1054-65-208 **Blake A Hunter*** (blakehunter@math.ucdavis.edu), Mathematical Sciences Building, One Shields Ave., University of California, Davis, CA 95616, and **Thomas Strohmer**. *Compressed Diffusion Maps.*

Diffusion maps provide a technique to extract the underlying structure of a data set. They use good known local similarity information to reveal the hidden global structure. This local similarity structure, thought to be necessary, can be replaced by compressed sensing measurements. Compressed sensing provides a mathematically rigorous way to obtain dimensionality reduction. 1000×1000 grayscale images are examples of signals in $\mathbb{R}^{1,000,000}$ where the true underlying data may only have a few degrees of freedom or be sparse in some unknown basses. Standard learning techniques require an appropriate transformation to higher dimension where dimensionally reduction is done before clustering. We show that instead of requiring the local distances be made in the large ambient dimension, measurements can be made on the order of the dimension of the hidden underlying structure. Our theoretical guarantees are complemented with numerical results along with a number of examples of the unsupervised organization and clustering of image data. (Received September 14, 2009)