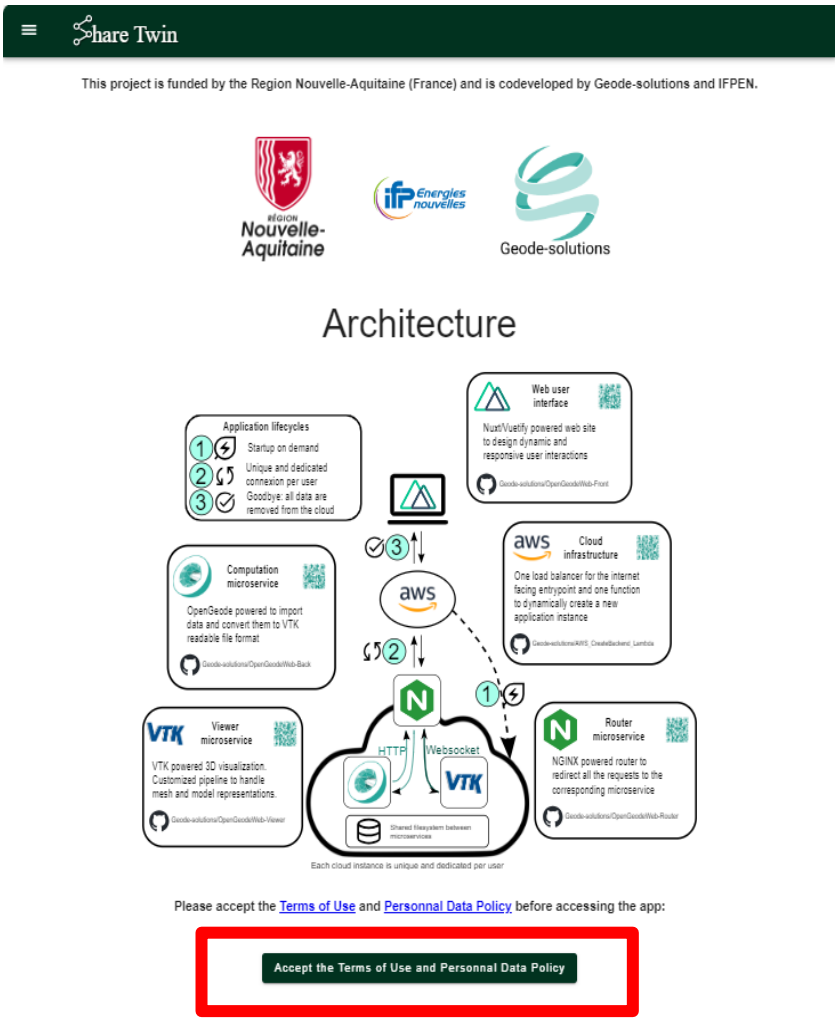
Share-Twin: a webapp to visualise geological 3D data

Share-Twin is the result of a joint effort initiated by Geode-Solutions and supported by IFP Energies Nouvelles. The web application aims to offer to both professionals and the general public a tool that can be easily accessed online, is simple to use, and allows the integration of information both from the surface and the subsurface. Its flexibility will allow anyone interested to visualise publicly available or property data through this interface.

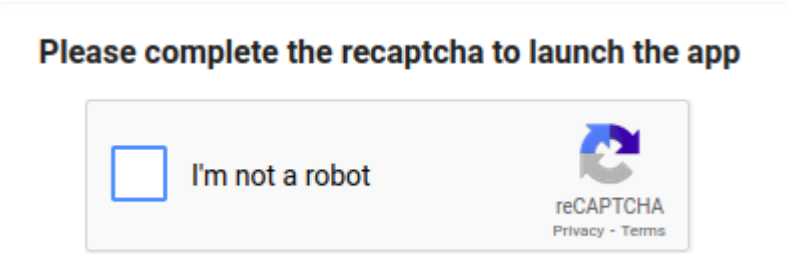
1. Starting the application

Share-Twin is a web application to visualise all data from the surface (e.g., urban or industrial) and the subsurface (e.g., utility network or geothermal reservoirs). To access it the address is as follow: https://share-twin.com

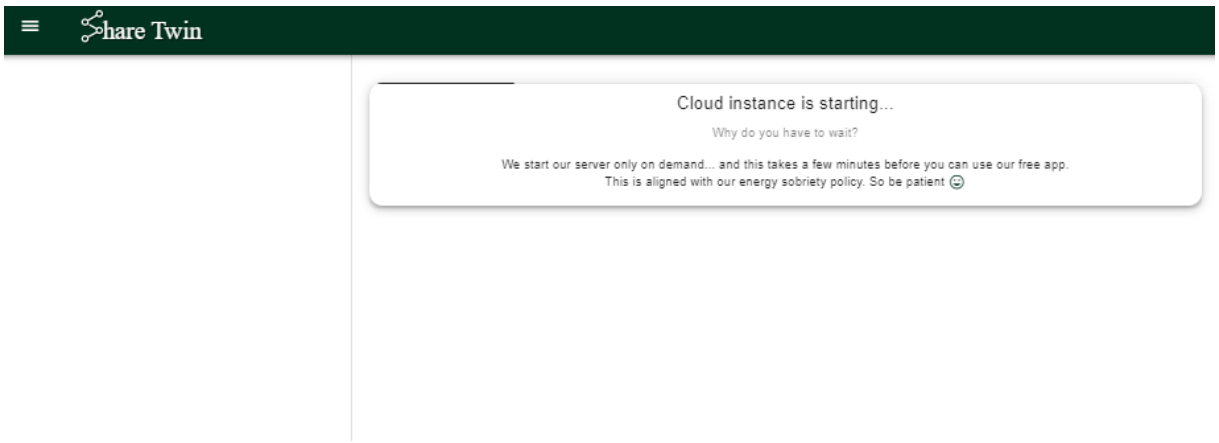


To enter, a clickable button “Accept the Terms of Use and Personal Data Policy” is available.

