

Eigen-feature Analysis of Weighted Covariance Matrices for LiDAR Point Cloud Classification

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Part A: Visual Comparisons

- Eigen-features from the proposed method
- Eigen-features from the standard method

Orthoimage of test data





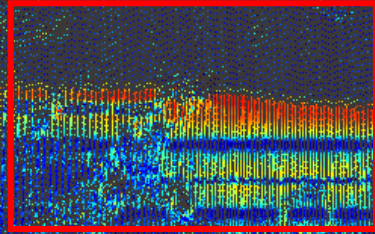
Un-overlapping region



Overlapping region (multiple strips)

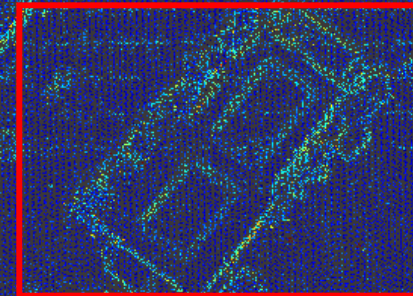
Standard PCA (linearity eigen-feature)

Un-overlapping region

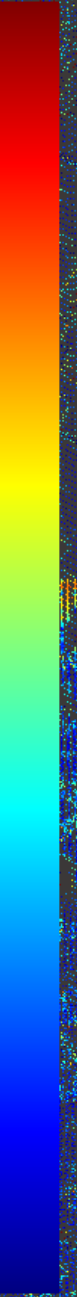


A. Strip boundary

Overlapping region

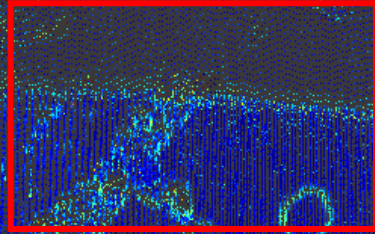


B. Building



Weighted PCA (linearity eigen-feature)

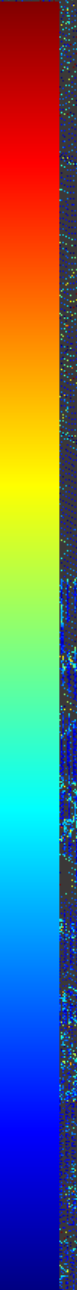
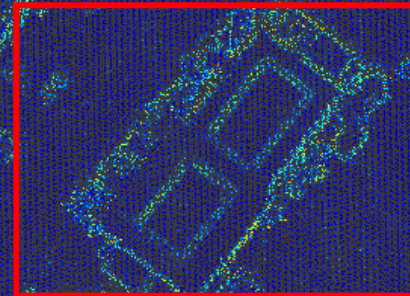
Un-overlapping region



