LiDAR data

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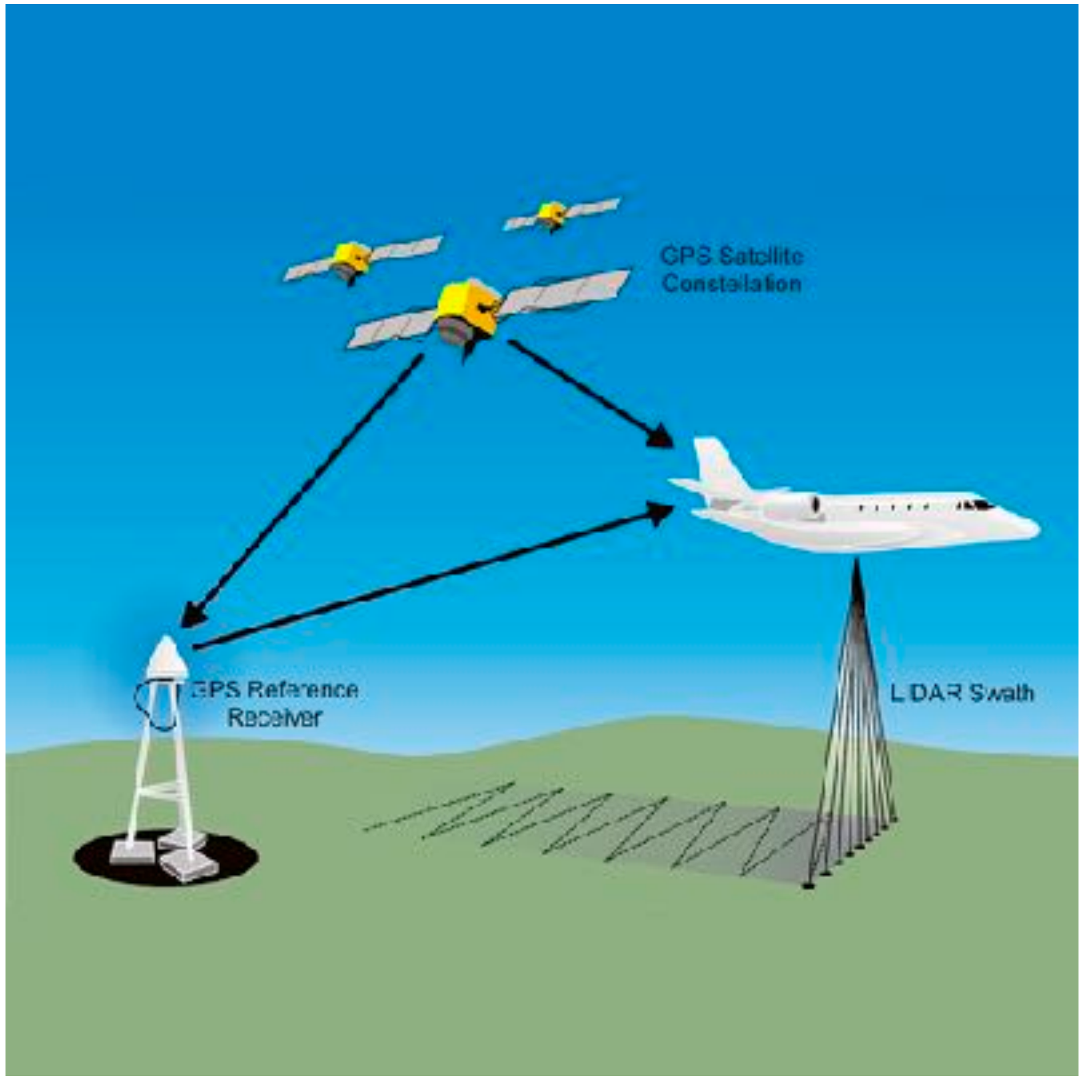
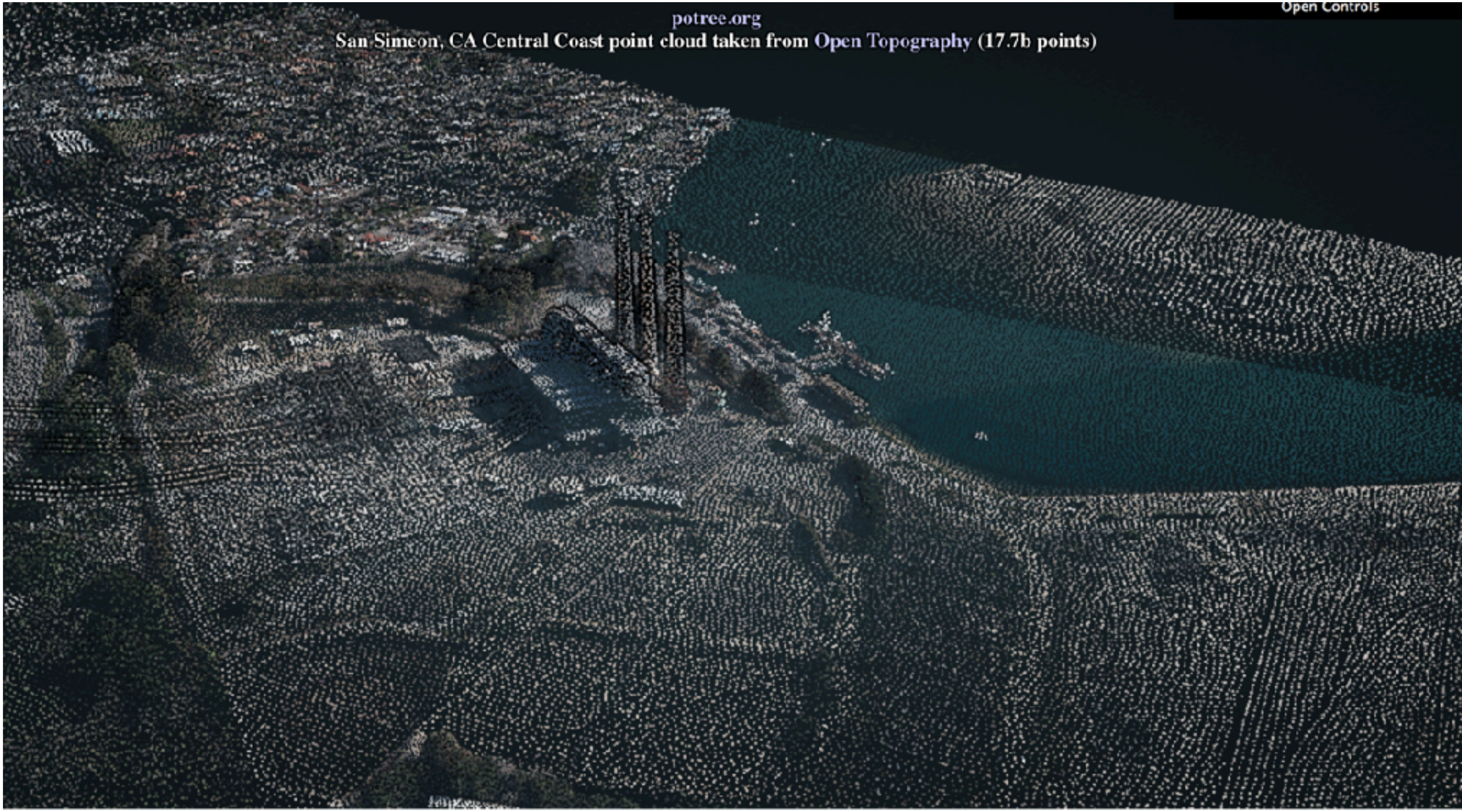
LiDAR (Light Detection and Ranging)



