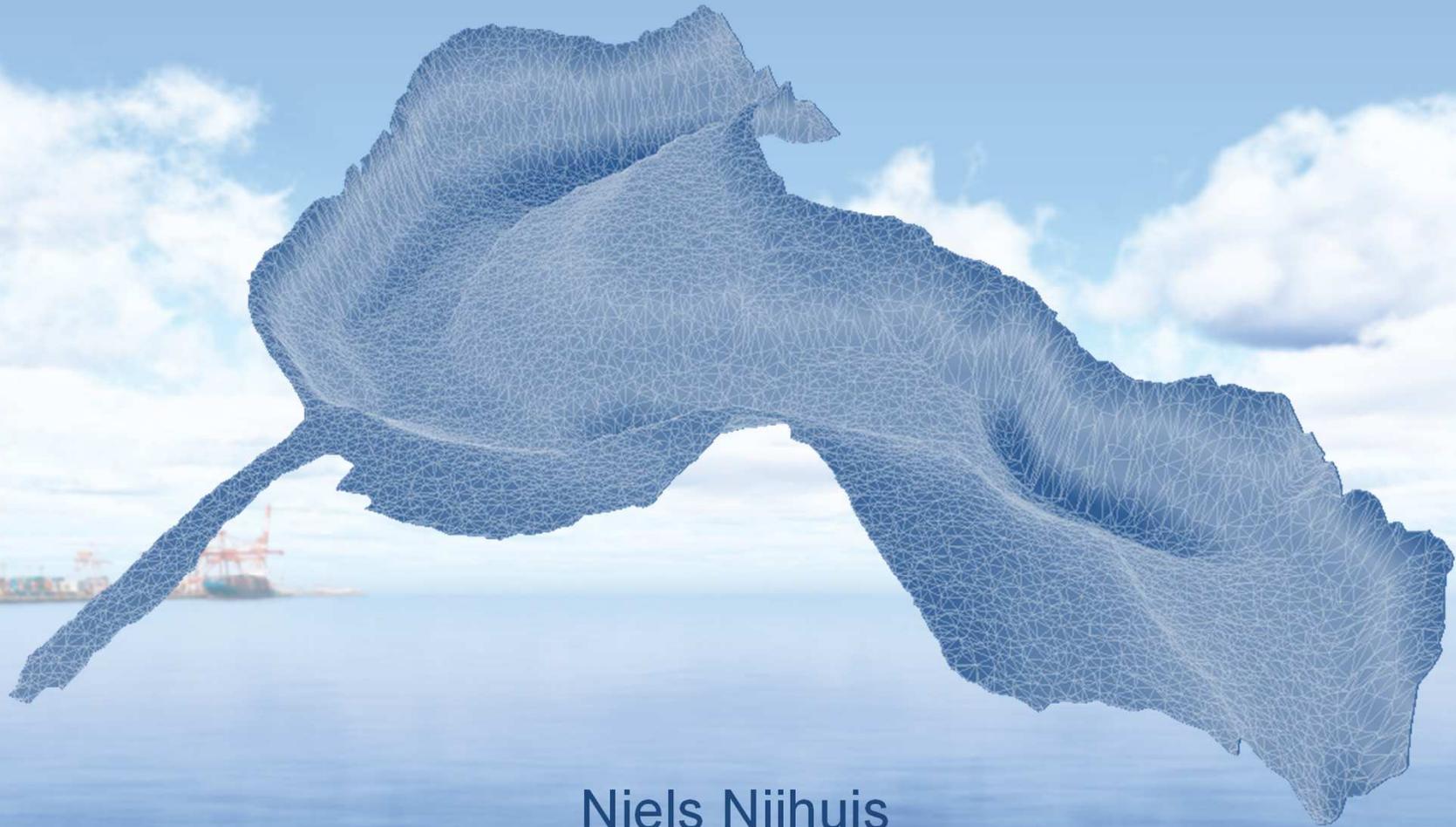


# Variabel Resolution Surfaces



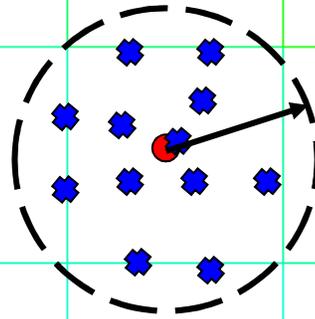
Niels Nijhuis

CARIS

- Defines every value within a continuous area
- Surface values are explicitly defined at *nodes*
- Raster surface: regularly spaced nodes with resolution defining spacing between nodes
- A mesh defines values everywhere else

