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Geoscientific Model Development Discussions

Interactive comment on "pyPI (v1.3): Tropical Cyclone Potential Intensity Calculations in Python" *by* Daniel M. Gilford

Anonymous Referee #1

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Summary: this work presents a development of the theoretical maximum potential intensity (PI) code, which is written and maintained on Github by the author. All aspects of the PI calcuations along with discussions are provided in great details, which present the author's significant effort in explaining and implementing the PI code that is worth consideration. This work provides the TC research community a good tool for studying the climatology of TC intensity, and so I would recommend it for publication on GMD. I have only a few comments that the author may want to take them into account so this PI package can be more useful for future research and applications.

Major comments:

1. The author may consider including a list of the functions that correspond to each calculation step listed in Table 1 so readers can quickly locate the part where they

want to make a change. This will be very helpful for the research community, because most often people want to implement or examine different processes rather than simply running it as a black box. So, being able to modify the code easily is important and useful in the long run for users.

2. In the abstract, the author mentioned about a future plan to improve pyPI's flexibility, which I think is really beneficial for users to examine the validity of different assumptions in Emanuel's PI framework (see also line 125-126). In this regard, it would be great if the author can document in the code where those assumptions in Emanuel's PI framework can be modified so users can examine these assumption in details. For example, a recent work by Kieu and Wang (2017, JAS) showed that the moist neutrality may not be applied, even at the mature stage. The inclusion of this factor can be done very easily within the PI code by introducing a factor $(1-\alpha*\Gamma)$ in the Vmax expression, where Γ is the environmental lapse rate and the factor α can be treated as an empirical parameter. The author can therefore extend his code to allow for such a flexibility so readers can explore the tropospheric stratification, as including any such environmental variable in the PI would introduce a new climate variable to the PI code and increase the value of the pyPI code. Please note that this comment is more or less a suggestion to improve the capability of this PyPI code, and by no mean critical. So, it is up to the author to provide a support for any way that can help verify the PI assumptions.

Minor comments

In Eq .(14), there is a factor RdT_v in the denominator of the exponent. What is the parameter d in the denominator here?

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