A. Strip boundary

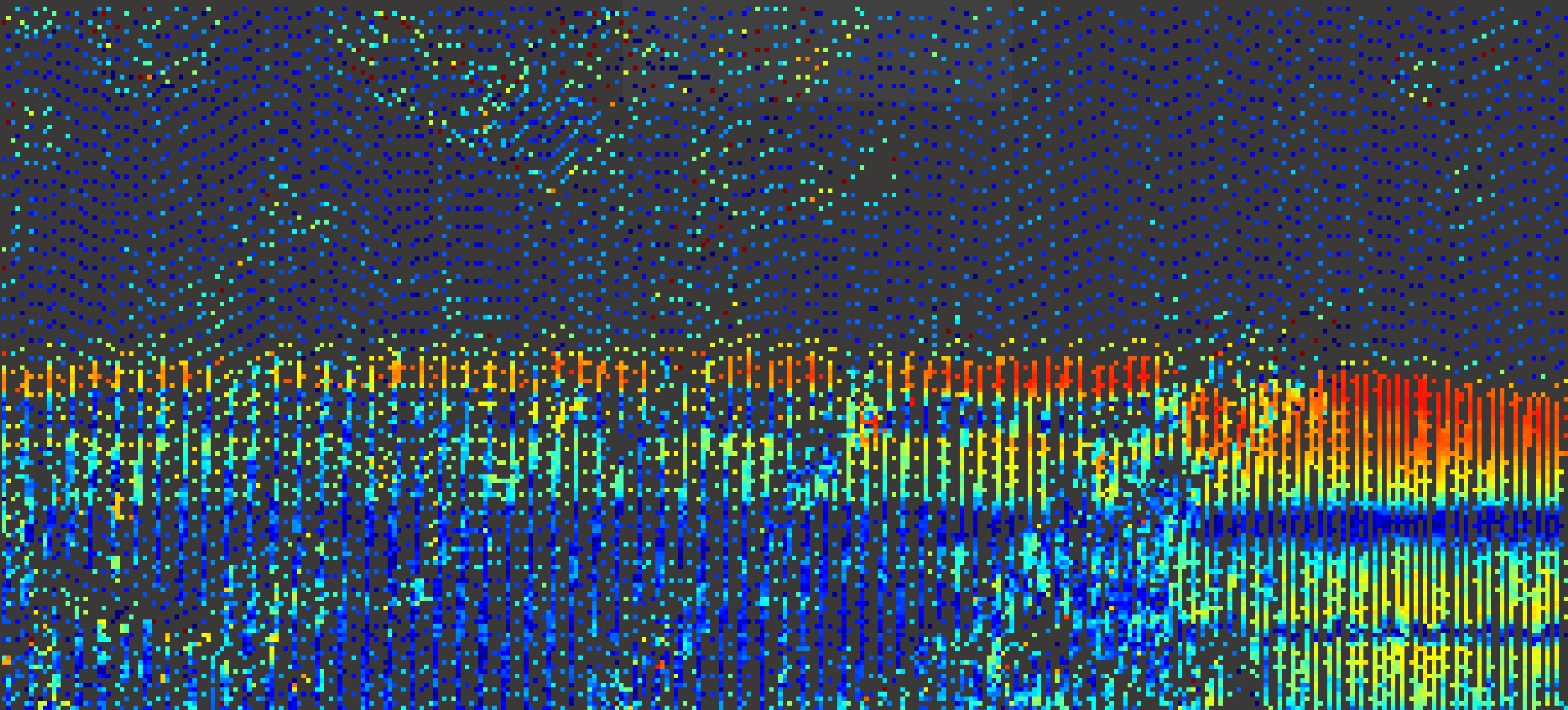
B. Building

Overlapping region



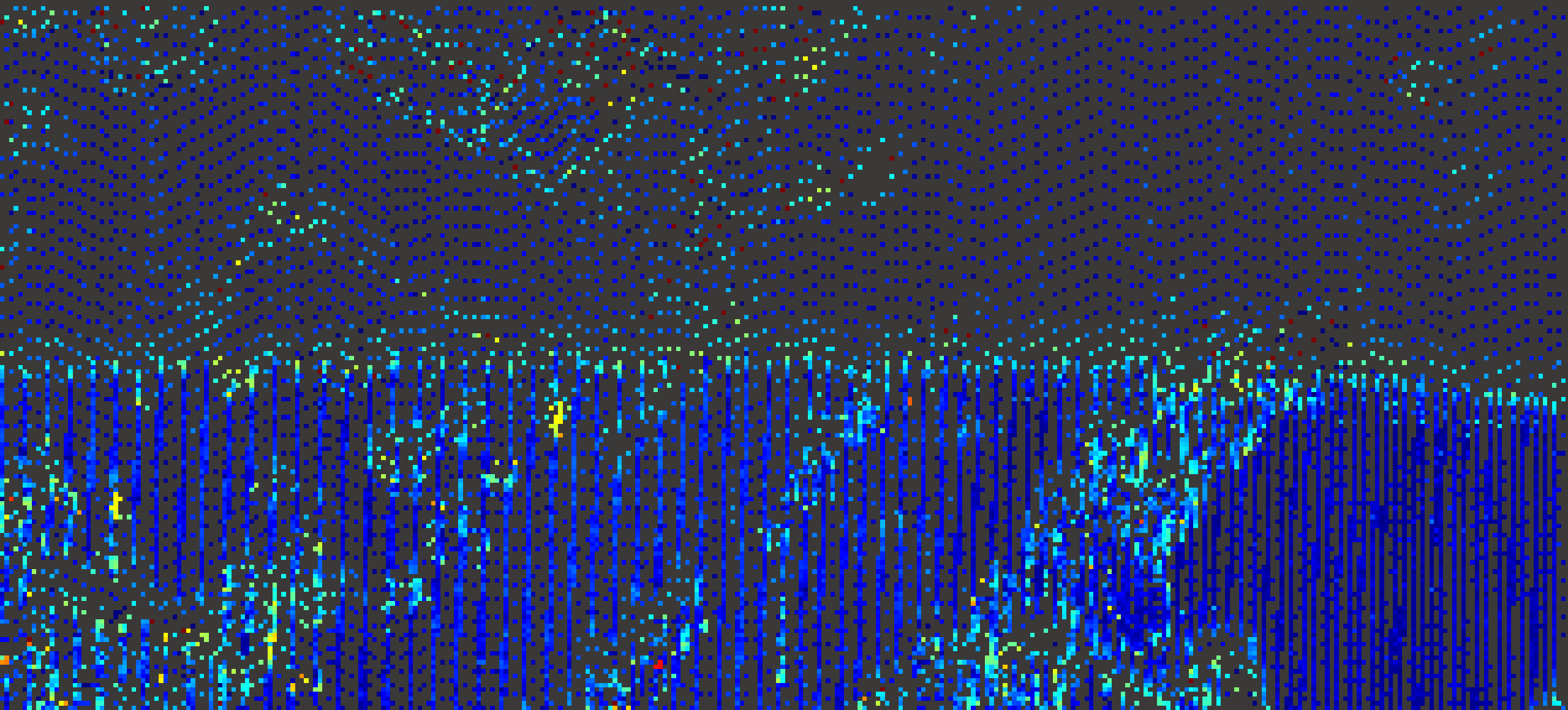
A. Strip boundary

Standard PCA (linearity eigen-feature)

