

# **3D Urban data in QGIS**

**FOSS4G – 2021**

B. De Mezzo - Oslandia

# 3D in GIS?

What for?

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# Complexe 3D scenes?

- building (BIM)
- city
- drill holes ([OpenLog](#))

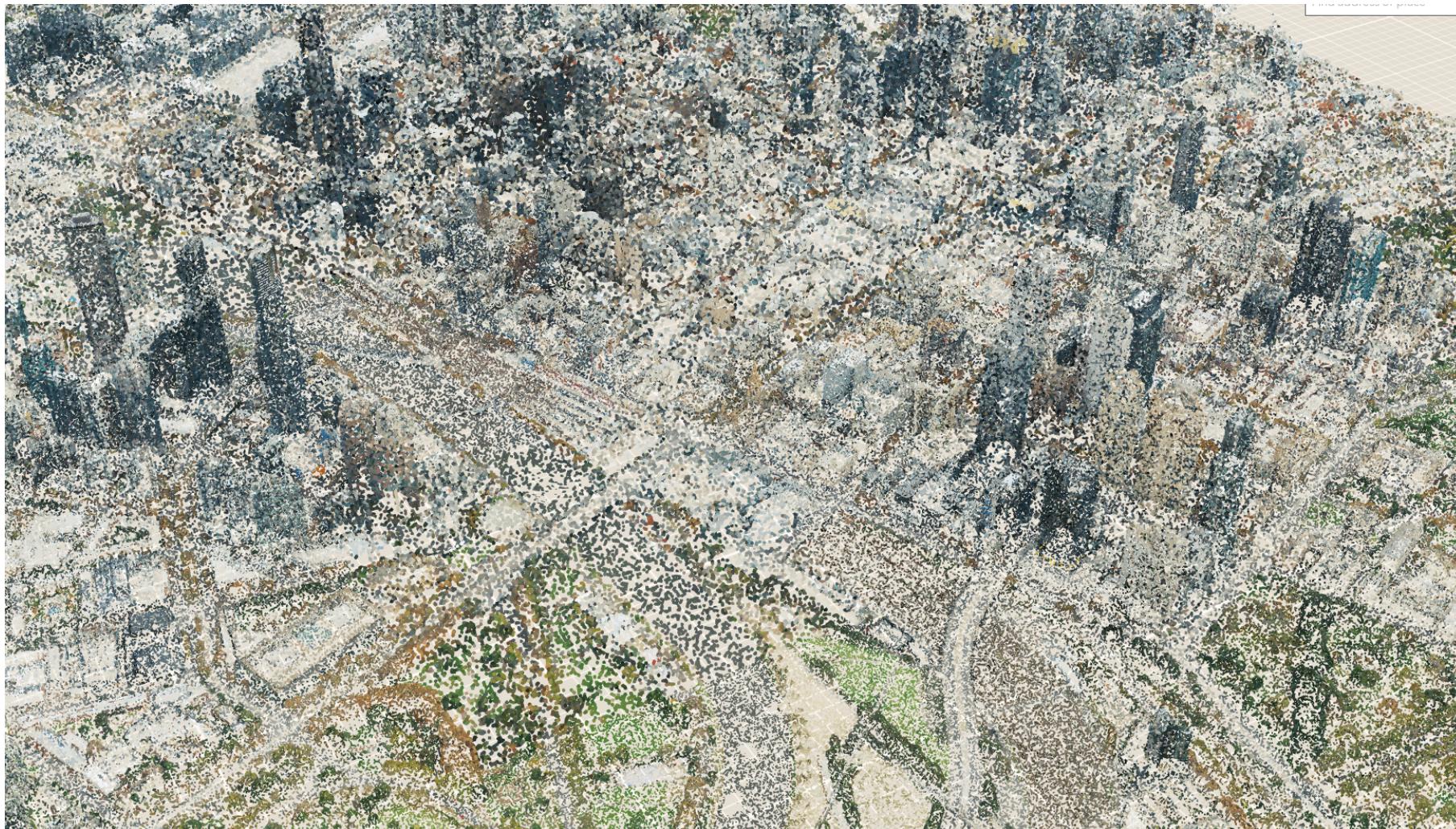
# Complexe 3D scenes – Needs

- smart data loading
- pickable
- stylable
- 2D views of 3D data subset

# Complexe 3D scenes – Numerous formats

- 3D point cloud (e.g., PCD, EPT)
- 3D models (e.g., 3DS, OBJ)
- 3D scenes (e.g., Collada, KML, glTF)
- 3D city models (e.g., CityGML)

