Review of "On Defining climate by means of an ensemble" by G. Drótos and T. Bódai.

The question of defining the probabilistic properties of the climate system under changes is addressed in this manuscript. The idea is to relax the constraints of introducing initial conditions in the far past to construct pullback attractors, the reason being that it necessitates very long model integrations, in particular in multiscale systems, in order to reach the proper pullback attractor. After introducing the key concepts of attractors under external forcing, the authors make an attempt of building a pragmatic scheme to check if the main statistical properties of the reached distribution are indeed robust when starting from another set of states at another moment of the system's evolution. The question is important and is worth to be published in Earth System Dynamics. There are however two points that, I think, should be further elaborated. These points follow:

The authors use a model, PlaSim, which is an atmospheric model coupled to a slab ocean. This choice is very restrictive as we know the importance of interactions between the atmosphere and the other components of the climate system (ocean, cryosphere, land/vegetation…). This implies that a low-frequency variability can emerge in reality which is not accounted for by the PlaSim model. An example of such an emergence of low-frequency variability in the climate system due to the interaction between several systems having different time scale characteristics is provided in Vannitsem et al (2021) where a reduced-order coupled ocean-atmosphere extratropical model is forced by a simple low-order recharge-discharge oscillator describing the evolution of the Tropical Pacific. The introduction of the Tropical forcing induces an emergence of non-trivial low-frequency variability in the extratropical model which are then present in the Pullback attractor. This feature suggested us that the convergence toward the Pullback attractor should at least be associated with the slowest time scales of the system under investigation. As mentioned by the authors, there is a possibility to build some "conditional" attractor provided there is an enough separation of scales, but when new time scales emerge related to the interactions (or resonances) between multiscale processes, the question becomes much harder. This question should be discussed in the present work (probably in Section 4) to have a full overview of what are the caveats and difficulties that may be encountered in defining the statistical properties of the system under climate change.

Related also to the separation of time scales and the definition of climate, there is a very interesting separation that was introduced in Lovejoy (2015). In this paper, Lovejoy defined regimes at different time scales, related to their scaling properties. In this context, the question of convergence of the statistical properties (mean, variance…) at the different time scales is discussed. There is one particular time scale range (10 days to 50 years), the macro-weather for which the convergence of the mean seems possible while for other periods, it seems to diverge. This could also help you in figuring out what are the time scales for which your definition of attractors may apply. A discussion around this question should be useful.

I also agree with the change of title and recommendations of Reviewer 1.

Some minor points

Line 12: "In" should be "If" I guess.

Line 30. The authors should provide examples on the different definitions of "climate" if any.

Line 36. Missing reference at the end of the line.

References:

Lovejoy, S. A voyage through scales, a missing quadrillion and why the climate is *not* what you expect. *Clim Dyn* **44**, 3187–3210 (2015). https://doi.org/10.1007/s00382-014-2324-0

Vannitsem, S., Demaeyer, J., & Ghil, M. (2021). Extratropical low-frequency variability with ENSO forcing: A reduced-order coupled model study. *Journal of Advances in Modeling Earth Systems*, 13, e2021MS002530. **https://doi.org/10.1029/2021MS002530**