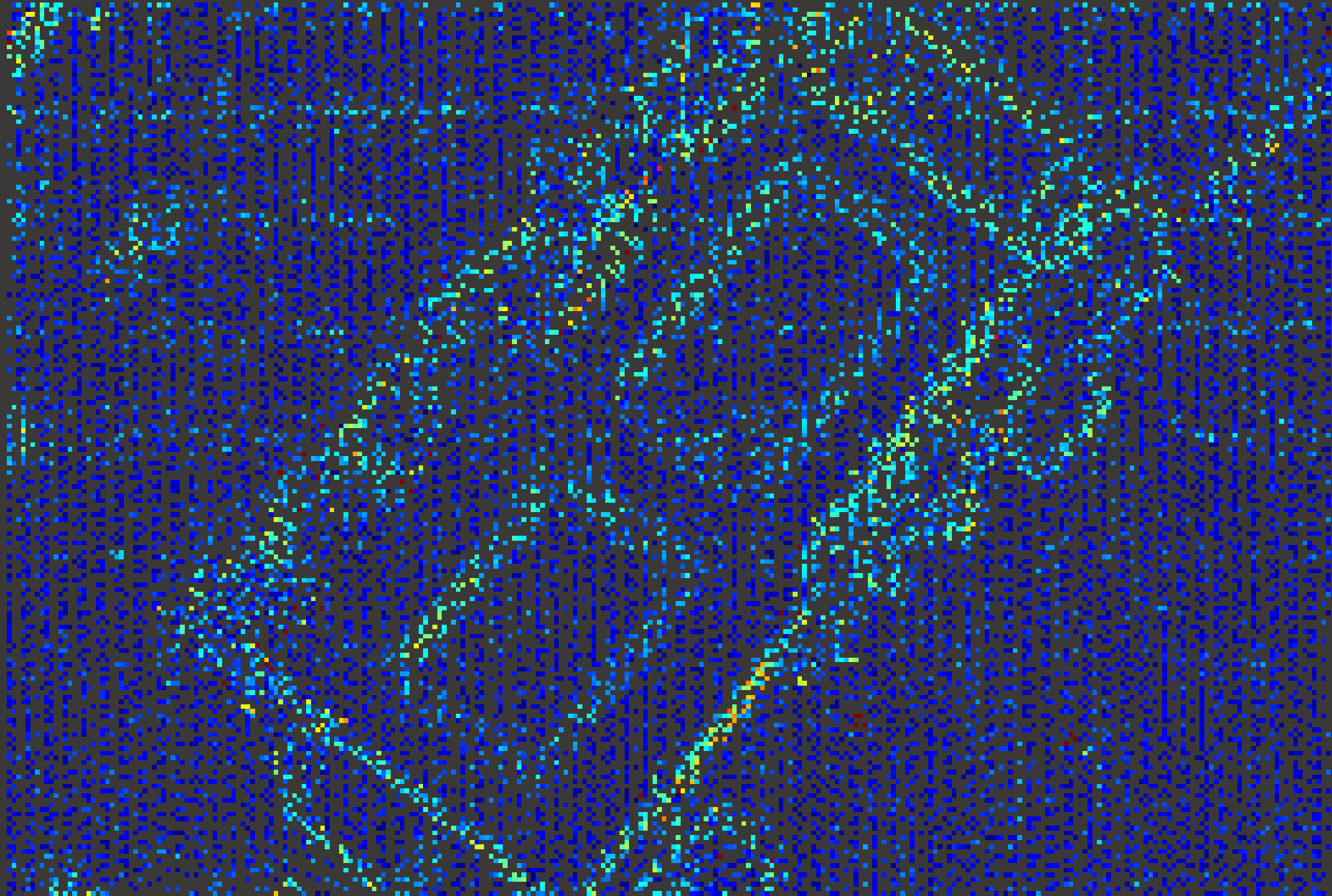


A. Strip boundary

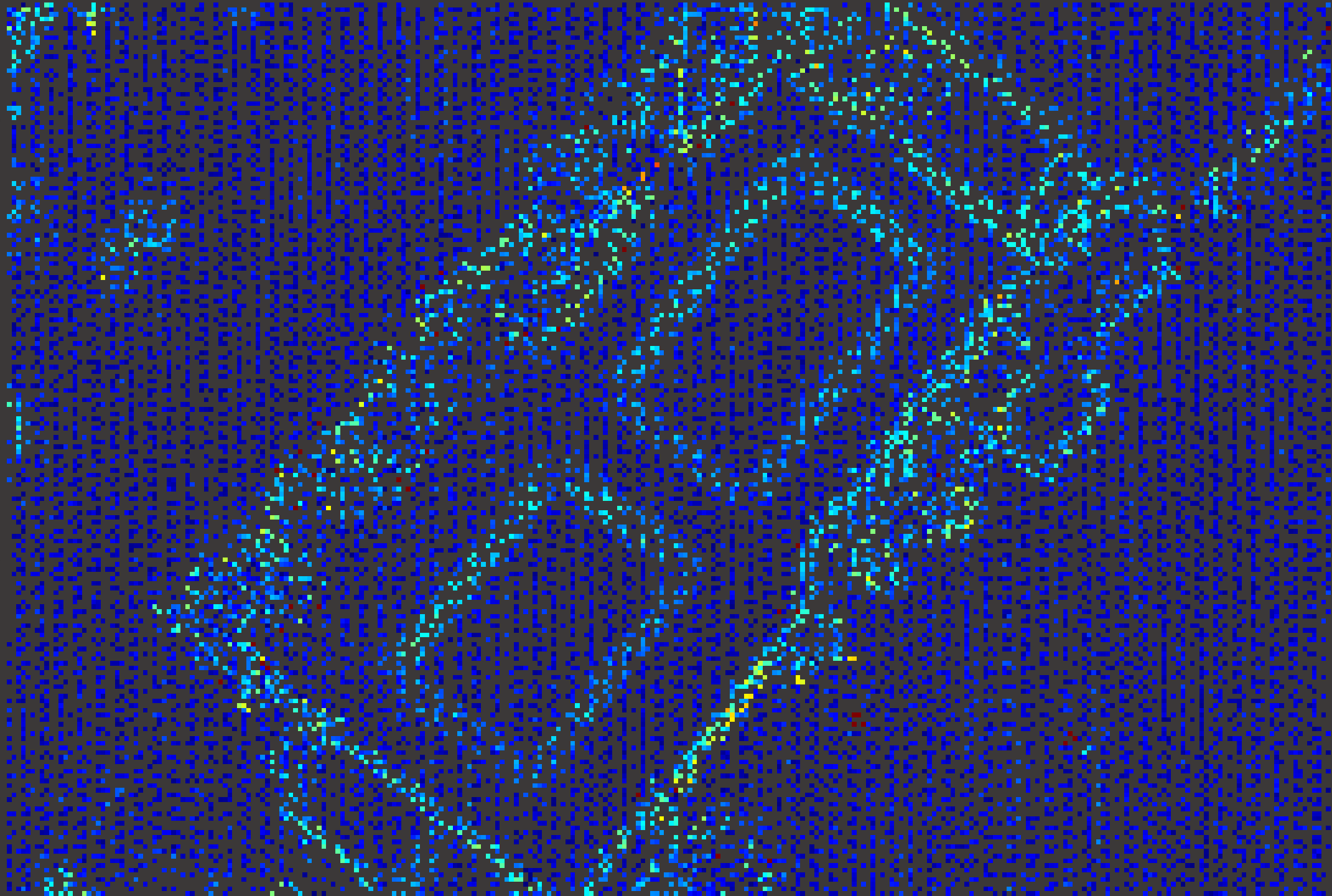
Weighted PCA (linearity eigen-feature)



B. Building Standard PCA (linearity eigen-feature)



B. Building Weighted PCA (linearity eigen-feature)



Orthoimage of test data

C. Strip boundary



A. Roof ridge



B. Roof ridge



Standard PCA (sphericity eigen-feature)

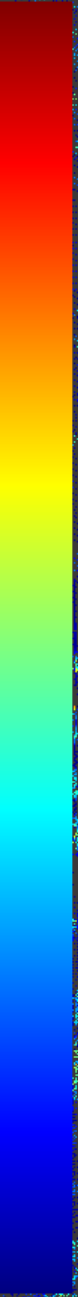
C. Strip boundary

Un-overlapping region

A. Roof ridge

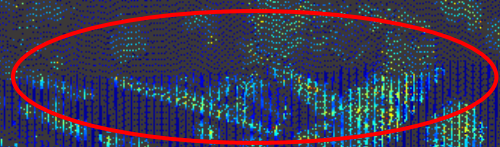
B. Roof ridge

Overlapping region

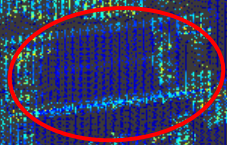


Weighted PCA (sphericity eigen-feature)

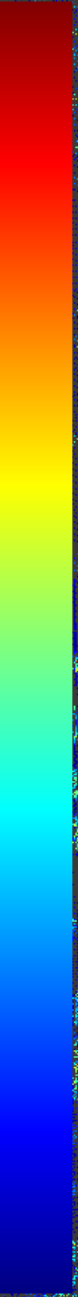
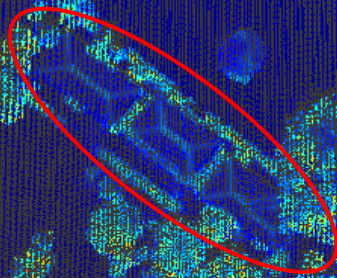
C. Strip boundary



