

Nonlin. Processes Geophys. Discuss., referee comment RC1  
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## Comment on npg-2021-6

Anonymous Referee #1

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Referee comment on "Producing realistic climate data with generative adversarial networks" by Camille Besombes et al., Nonlin. Processes Geophys. Discuss.,  
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This paper introduces a novel method of producing realistic climate data using Generative Adversarial Networks. The paper is well written in general. The text is fluent. The scientific approach is sound and clear. The results are well presented.

Few questions.

1. How tolerant are the wrap padding layers to discontinuity? To which extent, the padding process may affect the training?
2. By looking at the inputs/outputs in figures 1 to 5, I assume that some convolutional blocks have pooling/ upsampling layers and others do not. Could you explain the reason for that and present these blocks differently in the figures?
3. Figure 2 and 3 present two different architectures of the residual blocks of the Critic. Which one was used?
4. The stopping criteria of the training is a maximum number of iterations. Could this condition be combined with the convergence of the loss function, for example loss function derivative very small or training set and validation set having almost equal loss?
5. I would suggest reducing the length of the paper as follows:
  1. figure 10 and 11 could be merged in one figure
  2. figure 12 and 13 present almost the same information. I would recommend keeping only one of them.

Minor comments.

1. Please review the formatting of equations 5, 10, 13
2. Figure 2 and 3 have the same title
3. Please use the same title pattern in figure 5 as in figure 2
4. Figure 21, 22 and 24, please review the titles and explain what is a, b, c, d
5. Figure 29, please use the equation reference, (as in 28) instead of the equation itself.