# RESOLUTION GRID

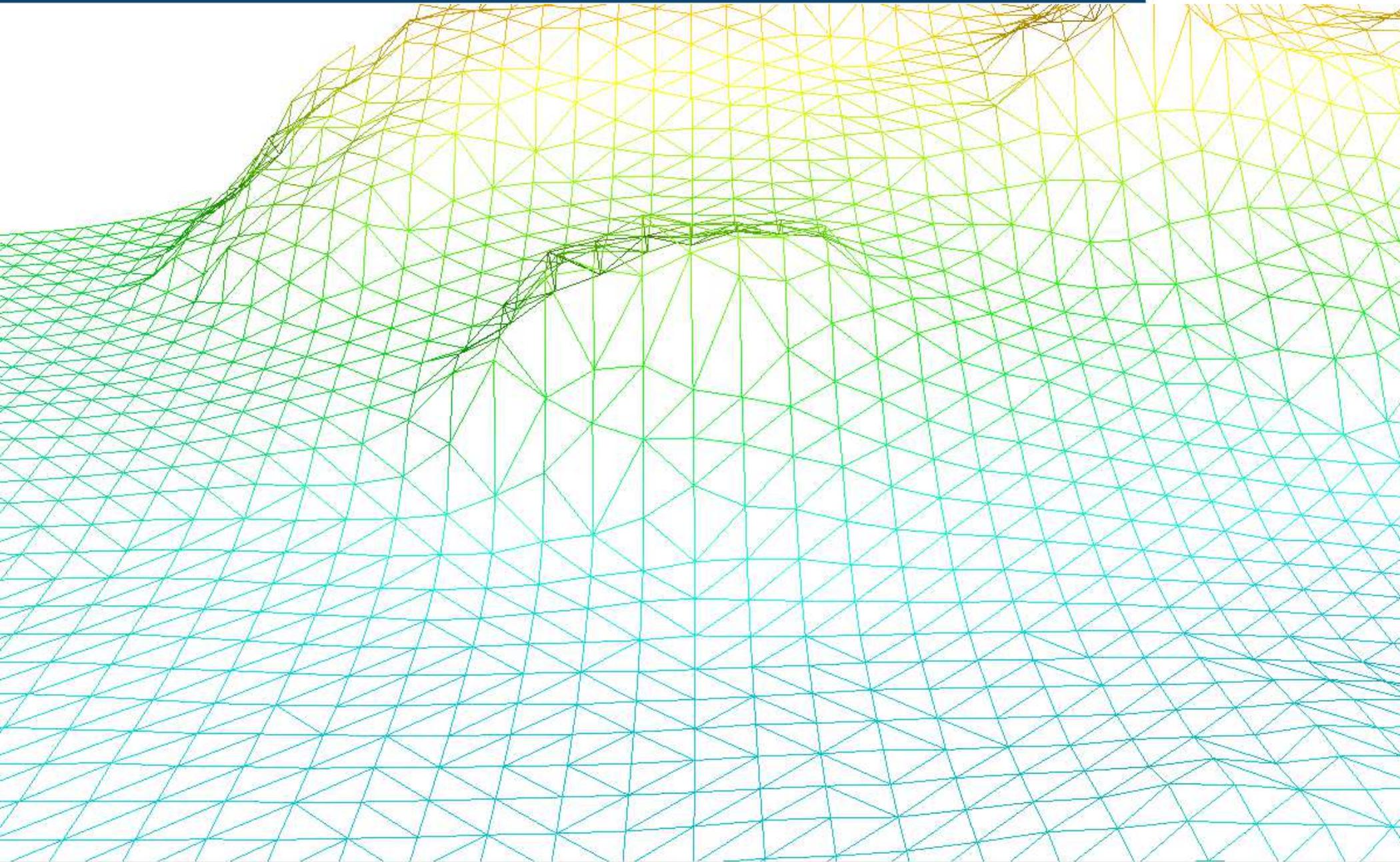


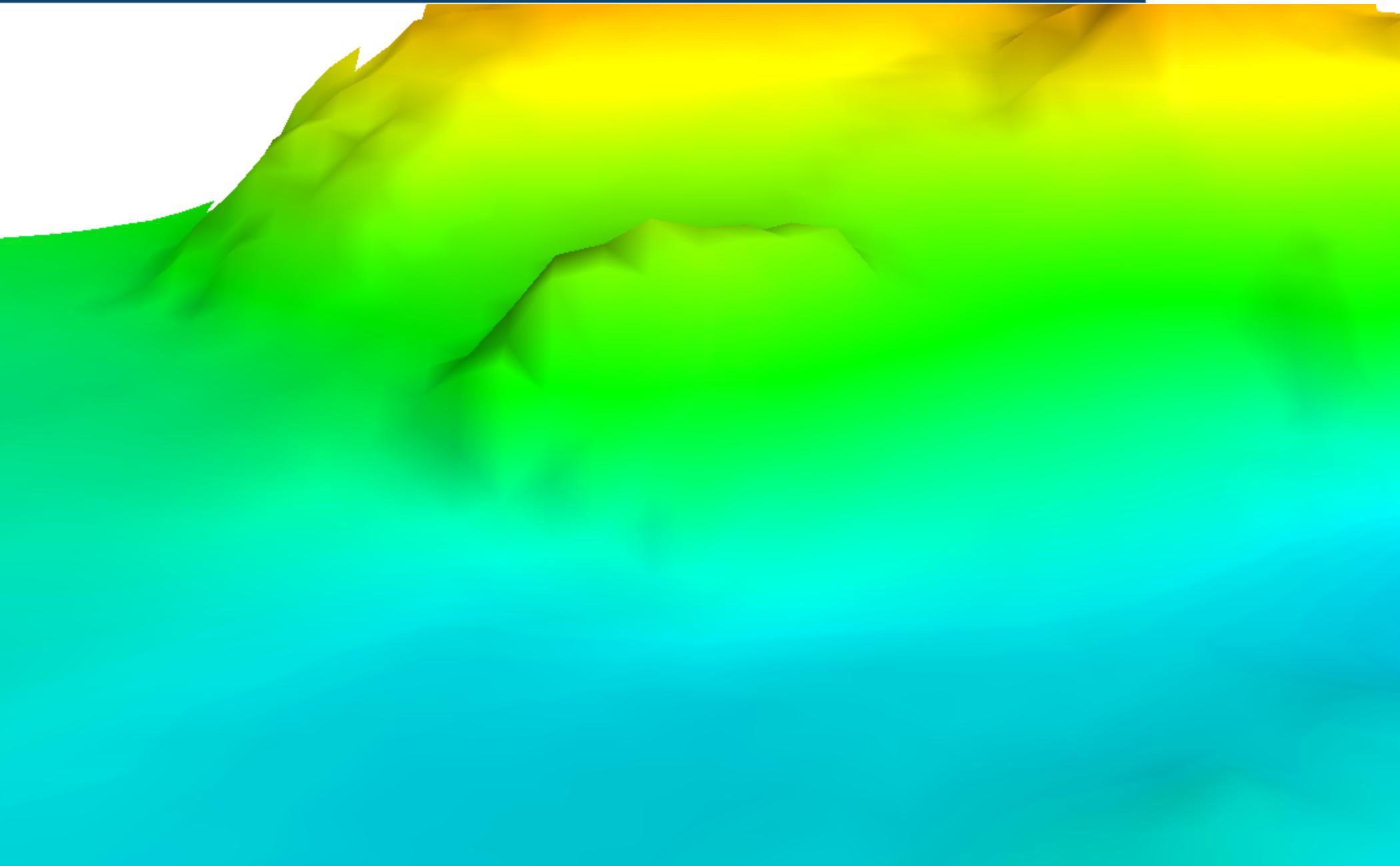



# SURFACE NODES



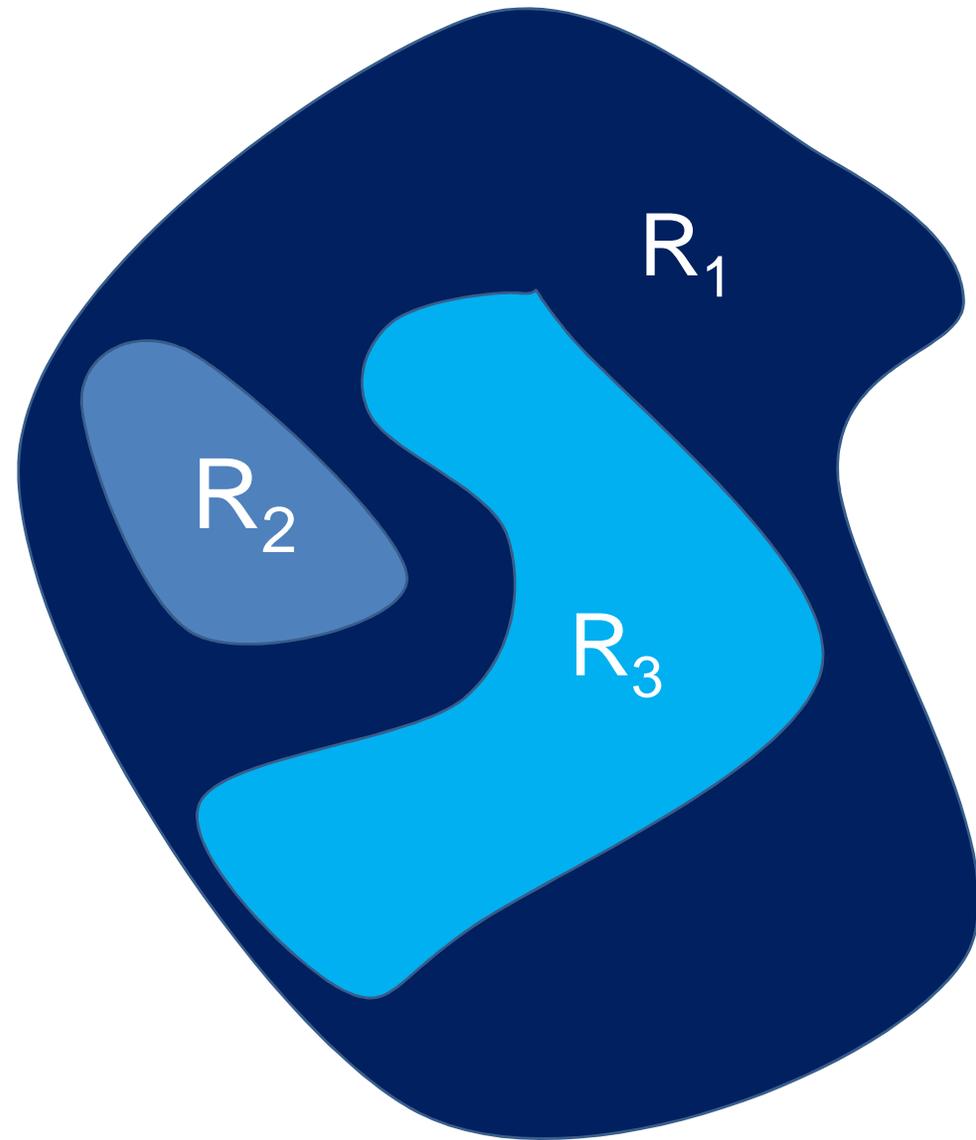
15 <sub>9</sub>	15 <sub>8</sub>	15 <sub>7</sub>	15 <sub>3</sub>	14 <sub>3</sub>	13 <sub>5</sub>	12 <sub>3</sub>	12 <sub>2</sub>	12 <sub>3</sub>	11 <sub>9</sub>
16 <sub>2</sub>	16 <sub>3</sub>	16 <sub>3</sub>	16 <sub>1</sub>	15 <sub>4</sub>	13 <sub>8</sub>	14 <sub>5</sub>	14	13 <sub>9</sub>	14 <sub>4</sub>
16 <sub>6</sub>	16 <sub>2</sub>	15 <sub>8</sub>	14 <sub>8</sub>	15 <sub>1</sub>	15 <sub>1</sub>				
16 <sub>8</sub>	16 <sub>9</sub>	16 <sub>9</sub>	17	17	17	16 <sub>8</sub>	16 <sub>7</sub>	16 <sub>3</sub>	15 <sub>7</sub>
17	17 <sub>1</sub>	17 <sub>2</sub>	17 <sub>2</sub>	17 <sub>3</sub>	17 <sub>3</sub>	17 <sub>2</sub>	17 <sub>1</sub>	17	16 <sub>9</sub>
17 <sub>1</sub>	17 <sub>2</sub>	17 <sub>3</sub>	17 <sub>4</sub>	17 <sub>5</sub>	17 <sub>5</sub>	17 <sub>4</sub>	17 <sub>3</sub>	17 <sub>2</sub>	17 <sub>2</sub>





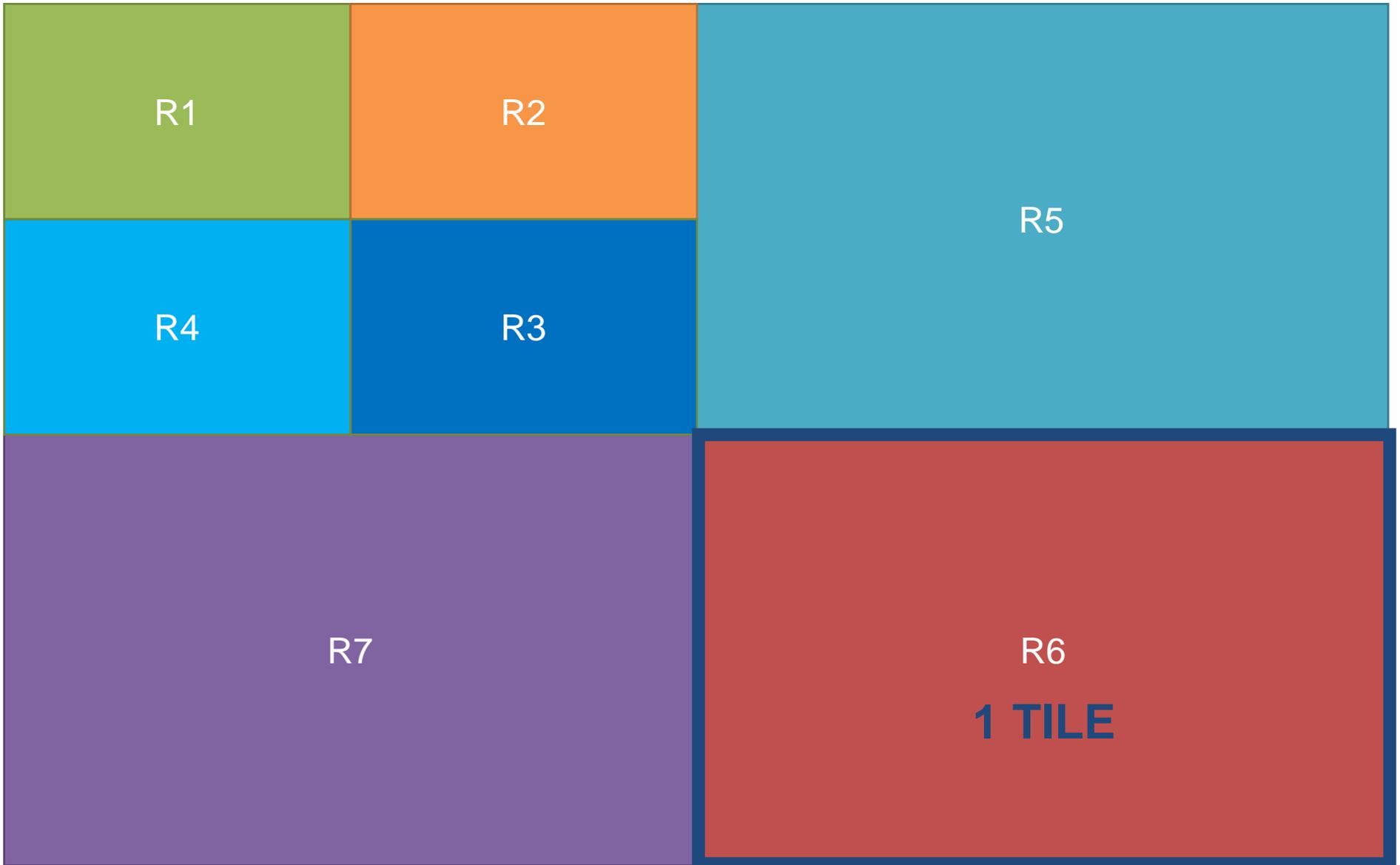
## Variable Resolution Surface:

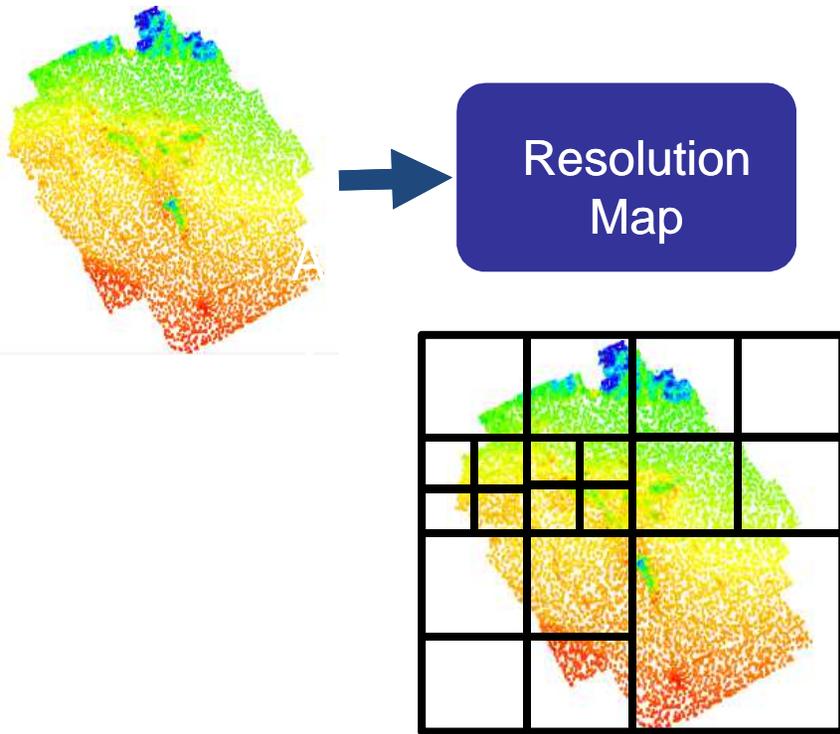
- Digital elevation model with varying spatial resolutions
- Can better model an area and deal better with e.g. different sounding densities.