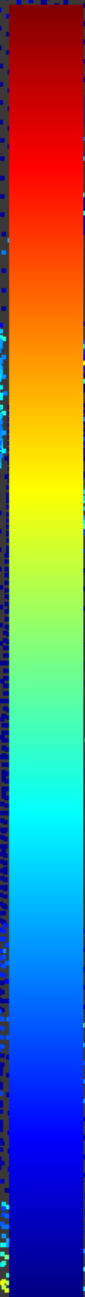
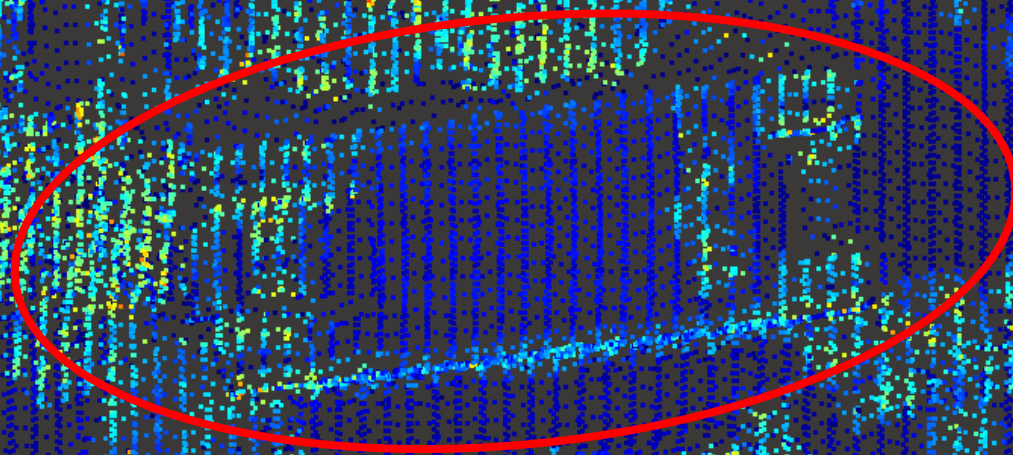
A. Roof ridge



