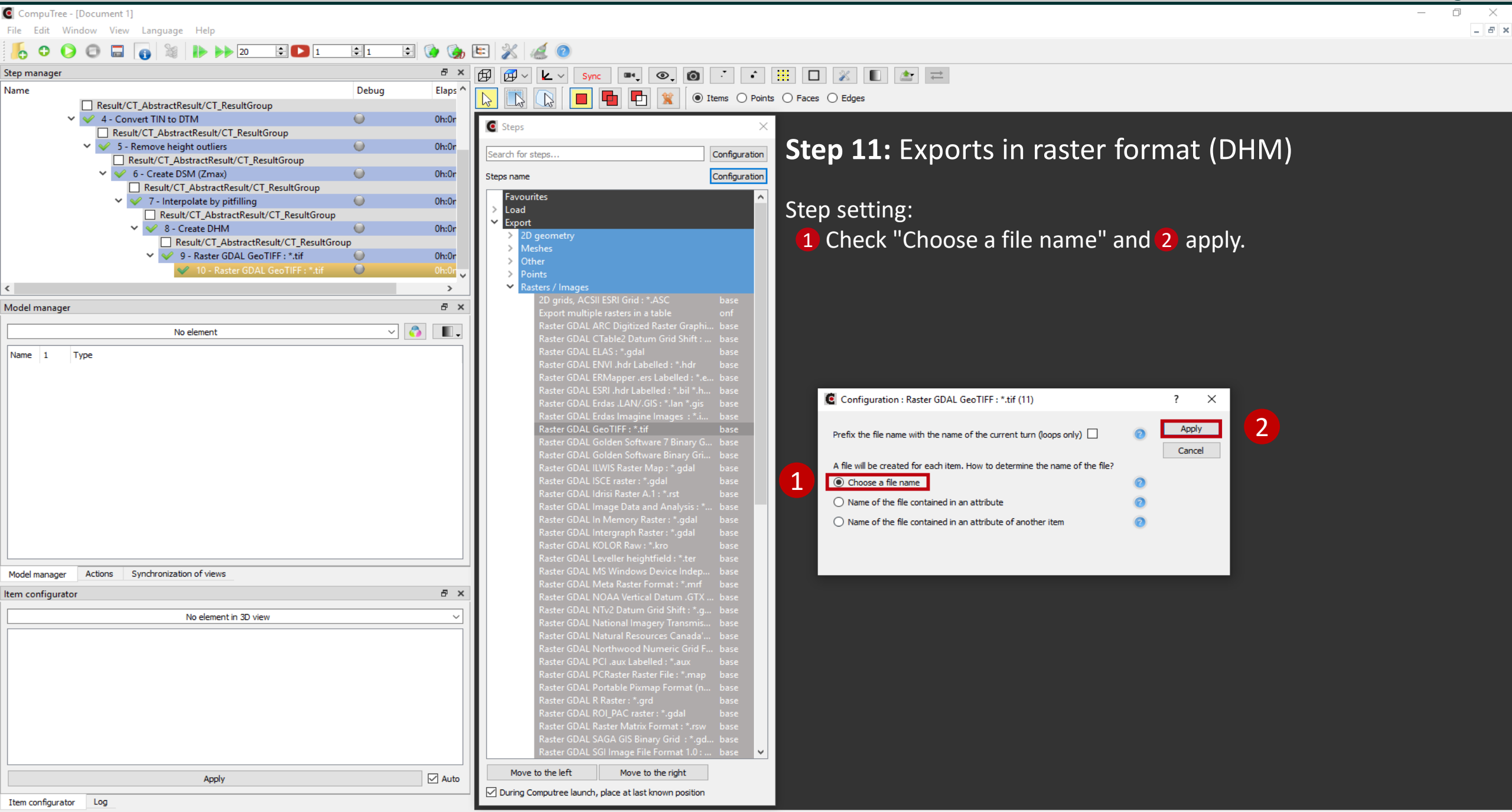
Step 11: Exports in raster format (DHM)

1. Open "Add a step".
   Go to the "Export" tab and then "Rasters/Images".
2. Double click on "Raster GDAL GeoTIFF : *.tif"

Step 11: Exports in raster format (DHM)

Step setting:

1 Check "Choose a file name" and 2 apply.



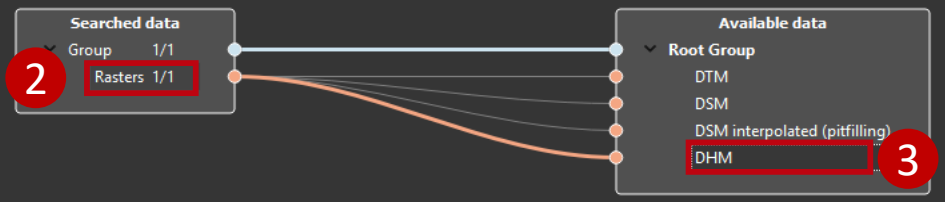
Configuration des résultats d'entrée of step "Raster GDAL GeoTIFF : *.tif".

Name of the results	Step	Help
Result (Export: Raster GDAL GeoTIFF)		
☑	(8) Create DHM	
☐	(7) Interpolate by pitfilling	
☐	(6) Create DSM (Zmax)	
☐	(5) Remove height outliers	
☐	(4) Convert TIN to DTM	

