We would like to thank the reviewer for his/her help to review our paper. The comments and suggestions are encouraging and useful in revising the manuscript. We have responded to the reviewer's comments below.

This paper presents some first observations from BepiColombo, taken as it crossed the terrestrial magnetopause during its Earth flyby. The authors present observations of six flux transfer events (FTEs). They conclude that Bepi crossed the magnetopause near the dayside reconnection line, which moved such that a combination of northward-travelling and southward-travelling FTE flux ropes were observed. They also infer the occurrence of a coalescence event whereby two smaller flux ropes merge, supporting theoretical arguments that FTE flux ropes can grow in this manner.

The paper is succinct and generally clear; if substantiated, the conclusions make a contribution to the body of knowledge, and it is nice to see some early results from BepiColombo. I am not aware of northward and southward-moving flux ropes having been observed on the same magnetopause crossing, and the idea of flux rope coalescence is relatively new. I just have two concerns on which I would appreciate it if the authors can provide further reassurance or clarification:

1) As plotted in Figure 1, these are not the clearest examples of flux transfer events, though this could be due to the temporal scale of the plot (relative to the scale of the signatures) and the fact that the data are plotted in GSM, rather than boundary normal coordinates. [Only one event is shown in boundary normal coordinates, in Figure 3.] Although the normal direction quoted on line 94 is predominantly along the GSM X direction, small differences can obscure signatures, and the fact that Bx seems to alternate between periods of about +5 nT and about -10 nT does suggest that Xgsm does not approximate the local magnetopause normal particularly well. For example, the signature for the first event seems to be more of a step function from a generally-negative to a generally-positive Bx orientation, and (as far as I can make out from the figure), the enhancement in magnetic field magnitude precedes the Bn/Bx reversal, rather than being centered on it (as would be expected for a flux rope). This does inject some doubt into the identification of this event, and that in turn undermines the conclusion of the X-line moving across Bepi. The magnetosheath field is highly structured, and a skeptic might wonder if this first signature is simply associated with some rotation of the magnetosheath field, rather than the passage of a flux rope. The remaining events are too small and close together to be able to see confidently in Figure 1, with the exception of the penultimate event. Can I suggest the authors plot all six events in a boundary normal coordinate frame, to improve confidence that these events are reliably identified? Hopefully this will rebut any skepticism, but if the signatures are as unclear in a boundary normal coordinate system, it might be worth considering whether there is any further evidence in

support of the first event, particularly, being an FTE (or reducing the strength of the claim about the motion of the X-line past Bepi).

In the revised Figure 1, a panel of B_N has been added. We have added a new Figure 2 to include the only southward traveling FTE-type flux rope. A shorter interval of the only southward traveling FTE-type flux rope and the hodograms of the magnetic field measurements are included in Figure 2.

We could not completely exclude the possibility that this structure was a magnetosheath structure. But based on what we observed, we would conclude that this is a southward traveling FTE-type flux rope.