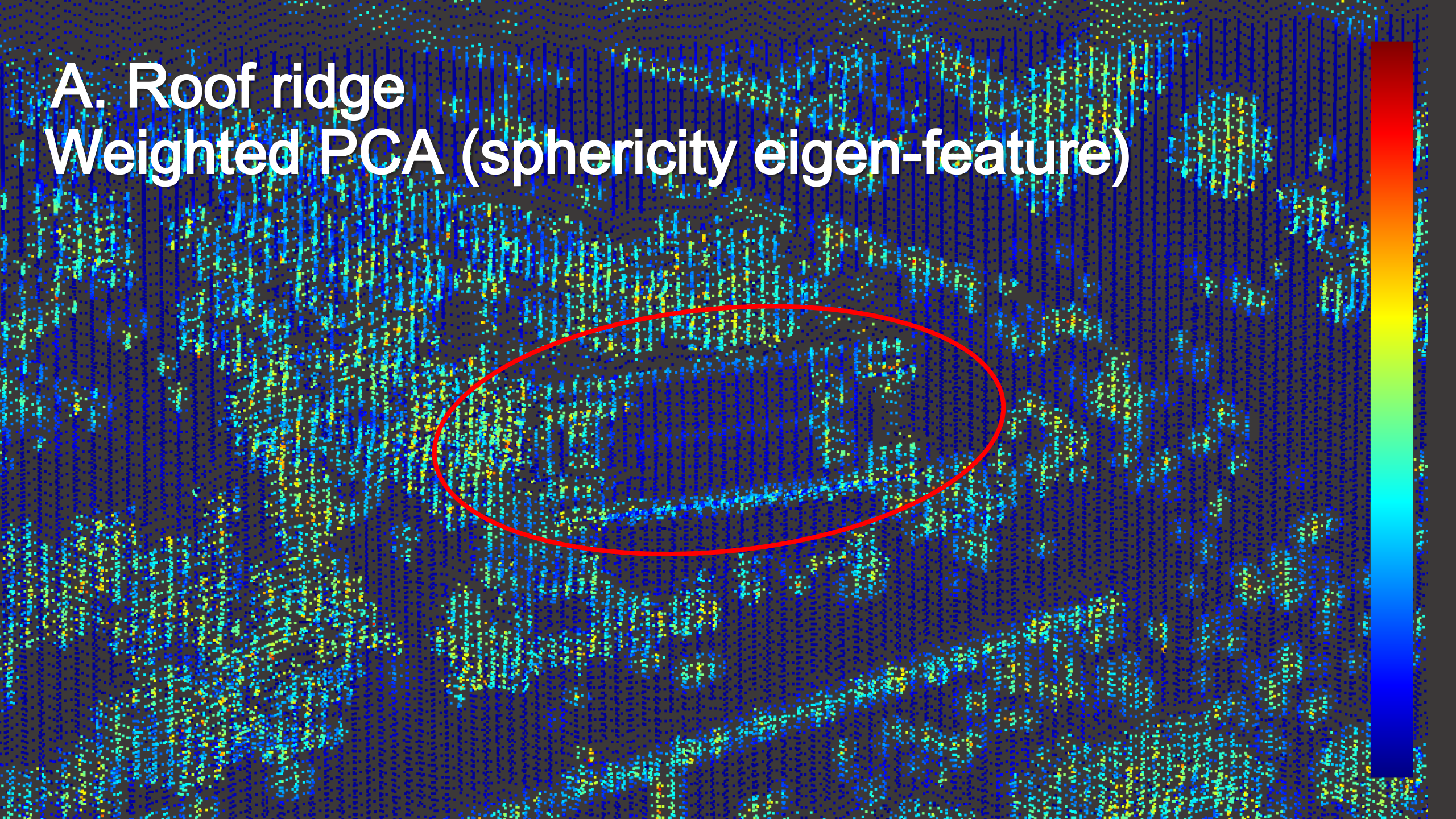
B. Roof ridge



A. Roof ridge Standard PCA (sphericity eigen-feature)

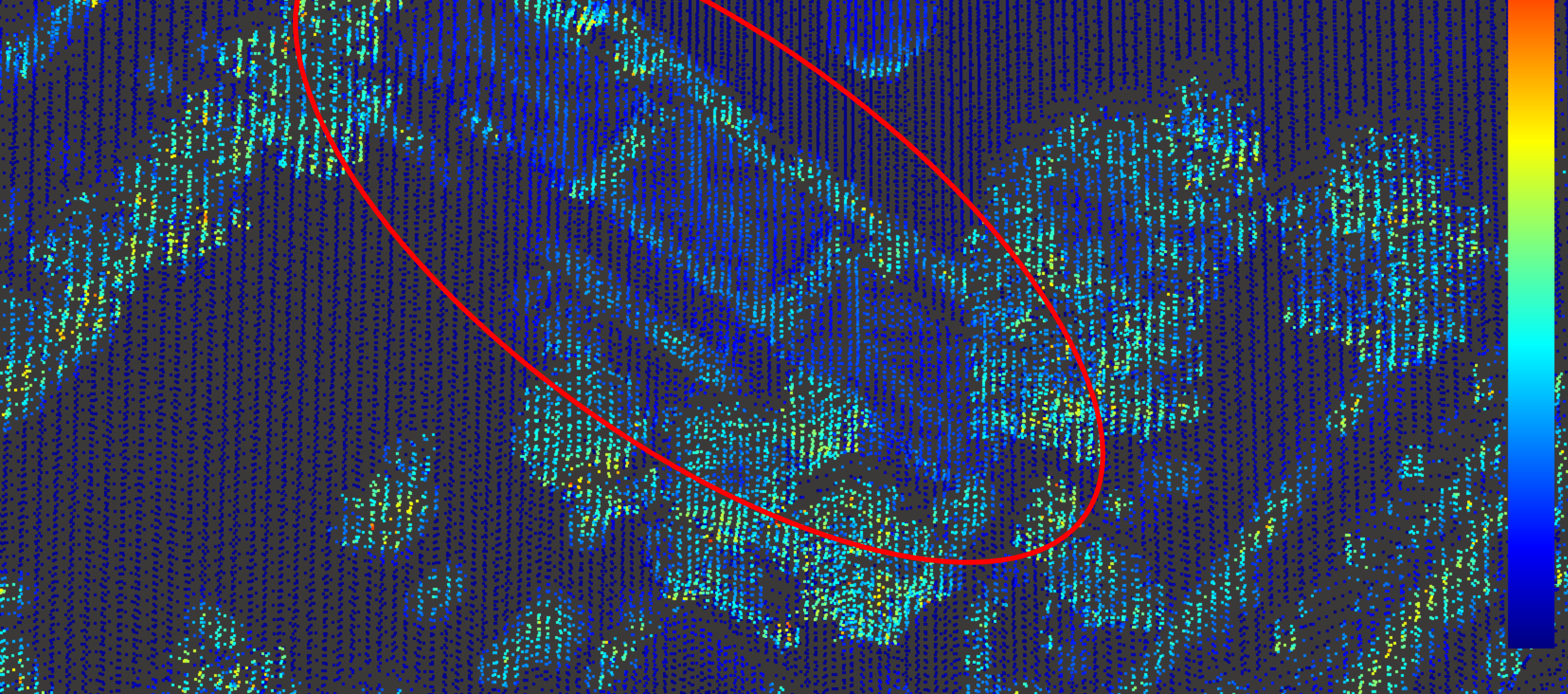


A. Roof ridge Weighted PCA (sphericity eigen-feature)

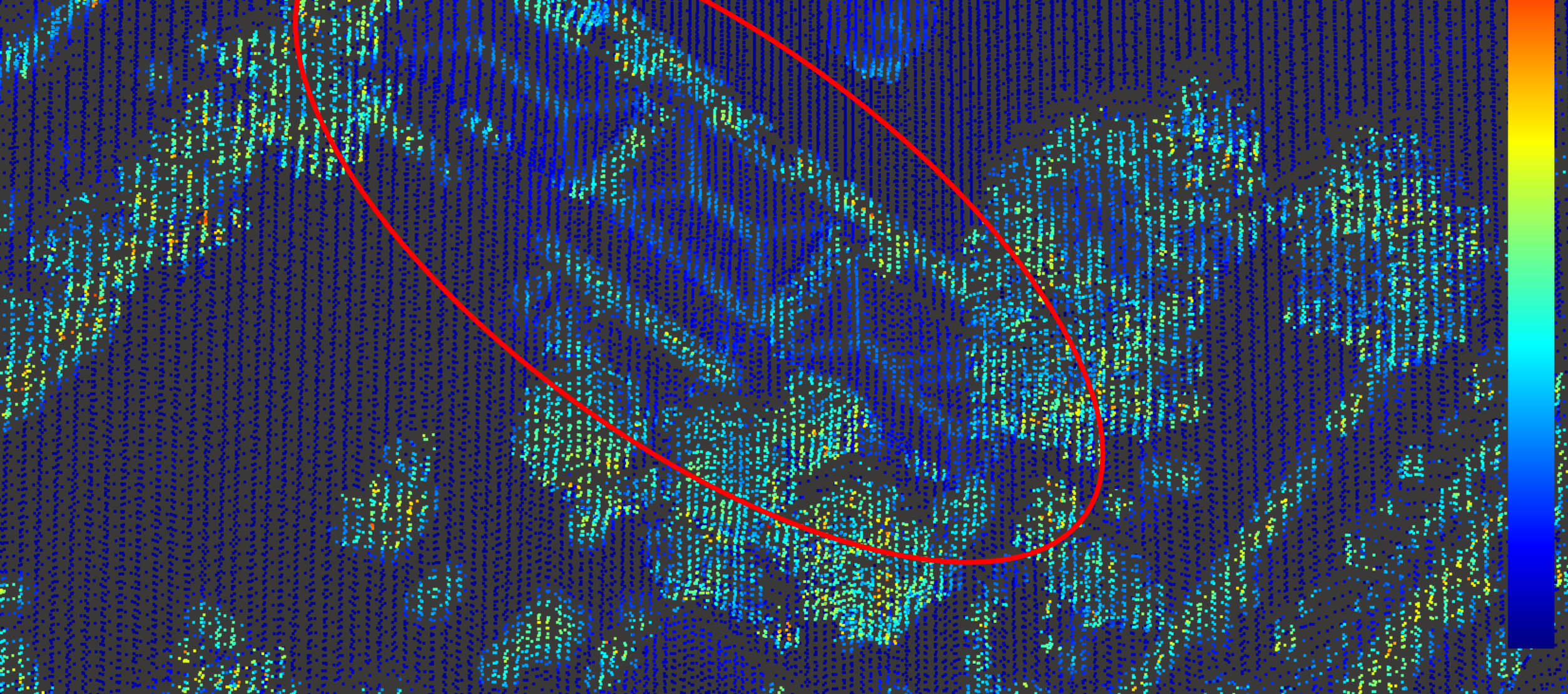


B. Roof ridge

Standard PCA (sphericity eigen-feature)

