

## ***Interactive comment on “pygeodyn 1.0.0: a Python package for geomagnetic data assimilation” by Loïc Huder et al.***

**Anonymous Referee #2**

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### Review of Manuscript # gmd-2019-82 pygeodyn 1.0.0: a Python package for geomagnetic data assimilation

Recommendation: accepted subject to minor revisions

The manuscript presents a python software package/library for the simulation and data assimilation of geomagnetic models. The packages provides a surface dynamic model, a reduced order model based on autoregressive processes, geomagnetic observations, and an data assimilation method (the augmented Kalman filter) in a single pack-

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age. All of the results in the paper are easily reproduced by downloading pygeodyn and the plotting package webgeodyn also developed by the same group. Although there are some significant deficiencies in the software package itself, as well as a lack of accessible user manual, the paper present a comprehensive description of the default features and data. I recommend accepting the paper after some minor revisions are done. The software on the other hand, is far from ready for widespread user adoption. If the main purpose is to make this package accessible, I strongly urge the developers to provide a human-readable user manual, tutorial, and customization examples.

#### Major Comments:

1. My major concern is that the software is far from ready for use by non-advanced python expert. The code is written is such a way that it's all but impossible to read and understand, much less modify to include new data, models, assimilation techniques. Worst of all, there is no proper documentation detailing the structure of the package, objects being used, and organization of the assimilation system. These are indispensable elements for customization and none are present. If the developers really want a widespread adoption of pygeodyn, then they need to work hard on making the software accessible and well documented. To be completely sincere, I wouldn't recommend this package to anyone in the geosciences community.
2. The git repository should only be used for the python software and not for the data. I strongly suggest that the data be stored on a separate repository or server since it is over one gigabyte of data. It makes no sense to store the data together with the python scripts.

#### Minor Comments:

1. On the Introduction (page 2, lines 3–6) the authors mention that there are two main families: sequential and variational. This might be an oversimplification

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- since the 3D-Var is a variational method that is sequential, and ensemble Kalman smoother is not a variational that is a smoother. I suggest the authors rework this sentence since it's misleading.
2. In section 2.2, the authors further classify the type of users for pygeodyn. As stated above, the software is far from ready for customization so I would suggest the authors rework or remove this section since it would be misleading to claim that the python package is accessible, it is not.
  3. The proper websites of where to download pygeodyn is buried at the very end of the paper. I strongly suggest this be moved in the forefront, maybe at the end of the introduction.
  4. increase the font size on the axis and labels for Figure 4

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