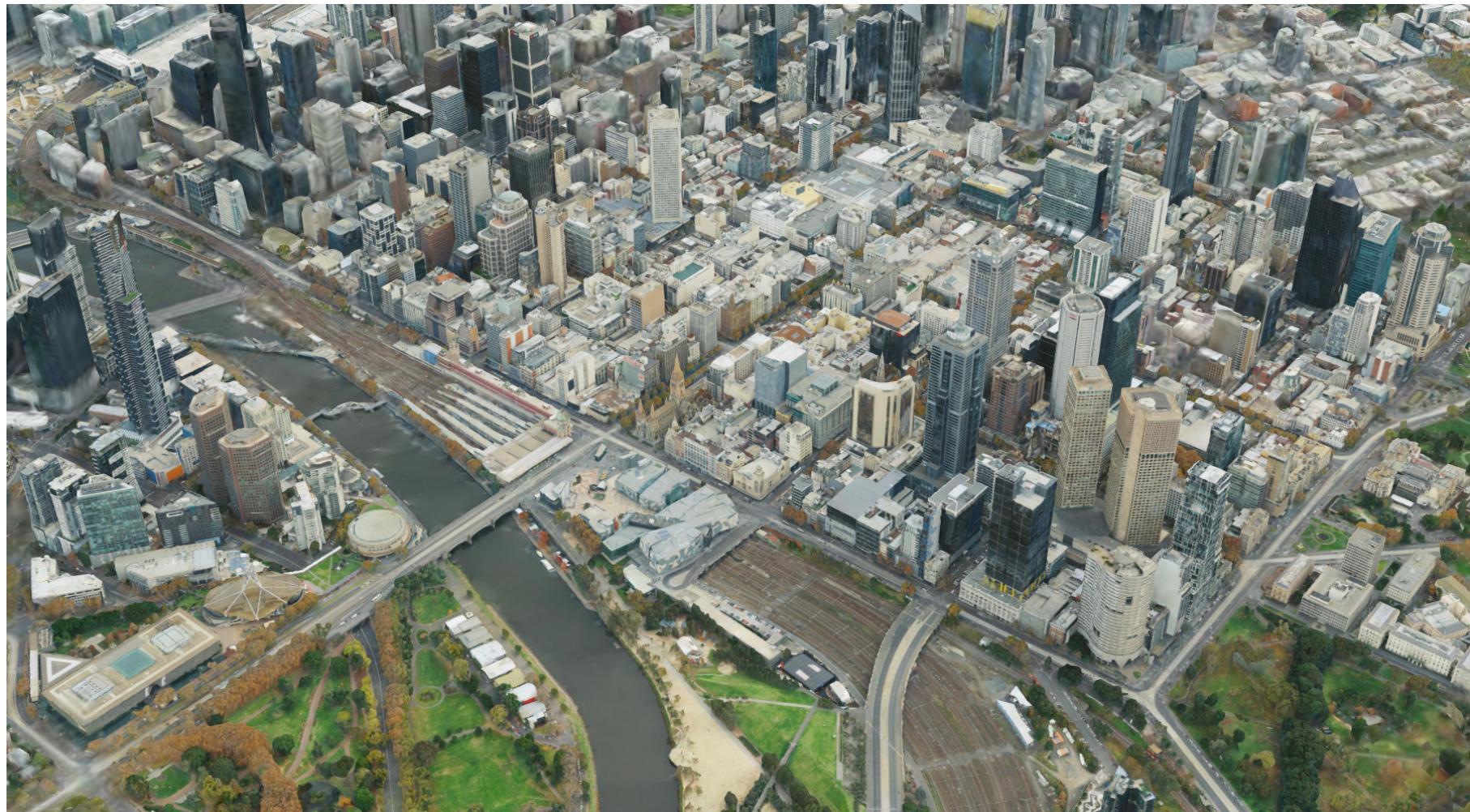
# Complexe 3D scenes – 3D point cloud



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# Complexe 3D scenes – 3D models



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# Complexe 3D scenes – 3D scenes





# Complexe 3D scenes – LOD formats

- 3D tiles
- BIM - IFC

# Complexe 3D scenes – 3D tiles?

- designed by Cesium for Cesium
- pushed to OGC
- hierarchical datasets
- JSON/binary mixed format
- default projection: 4978

# 3D in QGIS?

- 3D since 2.18 ~ Oct. 2017
- QGIS ≠ 3D viewer/modeler
  - dedicated 3D viewer widget
- 3D data reprojected to 2D/2.5D
- based on Qt5 3D

# 3D in QGIS – 🤖

- 3D projections partially supported
  - e.g., 4978 geodesic centered vs 3857
- 3D provided by Qt:
  - built with Qt5
  - will be more efficient with Qt6
- 3D software overlay by QGIS

# 3D in QGIS – 😊

- 3D object selection
- **stylable** et **texture**
- LOD support

# 3D tiles integration in QGIS

What do we need to do?