1

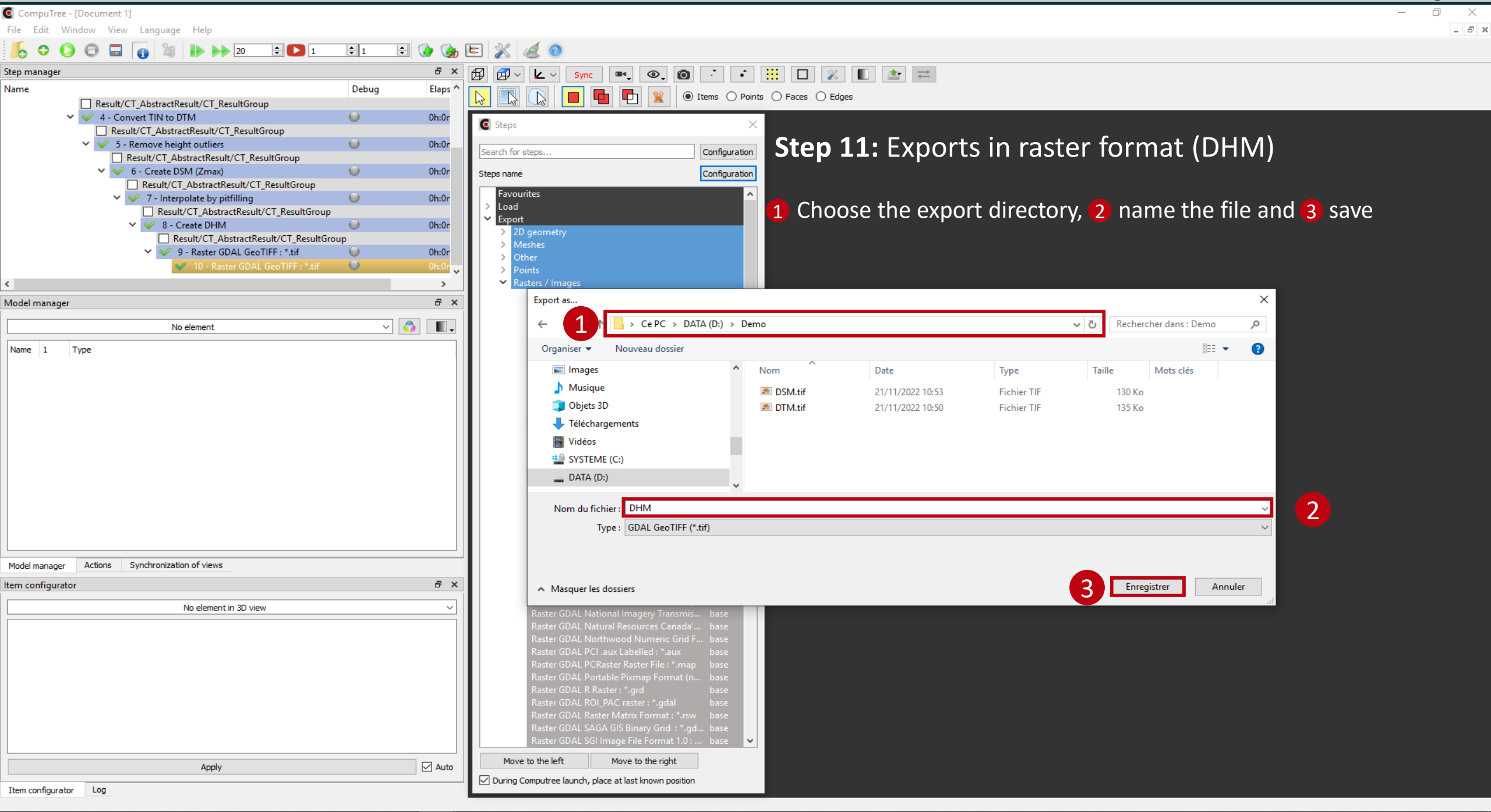
Step 11: Exports in raster format (DHM)

Indicate which raster to export, here the DHM.



