Referee Report Karlsson et al.

Title: Short Large-Amplitude Magnetic Structures (SLAMS) at Mercury observed by MESSENGER

This paper deals with the topic of so-called SLAMS, which occur in the upstream region of the quasi-parallel bow shock, the foreshock, at Earth. The question if they also occur at Mercury is discussed, as an older study claimed a non-existence. Using a simple criterion to search for SLAMS in the solar wind upstream of Mercury in the magnetometer data from MESSENGER, the authors identify a total of 435 structures that can be labeled as SLAMS. A statistical study on the characteristics of the SLAMS is then performed and it is shown that there are, at least, 3 categories, maybe 6. It is shown that the structures are much shorter in time than those measured near Earth. They occur for lower-than-normal background magnetic field strength, and therefore, at higher-than-normal Alfvénic Mach number. There is a tentative result that the inverse duration of these SLAMS at different planets show a linear correlation between the average background magnetic field strength.

This paper is clearly written and gives an incentive for measurements with the upcoming orbital phase of the BepiColombo mission, with which the necessary plasma measurements will be made. There are only a few minor comments, which are listed below.

Comments:

- Line 80 and lines 105-108: “the Tao solar wind model”
  In the absence of good solar wind plasma data it is necessary to use some model in order to make calculations (e.g., for the Alfvén velocity). Many papers use the Tao model (I have done it myself). Most likely is for the back-tracing of the solar wind the error in the timing not too bad, but can the authors give an indication how well the model worked, for example by showing the magnetic field as measured and as propagated? This in order to check the timing. If I recall correctly, at comet 67P the error was several hours.
- Line 169: “The example shown in Figure 1 has a wave period of around 0.3 s, which can be compared to the approximate periods of 3-4 s, and 2 s for the ’Wave field’, and ’Boundary’ examples, respectively.”
  I am not sure what the authors want to say here. Indeed, one can compare 0.3 s waves with the other values that are given. But what conclusion is one to get from this comparison? That the structures look alike? Maybe a few words more on what is meant here.
- Line 177: “SLAMS 170”
  This is probably a typo, or do the authors want to say something with the number 170?
- Lines 190-191: “it is anyway unlikely that the Mercury SLAMS would have the same dependence on the amplitude.”
  Here I am confused, why would the SLAMS not have the same dependence? Later in the discussion section the authors are showing how the Hermean SLAMS and the Earth SLAMS are very much the same, albeit that the Hermean are much shorter.
- Figure 9: This almost looks like a double peaked distribution around ~30 and ~60 degrees. I am not sure if this could be anything significant, but it could have something to do with the non-

linear growth rate peaking around these angles. This might go too far to discuss in this paper, as it would need a full discussion of the dispersion and non-linear growth of waves.

Typos:

- Line 29: “that the are” → “that they are”
- Line 53: “large cross-section” → either “a large cross-section” or “large cross-sections”
- Line 60: “defines” → “define”
- Line 63: “uses” → “use”
- Line 133: “oscillations the middle” → “oscillations in the middle”
- Line 142: ‘has has”
- Line 162: “which do not DeltaB/B > 2”, there is a verb missing here
- Lines 174-175: this sentence has twice “may”, delete the one in line 175.
- Line 227: “x0 = 0.5 ; Rm” probably take out “;”