Ann. Geophys. Discuss.,
https://doi.org/10.5194/angeo-2019-92-RC3, 2019

Annales Geophysicae Discussions

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

Anonymous Referee #3

Received and published: 8 August 2019

GENERAL COMMENTS:

This paper is well written, and presents the results of a large statistical study of the alignment of the flow direction associated with a magnetosheath high speed jet and the local magnetic field in a clear and concise fashion. The authors show that while there is a deviation of the local magnetic field direction such that it becomes more aligned with plasma flow direction of the jet, this is not a large effect on a statistical level, contrary to recent modeling results. While obtaining a deeper understanding of the general nature of the structure of the jets is important, there is not clear connection in the text as to why this particular aspect of the jet is important for further understanding local processes in the magnetosheath or how the alignment of the magnetic field and velocity vector impacts interactions of the jet with local ambient plasma and the magnetopause.

SPECIFIC COMMENTS:

Page 3: The "30°-wide cone centered at Earth and open to the Sun" used for selecting jet intervals simply corresponds to MLTs of 11-13 hours, correct?

Page 6, Line 15: Along with intrinsic conditions or upstream solar wind possibly contributing to the limited alignment effect, does spacecraft trajectory through the jet structure have any effect on the observations of the jet?

Page 6, Lines 16 – 18: Looking at Figure 4, there does appear to be a slight dependence on IMF cone angle. When you look at the percent change relative to the phi_B,V0 level at t = -2 for the different cone angle bins (i.e., looking at the change in the angle at t = 0 after subtracting out as an offset the value of the angle at t = -2 for each cone angle bin), is any dependence of cone angle seen?

Page 6, Lines 10-14 and Page 9, Line 6: Can you show another jet example that has the more common feature of a smaller change in the alignment of B and V? Since solar wind conditions were used for this statistical study, are there any indications that other upstream conditions may be related to the largest changes in alignment of B and V?

In the discussion section, more results are presented on the change in plasma velocity and the standard deviation of the angle between B and V, which is helpful in interpreting the superposed epoch analyses of the changes in alignment between B and V in the core of the jets. However, there isn't much discussion on the implications and consequences of the limited alignment effect seen for the majority of the jets. What does the small change in alignment mean for interactions with the local plasma or the magnetopause? Does it particularly matter, and if so, why? More discussion on this would be beneficial for grounding the results in the broader context of the studies mentioned in the introduction section.

TECHNICAL CORRECTIONS:

Page 2, line 8: change "on ground" to "on the ground" Page 2, line 9: add "of the

magnetopause” after “surface” Page 8, line 1: change “extend” to “extent” Page 8, line 8: change “in anti-sunward” to “in the anti-sunward” Page 8, line 12: change “similar” to “similarly”

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