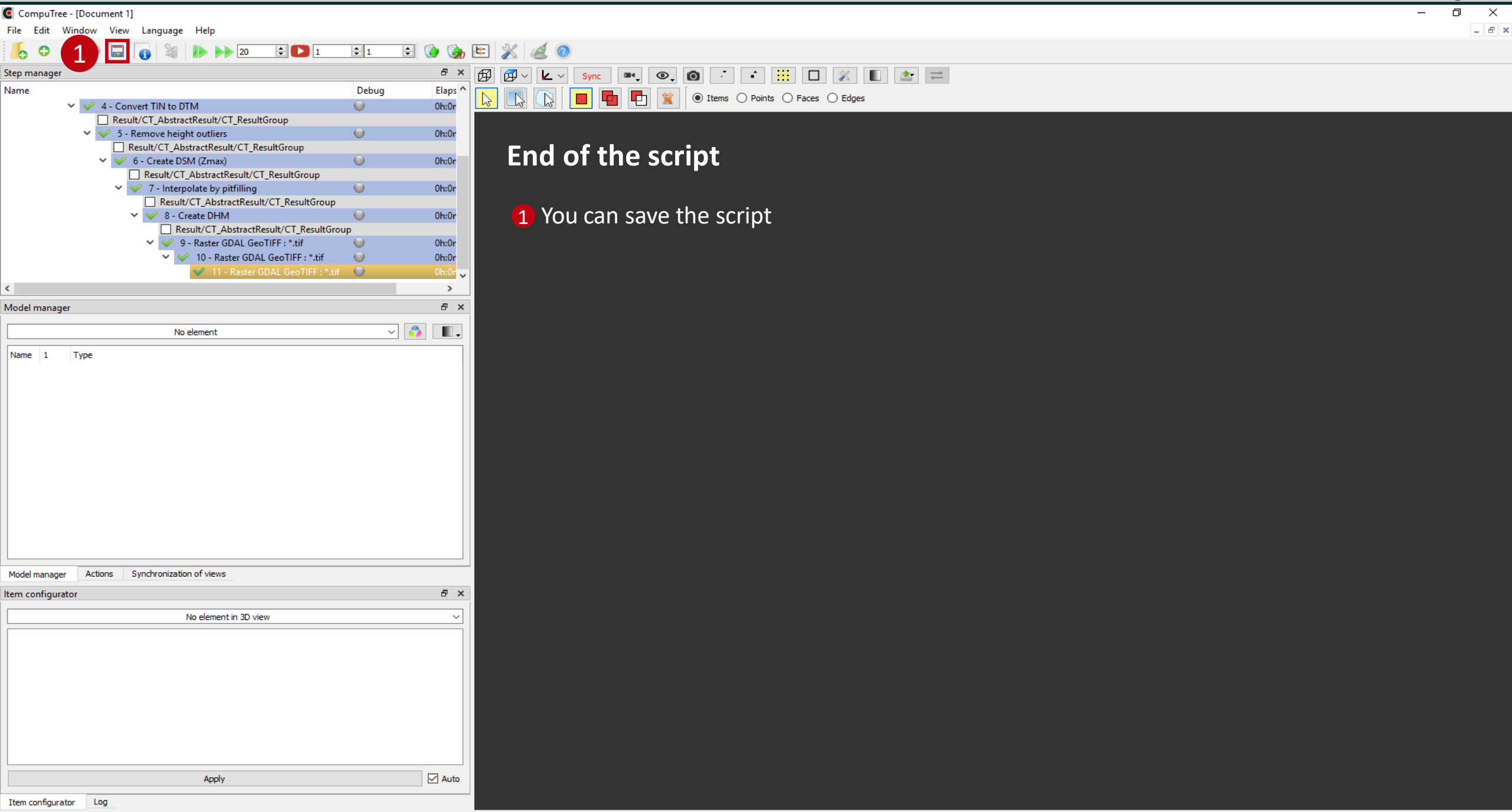
4

OK Cancel

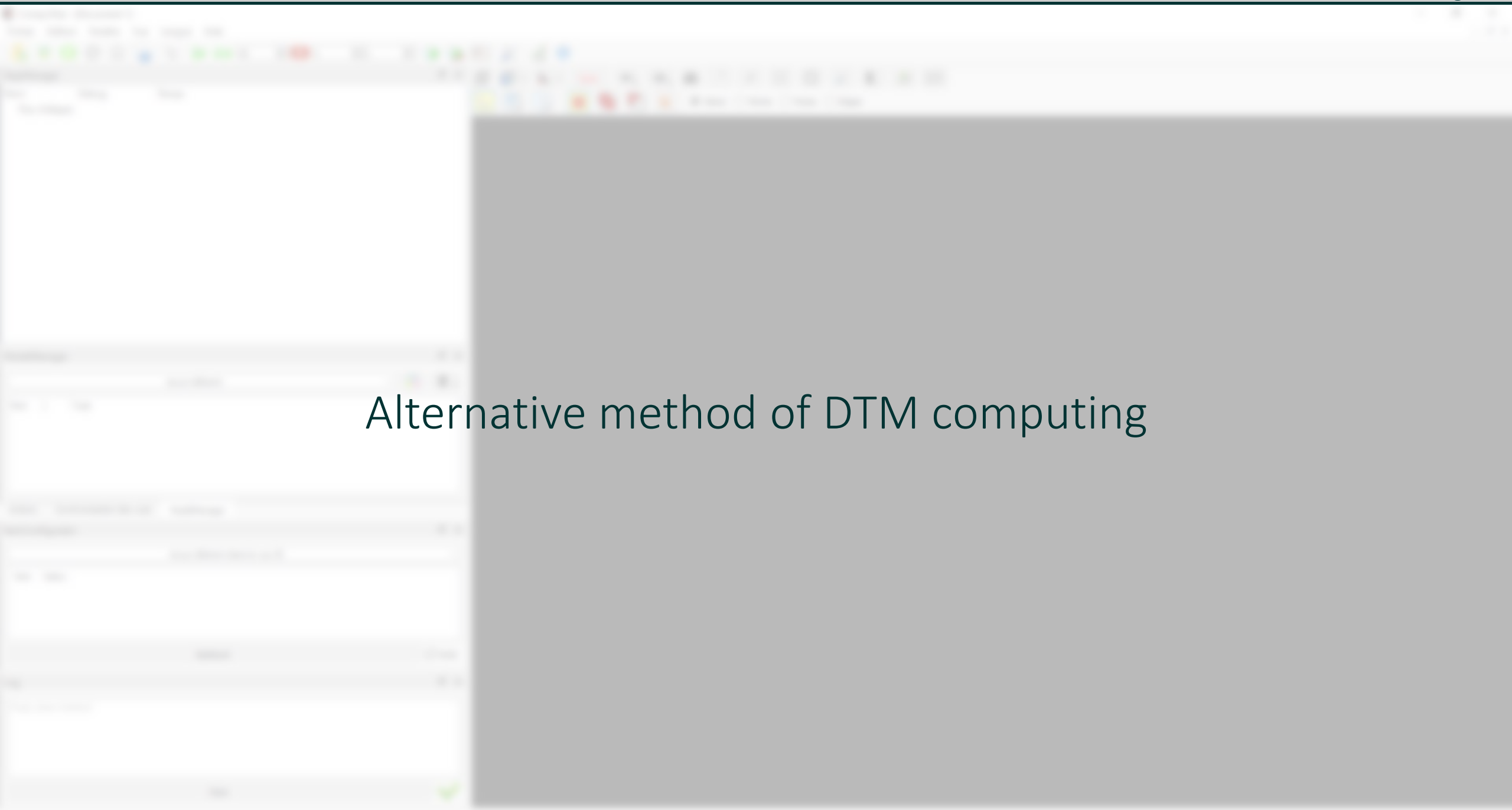


Step 11: Exports in raster format (DHM)