LiDAR point cloud: { (x,y,z) }


potree.org
San Simeon, CA Central Coast point cloud taken from Open Topography (17.7b points)
Open Controls

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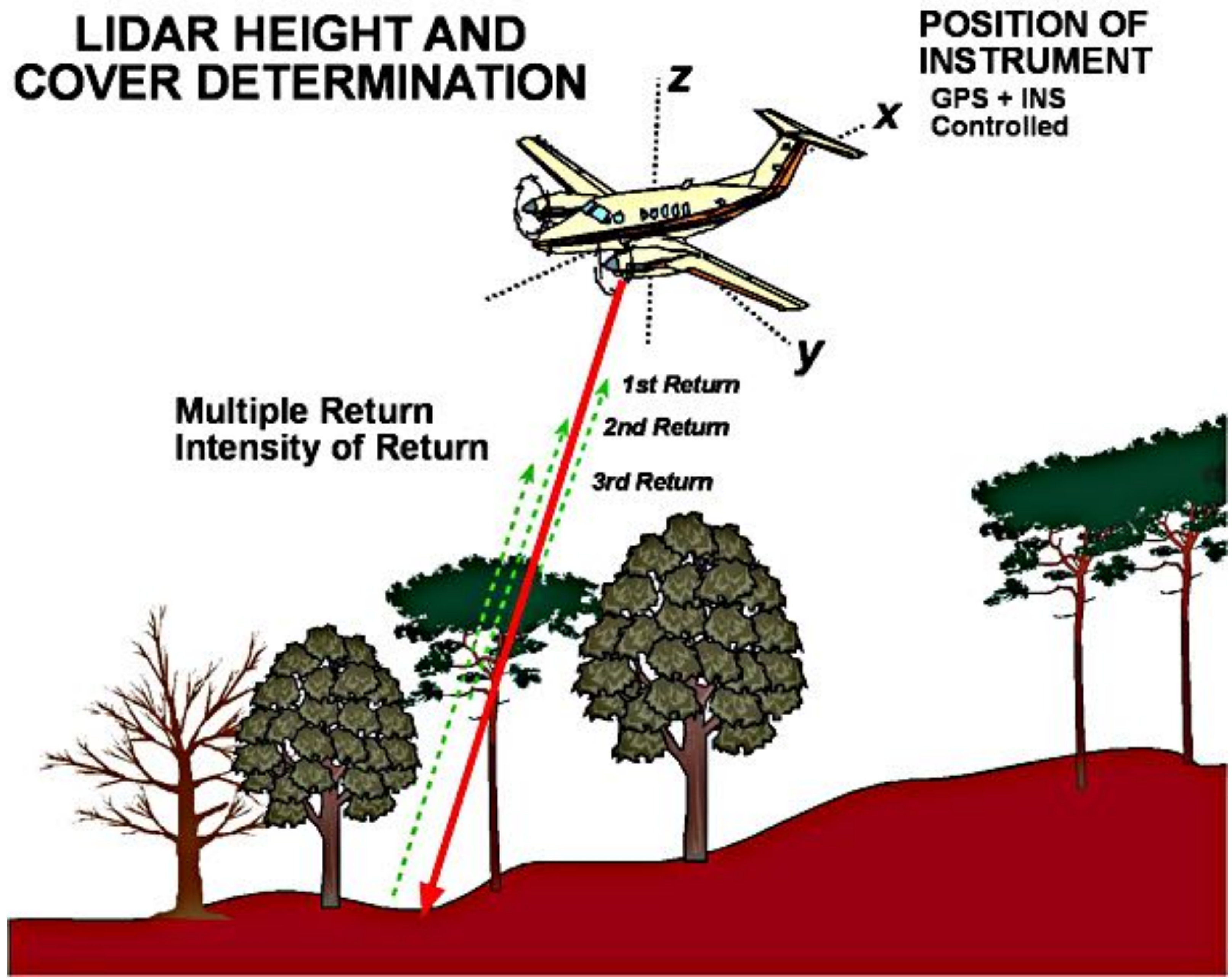
http://potree.org

LiDAR has many uses

- GIS, LiDAR data used to get digital terrain models (grids)
- Medicine: models of tumors
- Robotics: percept and classify environment
- Self driving cars: model space to avoid obstacles