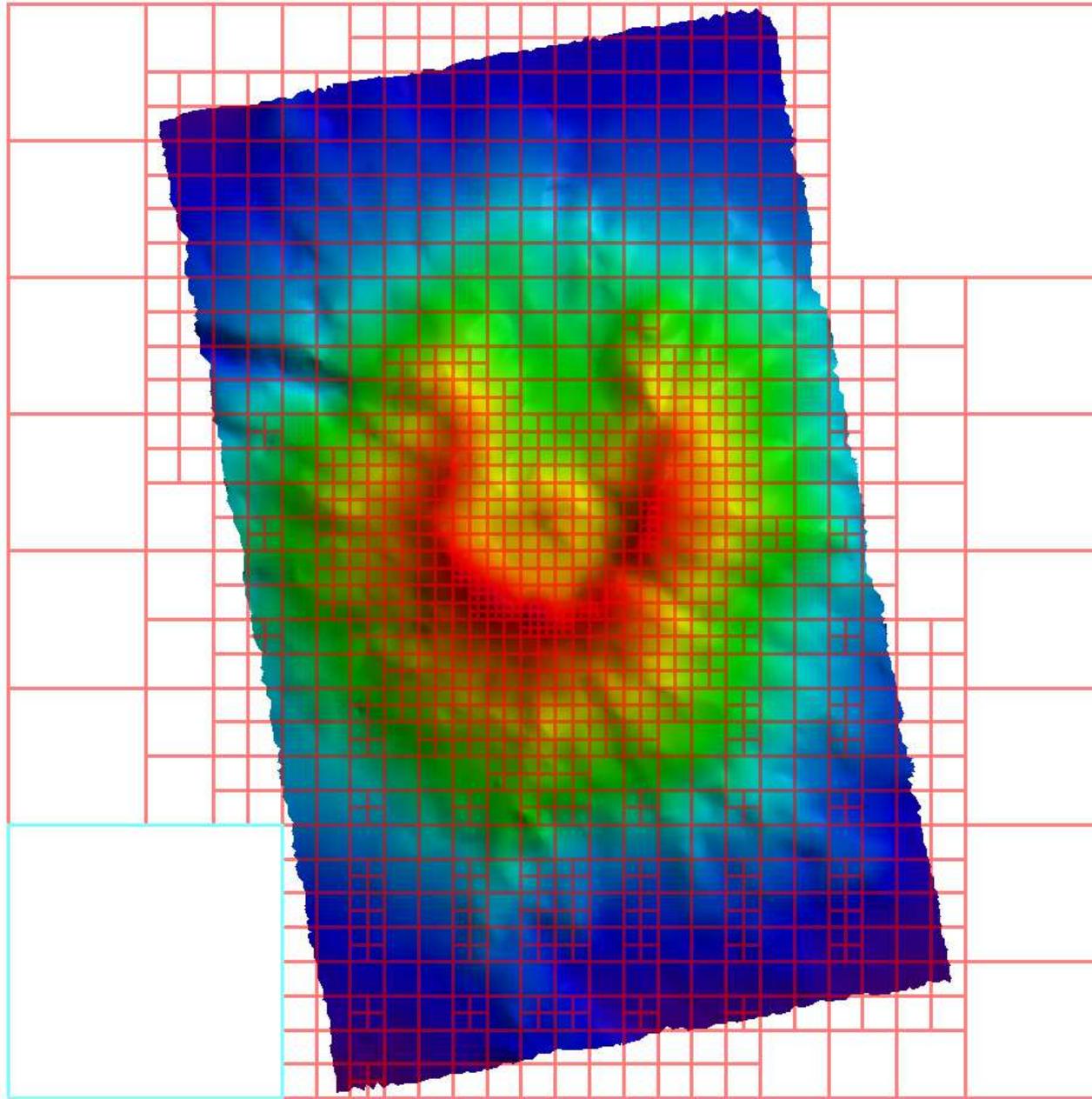


- Defines every value within a continuous area
- Surface values are explicitly defined at *nodes*
- **Variable Resolution** surface: regularly spaced nodes **within a tile** with resolution defining spacing between nodes **for that tile**
- A mesh defines values everywhere else

