This is a well-written paper that deals with the so-called non-dissipative Lorenz model (NLM), which is 3D with X, Y and Z representing the amplitudes of selected Fourier modes. The system of equations describing the 3D-NLM has two nonlinear terms (XY and XZ) and one linear driving term rX, where r is the normalized heating parameter. Despite the fact that the system is called non-dissipative, one term with the Prandtl number is still present; I'd like to ask the author to comment in the paper on the presence and relevance of this term for the 3D-NLM. All terms of the 3D-NLM are the same as in the original 3D Lorenz model (3D-LM), however, the 3D-LM has two additional linear terms. In the studies presented in this paper, the author concentrates on the role played by the nonlinear terms and the linear heating term in the behavior of the 3D-NLM, and in its energy conservation.

First, the author solves a nonlinear equation, which is obtained by elimination of Y and Z in terms of X, and by making an assumption that r = 0; with this assumption, the 3D-NLM is truly non-dissipative as the term with the Prandtl number disappears. He obtains the closed-form solutions, which represent wave-like (oscillatory) motions in phase space, and demonstrates that the nonlinear (X^2) term, called the nonlinear feedback loop, works together with the linear heating term to produce the resulting oscillatory solutions. This is a new and interesting result, which may be used to interpret solutions to the Duffing equation in the limit of no driving force and a small spring constant; there is an extensive literature about the Duffing system and its solutions, however, only very few papers deal with the above mentioned limits. I'd like to ask the author to comment in the paper on potential similarities and differences between the 3D-NLM and Duffing systems in the non-dissipative limits.

Since the 3D-NLM in the limit of r = 0 is non-dissipative (truly Hamiltonian), the author investigates its energy conservation and studies the resulting energy cycle. The studies of the latter are also extended to the cases when r is non-zero, which means that the term with the Prandtl number is included, and the formation of the so-called big cycle is observed. I'd like to suggest that the obtained results are also applied to the non-dissipative Duffing system and the resulting conclusions are included in the paper.

Since the considered systems are Hamiltonian (or Hamiltonian-like) systems, it'd be interesting to explore the dependence of solutions on initial perturbations by using the KAM theorem, and the standard techniques, such as Lyapunov exponents, the Fast Lyapunov Indicator (FLI) and the Mean Exponential Growth Factor of Nearby Orbits (MEGNO) to investigate the onset of Hamiltonian chaos in these systems.

In summary, this paper does contain new and significant results, which are presented clearly and concisely in the main text as well as in six figures. I'd like to recommend the paper for publication in NPG assuming that the author would address the above suggestions.