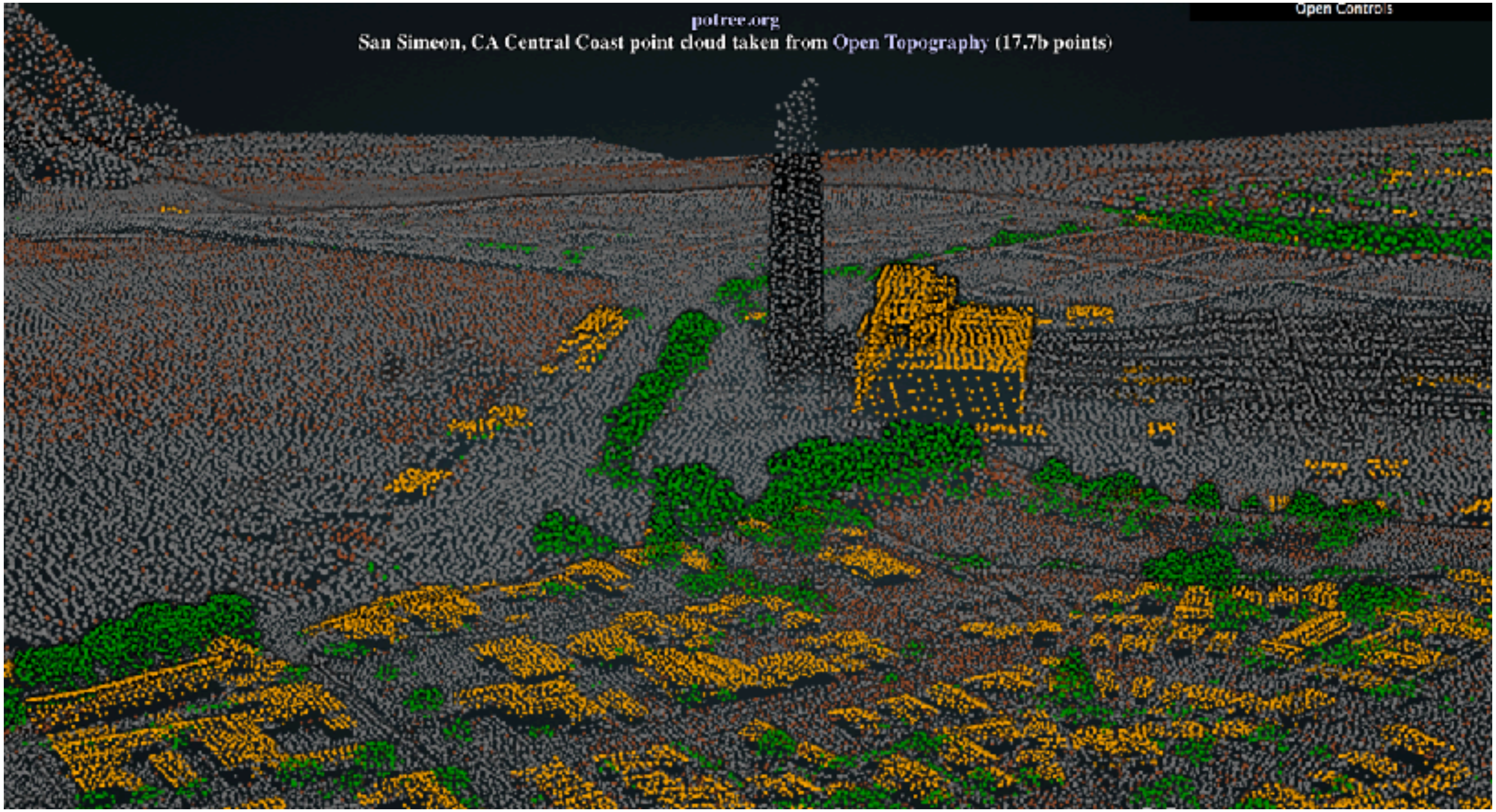
Robot equipped with LiDAR: uses it to construct maps and avoid obstacles