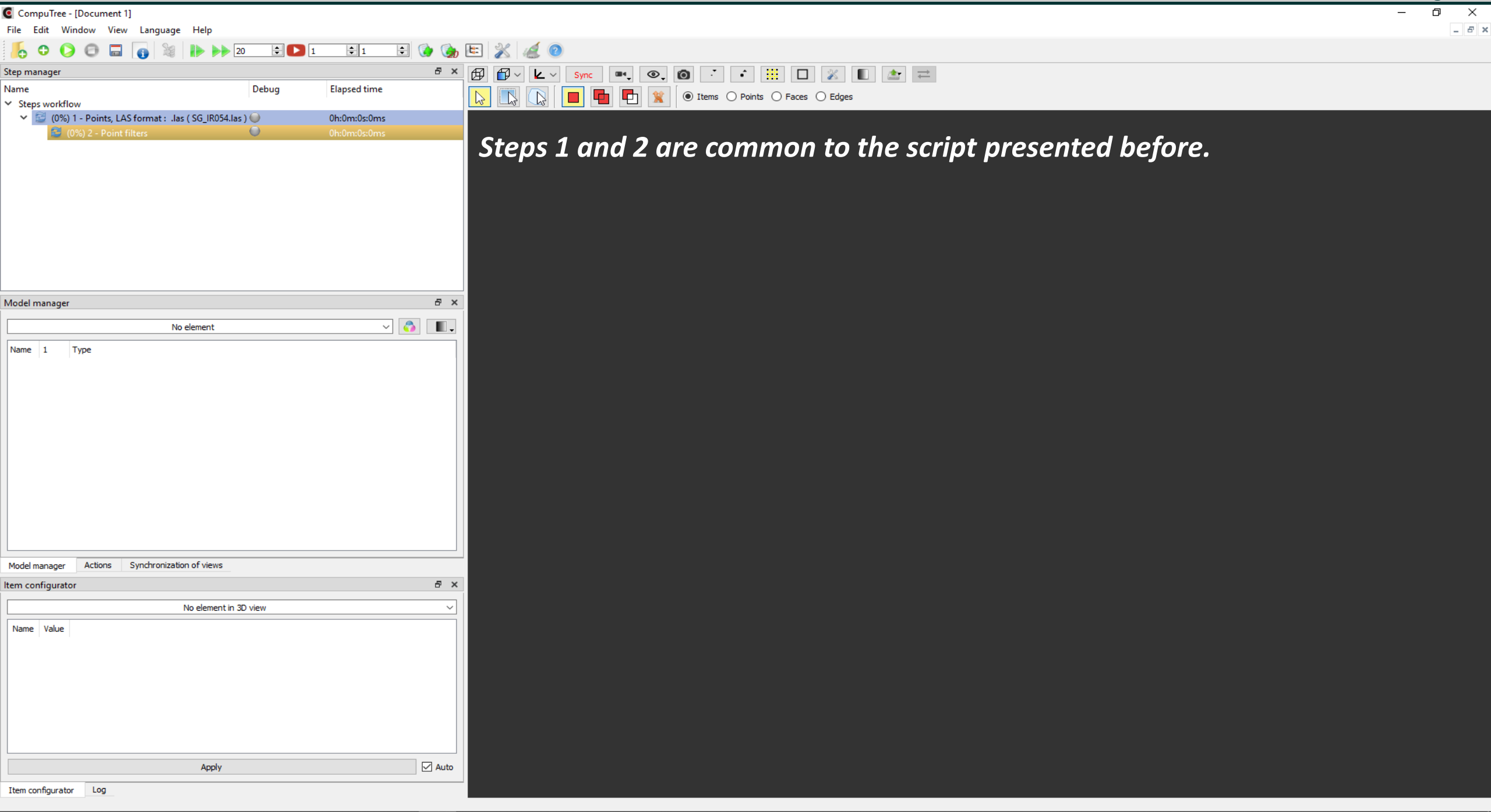
1 Choose the export directory, 2 name the file and 3 save

