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Interactive comment on "An empirical model (CH-Therm-2018) of the thermospheric mass density derived from CHAMP" *by* Chao Xiong et al.

Anonymous Referee #2

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The work of C. Xiong et al shows a thermospheric empirical model based on the accelerometer measurements of the CHAMP satellite. The analysis looks simple and straightforward. However, in my opinion, a more in-depth reasoning needs to be made because some conditions imposed to the model, might have led to inaccuracy in the presented results.

My main comment is on the evaluation of the height scale factor. Although the altitude of CHAMP shows a strong variability, the authors decided to divide the overall mission in only two periods of 5 year each, one for high and one for low solar activity. Furthermore, the approximation of constant scale height can strongly affect the results, in particular the dependency on the temperature. In my opinion, this part of the methodology should be fully revised.

The work of Liu et al. (2013), cited many times in the paper, shows a more in-depth analysis of the same problem and even better results. As an example, Fig. 6 of Xiong et al. shows a correlation of the CHAMP model wrt to the observations of at most 0.89 in the high solar activity phase, whereas Fig. 1 of the paper of Liu et al., shows a correlation coefficient of 0.96. The choice of a simpler model used in the revised paper is not always understandable.