First return, last return



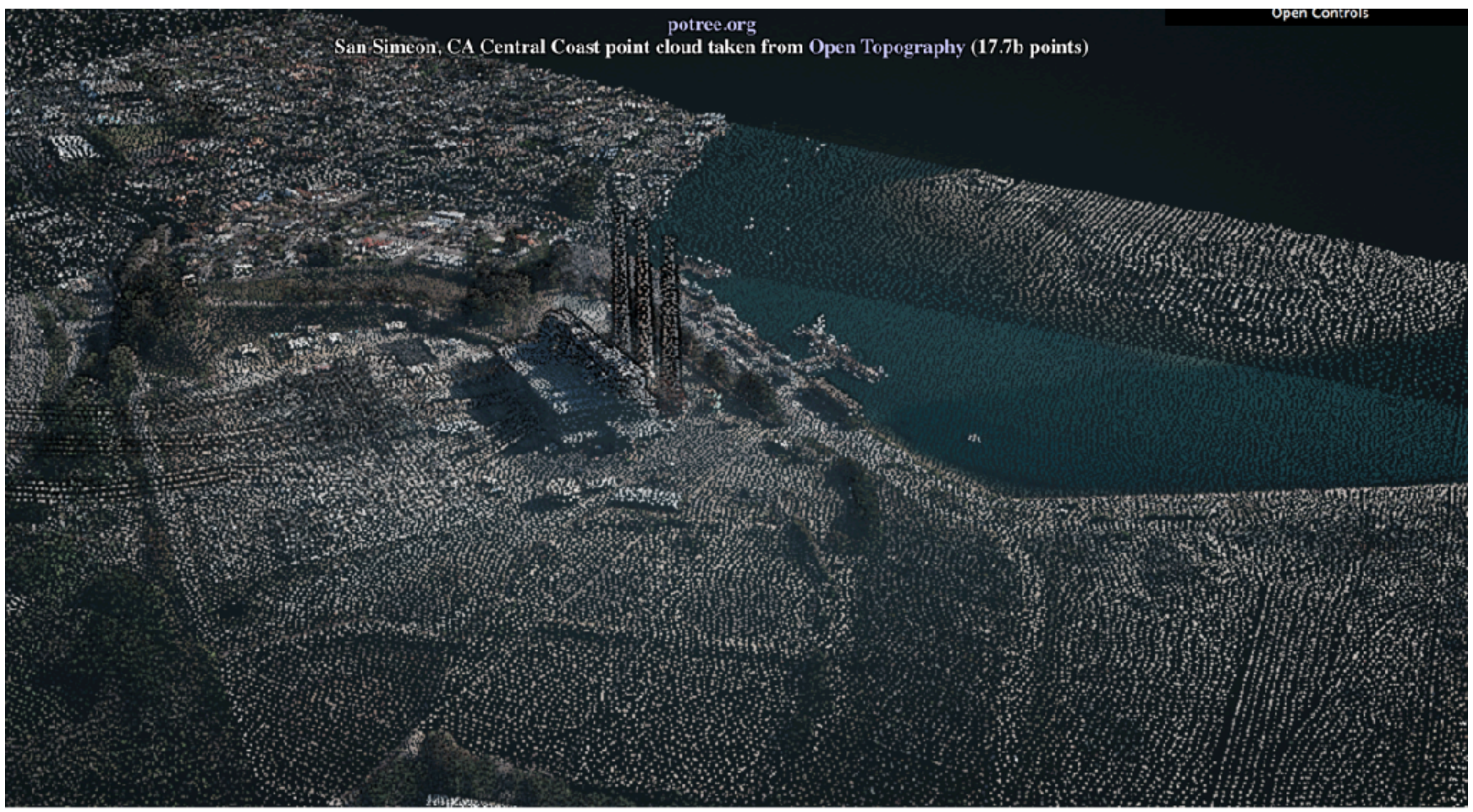
Working with LiDAR data (in GIS)

