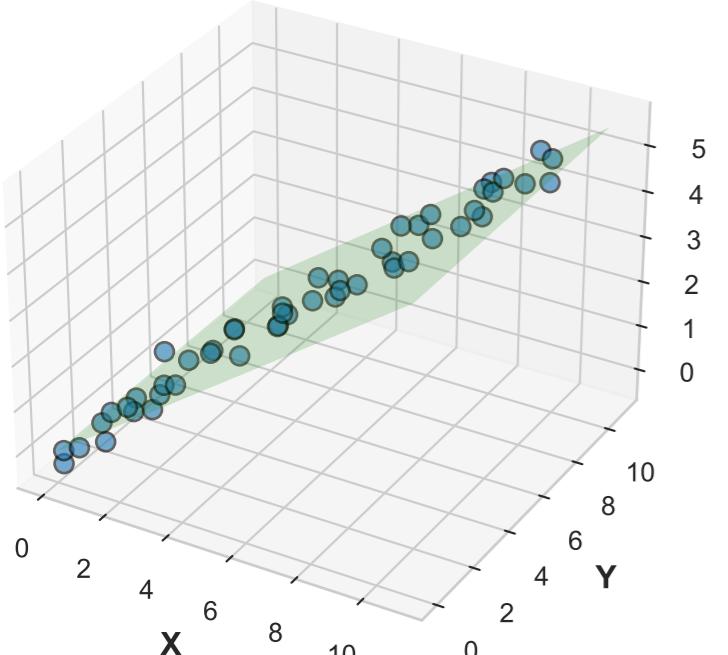


DIMENSIONALITY REDUCTION: Compressing 3D Data to 2D

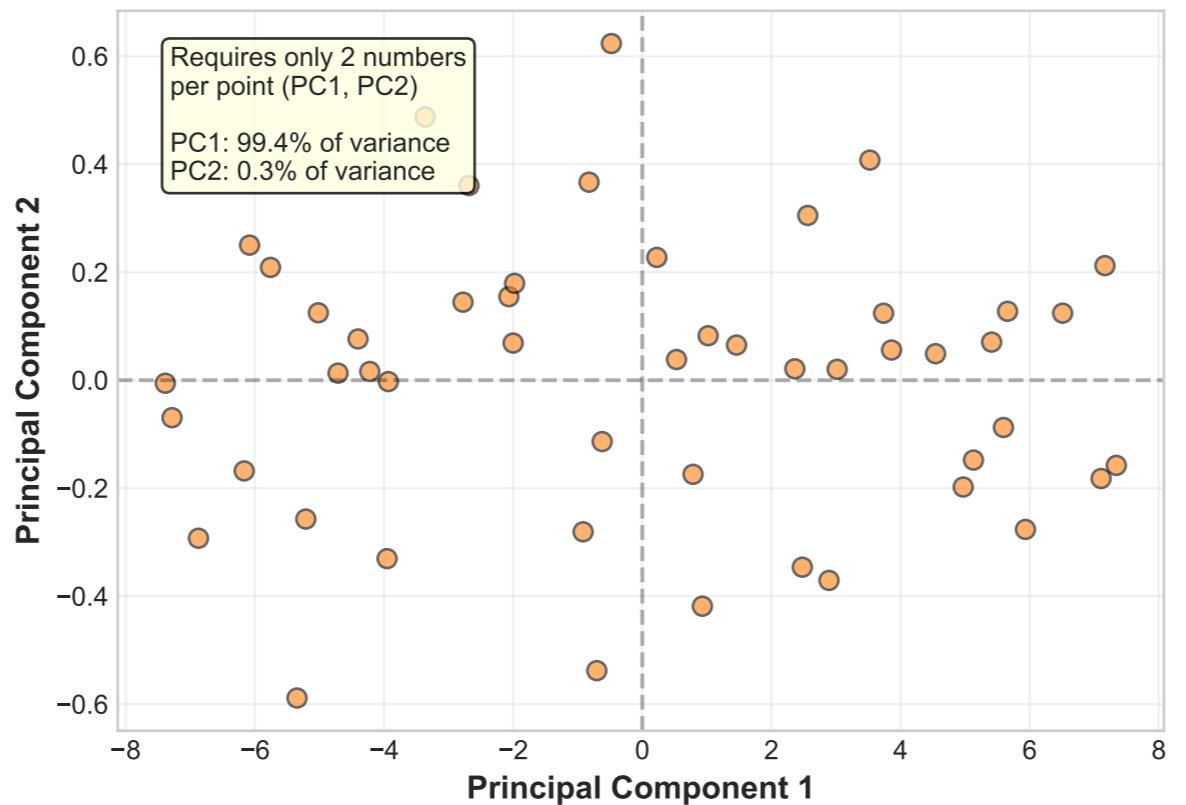
ORIGINAL DATA (3D) Points near diagonal plane

Requires 3 numbers per point (x, y, z)



PCA PROJECTION (2D) Compressed representation

Requires only 2 numbers per point (PC1, PC2)

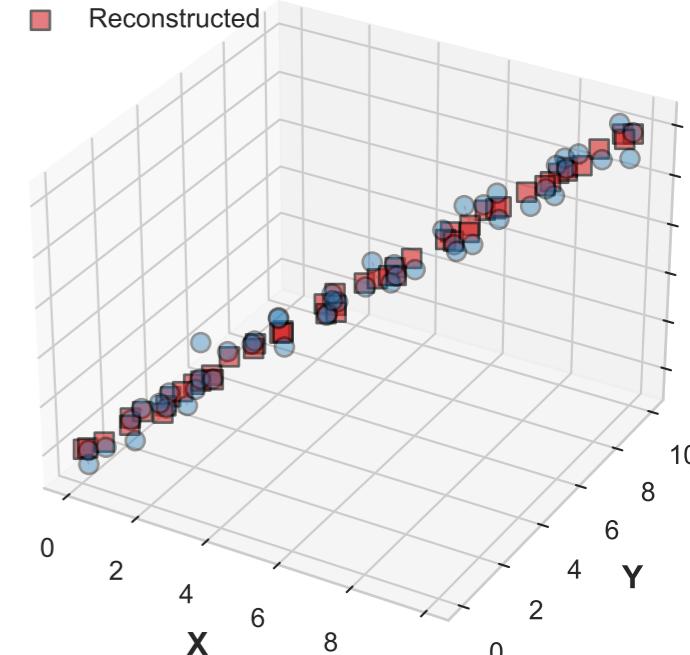


RECONSTRUCTION (3D)

From 2D back to 3D

Average Error: 0.190
Info Loss: 0.3%

Close match shows
good compression



DATA COMPRESSION PRINCIPLE: Points lying near a flat surface in 3D can be represented with 2D coordinates.
Left: Original data requires 3 numbers per point | Middle: Compressed to 2 numbers per point | Right: Reconstruction quality check