1135-37-2881 **Cara Donovan*** (cmdono18@g.holycross.edu). *A Dynamical Systems Approach To Climate Modeling.*

The goal of this project is to use low-dimensional mathematical models to better understand current climate, historical climate, and the drivers of climate change. In 1968, Mikhail Budyko developed one of the first Energy Balance Models, a differential equation that expresses the global average surface temperature of the Earth as a function of latitude. Budyko incorporated several relevant climate parameters such as albedo and the greenhouse gas effect. The latitude of interest in trying to model climate conditions of the past and present is that of the ice line. Using Budyko's model with a new albedo function that incorporates land and the fact that glaciers form at -10 degrees C, we can see how the ice line moves when varying certain parameters. Changes in the parameter values can cause qualitative changes in the equilibrium solutions also known as bifurcations. Climate scientists refer to these as tipping points because they often indicate major shifts in the climate system. So far, we have produced several bifurcation diagrams for different parameters to discern the possibility of extreme climate conditions in both the Neoproterozoic Era and the current climate state. Our model supports the theory of Snowball Earth and a subsequent ice-free state in the Neoproterozoic Era. (Received September 26, 2017)