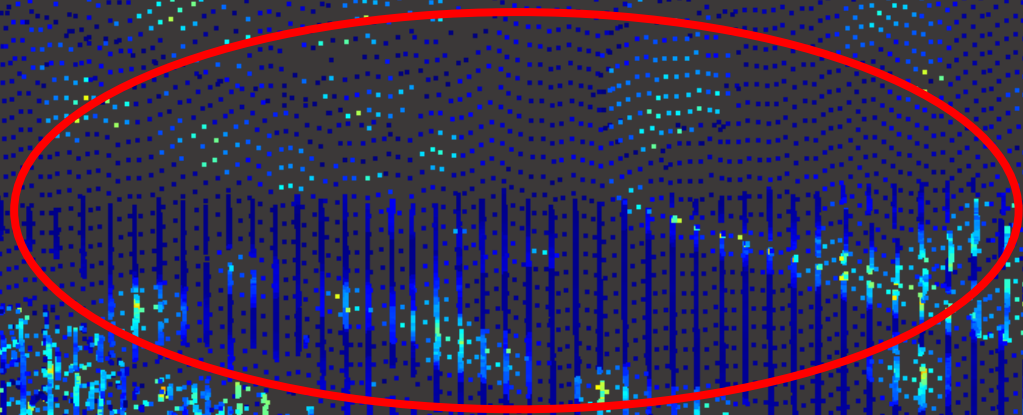


B. Roof ridge Weighted PCA (sphericity eigen-feature)

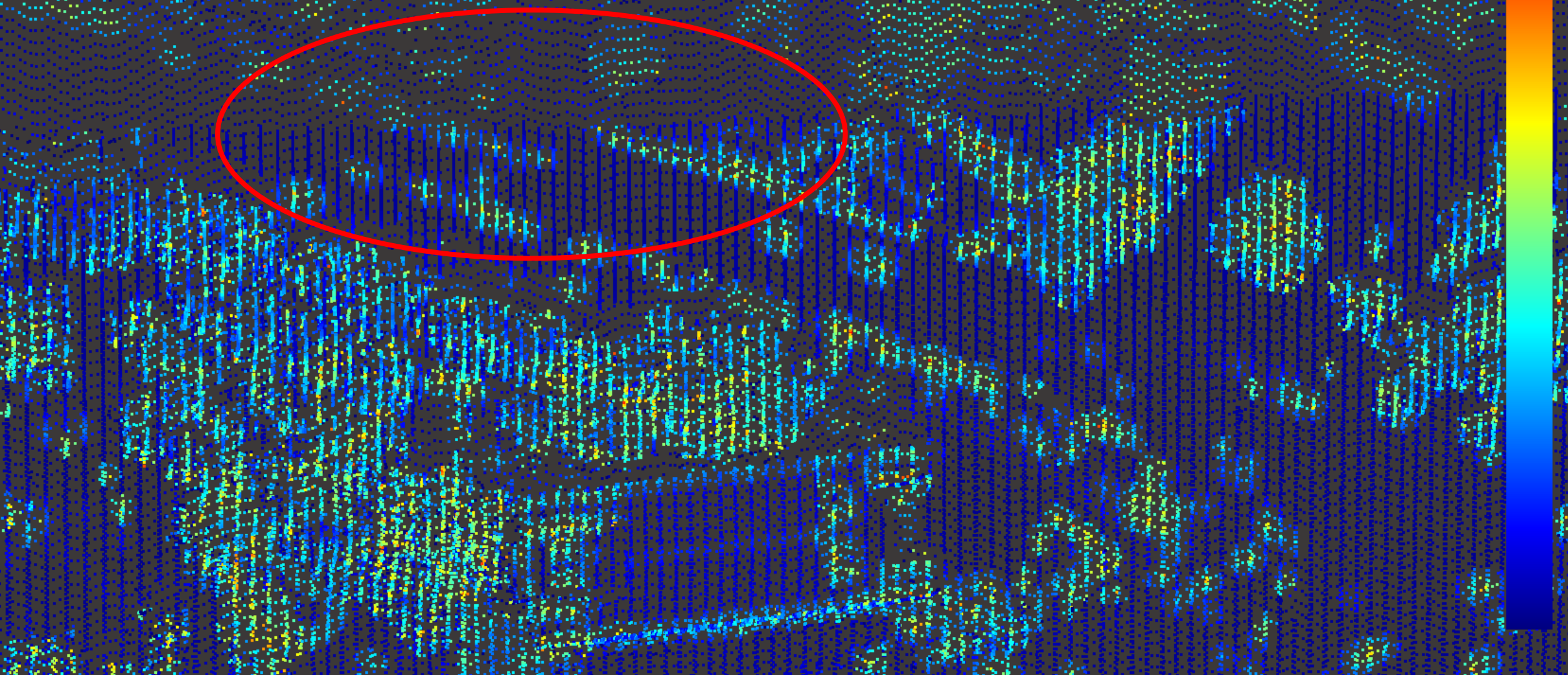


C. Strip

Standard PCA (sphericity eigen-feature)