# THE RESOLUTION MAP - ADAPTIVE RESOLUTION TILES







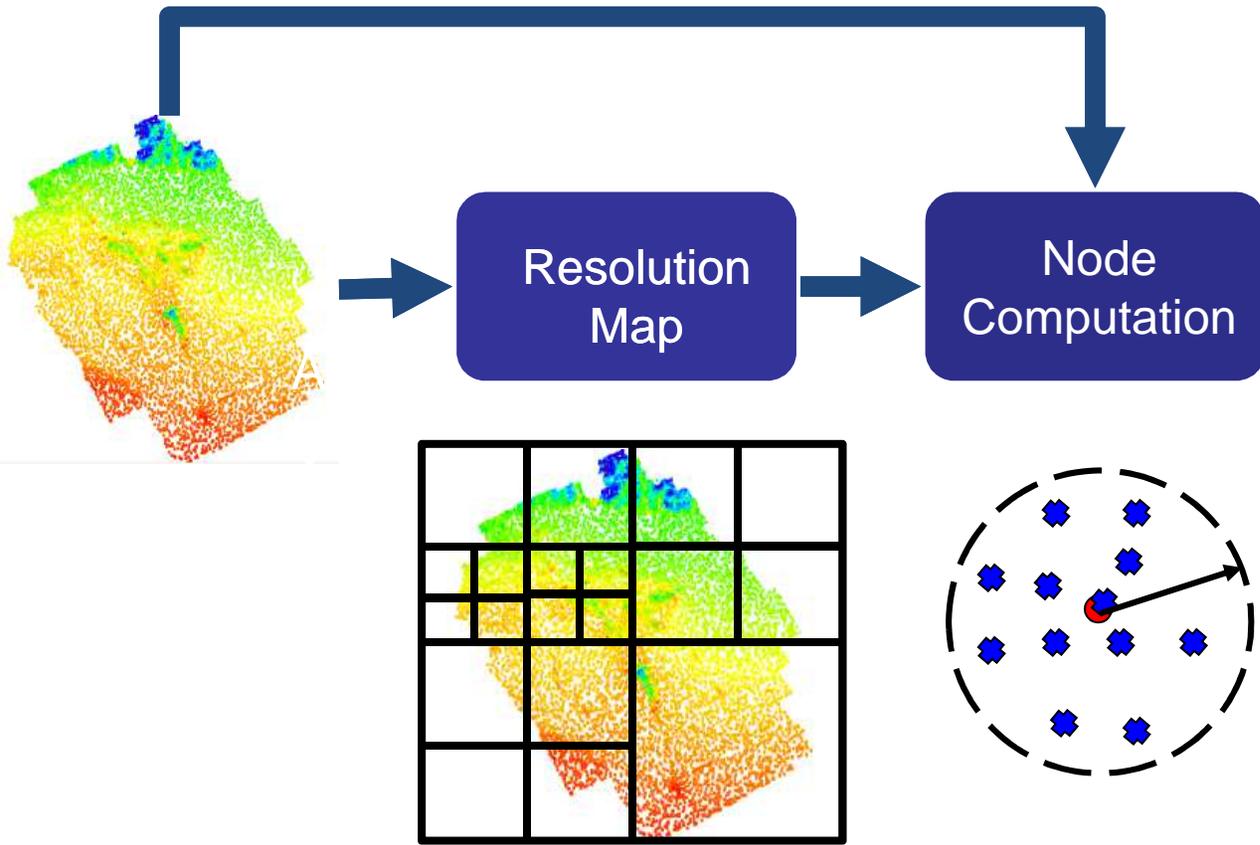
## Density-based

CARIS Density algorithm

Calder-Rice Density algorithm

## Depth-based

CARIS algorithm based on ranges



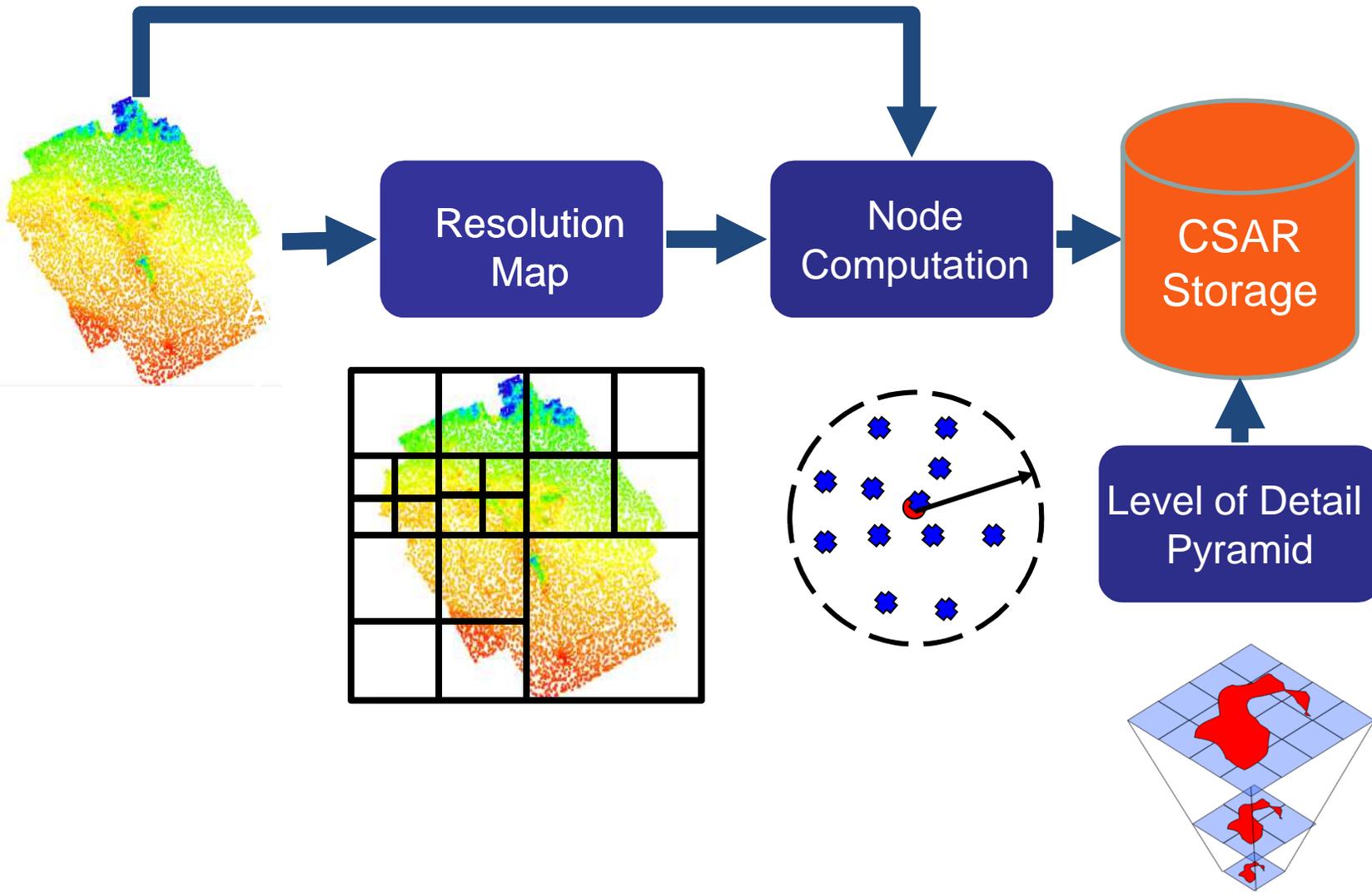
Inverse Distance Weighting

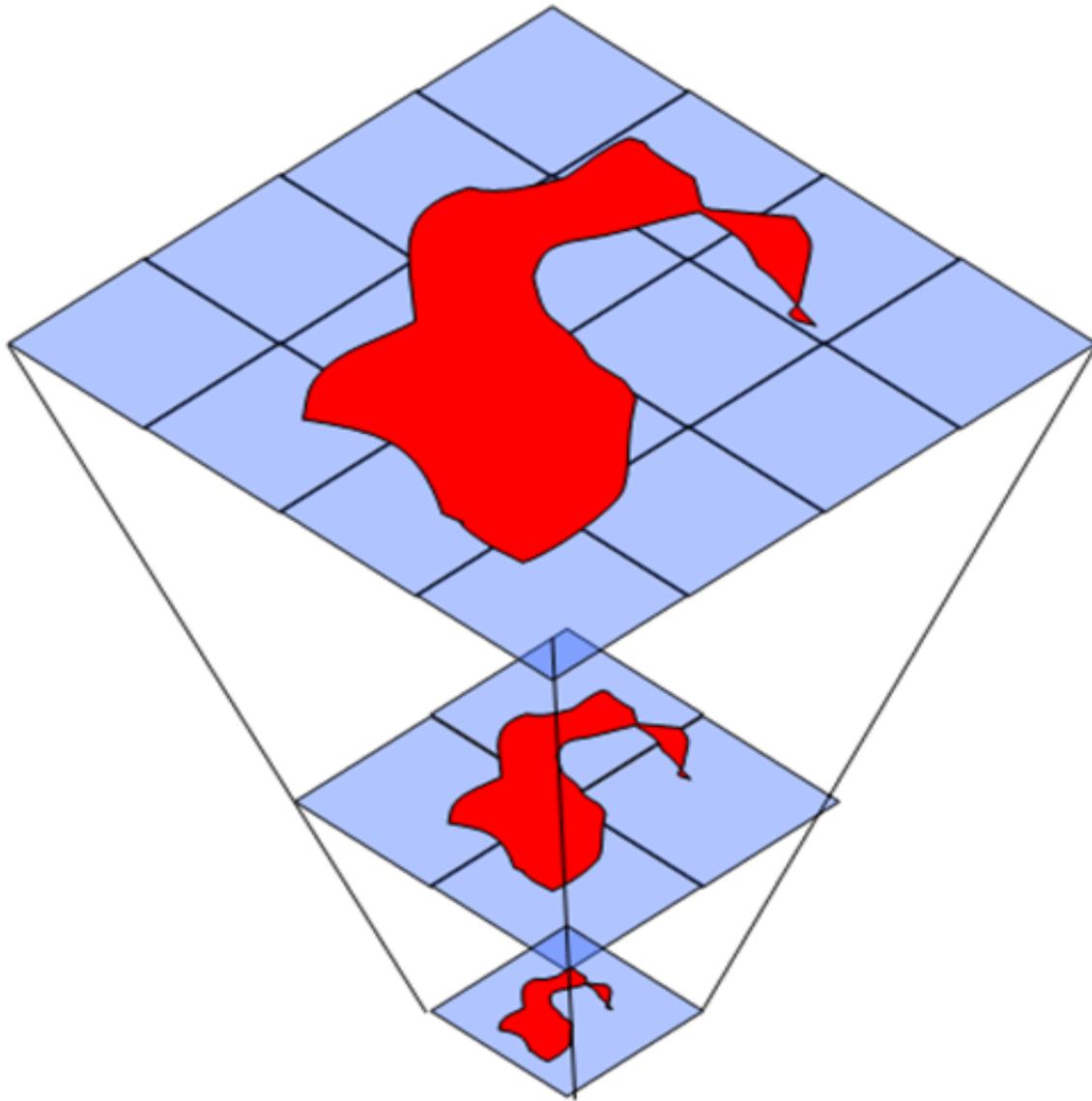
Shoal-biased binning

Mean binning

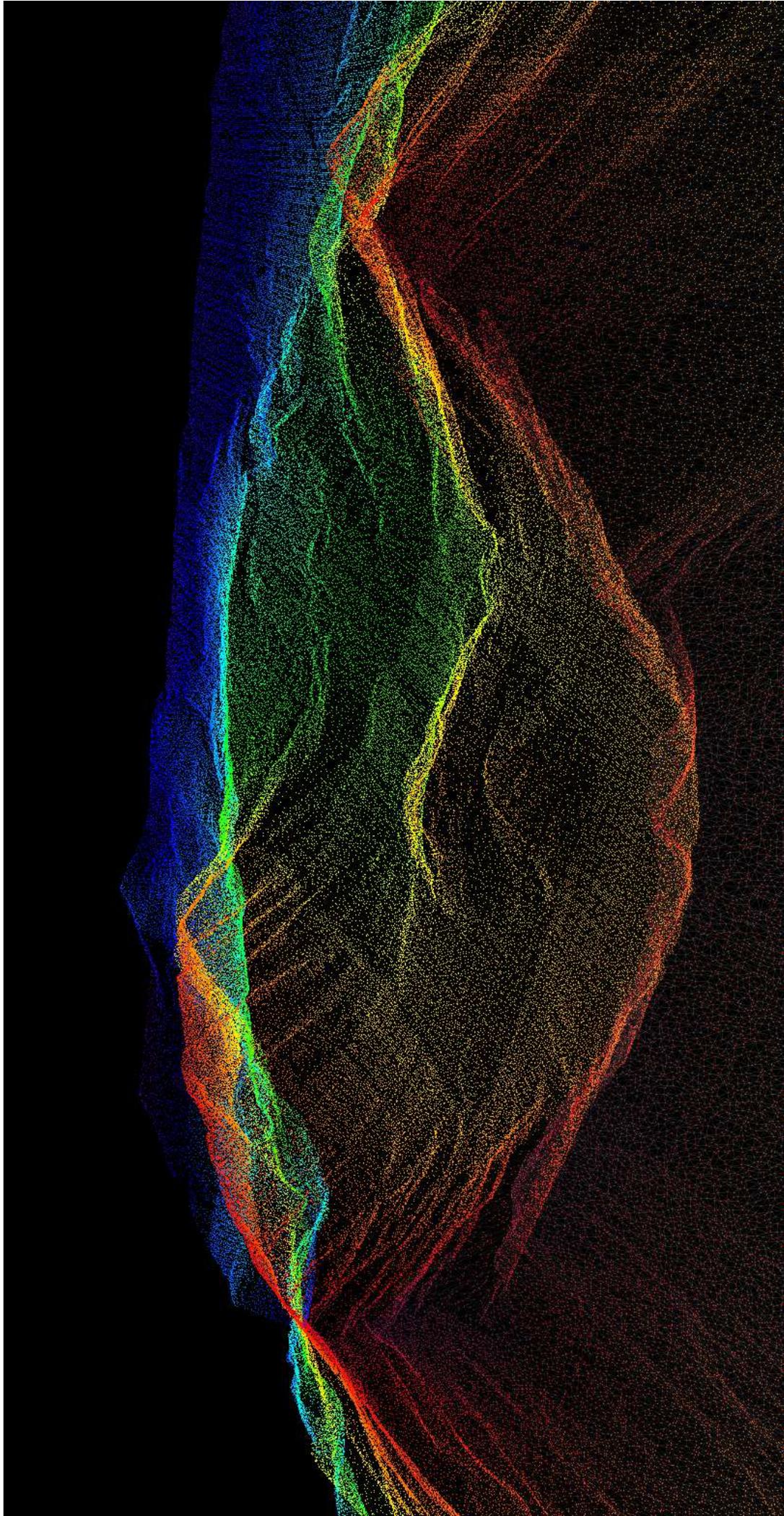
CUBE

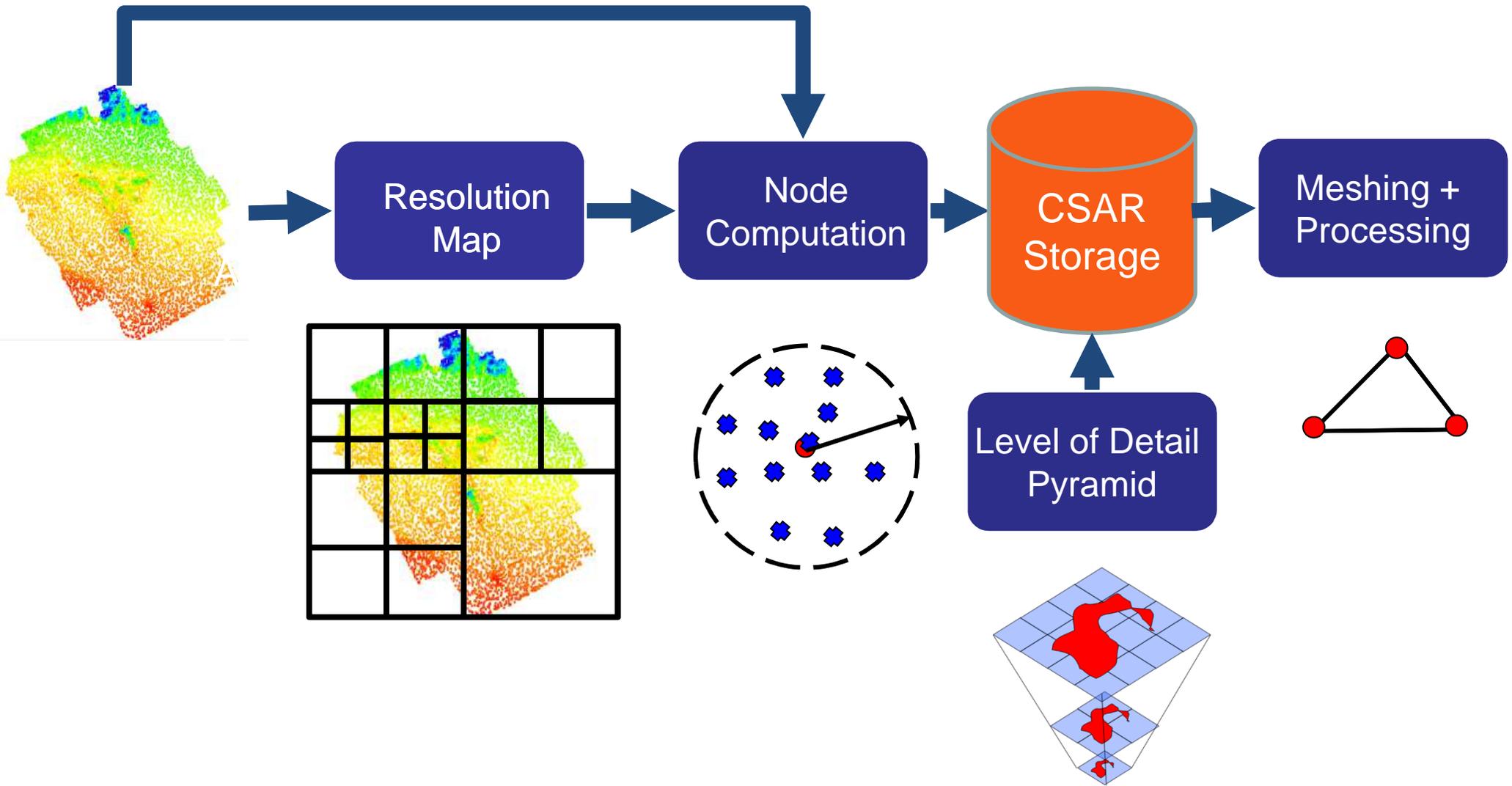
# VARIABLE RESOLUTION SURFACE CREATION & STORAGE