1. Classify it (ground, buildings, vegetation, noise, ..)



Working with LiDAR data (in GIS)

2. From ground to grid



Working with LiDAR data (in GIS)

A possible pipeline

- Find outliers and correct
- Classify ground
- Find height above ground
- Classify buildings and vegetation

Classified LiDAR data

- Convert ground point cloud to DEM

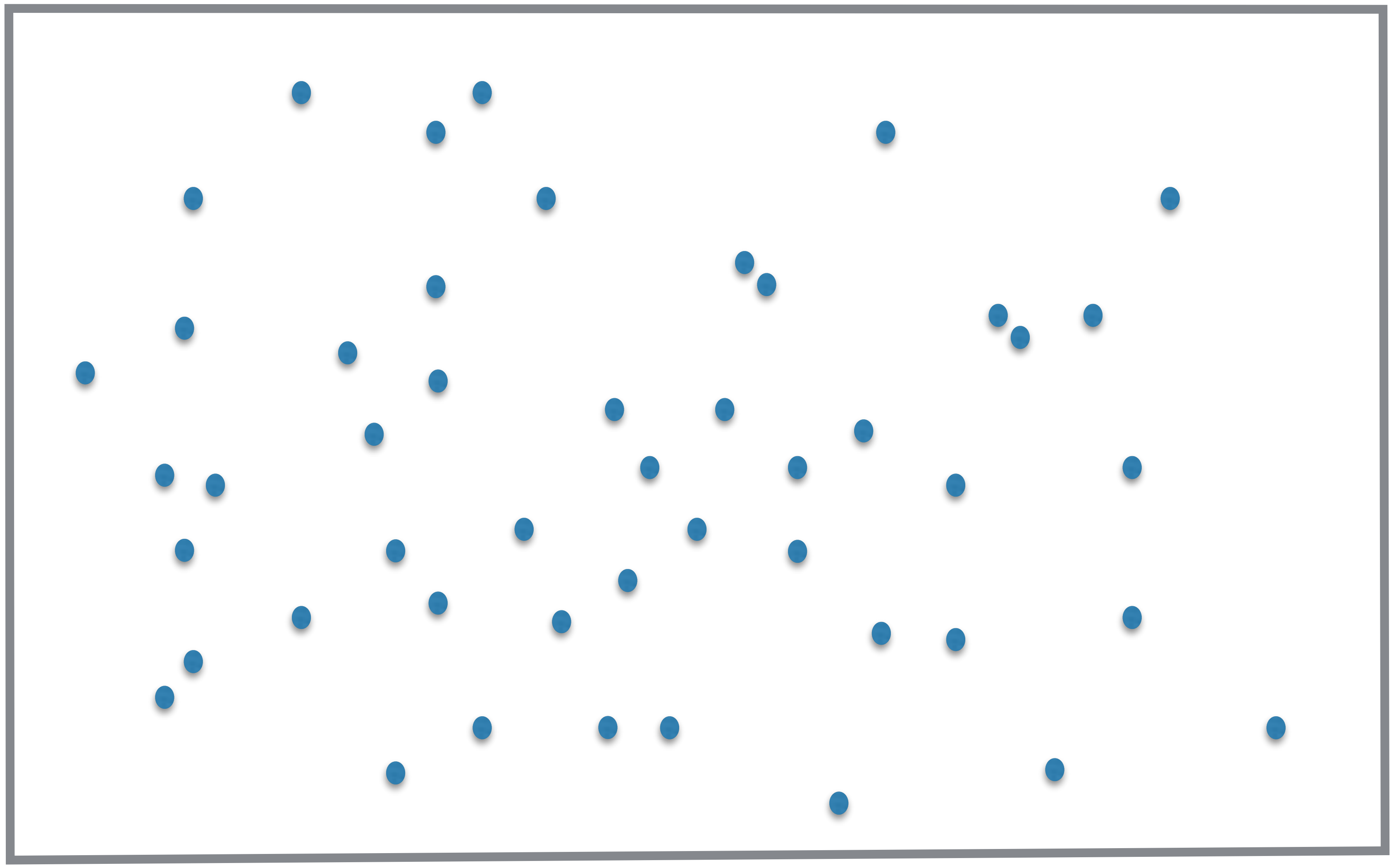
Why LiDAR?