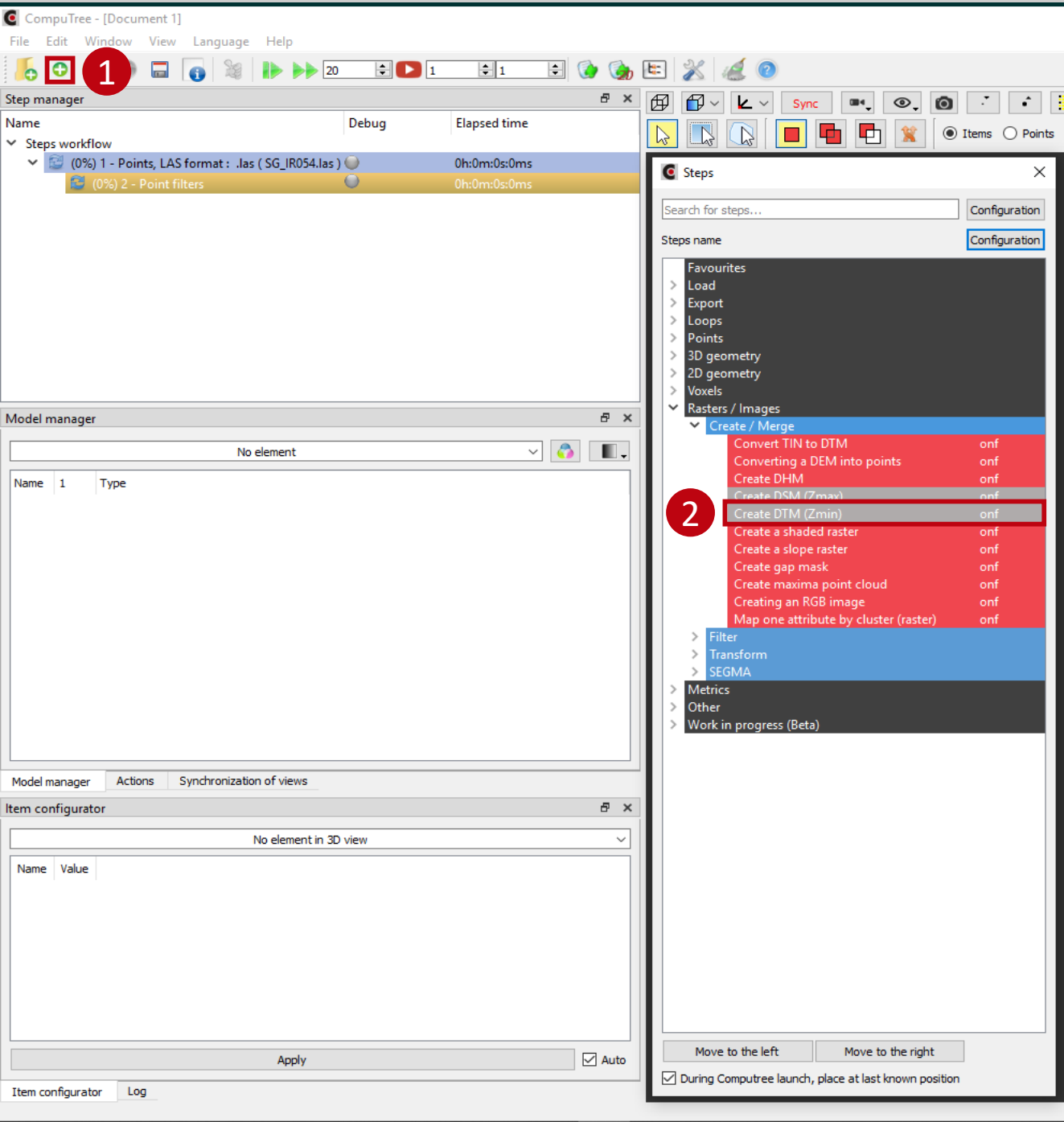

CompuTree - [Document 1]
File
Edit
Window
View
Language
Help
1
Step manager
Name
Debug
Elaps
4 - Convert TIN to DTM
Result/CT_AbstractResult/CT_ResultGroup
5 - Remove height outliers
Result/CT_AbstractResult/CT_ResultGroup
6 - Create DSM (Zmax)
Result/CT_AbstractResult/CT_ResultGroup
7 - Interpolate by pitfilling
Result/CT_AbstractResult/CT_ResultGroup
8 - Create DHM
Result/CT_AbstractResult/CT_ResultGroup
9 - Raster GDAL GeoTIFF : *.tif
10 - Raster GDAL GeoTIFF : *.tif
11 - Raster GDAL GeoTIFF : *.tif
Sync
Items
Points
Faces
Edges
Model manager
No element
Name
1
Type
Model manager
Actions
Synchronization of views
Item configurator
No element in 3D view
Apply
Auto
Item configurator
Log
End of the script
1 You can save the script

Summary of steps



Alternative method of DTM computing


CompuTree - [Document 1]
File
Edit
Window
View
Language
Help
Step manager
Name
Debug
Elapsed time
Steps workflow
(0%) 1 - Points, LAS format : .las (SG_IR054.las)
0h:0m:0s:0ms
(0%) 2 - Point filters
0h:0m:0s:0ms
Sync
Items
Points
Faces
Edges
Steps 1 and 2 are common to the script presented before.
Model manager
No element
Name
1
Type
Model manager
Actions
Synchronization of views
Item configurator
No element in 3D view
Name
Value
Apply
Auto
Item configurator
Log



Step 4: Creating the DTM

1. Open "Add a step".
   Go to the "Rasters / Images" tab, then "Create / Merge".
2. Double click on "Create DTM (Zmax) "

This step creates a raster corresponding to the DTM, without interpolating the data for missing values.

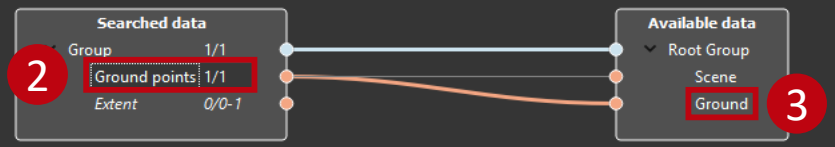
Configuration des résultats d'entrée of step "Create DTM (Zmin)".

Name of the results	Step	Help
Ground points		
(2) Point filters		

1

Step 4: Creating the DTM

Link the ground points of the searched data to the ground points of the available data and unselect the extent.



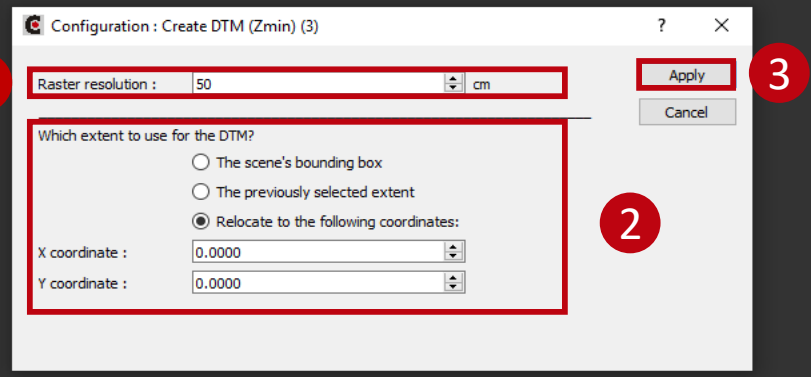
4

OK Cancel

Step 4: Creating the DTM

Step setting:

1 Choose the resolution of the raster, 2 check "Relocate to the following coordinates" for the corner setting and 3 apply.



The choice of the extent to be used for the DTM defines the spatial setting of the raster.

CompuTree - [Document 1]

File Edit Window View Language Help

1

Step manager

Name	Debug	Elapsed time
Steps workflow		
1 - Points, LAS format : .las (SG_IR054.las)		0h:0m:0s:307ms
Result		
2 - Point filters		0h:0m:0s:70ms
Result/CT_AbstractResult/CT_ResultGroup		
3 - Create DTM (Zmin)		0h:0m:0s:5ms
Result/CT_AbstractResult/CT_ResultGroup		

2

Model manager

Result/CT_AbstractResult/CT_ResultGroup (3)

Name	1	Type
Point Source	☐	Point quint16 attributes
Scan Angle	☐	Point qint16 attributes
GPS Time	☐	Point double attributes
Color	☐	Point color attributes
Red	☐	Point quint16 attributes
Green	☐	Point quint16 attributes
Blue	☐	Point quint16 attributes
Wave Packet Descriptor Index	☐	Point quint8 attributes
Byte Offset To Waveform Data	☐	Point quint64 attributes
Waveform Packet Size In Bytes	☐	Point quint32 attributes
Return Point Waveform Location	☐	Point float attributes
NIR	☐	Point quint16 attributes
File header	☐	LAS Header
Ground	☐	Point scene
DTM	☑	Raster<float>

