Nonlinear Processes in Geophysics Discussions

Nonlin. Processes Geophys. Discuss., referee comment RC1
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# Comment on npg-2022-2

Anonymous Referee #1

Referee comment on "Climate bifurcations in a Schwarzschild equation model of the Arctic atmosphere" by Kolja L. Kypke et al., Nonlin. Processes Geophys. Discuss., https://doi.org/10.5194/npg-2022-2-RC1, 2022

This paper presents a a column model for the Artic atmosphere-ocean system where surface albedo and water vapor effects are considered. The most relevant result is the existence of a bistable regime for certain values of CO2 concentration where the system could switch to a warm, ice-free state. Although the model is a simplification of the climate system in the area, it contains enough ingredients to make qualitative predictions, and the authors really do a complete and careful study of parametrizations, functional forms of different processes, and calibration of the model. The results are interesting and the authors identify the role and importance of different physical mechanisms (at difference of some previous works) in a possible bifurcation to an undesired ice-free state. The paper is ready for publication in my opinion. Maybe it is sometimes difficult to follow since there are many details, in particular in the appendixes, and the authors could try to improve the readibility of the paper in these sections.