- Very high resolution   (.5 m)
- Automatic vegetation and building extraction
- Opens the door to other modeling

Challenges

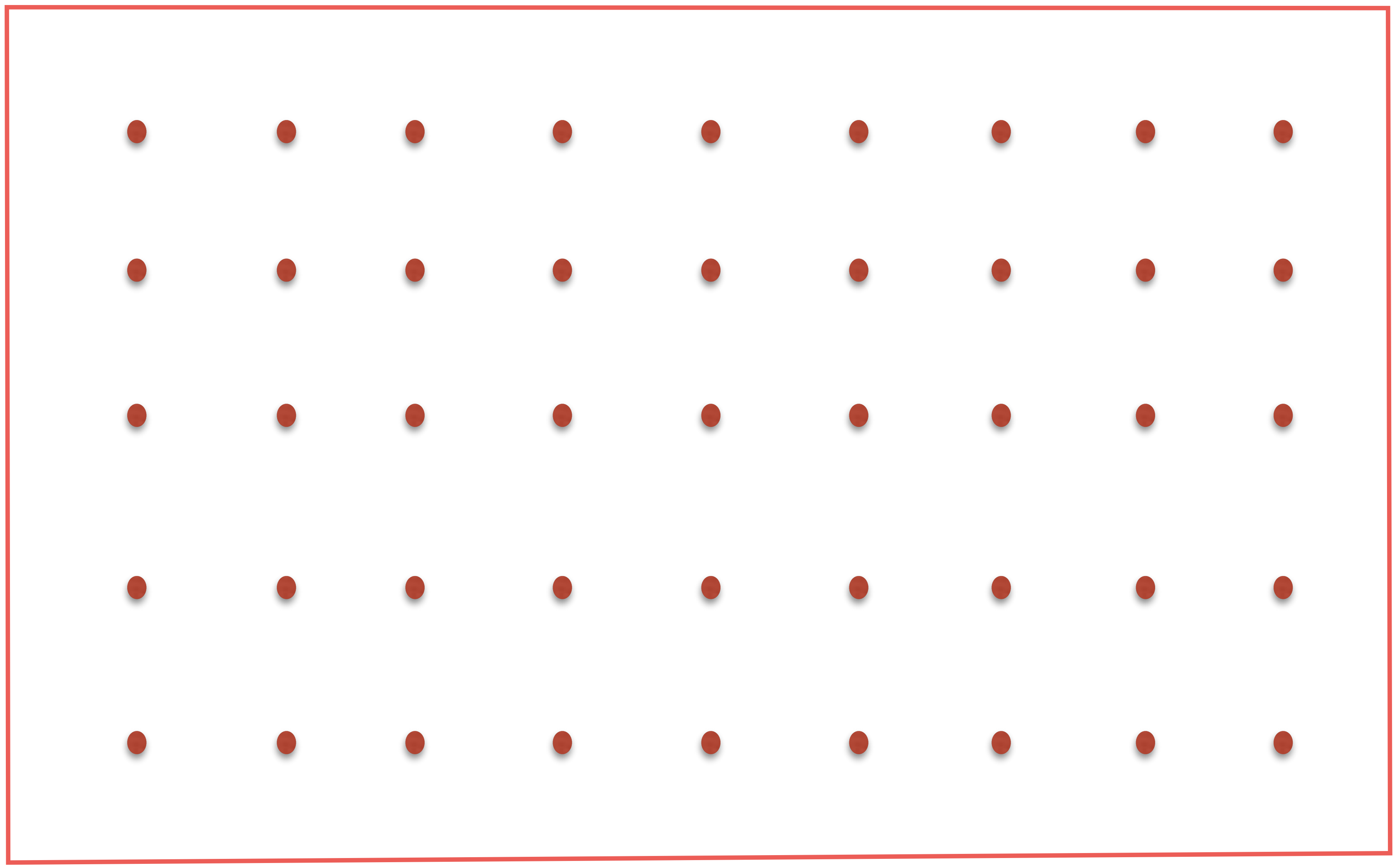
- Huge point clouds
- Storage issues
- Need efficient algorithms
    - CPU efficient
    - IO-efficient (streaming)
    - cache-efficient
    - parallel
- Algorithms (classification, gridding) not straightforward