C. Strip boundary Weighted PCA (sphericity eigen-feature)



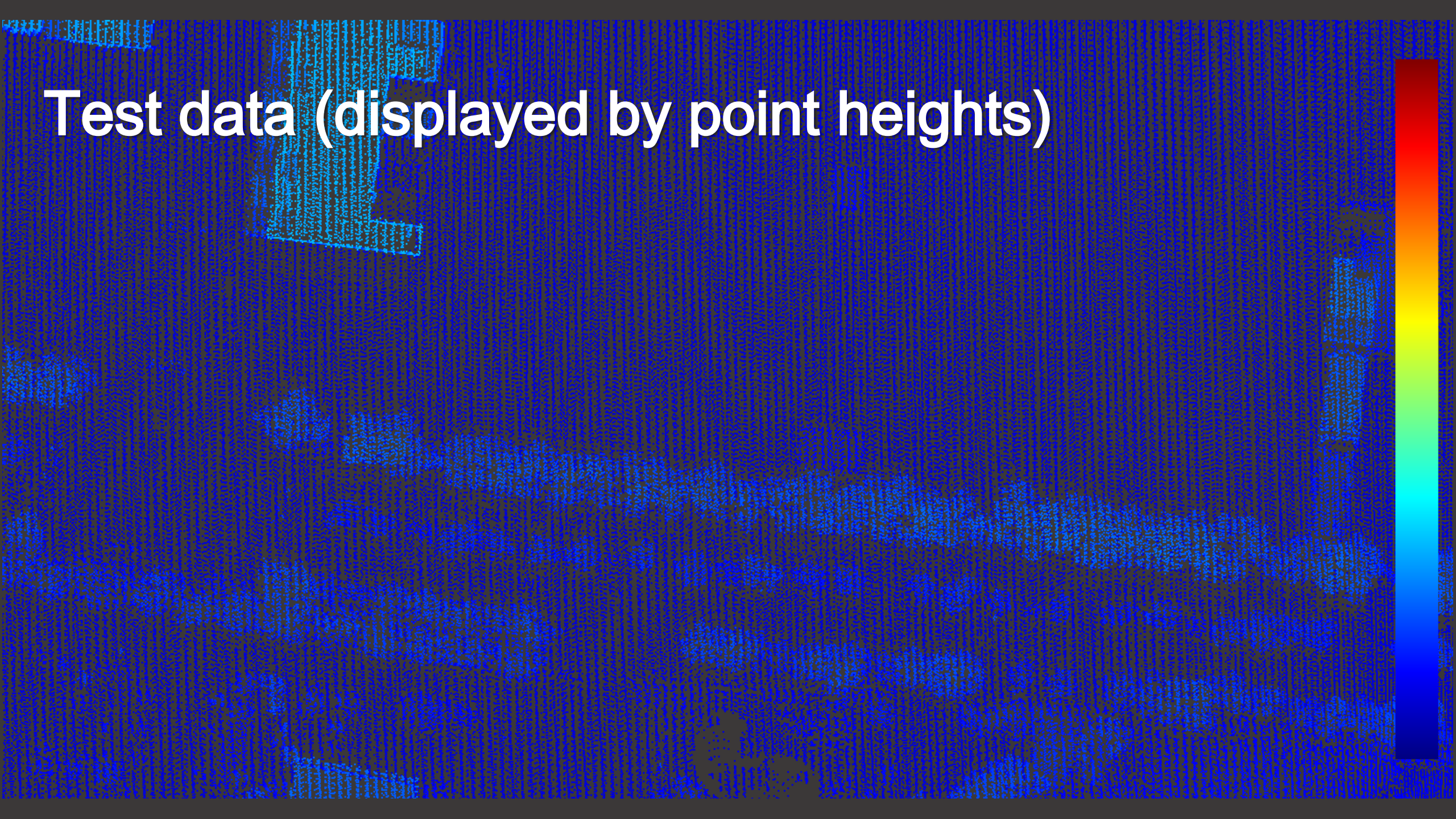
Part B: Visual Comparisons

-- Point cloud classification using eigen-features

Orthoimage of test data



Test data (displayed by point heights)



