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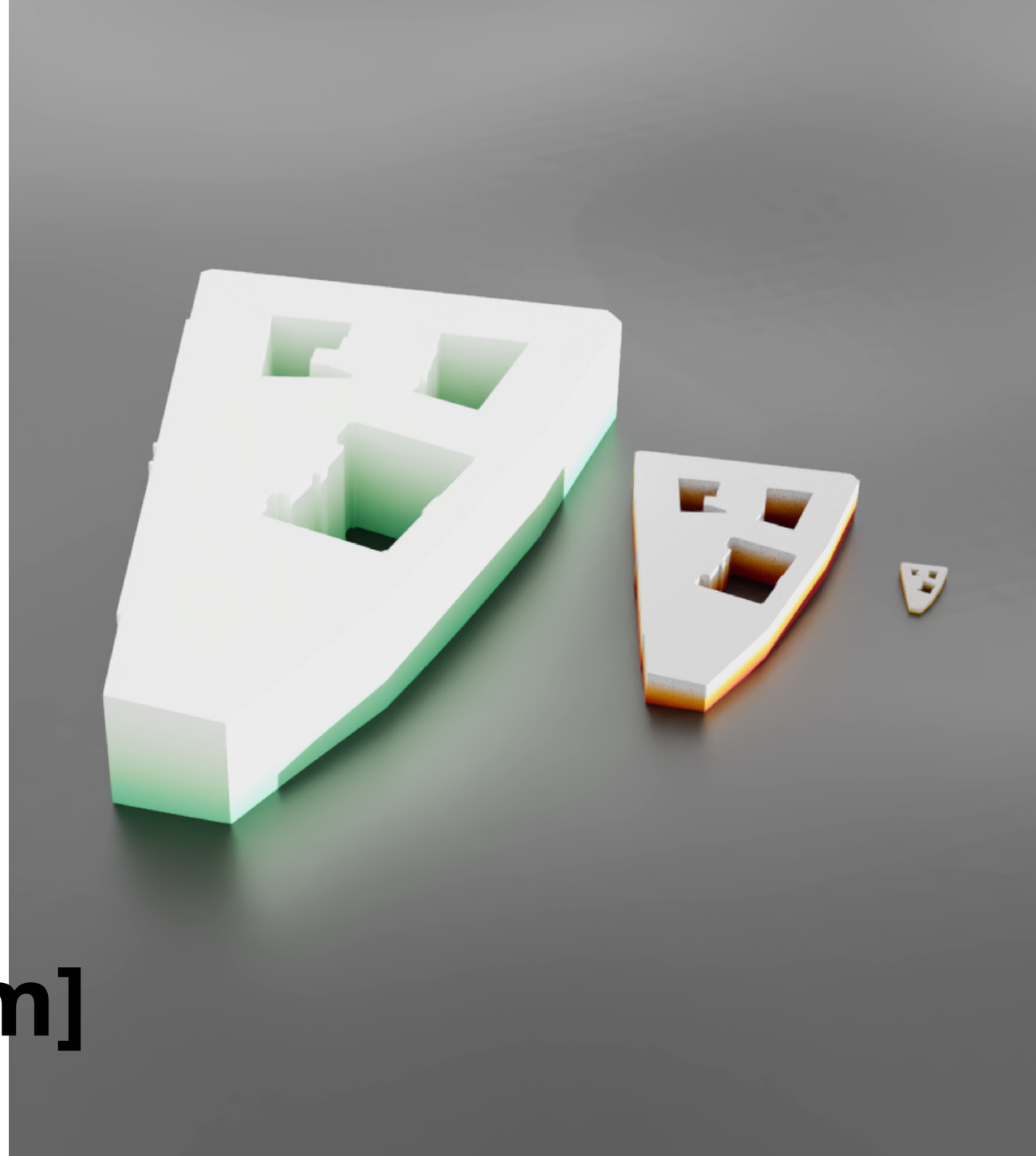
Common mistakes

We want you to get the best out of your simulations. Here is some guidance on how to avoid common mistakes when setting up your first urban wind simulation.