Brainstorming: Point-cloud-to-grid



Given a point-cloud P and a desired grid spacing, compute a grid that represents P.

Brainstorming: Point-cloud-to-grid



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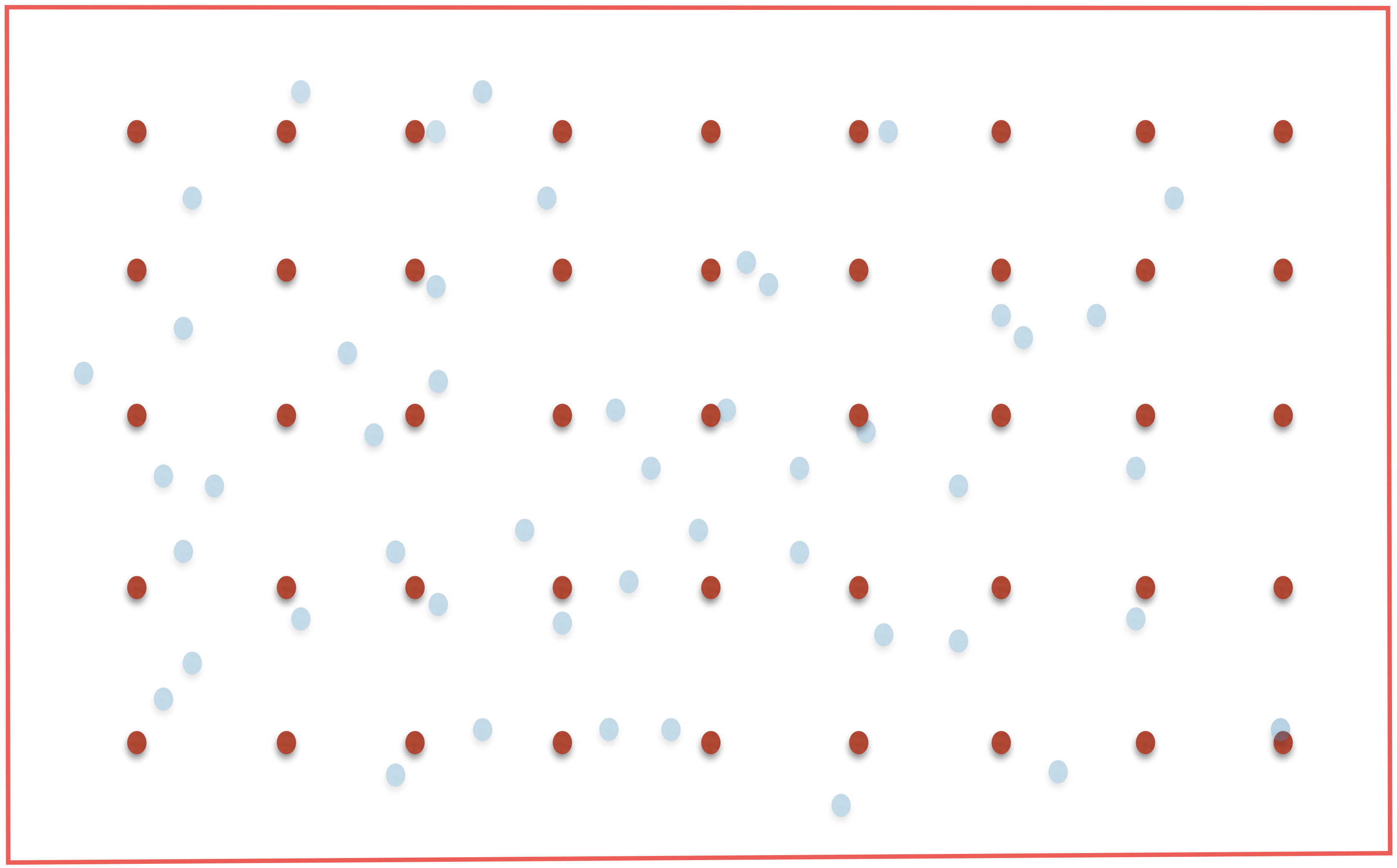