- Built in to Variable Resolution surface
- Allows fast 2D and 3D visualization





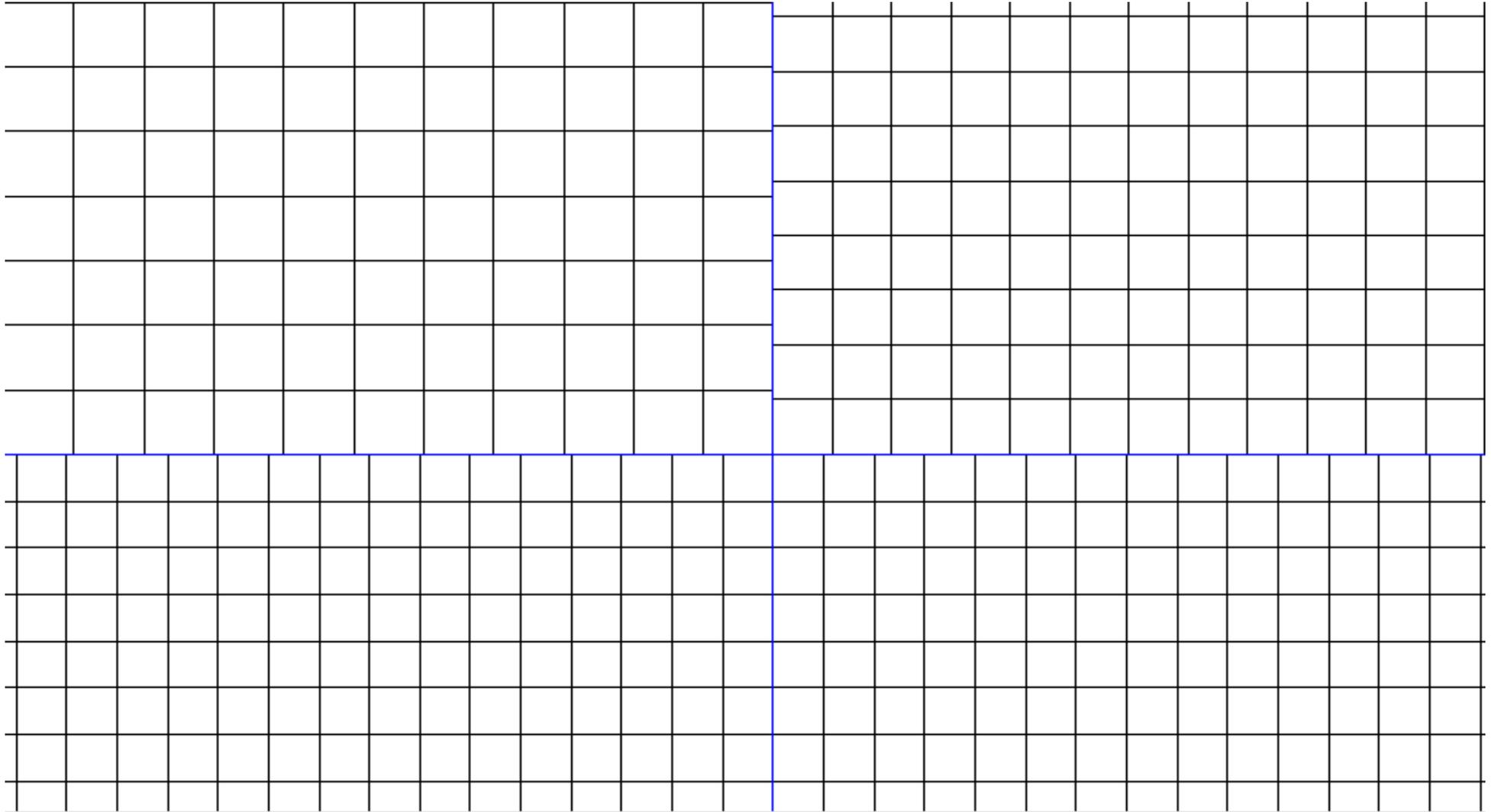
Store quadtree resolution map

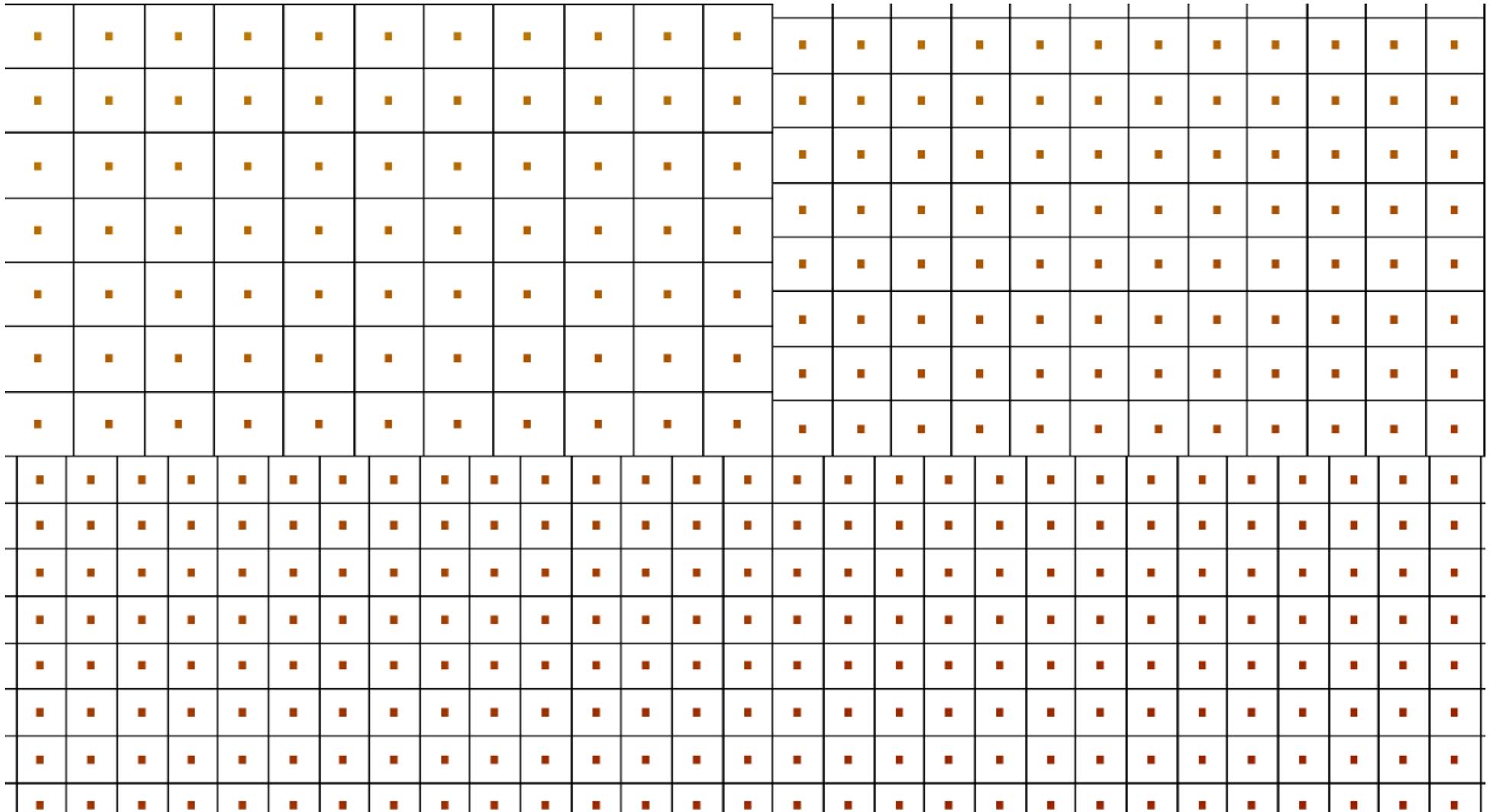
Store nodes in chunks on disk

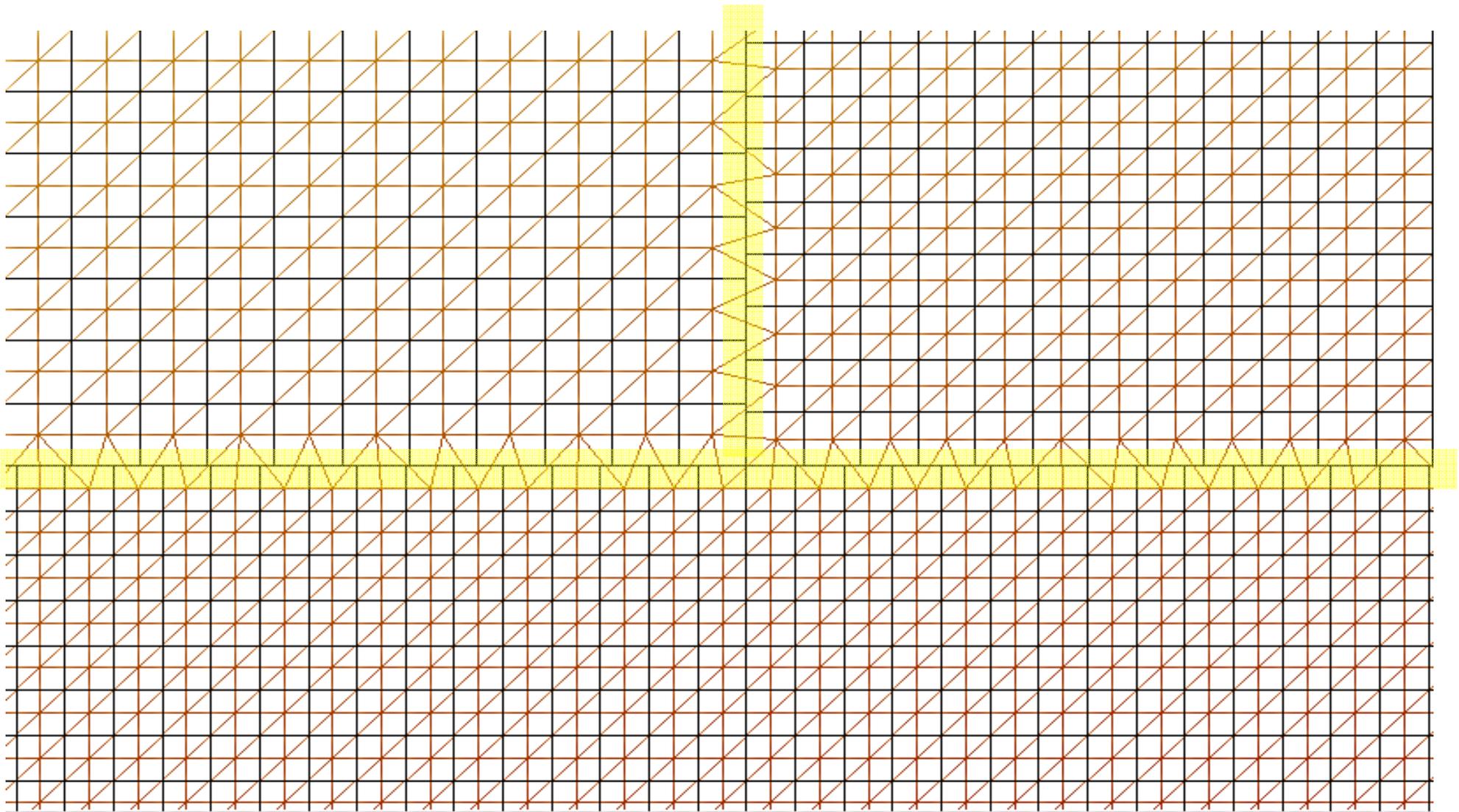