Incorrect

Scaling

One of the most common errors with .STL or .OBJ files are **improper scaling**. Remember that Archiwind assumes that the file uploaded is exported in **meters [m]**. If your model was created using a different unit (like inches or millimeters), **you must convert it appropriately before importing**.



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Openings such as windows and doors in your building model, if not properly closed, can cause significant issues in wind simulations due to the following reasons:

- Increased Complexity: Openings allow wind to flow through the building, necessitating more complex fluid dynamics calculations.

- Meshing Difficulties: Small or irregular openings can lead to complications during the meshing process, creating elements that may lead to numerical instability.

To avoid these issues, **consider closing off all openings** for external wind behavior simulations. If openings are required, ensure they are properly defined in terms of size and shape. Always align the complexity of your model with the objectives of your simulation.

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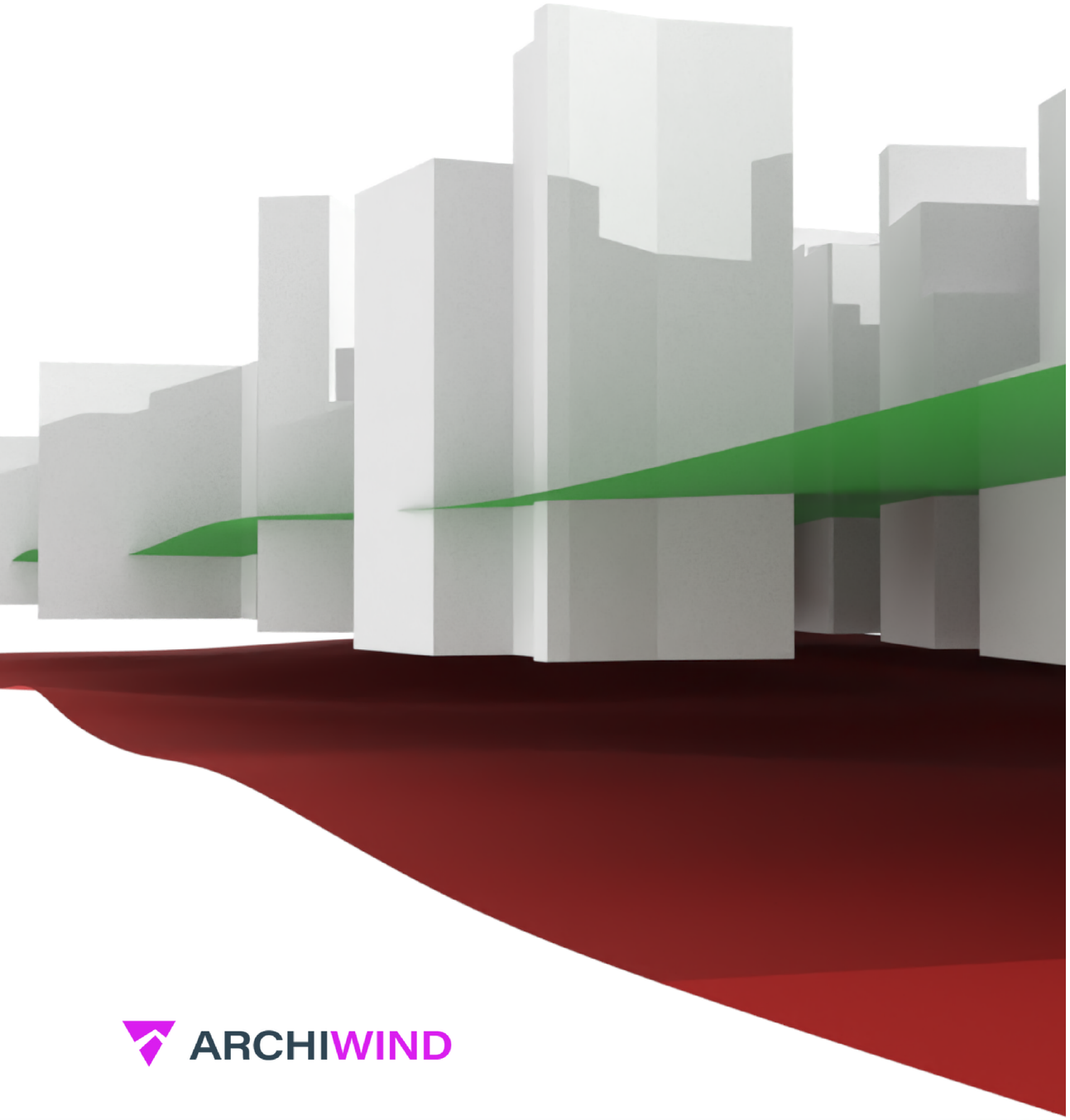

