

## ***Interactive comment on “On the alignment of velocity and magnetic fields within magnetosheath jets” by Ferdinand Plaschke et al.***

**Anonymous Referee #2**

Received and published: 7 August 2019

This paper presents the effects of magnetosheath jets on magnetosheath magnetic fields based on epoch analysis. The results clearly show that the magnetic fields tend to be aligned with the velocity of magnetosheath jets. The authors also discuss the consistency and inconsistency with the previous case studies and simulations. That discussion looks good to me. Thus I only have some minor comments as shown below.

Line 6 of Page 6: You use the angle between  $B(t)$  and  $V_0$  to do epoch analysis but can you explain why you did this? The angle between  $B(t)$  and  $V(t)$  is easy to understand while  $B(t)$  and  $V_0$  usually occur at different time/location, so it is difficult for me understand why you compare these two vectors. In addition, in figure 3, the alignment effect is more significant shown in black lines than red lines. Do you have a good explanation of that?

C1

Figure 3 or Lines 1-3 of Page 7: I saw you discussed about why the angle between  $B$  and  $V$  is  $\sim 60$ - $70$  degree at  $t(-2)$  or  $t(2)$ . You said that this value indicates “the typical angles between magnetic field and plasma flow directions in the subsolar magnetosheath”. Is there any reference showing that typical angle? In addition, do you think the locations of MMS probes (e.g., closer to magnetopause vs. closer to bow shock) affect that angle in the background magnetosheath plasma? Furthermore, magnetosheath jets may evolve in the magnetosheath as they propagate from bow shock to magnetopause, do the locations of MMS probes also affect the angle change with magnetosheath jets? Is it possible to briefly discuss about that with your current database?

Lines 16-17 of Page 8: “. . . much smaller than seen in simulations by Karimabadi et al., (2014)”. You attributed it to the 2D not 3D simulation in the previous simulation. Their simulation seems to be done in the XY plane and do you agree that if you do an epoch analysis in that 2D plane, you will obtain the similar result as what their simulation obtained?

Lines 4-9 of Page 10: The second conclusion says the statistical results got smaller angle change than the previous simulation got; The third conclusion says that the large fluctuations in sub-jets may mask the decrease in  $\hat{\alpha}$ . If there is a way to remove the effects by sub-jets (you don't have to do that), do you think the decrease in  $\hat{\alpha}$  will be comparable to what the previous simulation shows? Or you still consider 2D vs. 3D is an important issue here?

---

Interactive comment on Ann. Geophys. Discuss., https://doi.org/10.5194/angeo-2019-92, 2019.

C2