3

Model manager | Actions | Synchronization of views

Item configurator

Raster<float>

	Name	Value
1	Bounding Shape	☐ Activate
2	Centre of the Bounding Shape	☐ Activate
3	Point size (Bounding Shape)	10
4	Raster mode	☑ Activate
5	Raster mode: Set the Z level	☐ Activate

Apply ☑ Auto

Item configurator | Log

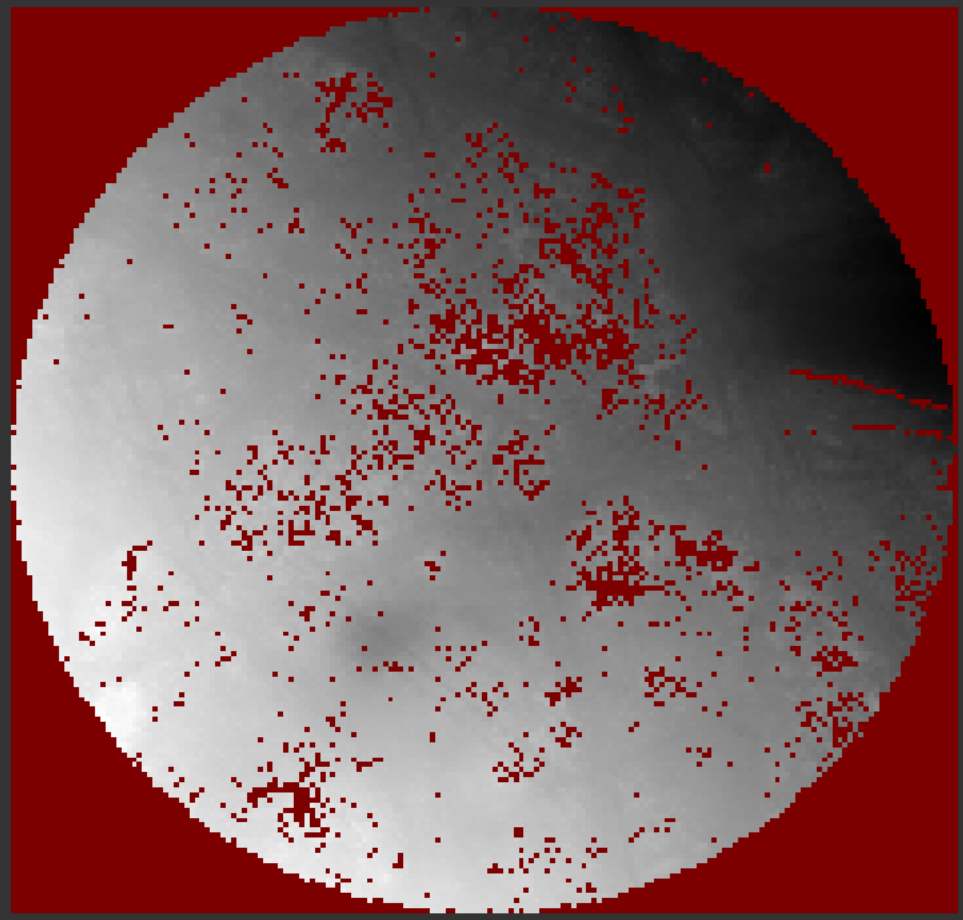
4

5

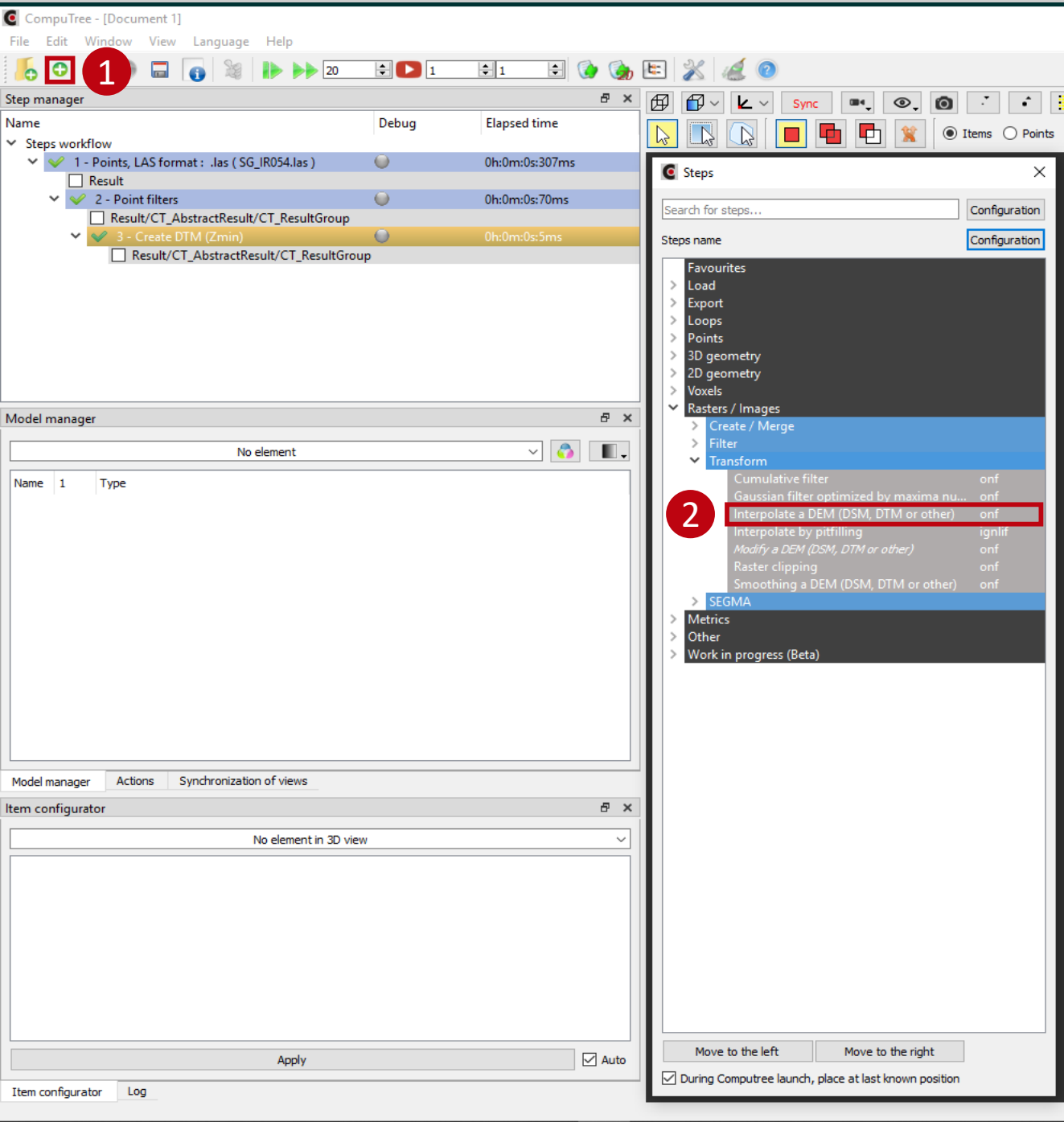
Sync

Items Points Faces Edges