Geometries are not...

It's critical for the building model to be correctly positioned on the terrain model to simulate wind conditions accurately. If the building floats above the terrain surface, the software will likely produce inaccurate results or fail to run the simulation. Follow the extrusion step in the "OSM importation and files export" video. Geometries can be extruded under terrain level. Everything under the terrain surface will be cropped out from the simulation domain.

attached to the terrain.

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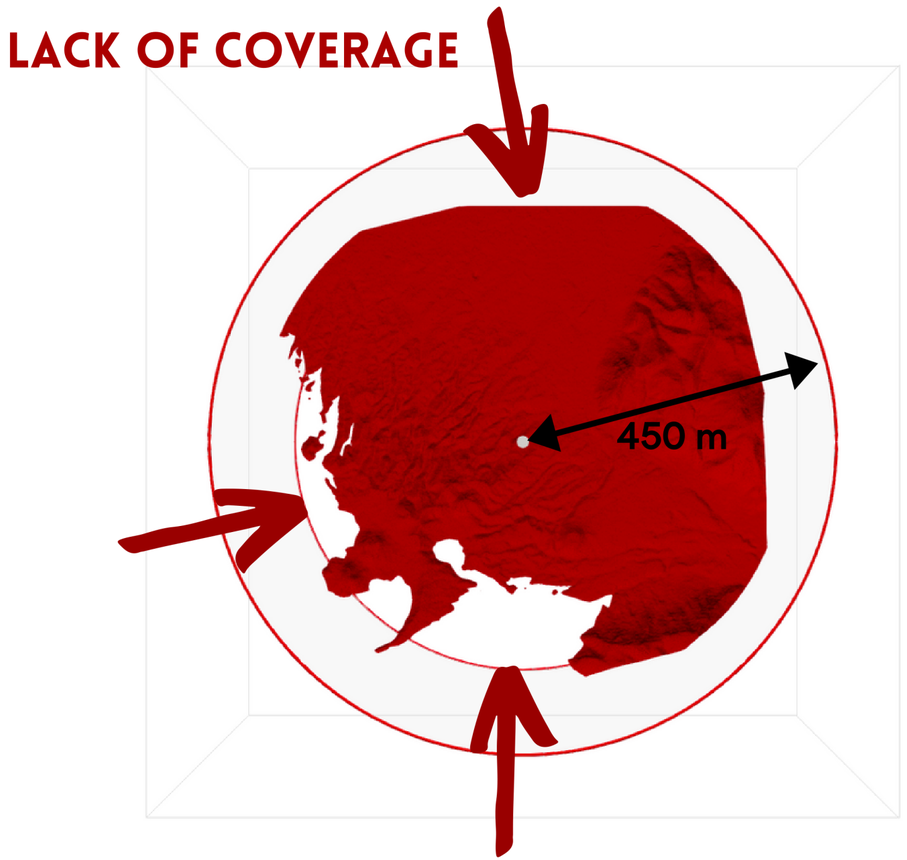