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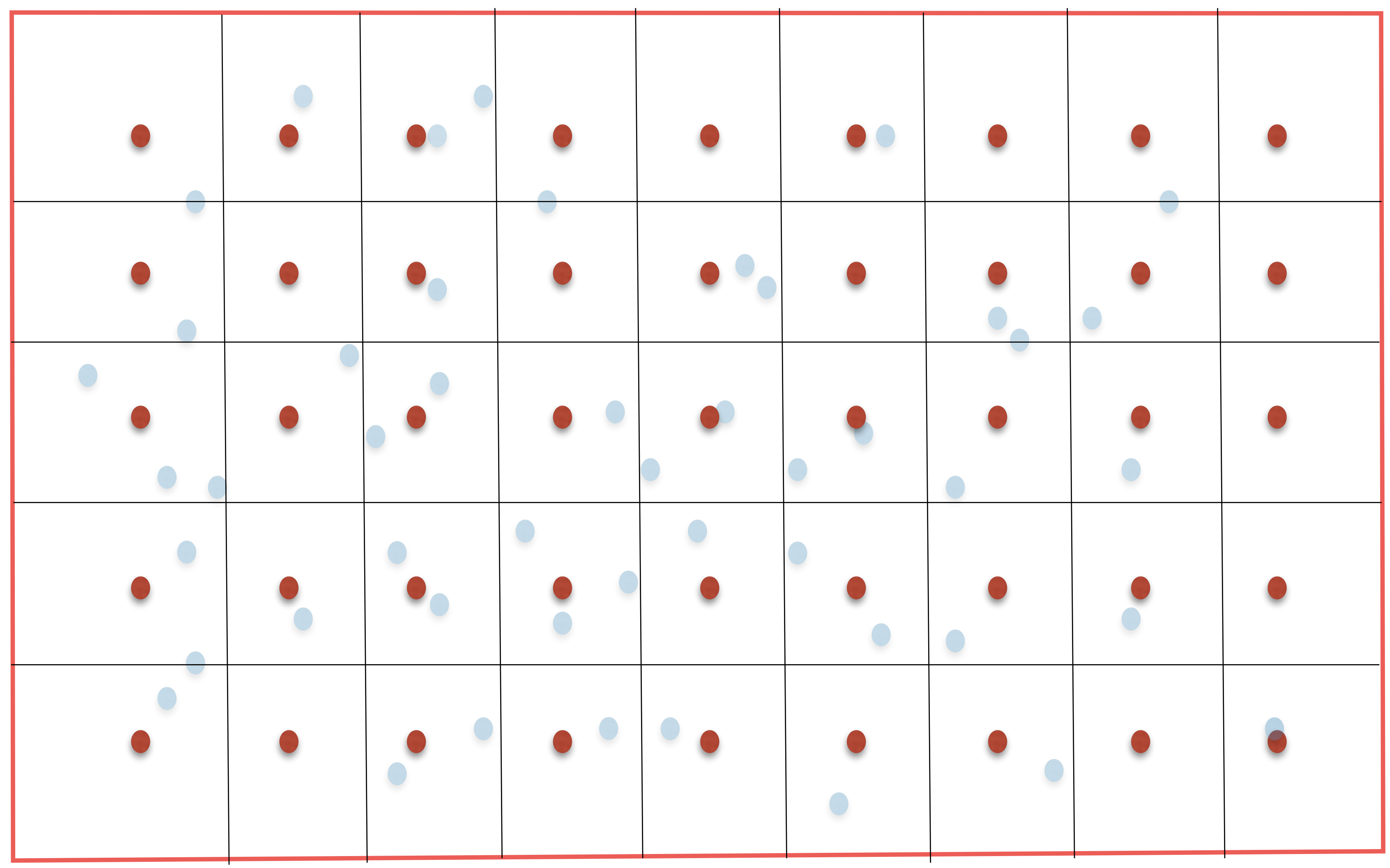

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