The second stage to enter is to fulfill the required reCAPTCHA to secure Share-Twin from undesirable use by robots. The CAPTCHA is a Turing test that allows us to tell bots and humans apart. In the case below, the only required action is to tick the box “I’m not a robot”

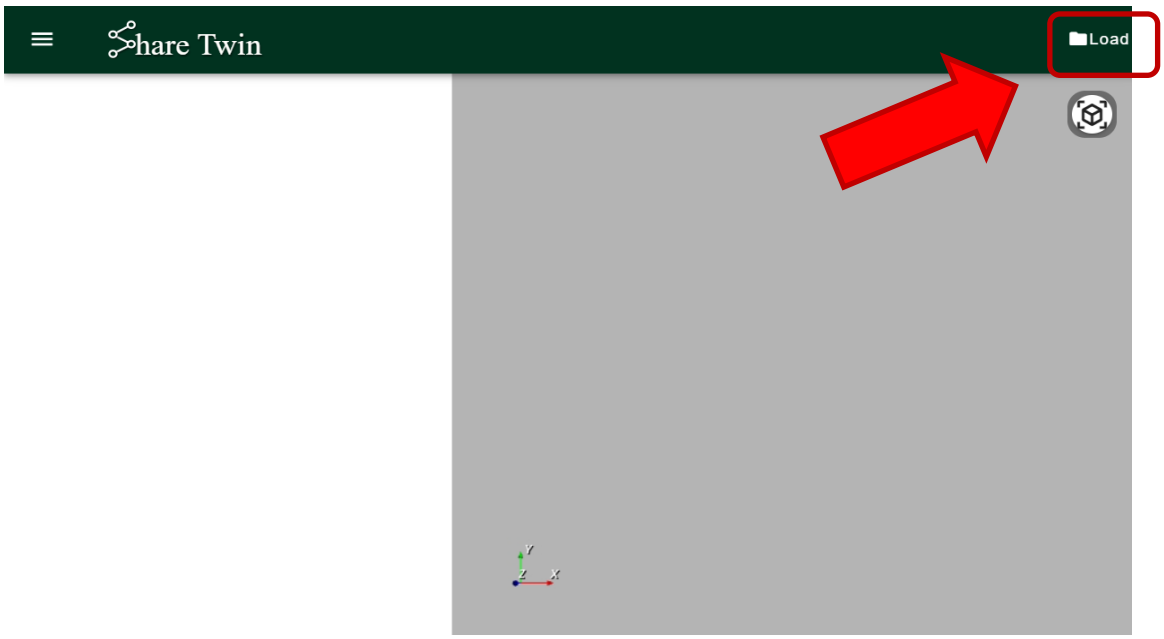


Once this stage is passed a message could appear asking you to wait while the application is being launched. This stage allows the web application to start. In line with the energy sobriety policy of Share-Twin, the application is launched “on demand” some time is required for the servers to start.

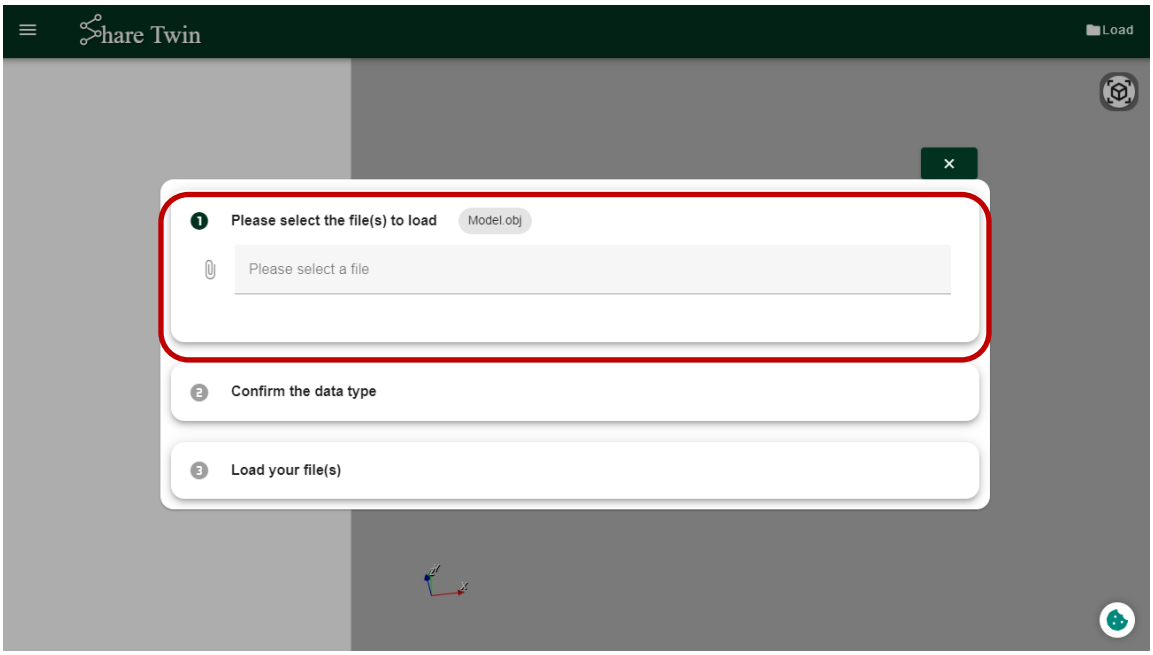


2. Homepage, possible actions, and a first entry

Once the application has started, the homepage opens.



At this point, the main action that can be done in the application is to open a layer. To do so, a “load” button is available in the top right corner of the application.