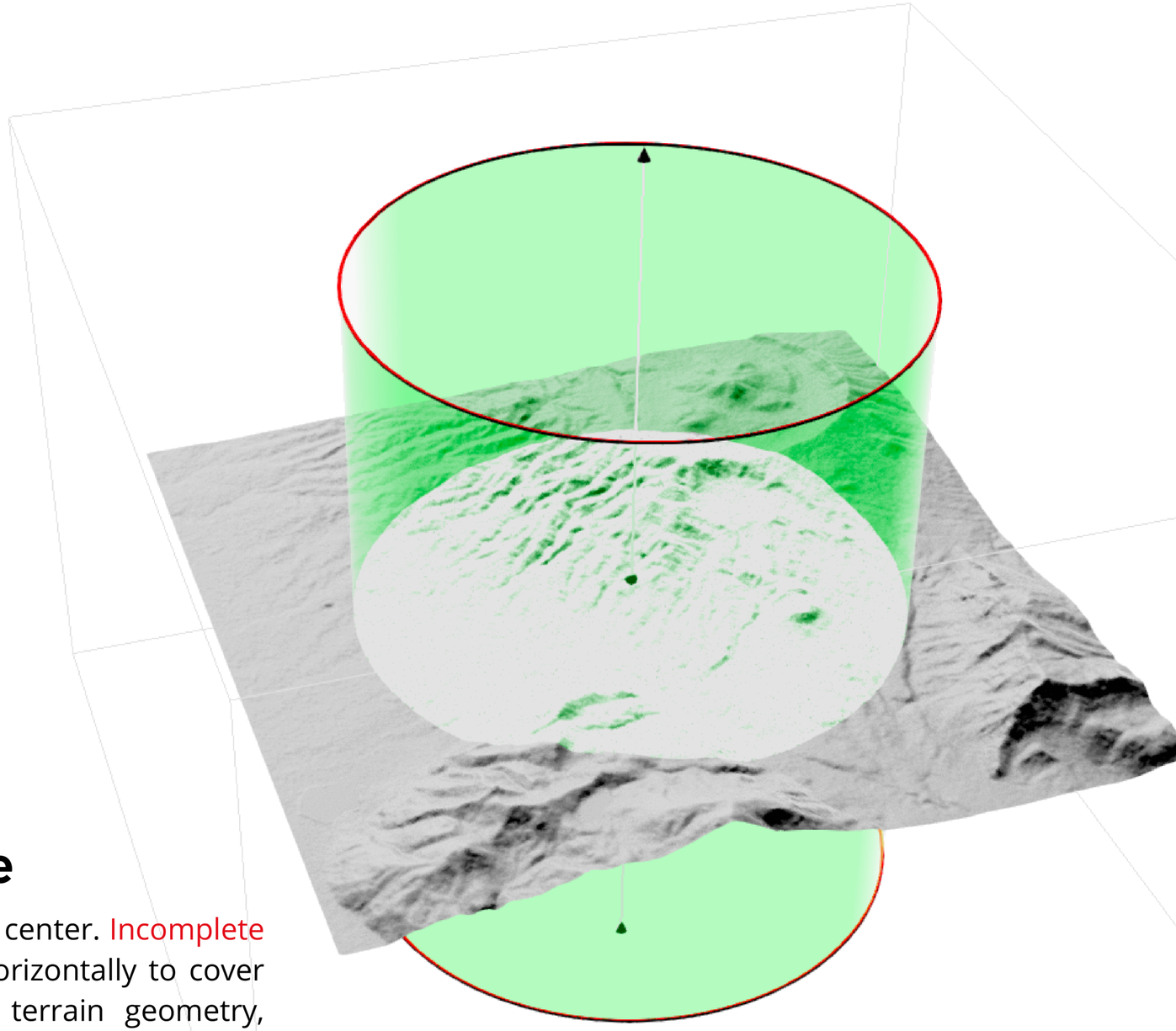

Ensuring Complete Terrain Coverage

Your terrain model must extend beyond a 450m radius from its center. Incomplete terrain leads to gaps, causing the geometry to be stretched horizontally to cover the missing surface. As simulations are centered on your terrain geometry, complete coverage within a 450m radius is essential for ensuring the results' validity. **Make sure your terrain geometry is large enough.**