It is possible to view the created DTM. The red squares correspond to the missing values.



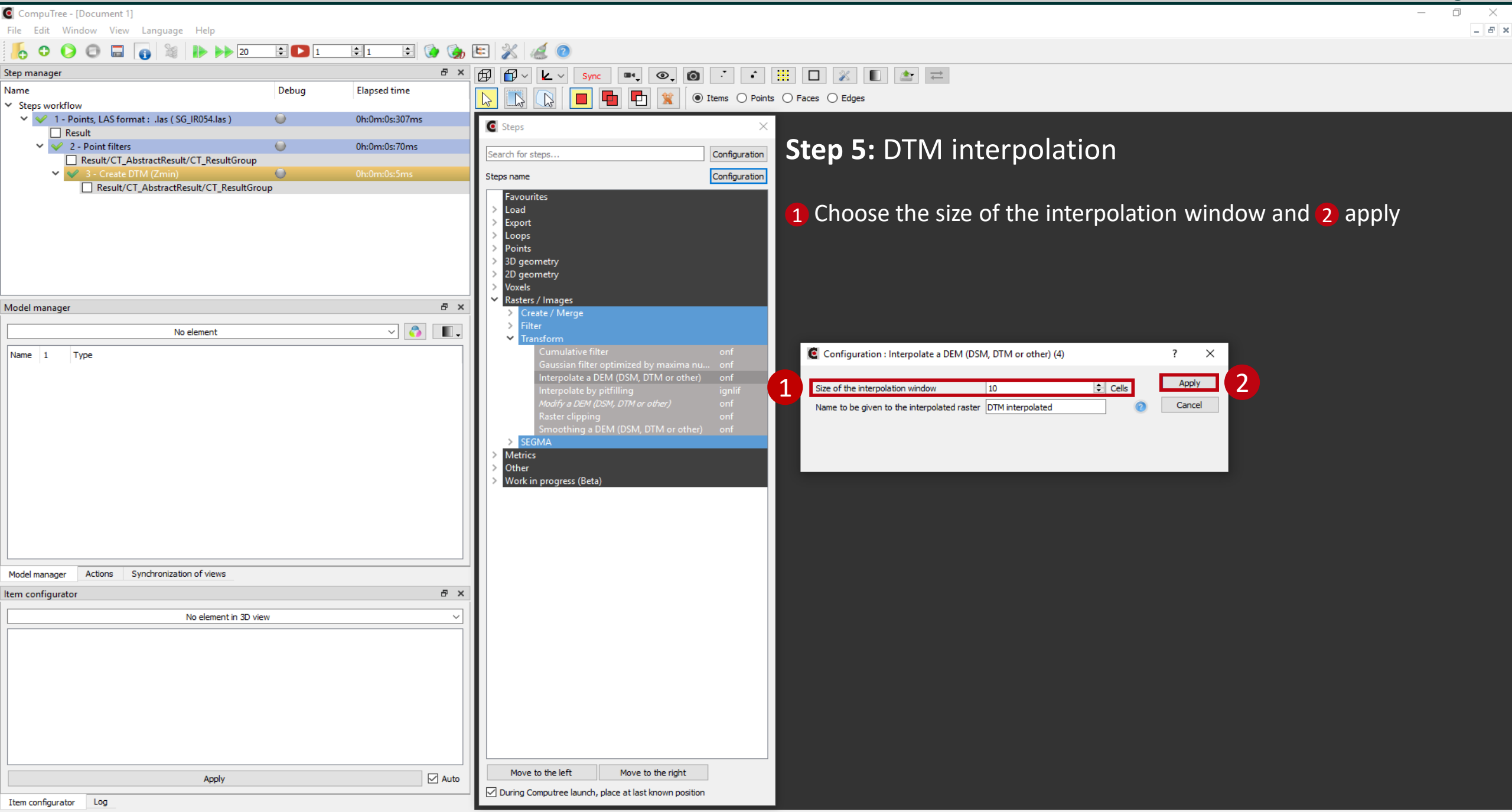
** The execution of the steps is not mandatory for the creation of the rest of the script*



Step 5: DTM interpolation

1. Open "Add a step".
   Go to the "Rasters / Images" tab and then "Transform".
2. Double click on "Interpolate a DEM (DSM, DTM or others)".

This step interpolates the created DTM to fill in the missing values and obtain a raster over the entire plot.


