

1077-AE-1780 **Chris Danforth*** (chris.danforth@uvm.edu). *A Toy Climate Laboratory for Chaos and Differential Equations.*

This talk describes the use of a physical fluid dynamics experiment as the basis for undergraduate explorations of nonlinear dynamics, differential equations, data assimilation, predictability, and evolutionary algorithms. Measurements from a vertically oriented, hula-hoop shaped thermal convection loop are compared to forecasts made by (1) a low-dimensional Lorenz-like model derived from first principles, (2) the output of Eureka, an algorithm designed to infer natural laws from free-form data by mimicking the principles of evolution, and (3) a hi-dimensional Computational Fluid Dynamics simulation. Special attention will be paid to the value of combining theoretical, numerical, and experimental investigations. (Received September 20, 2011)