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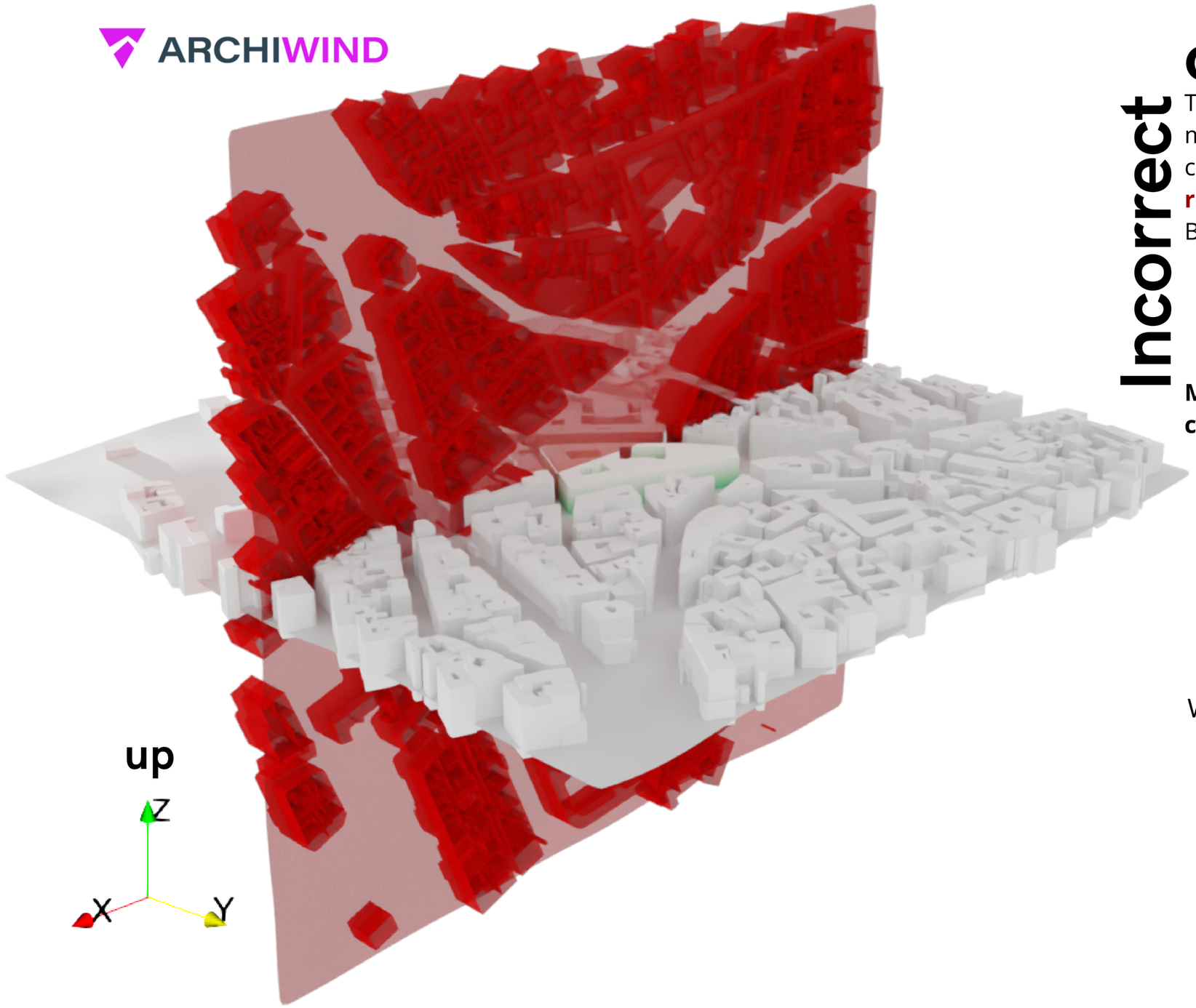
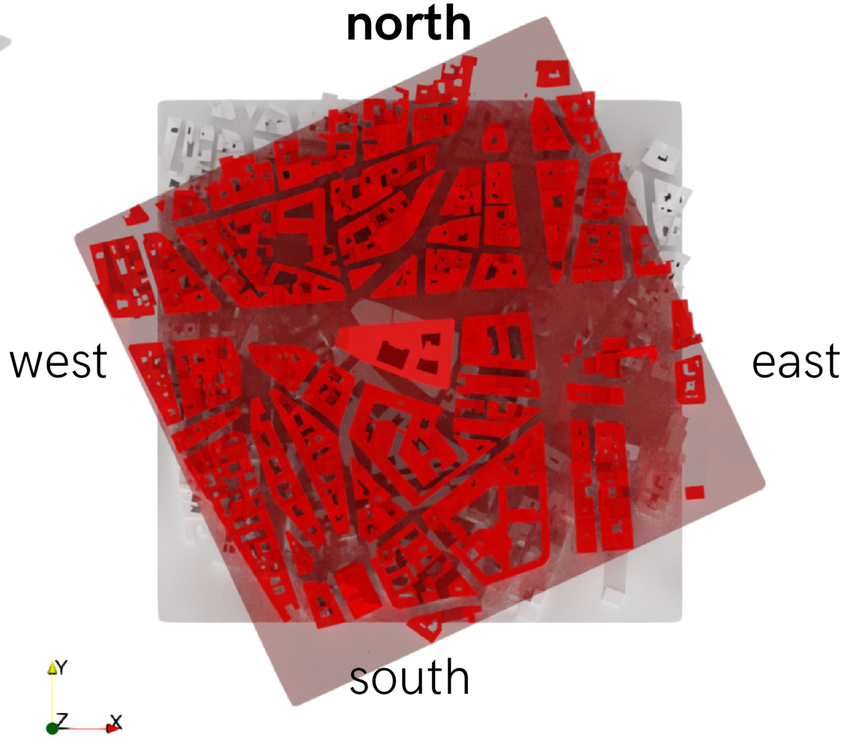
Incorrect orientation.