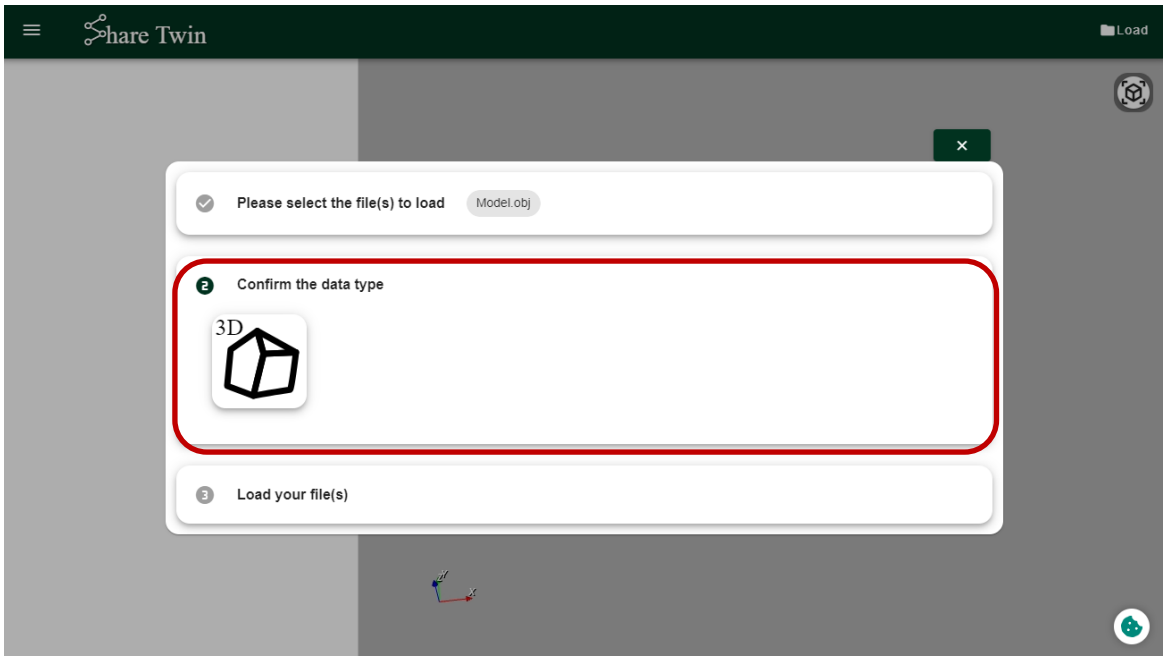


The pop-up window first allows you to choose a layer that you’d like to view in Share-Twin. For that, you have to select a file by clicking on “Please select a

file". The second part requires selecting a type of file: 2D or 3D as a similar format can something be the carrier of different datatype. The third and last step is to validate by pressing "Load" in the "3- load your file(s)" section. It also allows you to cancel the loading process if you decide not to proceed with the action.

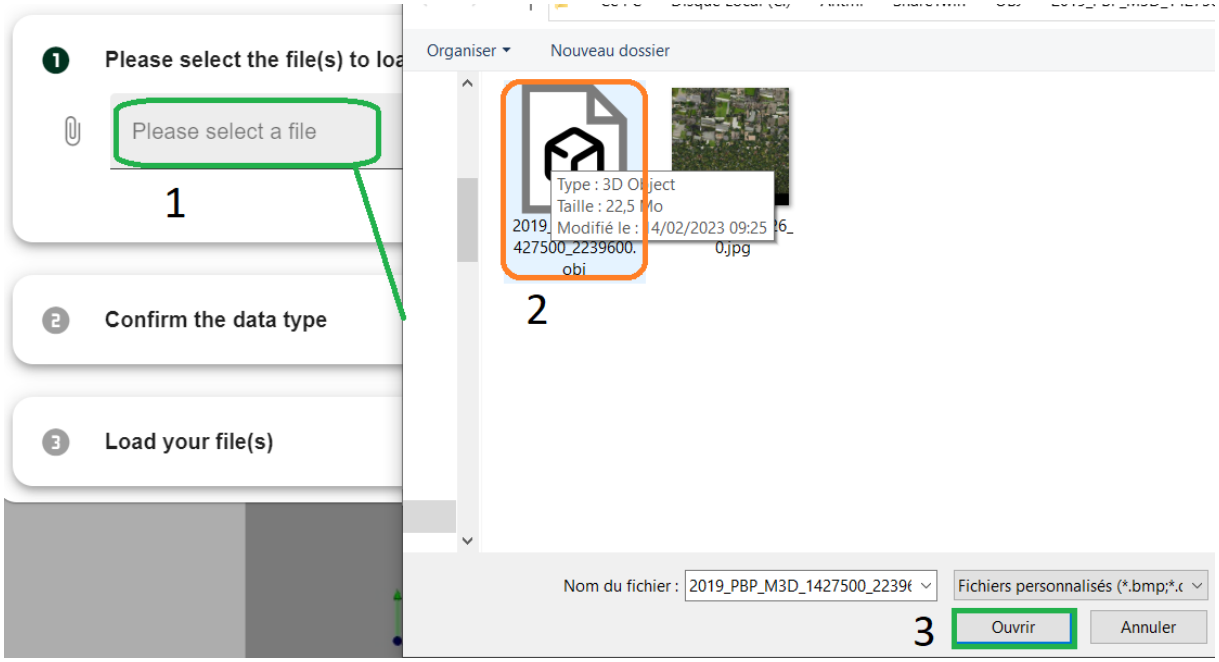
Share-Twin allows to import many different file formats: e.g., in 1D (*.wl), 2D (*.obj, *.dxf, *.ts, *.svp, *.jpg) et 3D (*.vtu). See Annex 1 for further details.

Note: a multiple import can be done, allowing to load several files in one action. For example, several maps can be brought into the application at once.



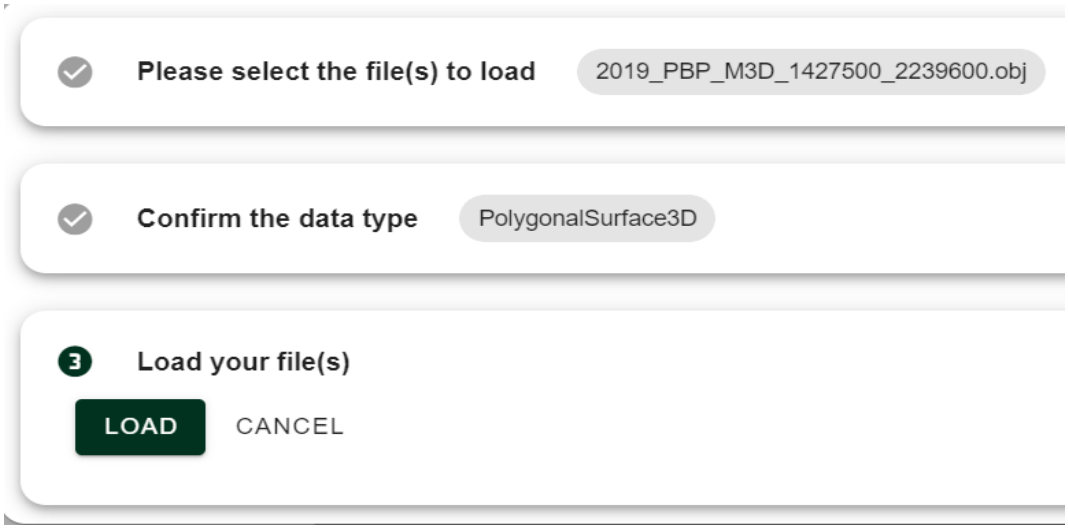
Example 1: importing a 3D surface in Share-Twin

Following the previously described steps, an *.obj file has been selected.



