

Interactive comment on “Comparing high-latitude thermospheric winds from FPI and CHAMP accelerometer measurements” by Anasuya Aruliah et al.

Anonymous Referee #2

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This paper statistically compares upper thermospheric F-region winds measured by two high-latitude ground-based Fabry-Perot Interferometers (one located near Kiruna and other at Longyearbyen) and derived from in-situ accelerometer measurements on-board the CHAMP satellite. One of the ground-based stations is located in the auroral zone whereas the other one is in the polar cap. Results show that CHAMP winds are systematically 1.5-2 times larger than FPI winds. Further, the authors utilize the existing modeling tools for exploring the various possible reasons responsible for these systematic discrepancies in winds obtained from in-situ and optical techniques. Overall, this study can serve as an important reference for data users of these instruments.

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In my view, the manuscript is loosely written. There is some repetitiveness of some of the text and the manuscript could be streamlined quite a bit. I would strongly recommend the authors to make clear, elaborate, and explain the following parts:

1. Please explain the purpose of having first four figures (Figures 1-4). I think they are irrelevant and can be dropped without impacting the focus of the paper. Instead, it would help focusing this study on the core topic - FPI and CHAMP wind comparison.
2. Line 17: should be kinematic viscosity instead of viscosity?
3. Line 25: ± 2 degrees in latitude, longitude, or both? Please explain.
4. Line 148: In Table 1 (column 4 and row 2), you mean 1.860 UT?
5. Line 172: Emmert 2006a reference is not valid here because it is a climatological study.
6. Lines 299-317: The simplest and most direct way to compare CHAMP and ground station winds would be to project ground station winds along the CHAMP cross track winds; it is doable because both the zonal and meridional winds exist for ground station FPIs.
7. Figure 5 and 6: Please keep the figure titles consistent. Subfigures a/b titles are not consistent with c/d titles: one shows Kp index in title and others not. In addition, please keep consistency when using plus or minus symbols in Kp values. For example, sometimes the manuscript uses $Kp < 2$ and the other times $Kp < 2^-$ [[or $Kp < 2_0$ (line 367, 413, etc.) which may be a typo]]. $Kp < 2_0$ is also present in Figures 6a and b. Moreover, I would suggest using an actual math symbol (\leq) instead of \leq .
8. Lines 424-426 are referred to which figure/figures?
9. Figure 7:
 - This comparison is done for Kp 2-4, whereas earlier figures and discussion was focused on Kp 0-2. Same is true for Figure 8. Please explain the reason for this gear shift.

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- Please explain why HWM87 and HWM90 were used instead of HWM14? HWM14 is the latest version of this empirical wind model.

10. Figure 9: In addition to this figure, a plot showing CHAMP/FPI ratio as a function of UT or LT would be really helpful.

11. Lines 518-522: The major source of discrepancies could be the assumptions used when applying different wind extraction schemes as they can fail under different conditions.

12. Line 556: Please verify the viscosity expression.

13. Lines 715-722: Project FPI wind vector along the CHAMP cross track wind component.

14. Section 6.4: I did not get the motive of adding this section. So, please state explicitly the contribution of this section in this investigation.

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