The orientation of the models in the 3D space matters for the simulation. If a model is not oriented correctly, the simulation might give **incorrect results**. Archiwind follows the axe convention from Blender and Paraview :

- **positive y axe points north**
- **positive z axe point up**

Make sure that your model adheres to this convention.





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Stay aligned

Ensure that the coordinate systems for all three models (terrain, surroundings, and building) are aligned with each other. If they're not, the resulting simulation may be **physically incorrect** because the models will not interact with each other properly.

We use the **geometric center of the terrain** as the origin of the simulation domain.

nb : Geo-referencing is not required. The location will be set on the submit page

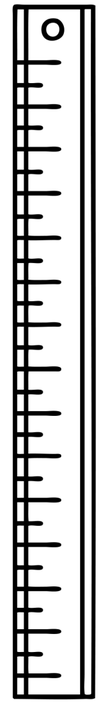
Geometry complexity in your model can significantly impact the performance and accuracy of wind simulations.

- Performance Impacts: Highly complex models, with many intricate details or irregular shapes, can lead to slower simulations. More complex geometries require more computational power to accurately simulate wind interactions.

- Accuracy Issues: Meshing is how the software breaks down your model into smaller elements for computational analysis. Complex shapes or features can result in poorly formed or extremely small mesh elements, potentially leading to inaccurate simulations or numerical instabilities.

While adding more detail to your model can increase the realism of the simulation, it can also introduce more room for error if the details are not modeled accurately.

Consider simplifying your models by removing fine details (smaller than 50cm) **or by approximating complex shapes with simpler ones.**



Detail sensitivity

.5m

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