The imported file type needs to be selected, in this case only the 3D option is proposed.

Once the file type is selected, the “load” button becomes active in section 3 to finalise the import.

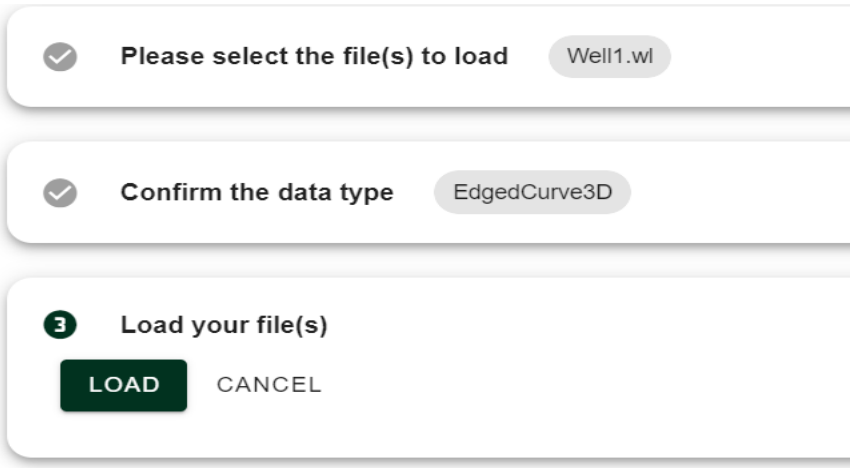


Once the importation process is done, the file is shown on the main display area, and the layer is listed on the right-hand side menu.

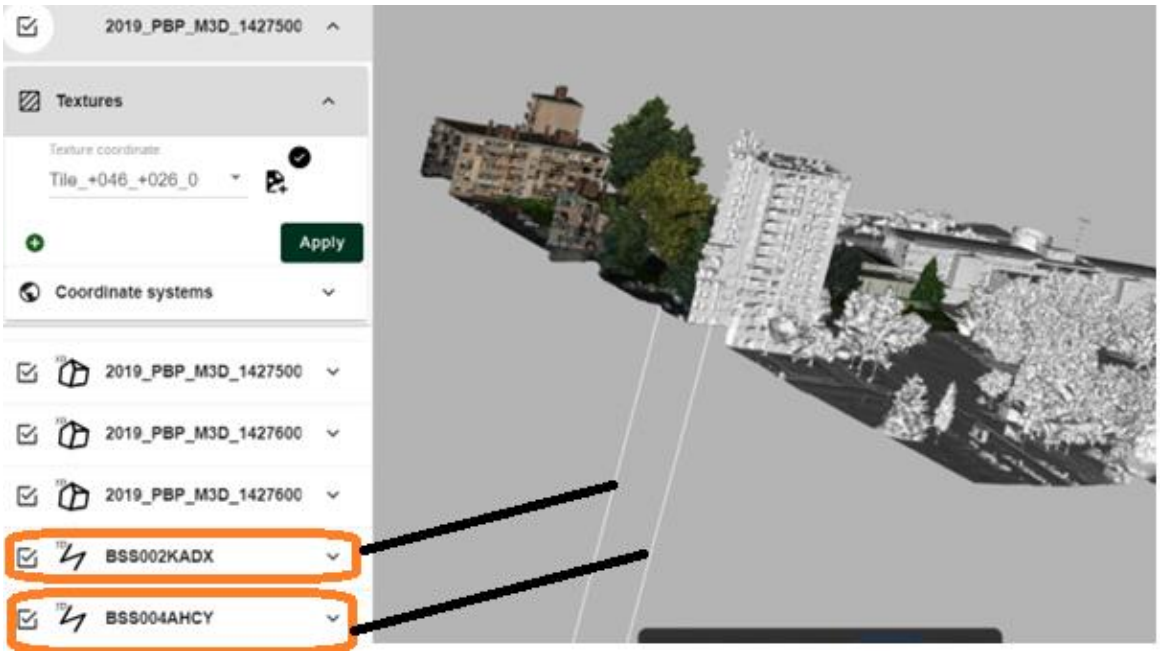
Data courtesy of CAPBP (Communauté d'Agglomération de Pau Béarn Pyrénées, France)

Example 2: importing wells (1D)

The main “load” button allow to select a *.wl file to import a well into Share-Twin



The result in the visualisation panel (shown here with a 3D tile; including one with texture) of the importation of two wells.

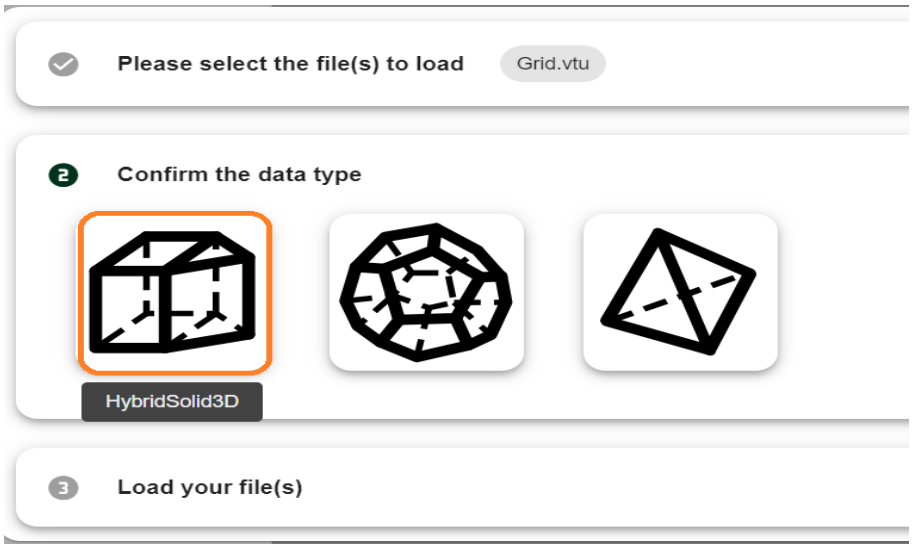


Data courtesy of CAPBP (Communauté d’Agglomération de Pau Béarn Pyrénées, France)