- 3D tiles structure ↵ QGIS LOD  
(ChunkLoader)
- glTF (meshes, textures, etc.)
- reprojection from 4978
- object style and selection

# 3D tiles integration in QGIS

What have we done?

- [QEP #225](#)
- lazy tileset loading
- basic glTF support
- reprojection from [4978](#)

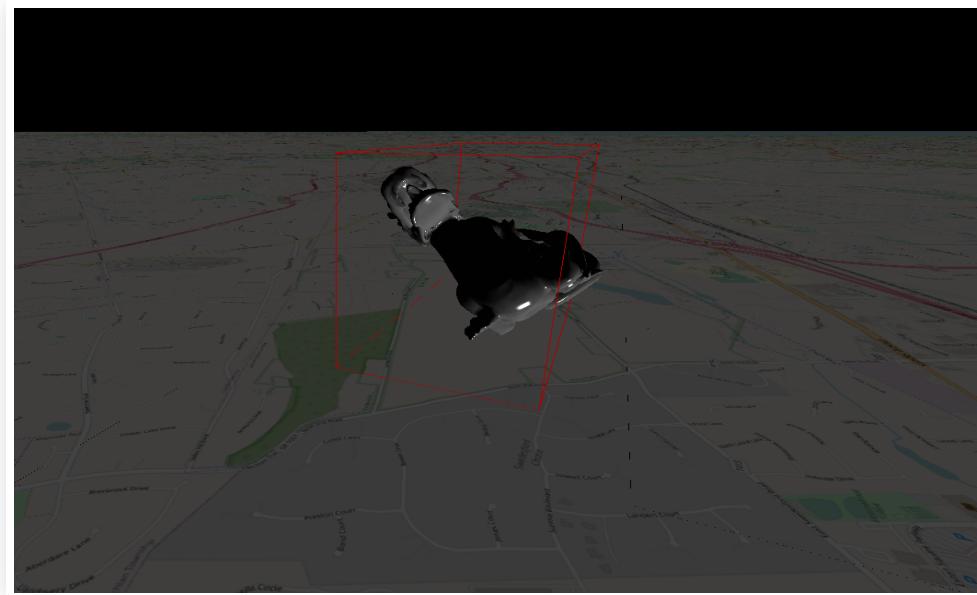
# 3D tiles integration – glTF

- Qt3d SceneLoader uses [Assimp lib](#)
- glb not supported (need of [tinyglTF](#))
- 1 mesh per file
- material extraction

# 3D tiles integration – From 4978

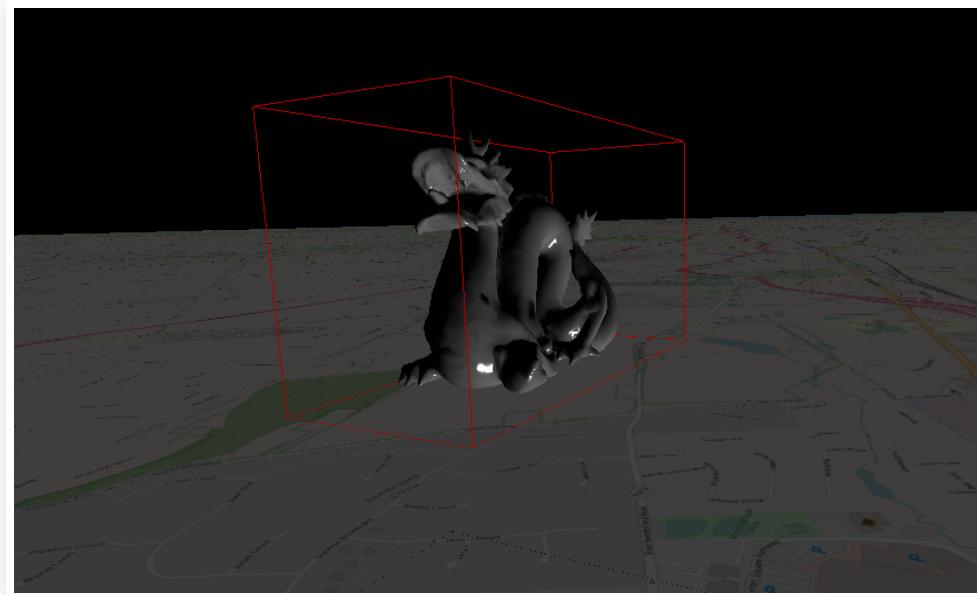
- default projection: 4978
  - fix orientation
  - object coordinate system