CompuTree - [Document 1]
File Edit Window View Language Help
Step manager
Name Debug Elapsed time
Steps workflow
1 - Points, LAS format : .las (SG_IR054.las) 0h:0m:0s:307ms
Result
2 - Point filters 0h:0m:0s:70ms
Result/CT_AbstractResult/CT_ResultGroup
3 - Create DTM (Zmin) 0h:0m:0s:5ms
Result/CT_AbstractResult/CT_ResultGroup
Model manager
No element
Name 1 Type
Model manager Actions Synchronization of views
Item configurator
No element in 3D view
Apply Auto
Item configurator Log
Sync
Items Points Faces Edges
Steps
Search for steps...
Configuration
Steps name
Configuration
Favourites
Load
Export
Loops
Points
3D geometry
2D geometry
Voxels
Rasters / Images
Create / Merge
Filter
Transform
Cumulative filter onf
Gaussian filter optimized by maxima nu... onf
Interpolate a DEM (DSM, DTM or other) onf
Interpolate by pitfilling ignlif
Modify a DEM (DSM, DTM or other) onf
Raster clipping onf
Smoothing a DEM (DSM, DTM or other) onf
SEGMA
Metrics
Other
Work in progress (Beta)
Move to the left
Move to the right
During Computree launch, place at last known position
Step 5: DTM interpolation
1 Choose the size of the interpolation window and 2 apply
Configuration : Interpolate a DEM (DSM, DTM or other) (4)
1
Size of the interpolation window 10 Cells
Name to be given to the interpolated raster DTM interpolated
Apply
Cancel
2

CompuTree - [Document 1]

File Edit Window View Language Help

1

Step manager

Name	Debug	Elapsed time
Steps workflow		
1 - Points, LAS format : .las (SG_IR054.las)		0h:0m:0s:307ms
Result		
2 - Point filters		0h:0m:0s:70ms
Result/CT_AbstractResult/CT_ResultGroup		
3 - Create DTM (Zmin)		0h:0m:0s:5ms
Result/CT_AbstractResult/CT_ResultGroup		
4 - Interpolate a DEM (DSM, DTM or other)		0h:0m:0s:875ms
Result/CT_AbstractResult/CT_ResultGroup		

2

Model manager

Result/CT_AbstractResult/CT_ResultGroup (4)

Name	1	Type
Scan Angle	☐	Point qint16 attributes
GPS Time	☐	Point double attributes
Color	☐	Point color attributes
Red	☐	Point quint16 attributes
Green	☐	Point quint16 attributes
Blue	☐	Point quint16 attributes
Wave Packet Descriptor Index	☐	Point quint8 attributes
Byte Offset To Waveform Data	☐	Point quint64 attributes
Waveform Packet Size In Bytes	☐	Point quint32 attributes
Return Point Waveform Location	☐	Point float attributes
NIR	☐	Point quint16 attributes
File header	☐	LAS Header
Ground	☐	Point scene
DTM	☐	Raster<float>
DTM interpolated	☑	Raster<float>

3

Model manager | Actions | Synchronization of views

Item configurator

Raster<float>

	Name	Value
1	Bounding Shape	☐ Activate
2	Centre of the Bounding Shape	☐ Activate
3	Point size (Bounding Shape)	10
4	Raster mode	☑ Activate
5	Raster mode: Set the Z level	☐ Activate

Apply ☑ Auto

Item configurator | Log

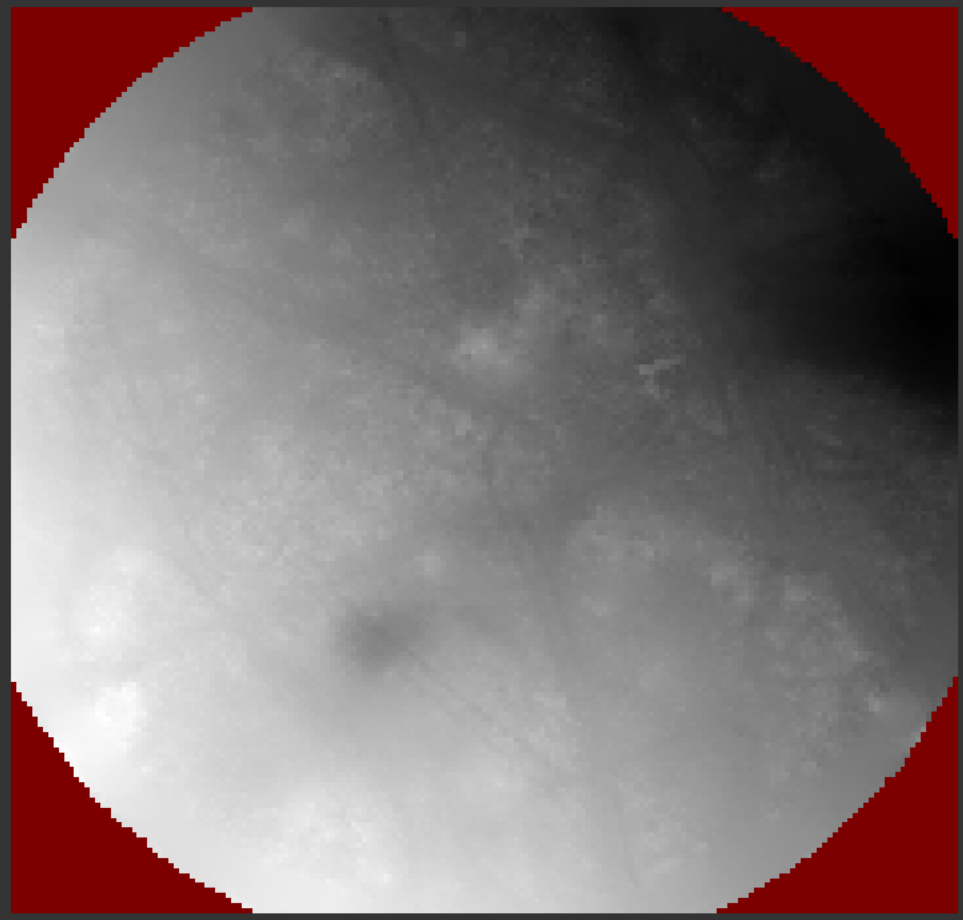
4

5

Sync

Items Points Faces Edges

It is possible to view the interpolated DTM.



** The execution of the steps is not mandatory for the creation of the rest of the script*