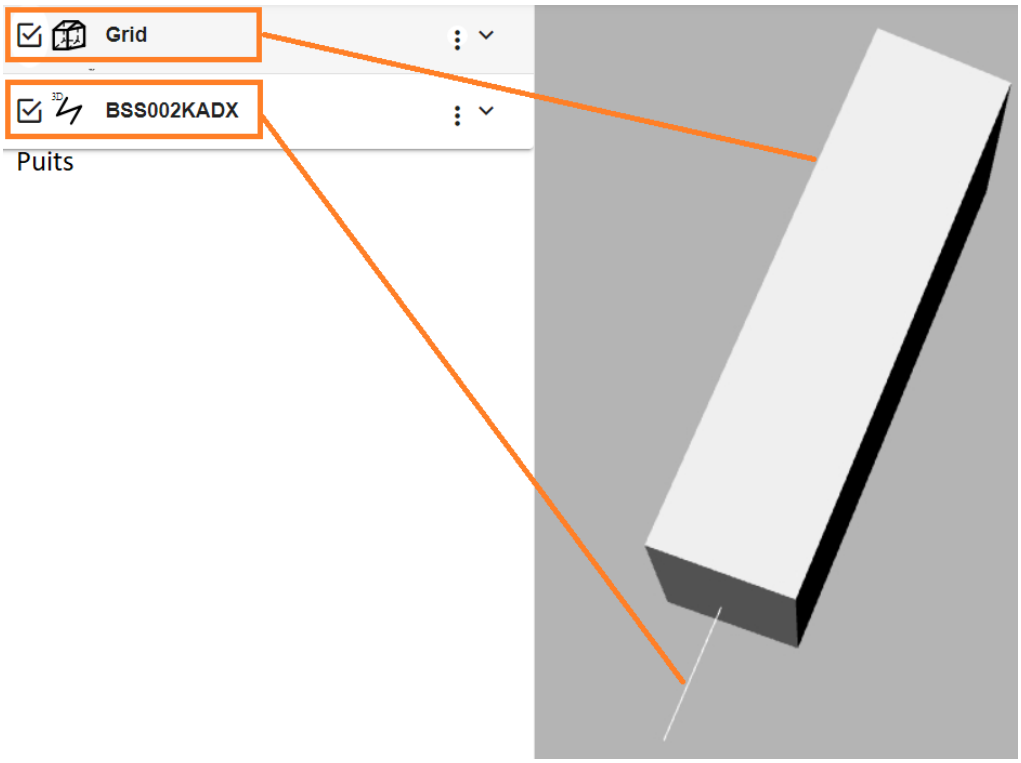
Example 3: importing 3D grid (*.vtu)

The main “load” button allows the selection of a *.vtu file that can be added to the viewer.

The data type ‘HybridSolid3D’ needs to be selected in this case followed by the load button in step 3.



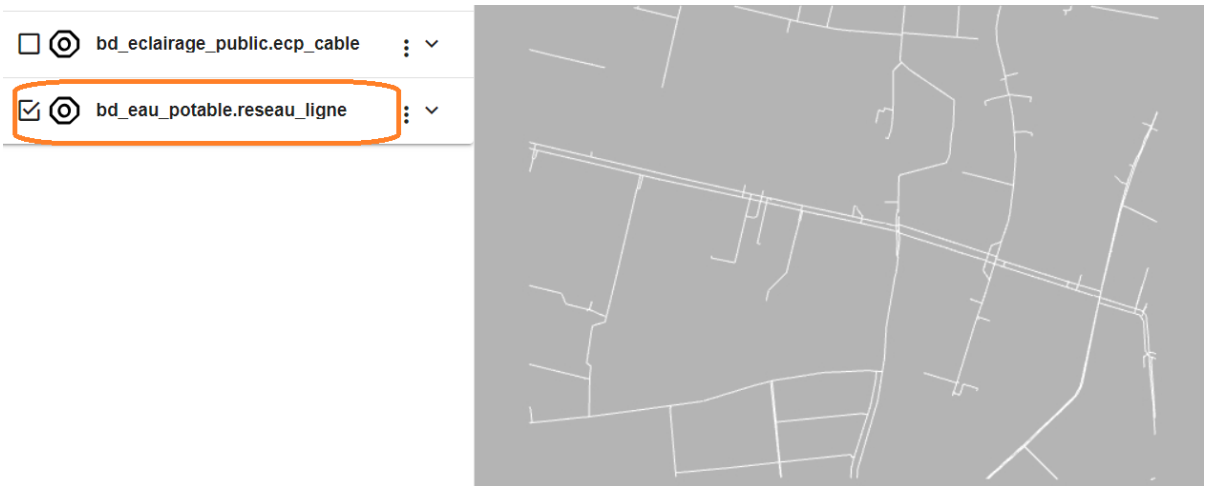
The imported grid can be displayed (here together with a 1D well).



Example 4: visualising a *.svg file

Underground network (e.g., water and electric networks) can be visualised in Share-Twin.

- Visualisation of the water network (*eau potable* in French)



- Adding the street lightning network (*réseau d'éclairage* in French)

3. The right-hand panel: main visual actions on the object

On the main visualisation panel several actions can be performed to visualise the object in 3D (objects imported in 2D appear as a plane surface in the 3D environment).

The action to visually ‘move around’ the object is:

- Translation of the object in the visualisation space by pressing and maintain it pressed on the *mouse wheel.*
- Zoom in and out by scrolling the *mouse wheel.*
- Change the view angle by keeping the mouse right-click pressed and moving the mouse around.

You can also recentre the object by using the ‘resize camera’ button  .

4. The left-hand panel: selecting the object, adding a texture, and dealing with the coordinates.

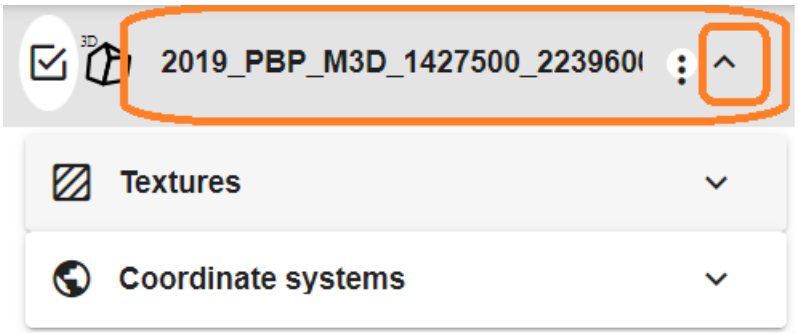
On the left-hand side panel, all objects appear initially as a list mentioning their name.