- Network key-value store

Store Level-of-detail pyramid

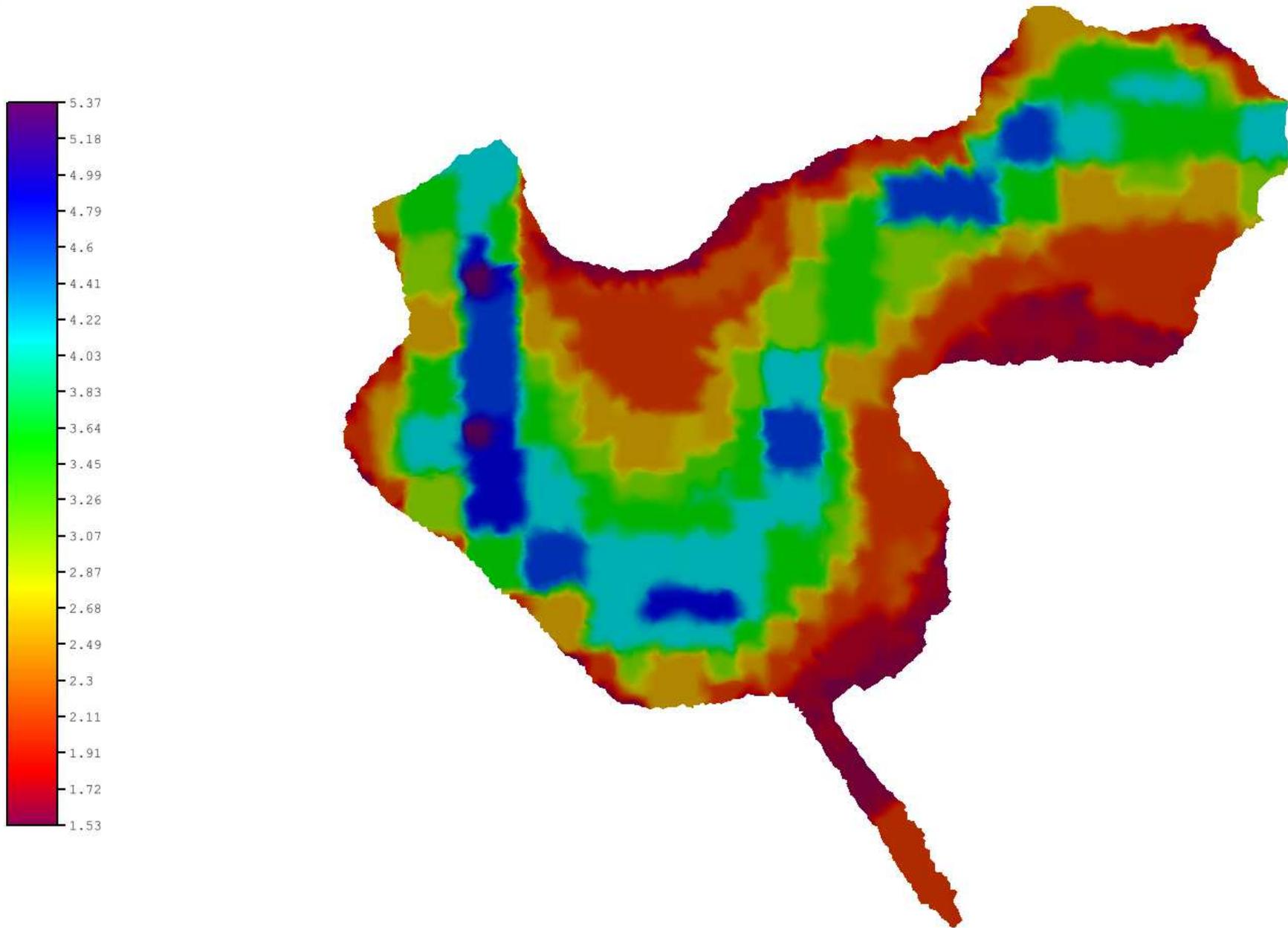
Triangulation *on the fly*





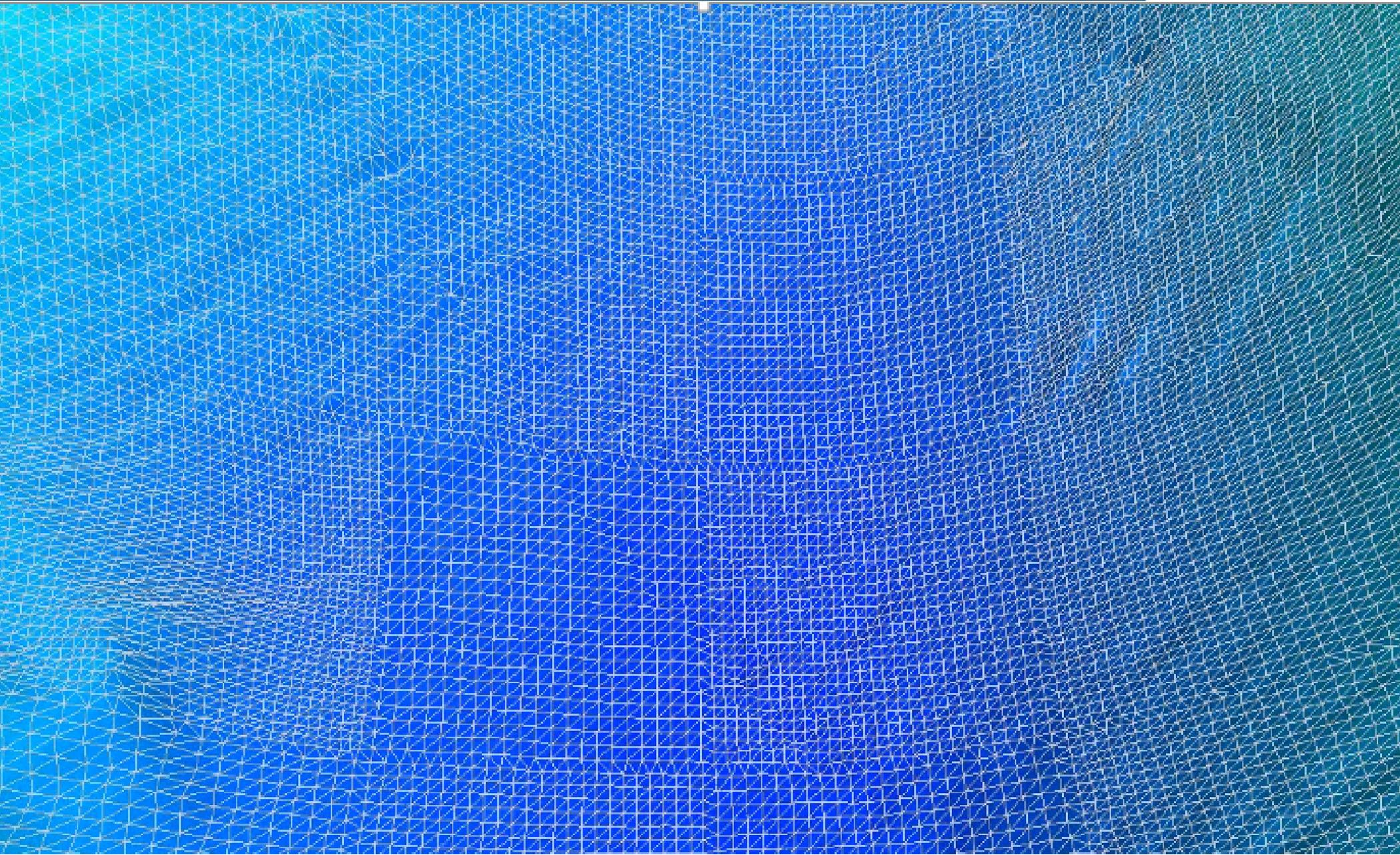


# VARIABLE RESOLUTION SURFACE RESOLUTION



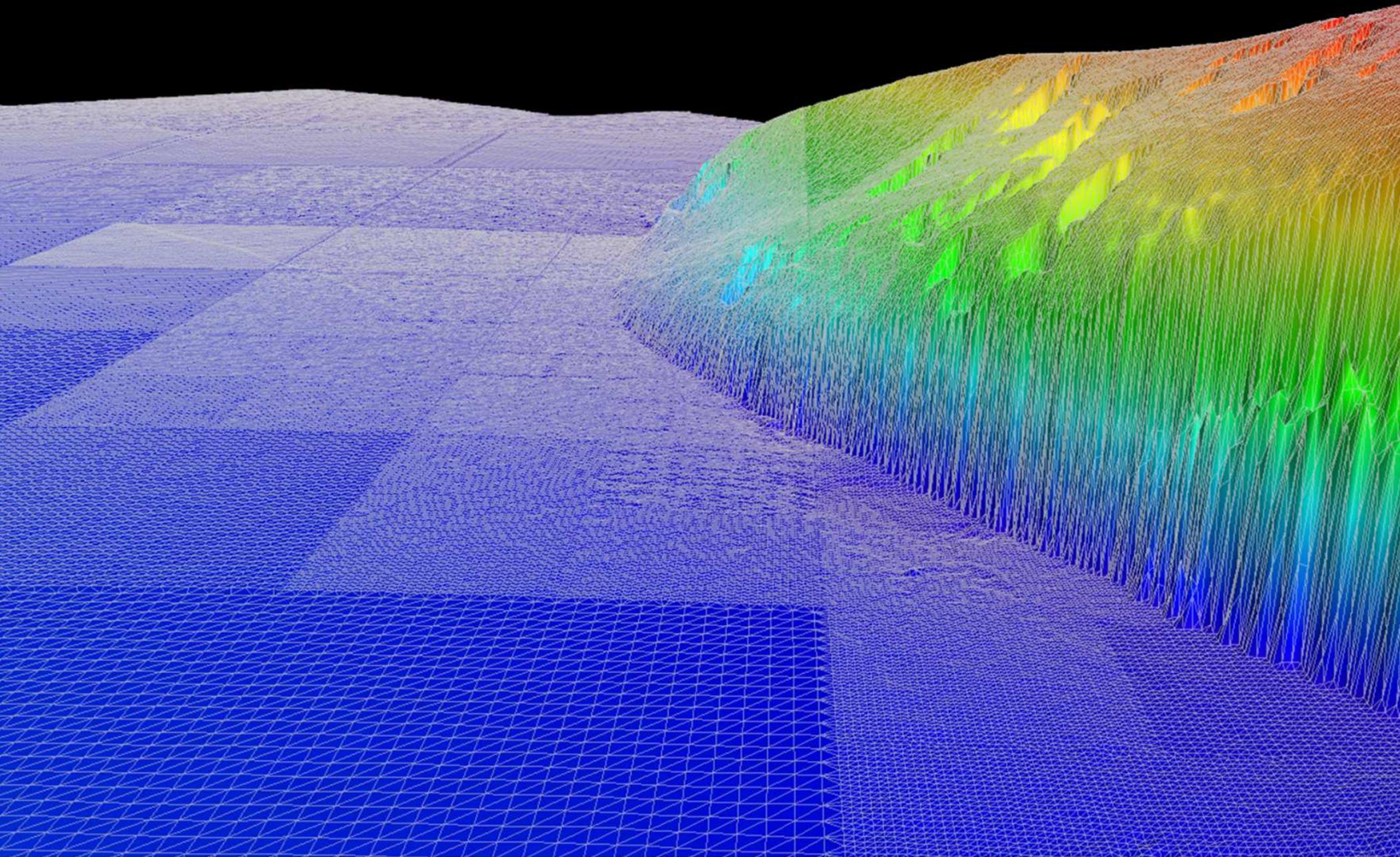