# From 4978 – orientation



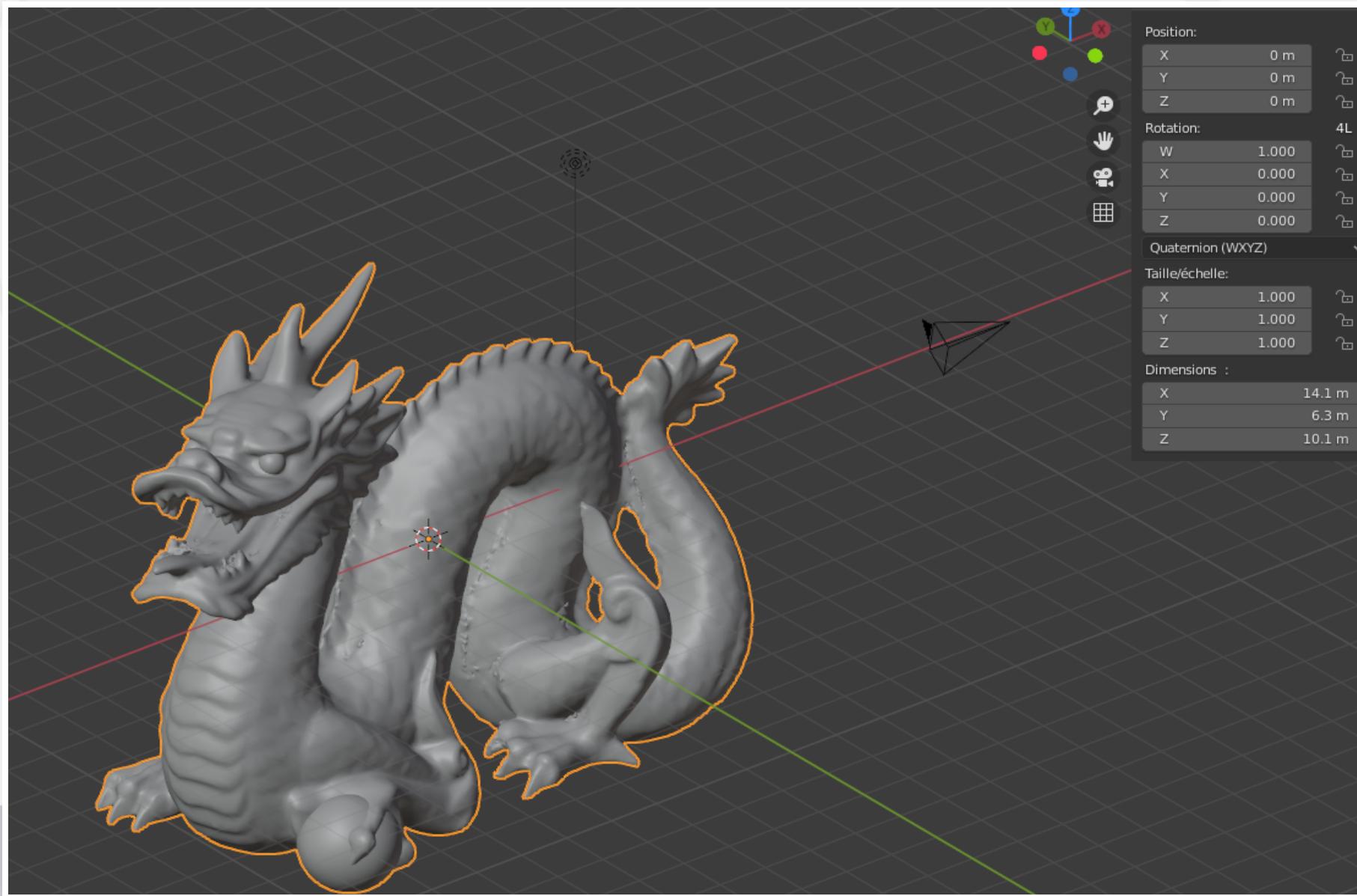
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# From 4978 – orientation