4.1. Selecting the object

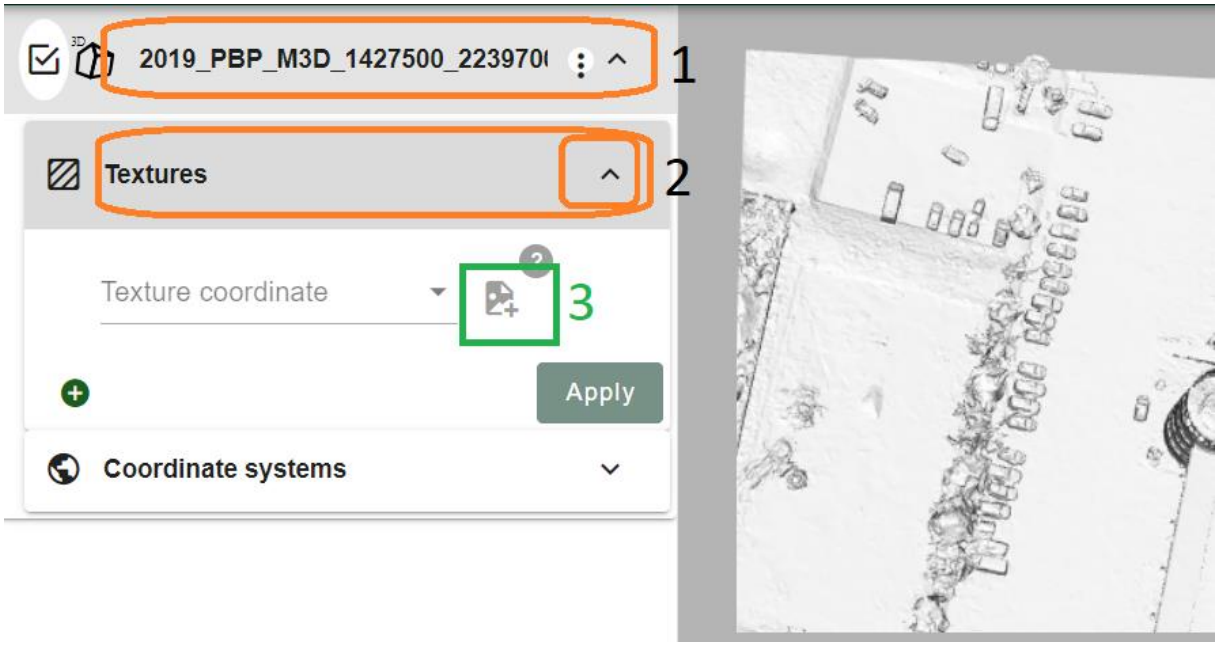
First action is the section of an object that you want to visualise. To do so there is a “tick box” next to the name of the file that has been loaded that you can tick or not.

4.2. Adding a texture to a loaded object

Unfolding the menu of a specific object in the left-hand panel using the arrow at the right allow the addition of a texture to the otherwise gray shade visualisation.

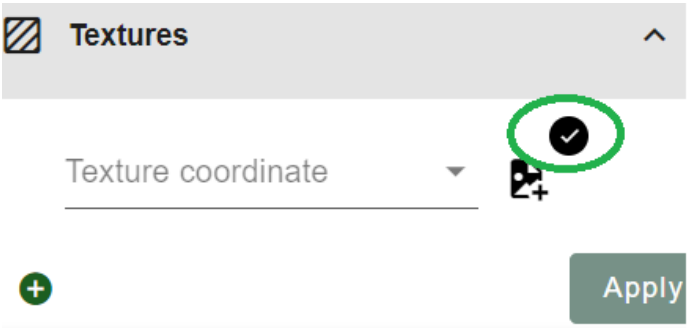


To import the texture, the first step is to find the file that contains the texture by unfolding the texture menu using the arrow on the right of the “texture” label.

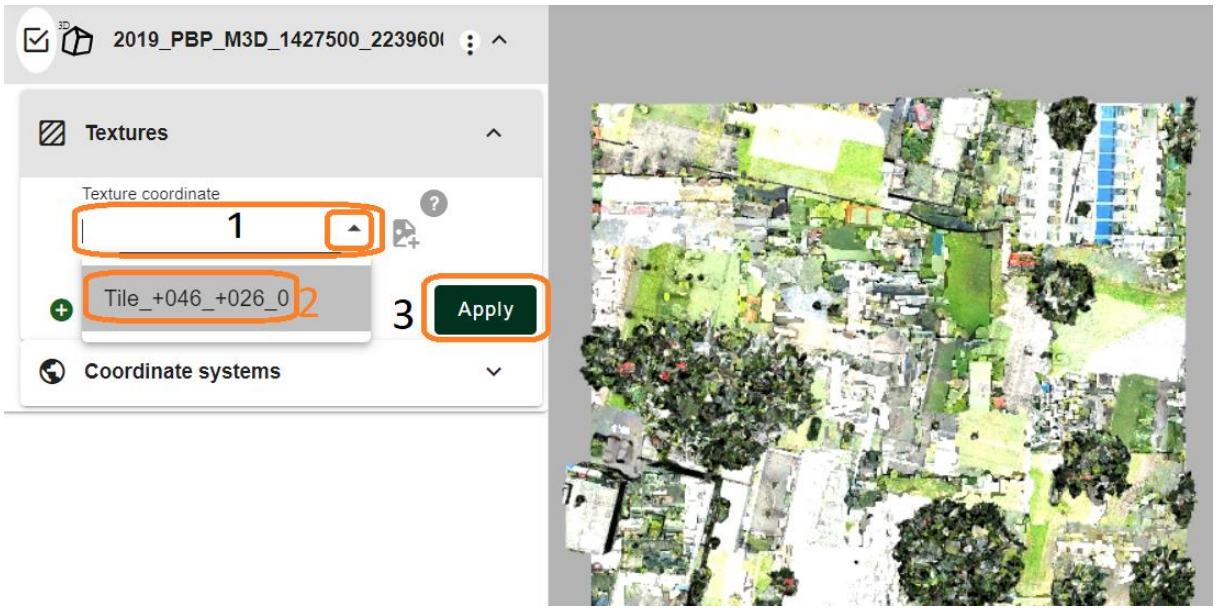


The button ‘file import’  is then available to select the texture file in a newly opened pop-up window.