# VARIABLE RESOLUTION SURFACE

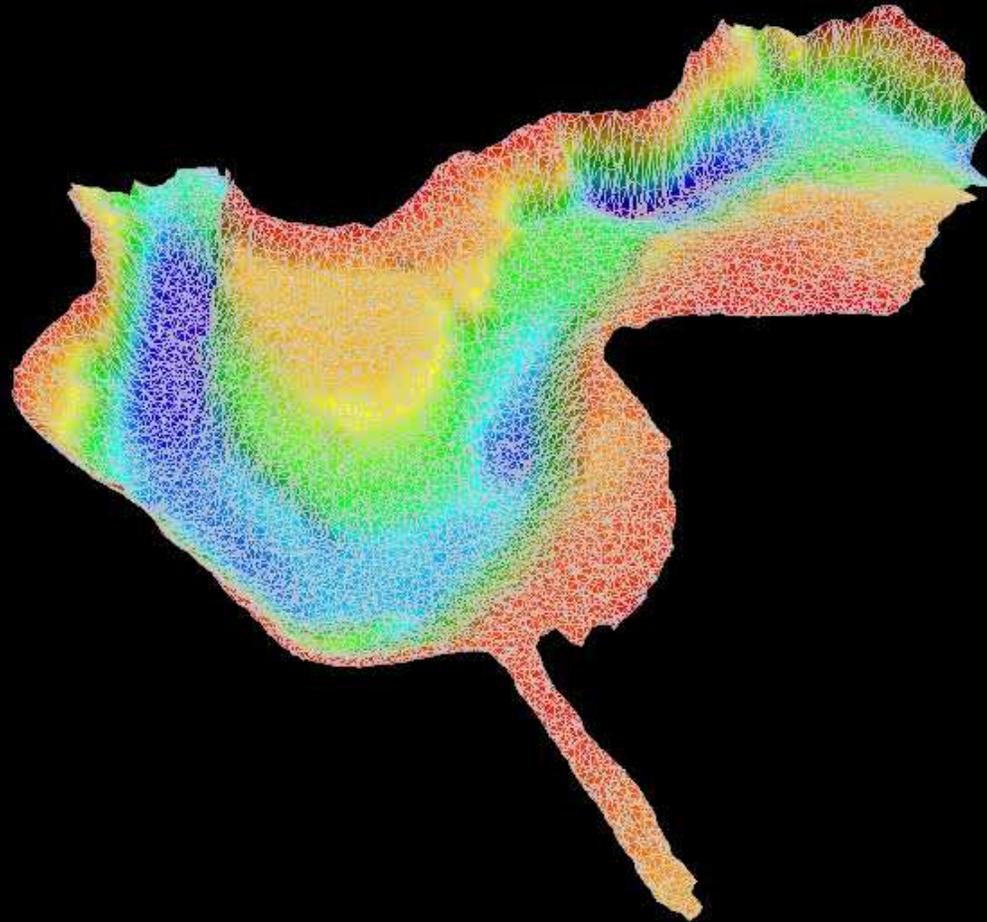
*caris*

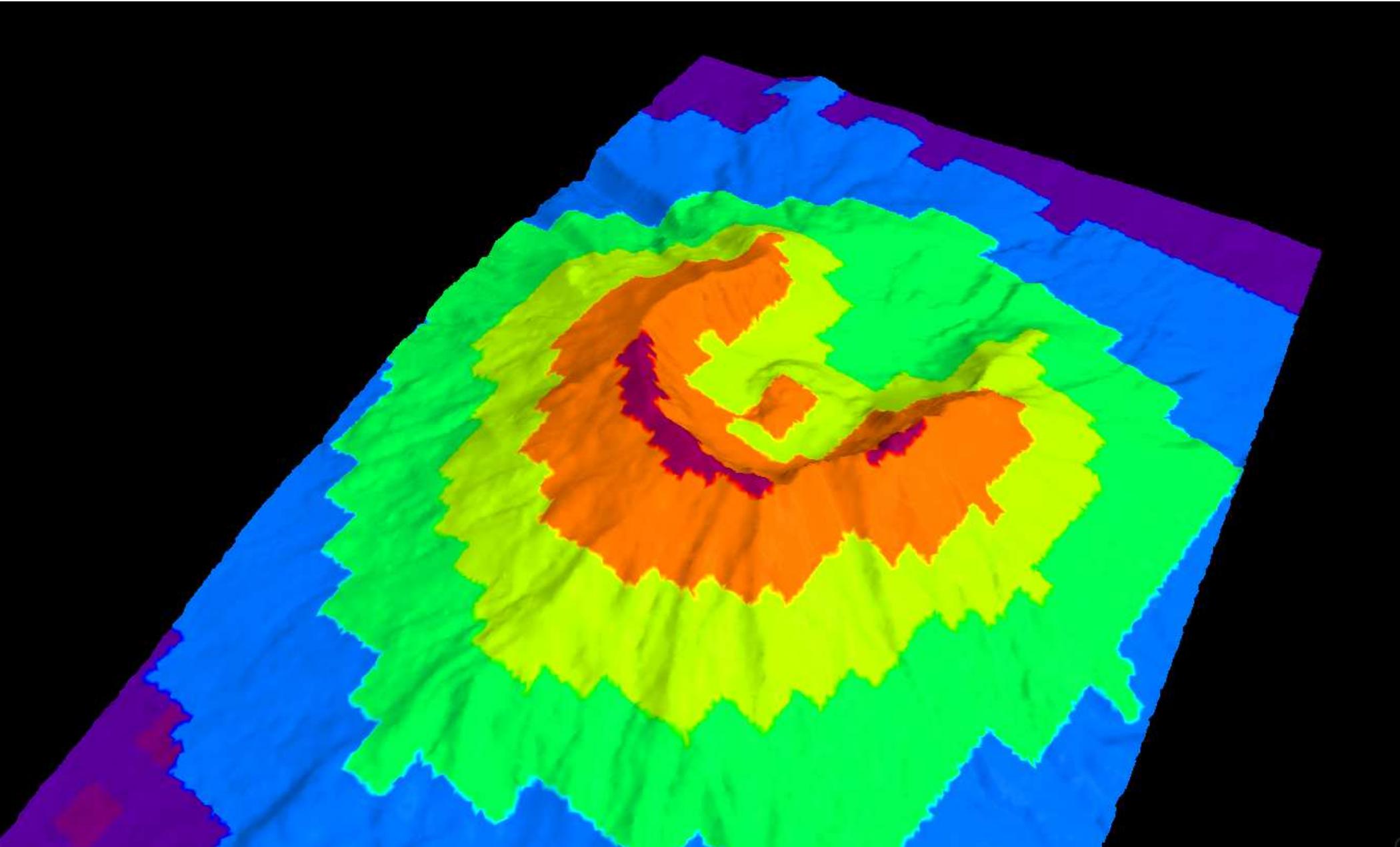


# DENSITY-BASED RESOLUTIONS

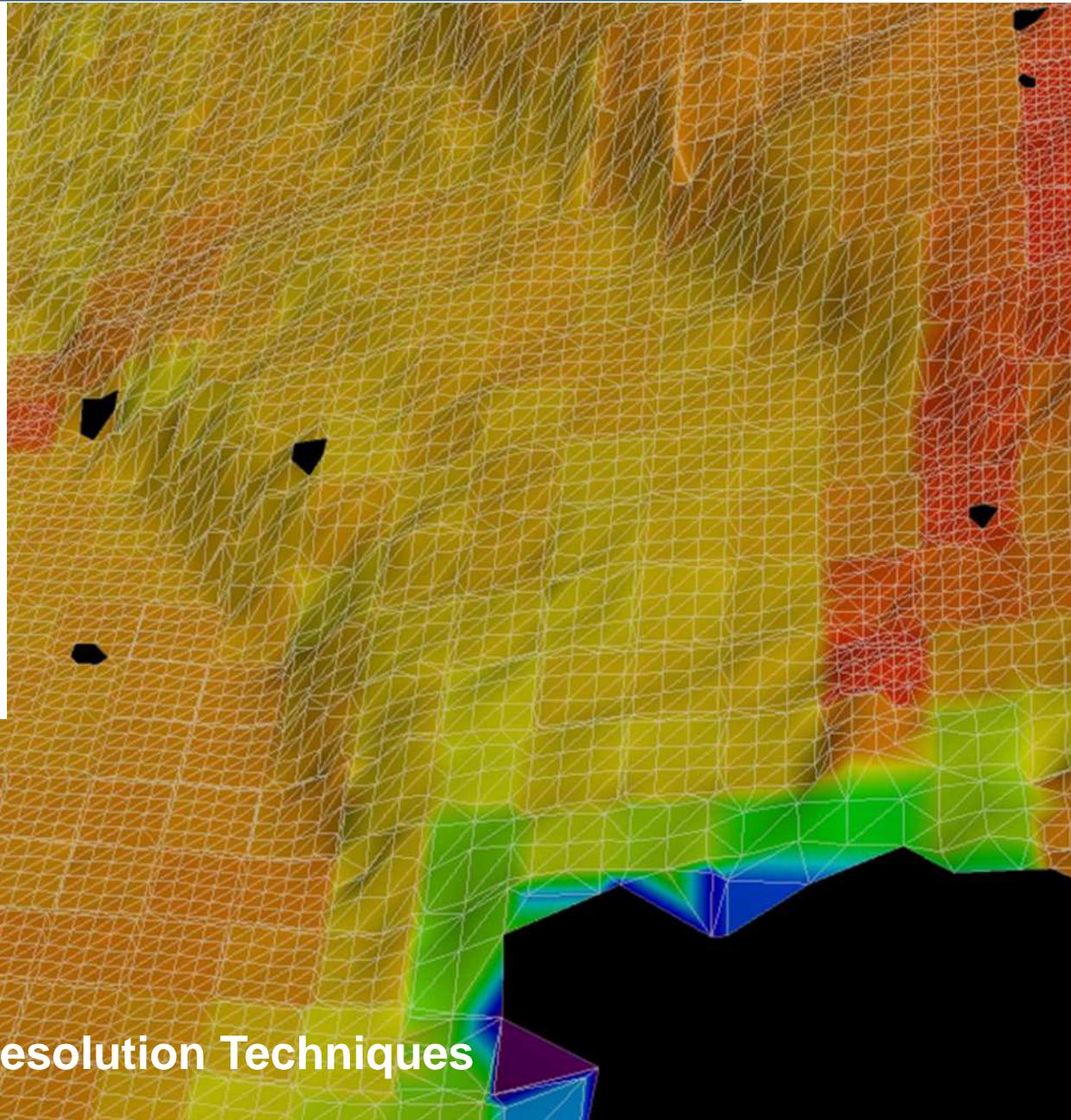
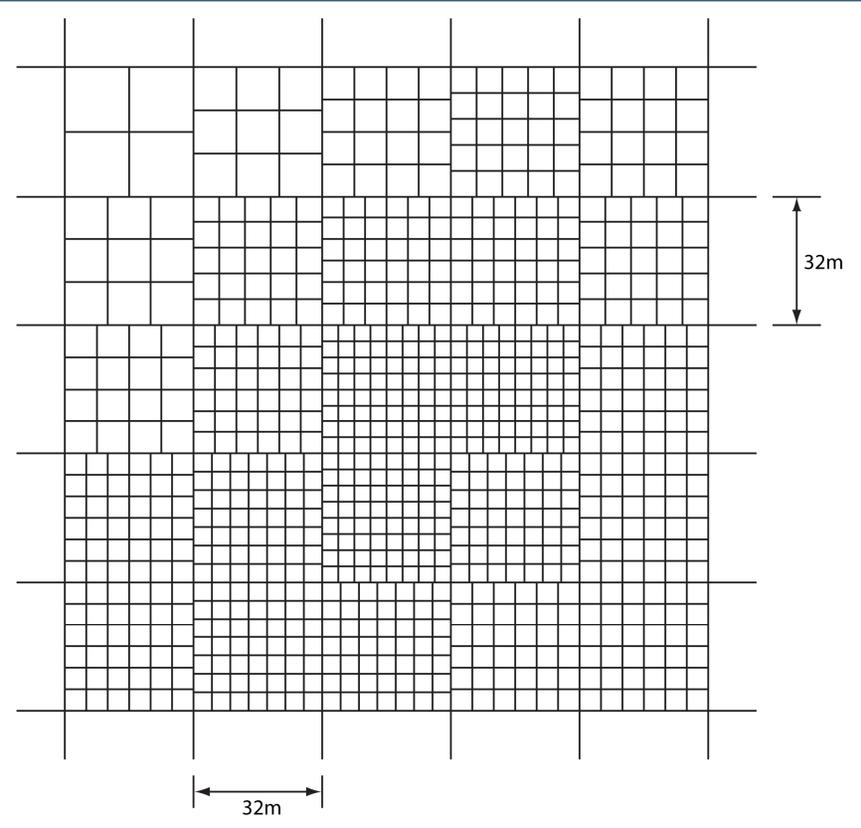
*caris*