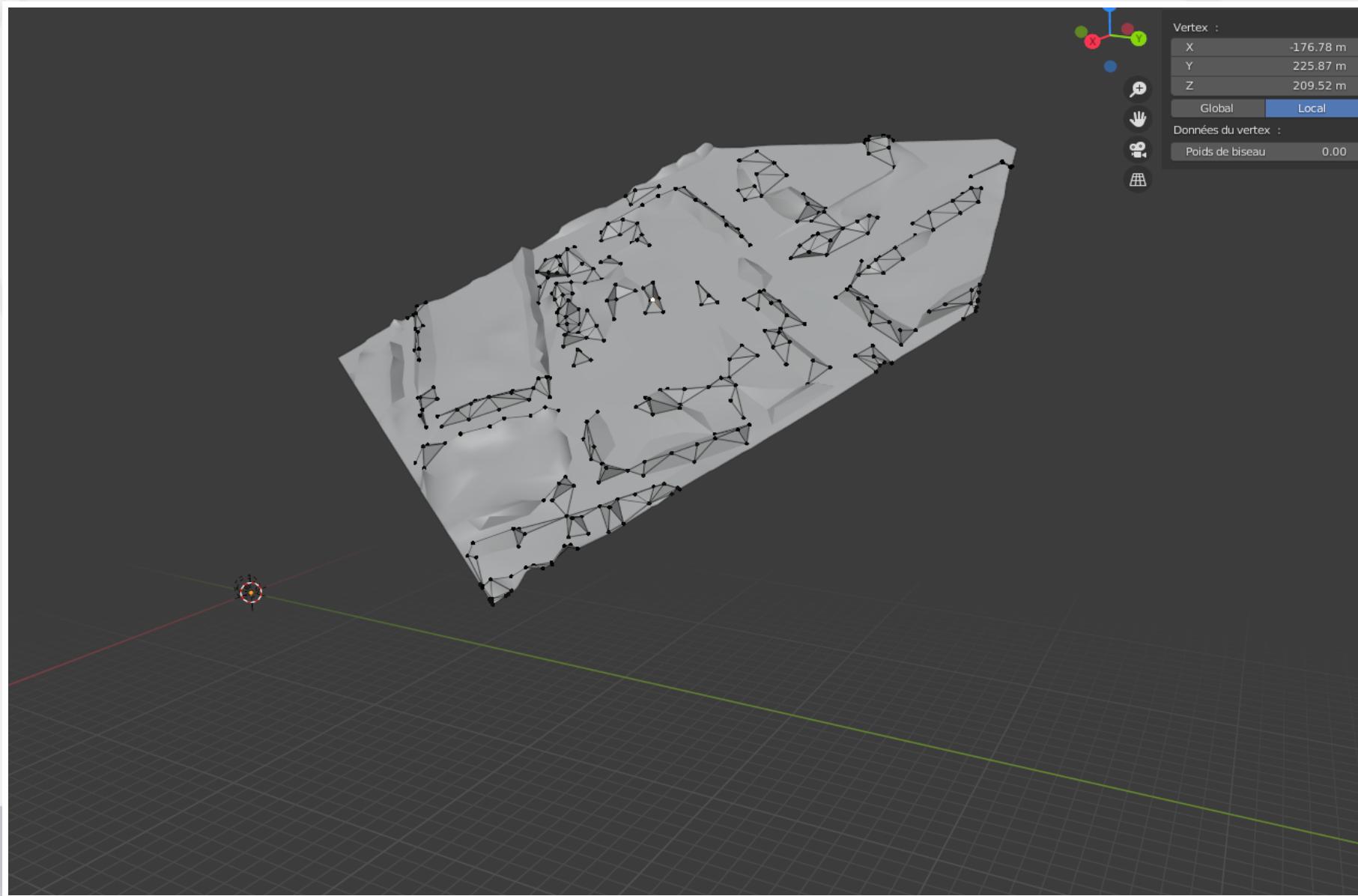
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# From 4978 – object coord





# From 4978 – object coord





# From 4978 – object coord

-  Mesh needs to be:
  - centered around 0, then moved/rotated (via Xform matrix)
-  Mesh must not be:
  - centered at its final place and already rotated (ident Xform matrix)

# Demo

- Cesium dragon
- Japanese house (from Emeric Beaufays)
- Nasa land (from NASA Advanced Multi-Mission Operations System)

# Questions?

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