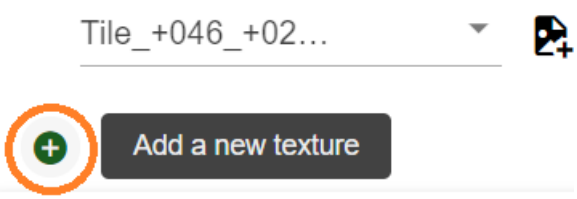
The texture file is then being loaded when the tick appears above the ‘file import’ icon.



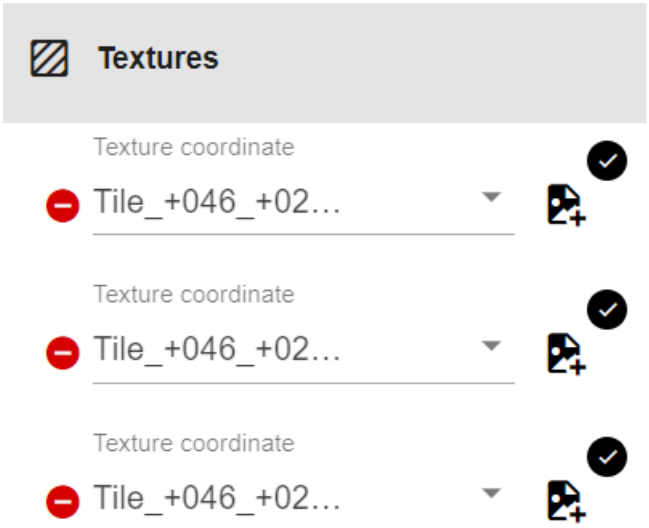
To select the texture that has been loaded you have to choose the right texture from the scrolling menu (Tile_+046_+026_0 in the example below). A validation through the “apply” button is necessary to finalise the texturization of the object.



Additional textures can be added by clicking on the ⊕ button



Deleting textures is also possible through the button

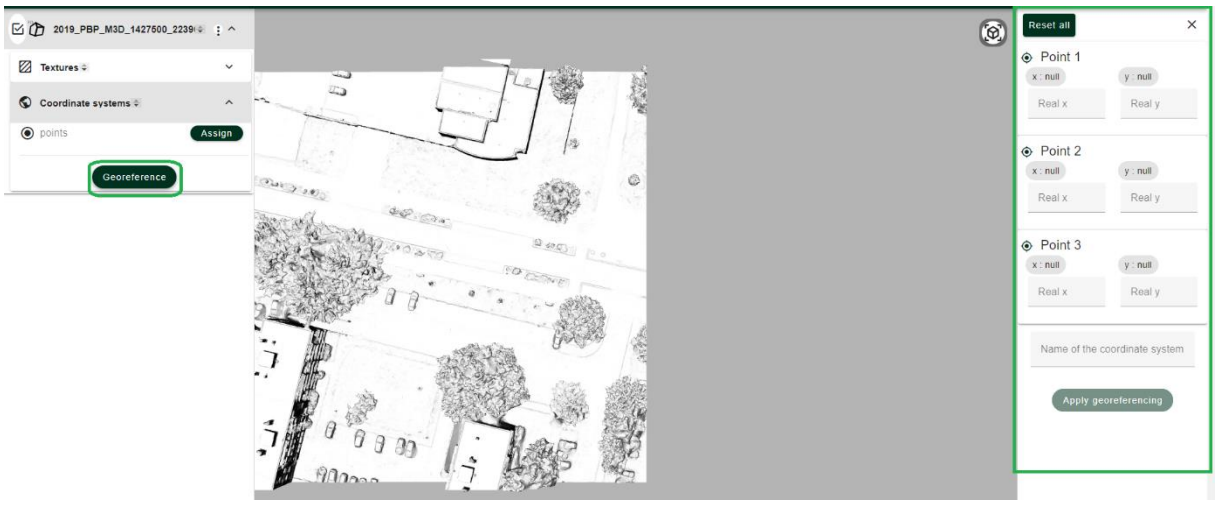


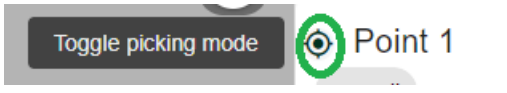
4.3. Dealing with coordinate systems

4.3.1. **Manual georeferencing**

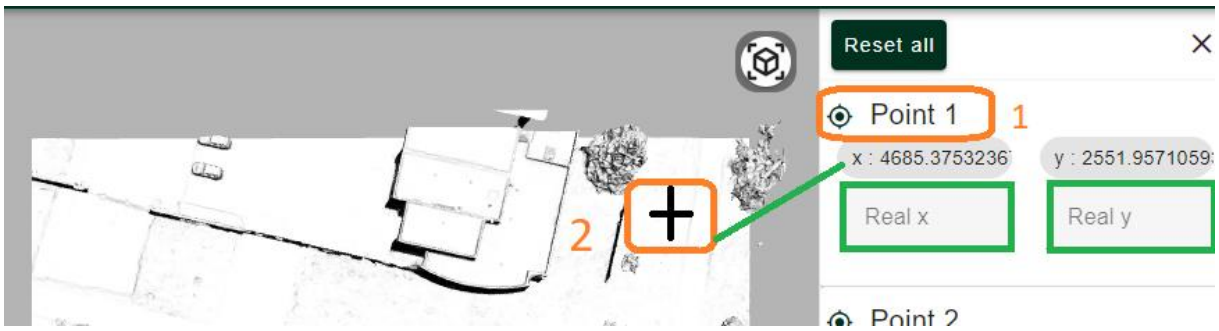
This feature offers the possibility to manually correct the georeferencing of a map by localising the position of three points.

Select the "Georeference" button, a lateral menu opens to the right.



