

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.

C1

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.

C2

- 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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