1123-37-202 **Mary Silber*** (msilber@uchicago.edu), Dept. of Statistics, 5747 S. Ellis Avenue, University of Chicago, Chicago, IL 60637, **Kaitlin Hill** (k-hill@u.northwestern.edu), Dept. of Engineering Sciences & Applied Math, Northwestern University, Evanston, IL 60208, and **Dorian Abbot** (abbot@uchicago.edu), Dept. of Geophysical Sciences, University of Chicago, Chicago, IL 60637.

A piecewise-smooth dynamical systems analysis of an Arctic sea ice loss model: what we learn from bifurcations when we remove albedo smoothing.

Smoothing of nonlinearities in dynamical systems can remove bifurcations, bistability, and hysteresis loops associated with nonlinear dynamical systems. This presents challenges for using simple models to gain insight into the impact of feedbacks, and possible tipping point behavior associated with them, especially since the smoothing parameters are not well constrained. We analyze a simple Arctic energy balance model, proposed by Eisenman and Wettlaufer, in a limiting case where a smoothing parameter associated with ice-albedo feedback is set to zero, which makes the system piecewise-smooth. We demonstrate that certain qualitative bifurcation behaviors of the smooth system can have nonsmooth counterparts. We also focus on some features, unique to the non-smooth system, which, surprisingly, turn out to give us insights into how model parameters affect the bifurcation structure of the smoothed problem. We use this perspective to systematically search parameter space, and this analysis provides an alternative perspective on how parameters of this simple conceptual model affect bifurcation behavior. In addition, we have examined a version of this model with additive stochastic forcing, and some preliminary results related to that problem will be presented. (Received August 26, 2016)