Standard PCA

Gray points: correct classification
Red points : incorrect classification

Weighted PCA

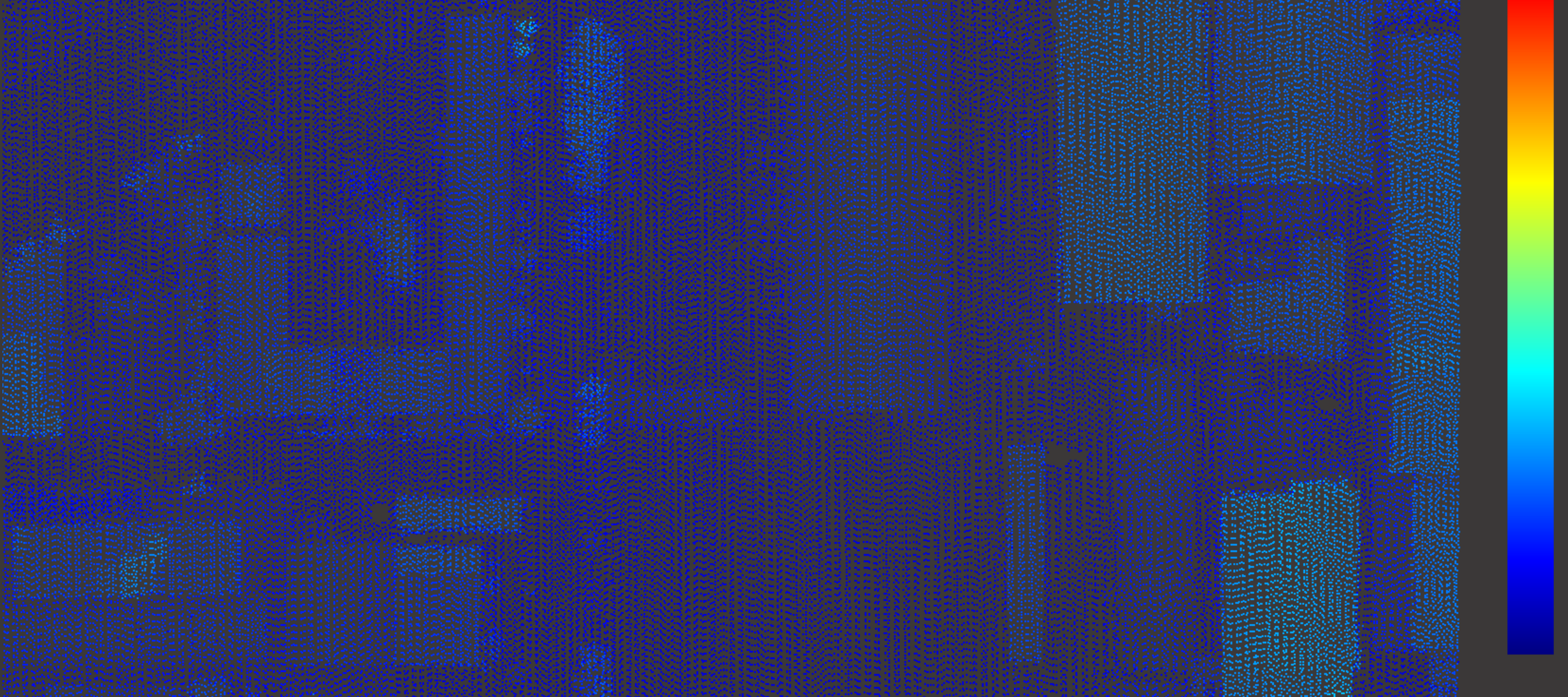


Gray points: correct classification
Red points : incorrect classification

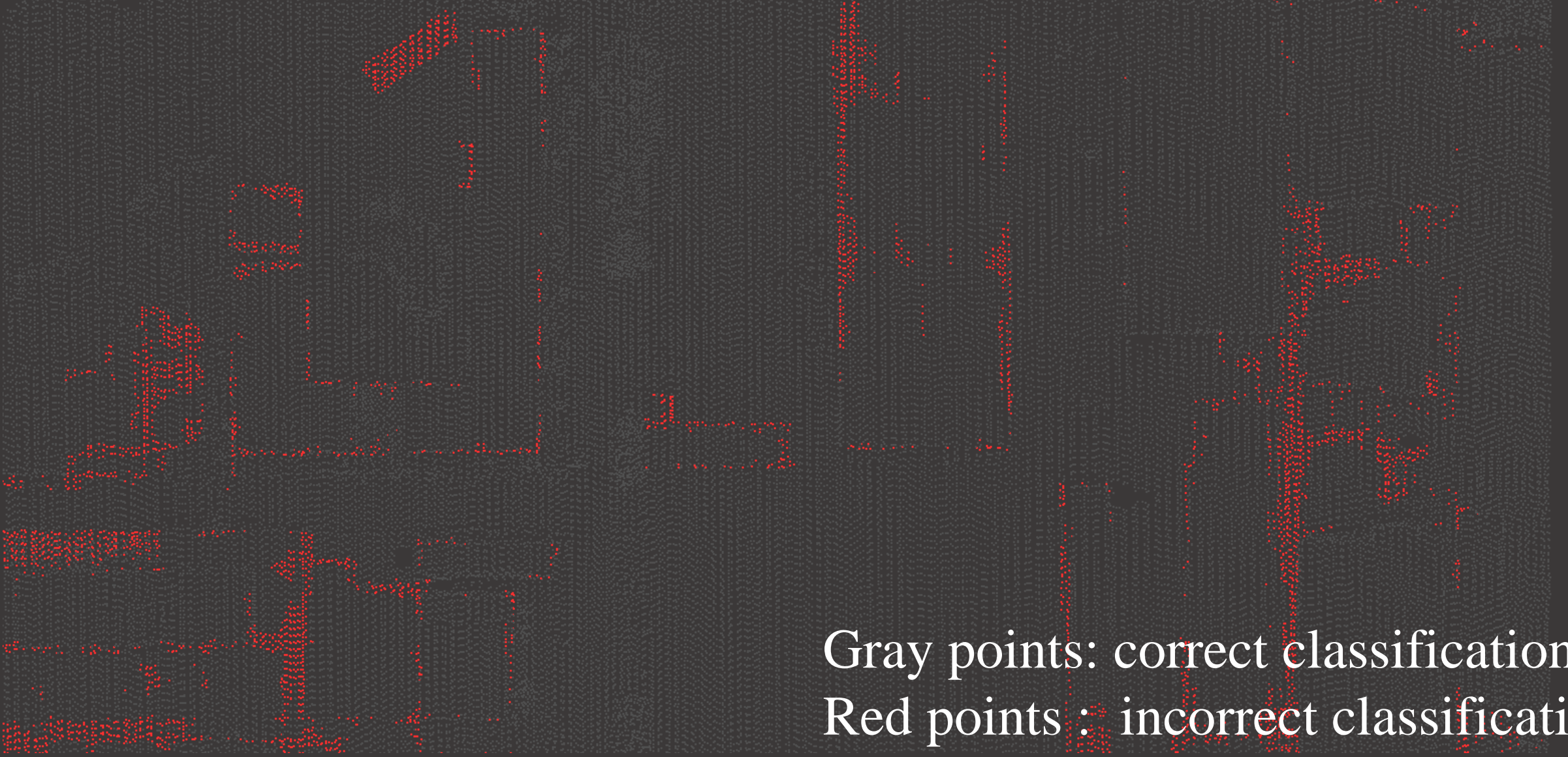
Orthoimage of test data



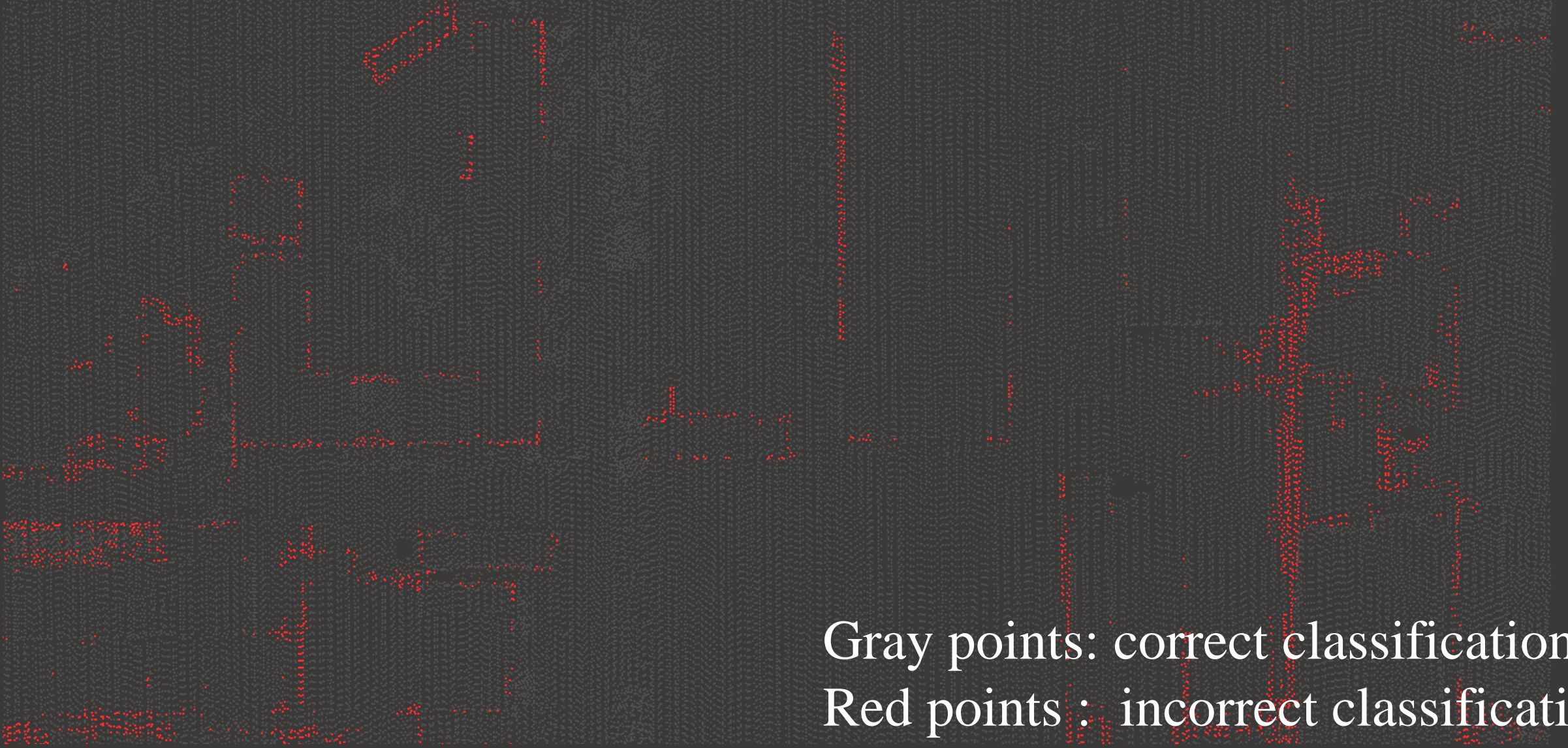
Test data (displayed by point heights)



Standard PCA



Weighted PCA



Gray points: correct classification
Red points : incorrect classification