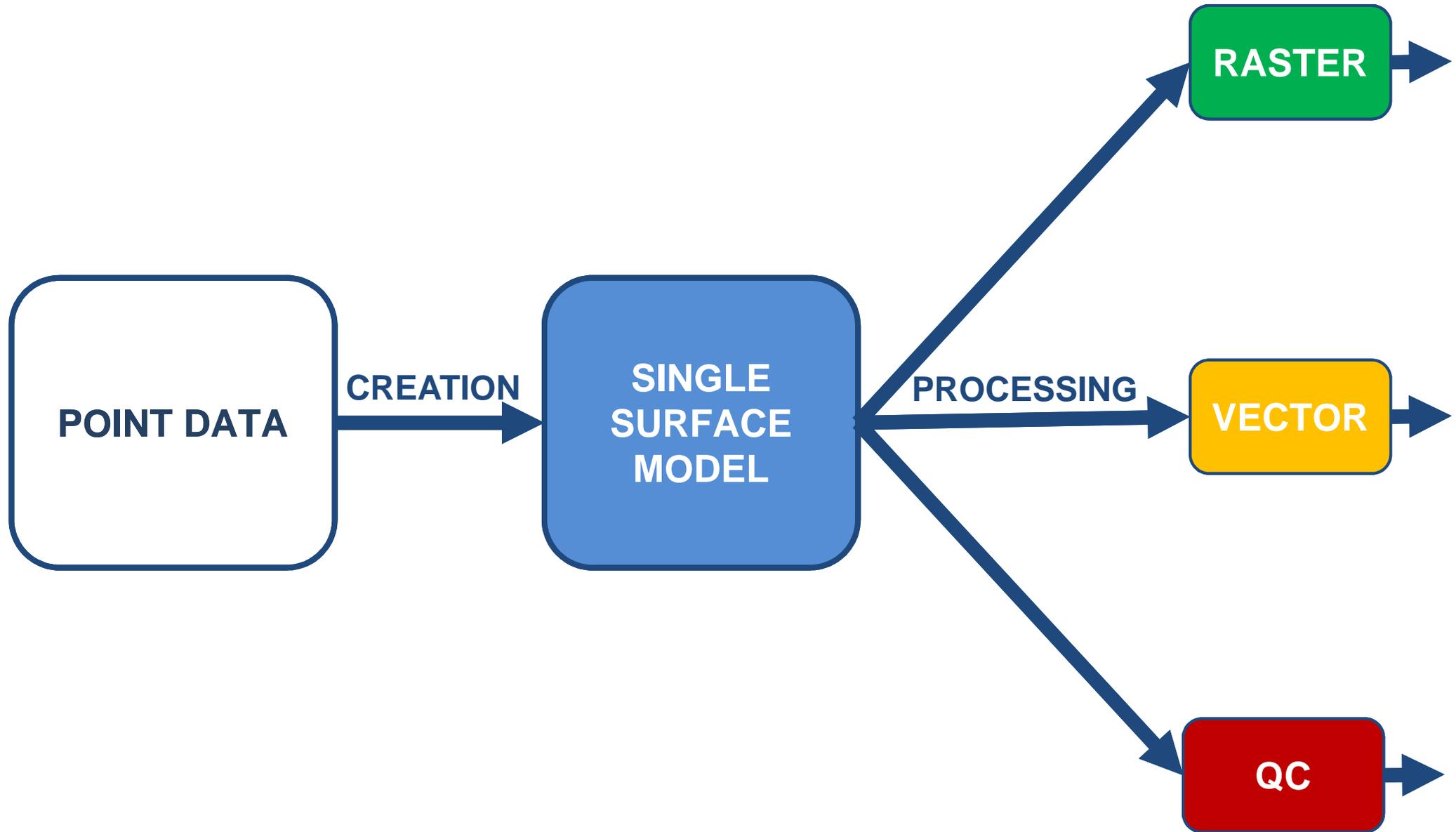


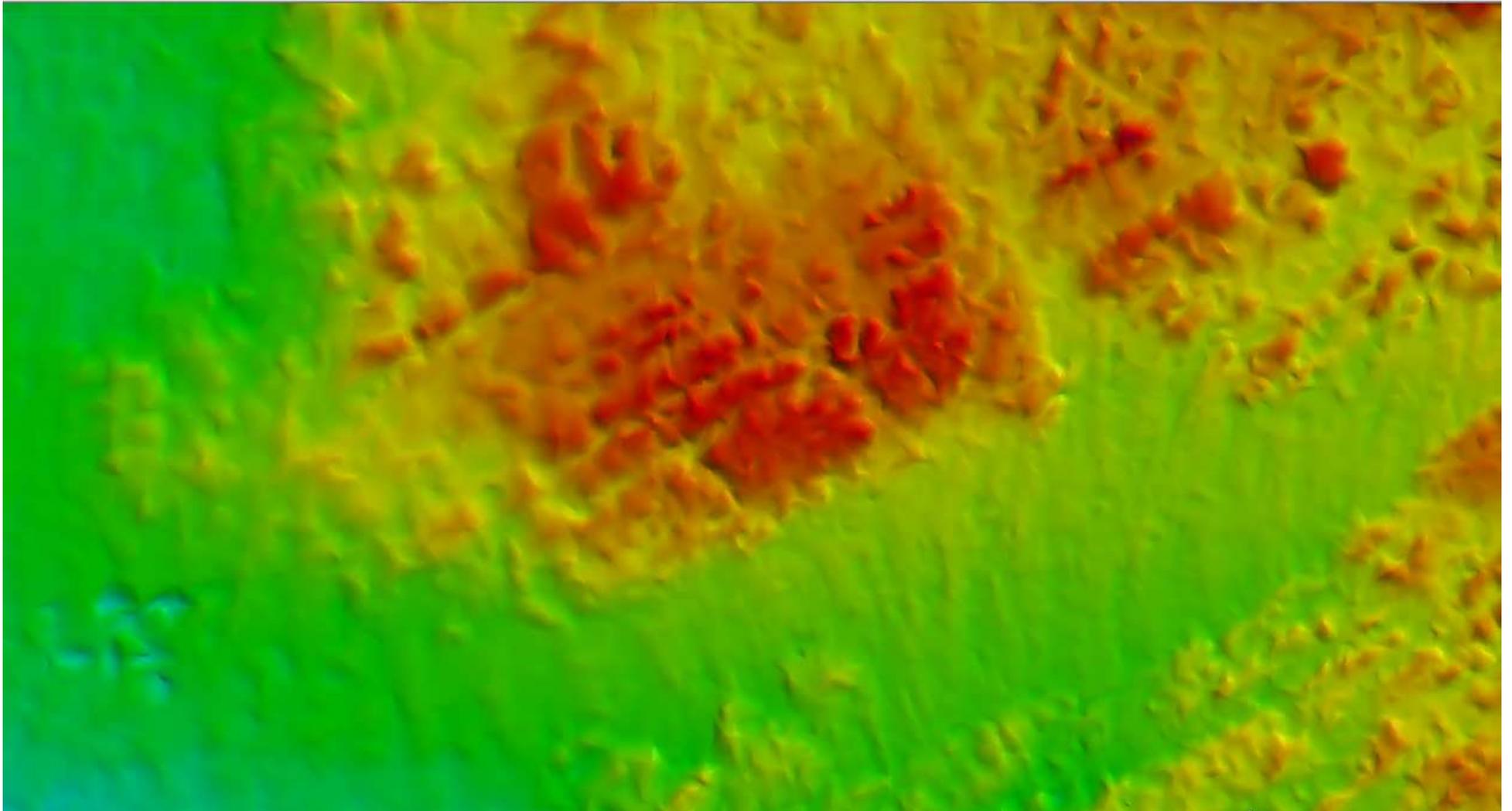


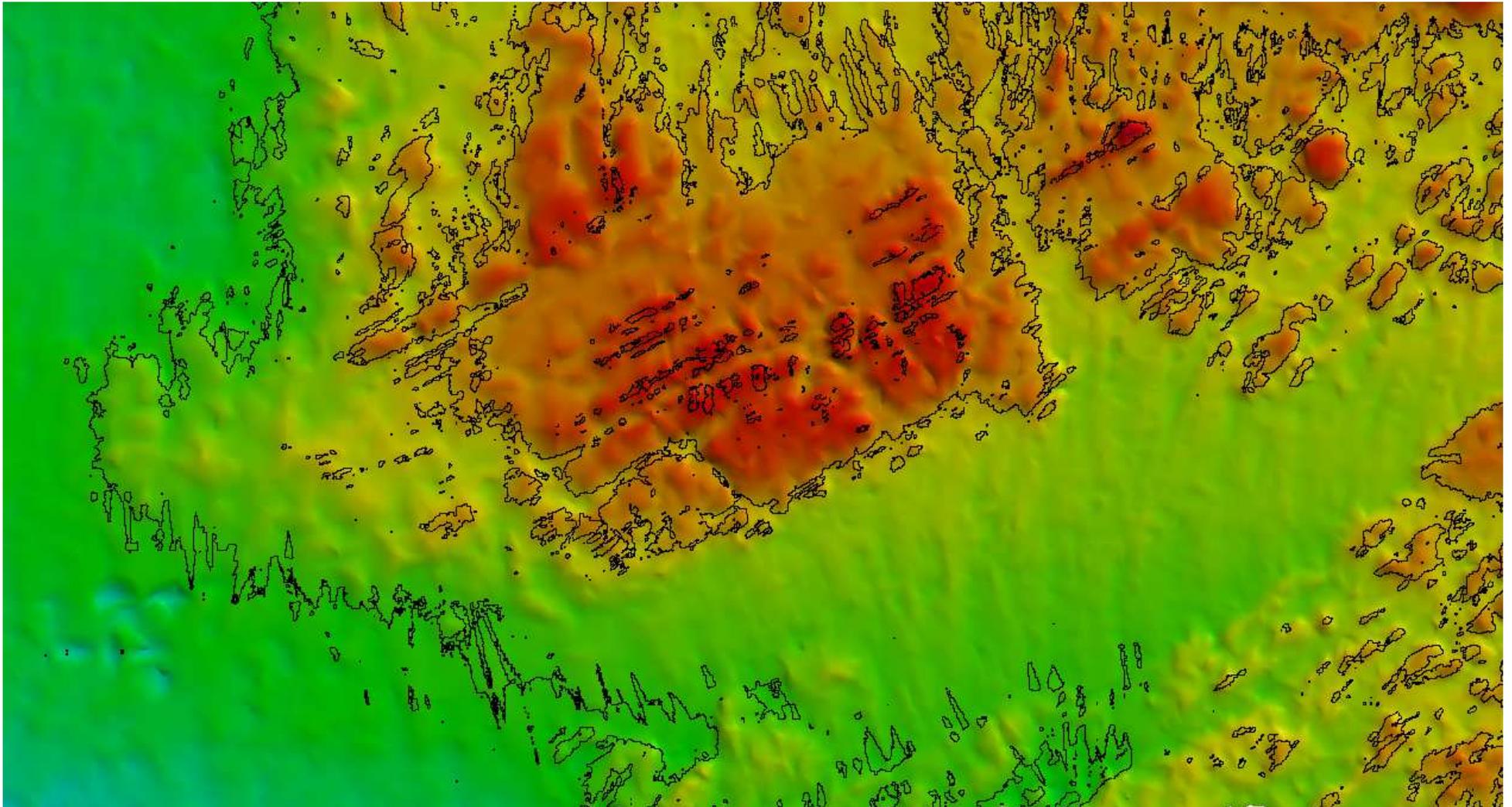
# CHRT SURFACE

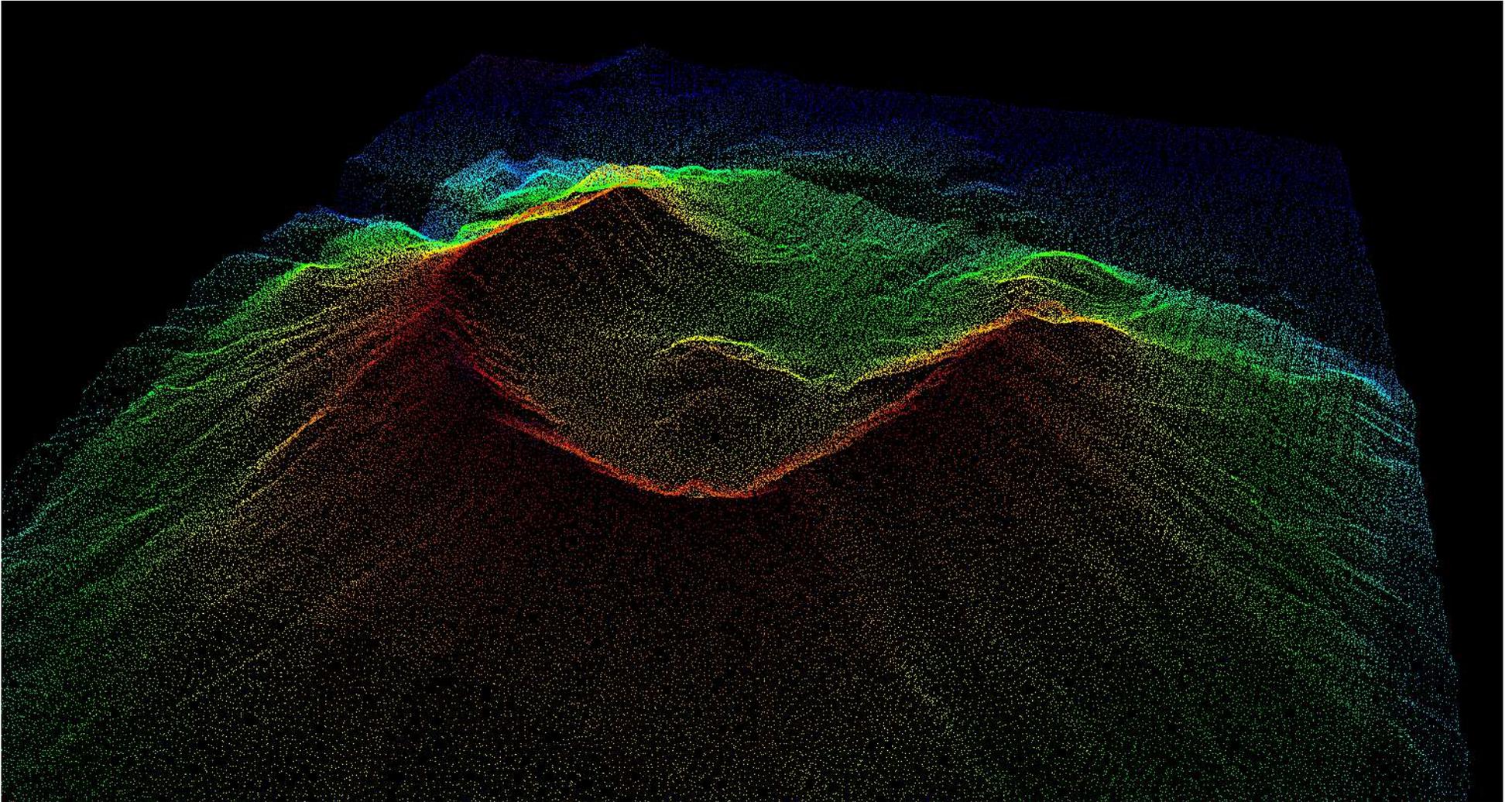


**CHRT: CUBE with Hierarchical Resolution Techniques**









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