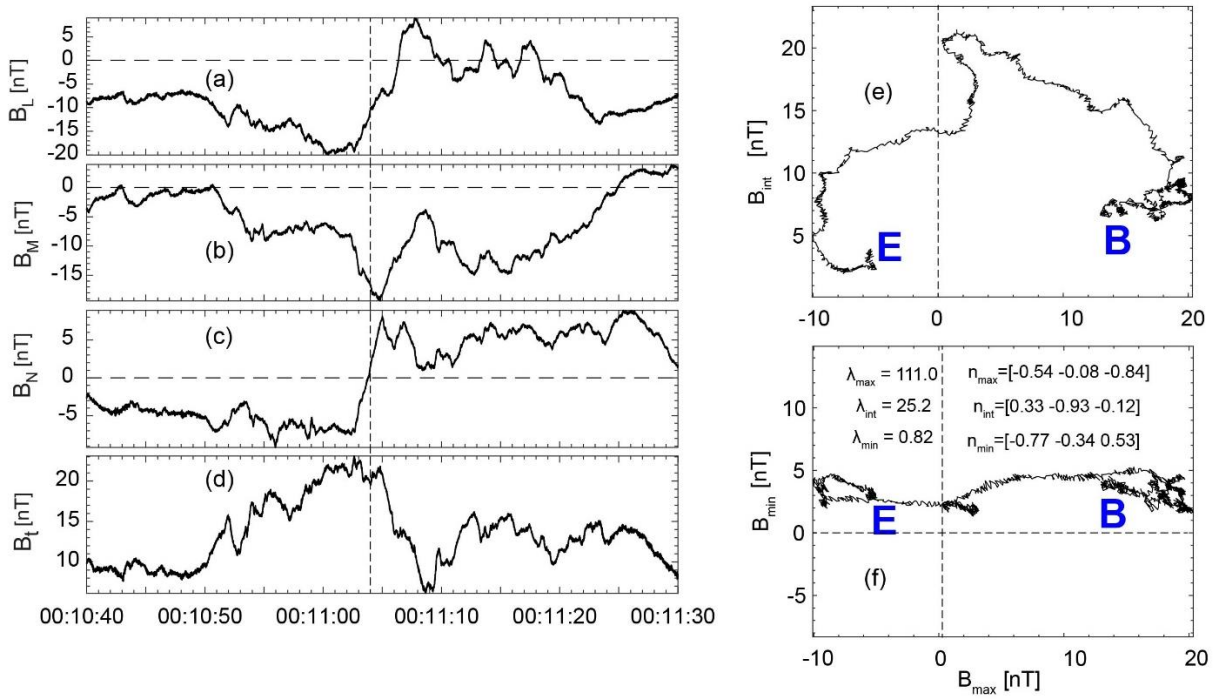

Figure 2. The southward traveling FTE-type flux rope centered at ~ 00:11:04 UT. (a) B_L, (b) B_M, (c) B_N, (d) B_t. This LMN is the local coordinate of the magnetopause. (e) and (f) are the hodograms of the magnetic field measurements under the local coordinate of the flux rope. The "B" and "E" indicate the beginning and the end of the data points.

2) The authors have shown evidence of a magnetic shear, and hence current sheet, but as I understand it, evidence of active reconnection relies on the ratio of the normal/tangential field components. The authors note that uncertainties in the normal direction will influence this (line 185) - is there any other evidence that the authors can present to support this

conclusion? (Or can they quantify the uncertainty on the minimum variance direction and how that translates into uncertainty on the magnetic field component normal to the current sheet?)

We have employed the minimum or maximum variance analysis (MVA) to obtain the normal direction of the current sheet. As noted by Sonnerup & Scheible (1998), the MVA requires the magnetic structure to be stationary and one-dimensional. However, in situ measured structures are hardly 100% stationary and one-dimensional. Therefore, there shall be uncertainties of the normal direction determined by MVA.

There are several studies introducing how to estimate the uncertainties of the orientations of the eigenvectors. See, section 8.3 in Sonnerup, B. U. Ö., & Scheible, M. (1998). Minimum and maximum variance analysis. In G. Paschmann & P. W. Daly (Eds.), Analysis methods for multi-spacecraft data (pp. 185-220). Noordwijk, Netherlands.: ESA Publication.

As an example, we applied the method introduced by Khrabrov and Sonnerup [1998]. The delta B_N for the secondary current sheet can be determined as ~ 0.93 nT, and for the magnetopause current sheet is ~ 0.04 nT. Those values although small, but can have some influence on the dimensionless reconnection rate.

This has been discussed in the revised manuscript.

Aside from the above, I had a few minor comments:

Line 18: "flux rope" -> "flux ropes"

Done.

Lines 45 and 46: "reconnections occur" -> "reconnection occurs"

Done.

Line 71: "and" missing after Heyner reference

Done.

Line 73: outbound/inbound should be outboard/inboard?

Done.

Line 137: xmin and xmax are the locations of what? And what is meant by "along with nmin and nmax"?

The xmin and xmax are the positions in the flux rope along with n min and nmax.

Line 140: What is the physical meaning of chi?

In the equation of chi, the parameter ε is associated with the shape of the flux rope, i.e., flatten or circular profiles.

Line 154: I am confused by the text structuring here, as Figure 3 is introduced but you then go on to talk about flux ropes (at 00:26:06 and 00:26:26 UT) that are not shown in the figure. Should the sentence introducing Fig 3 move to the next paragraph?

The purpose is to introduce a successful modeling example. We have rewritten this sentence.

"Out of the 6 FTE-type flux ropes, 4 were successfully modeled. As an example, the modeling curves of the flux rope centered at 00:28:13 UT are shown in Figures 4a to 4d. In the figures, the dashed lines overlapping with the solid measured magnetic fields represent the modeling curves from the flux rope model. It can be seen clearly that the two curves were close to each other and this flux rope was well fitted by the model. The modeling results for the 4 flux ropes were summarized in Table 1. The plasma density was ~ 10 cm-3 corresponding to an ion inertial length (di) of ~ 70 km. The two FTE-type flux ropes centered at 00:26:06 UT and 00:26:26 UT were in the scales of several di. The magnetic flux content of these two flux ropes was small (~ 20 kWb). In addition, these two flux ropes corresponded to the largest and smallest core fields. The other two FTE-type flux ropes centered at 00:28:13 UT and 00:30:26 UT were in the scales of more than 10 di. These two flux ropes contained much higher magnetic flux (~ 300 kWb and ~ 188 kWb). The analysis of the flux rope centered at ~ 00:28:13 UT corresponding to the highest magnetic flux content is shown in the next section."

Line 161: Word missing after "next"

“in the next section”

Line 163: There seem to be some words missing from this sentence

Corrected. “Figure 3 shows the magnetic field measurements of the FTE-type flux rope centered at ~ 00:28:13 UT in the LMN coordinate.”

Line 164: I am inferring that the two successive bipolar signaures mentioned here correspond to two green arrows in Figure 1, but please clarify.

No. It corresponds to the fifth green arrow in Figure 1e. It has been clarified in the manuscript.

Line 168: "was clearly resulted" - does not make sense

It has been changed into “possibly resulted from”.