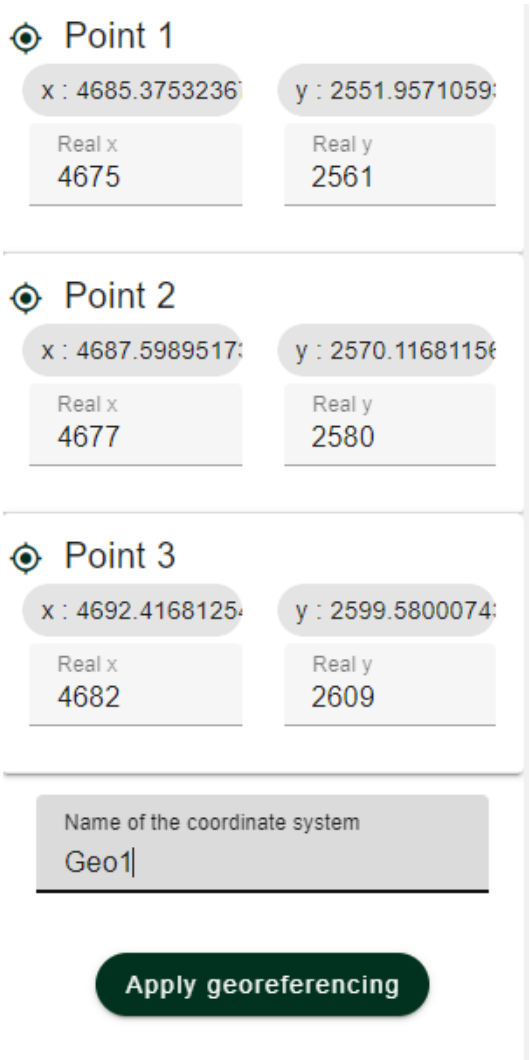
To modify the coordinates, first select point 1 to georeference by clicking on the point icon 

, then choose where this point should be on the map (select points that have a known coordinate).



The x, y coordinates appear in the right-hand menu and can be modified in the "Real x" and "Real y" boxes.

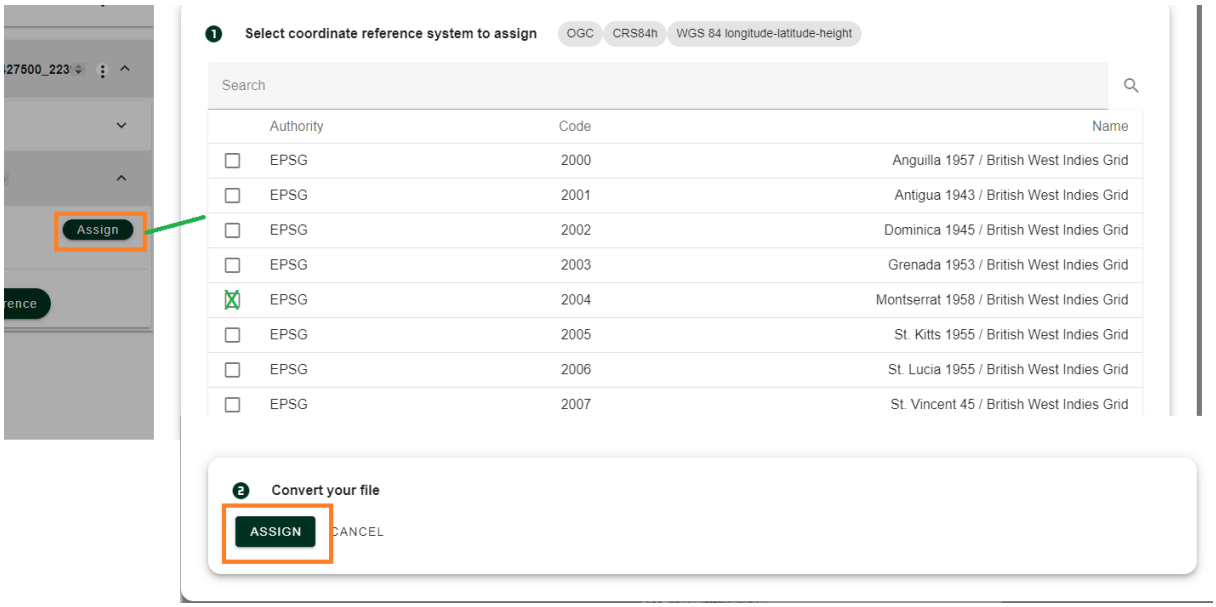
Repeat the same operation for the points 2 and 3.



Click on ‘Apply Georeferencing’, and the position of the map is updated.

4.3.2. **Assign a coordinate system to a map.**

To assign a coordinate system to a map, click on “Assign”. In the pop-up window select the coordinate system to be assigned to the map and click “Assign” at the bottom of the pop-up window to validate the choice.



The new coordinate system is now assigned to the selected map.

Annex 1 : Compatible file formats

File format	OpenGeode object	Input	Out put	Notes
.lso	StructuralModel	✓	✓	requires tetrahedral blocks
.ml	StructuralModel	✓	✓	requires triangulated surfaces
.ml	BRep		✓	requires triangulated surfaces
.pl	EdgedCurve3D		✓	
.ts	TriangulatedSurface3D	✓	✓	
.wl	EdgedCurve3D	✓	✓	
.vo	RegularGrid3D	✓		
.dev	EdgedCurve3D	✓		
.txt	EdgedCurve3D	✓		
.dat	EdgedCurve3D	✓		
.dxf	PolygonalSurface3D	✓	✓	
.msh	BRep	✓	✓	v2 and v4 for input, v4 only for output, requires triangulated surfaces and tetrahedral blocks (if they are meshed)
.obj	PolygonalSurface3D	✓	✓	
.obj	TriangulatedSurface3D		✓	
.obj	PolygonalSurface3D	✓	✓	
.smesh	TriangulatedSurface3D EdgedCurve3D	✓		
.shp	Section	✓		
.shz	Section	✓		
.stl	TriangulatedSurface3D	✓	✓	

.svg	Section	✓		
.triangle	TriangulatedSurface2D	✓	✓	output three files named: .ele, .node, .neigh
.vti	RegularGrid3D RegularGrid2D	✓		ascii, binary and encoded appendedData supported
.vti	RegularGrid2D RegularGrid3D RasterImage2D RasterImage3D		✓	ascii only supported
.vtp	PolygonalSurface3D PolygonalSurface2D	✓		ascii, binary and encoded appendedData supported
.vtp	PointSet3D PolygonalSurface3D TriangulatedSurface3D EdgedCurve3D PointSet2D PolygonalSurface2D TriangulatedSurface2D EdgedCurve2D		✓	ascii only supported
.vtu	PolyhedralSolid3D TetrahedralSolid3D	✓		ascii, binary and encoded appendedData supported
.vtu	PolyhedralSolid3D TetrahedralSolid3D HybridSolid3D		✓	ascii only supported
.vtm	Section BRep		✓	
.jpg	RasterImage2D	✓		
.png	RasterImage2D	✓		