1145-55-1377 **Lori Ziegelmeier*** (lziegel1@macalester.edu), **Henry Adams**, **Chad Topaz** and **Lu Xian**.

Using Topology to Measure Dynamics of Time-Varying Systems. Preliminary report.

A time-varying collection of metric spaces as formed, for example, by a moving school of fish or flock of birds, can contain a vast amount of information. There is sometimes a need to simplify or summarize the dynamic behavior, and recently, topological tools have been applied to this purpose. One such method is a crocker plot, a 2-dimensional image that displays the (non-persistent but varying with scale) topological information at all times simultaneously. We apply this method to simulations arising from different choices of noise parameter (which controls the magnitude of stochasticity) of the highly-cited Viscek model. We then input the crocker plot of each simulation as a feature vector for the machine learning task of recovering the unknown underlying noise parameters. The topological features classify by noise parameter with a higher degree of accuracy than the more standard feature vector of the alignment order parameter. Further, we discuss an extension of the crocker plot, a crocker video, which is a persistent version of a crocker plot that is equivalent to the information in a vineyard and hence, inherits the nice stability properties of vineyards. For some purposes, the information in a vineyard is more accessible when instead displayed as a crocker video. (Received September 21, 2018)