

Supporting Information for “Interplanetary magnetic field properties and variability near Mercury’s orbit”

Matthew K. James,¹ Suzanne M. Imber,^{1,2} Emma J. Bunce,¹ Timothy K.

Yeoman,¹ Mike Lockwood^{3,4,5} Mathew J. Owens^{3,5} and James A. Slavin⁶

¹Department of Physics and Astronomy,
University of Leicester, Leicester LE1 7RH,
UK

²Department of Atmospheric, Oceanic
and Space Sciences, University of Michigan,
Ann Arbor, Michigan, USA

³Department of Meteorology, University
of Reading, Reading, Berkshire, RG6 6BB,
UK

⁴RAL Space, Rutherford Appleton
Laboratory, Chilton, Didcot, Oxfordshire,
OX11 0QX, UK

⁵Space & Atmospheric Physics Group,
The Blackett Laboratory, Imperial College
London, London SW7 2A, UK

Contents of this file Additional Supporting Information (Files uploaded separately)

1. Captions for large Tables S1 to S13

Introduction

This supporting information contains the data required to reproduce the probability distributions presented in Figures 5 – 8 of the manuscript. The methods used to calculate the probabilities for each figure are detailed within Section 2 of the manuscript and are derived from MESSENGER magnetometer data from 23 March 2011 to 30 May 2015. The tables S1 – S3 correspond to the probabilities presented in Figures 5 (a – c) of the manuscript, relating to the change of IMF magnitude, $|\mathbf{B}|$, over time. Table S4 shows the probabilities in Figure 5 d, which demonstrate the variability of the quantity $\Delta B/|\mathbf{B}|$. The data contained in tables S5 – S7 corresponds to the probabilities in Figures 6 (a–c), showing the variability of the IMF clock angle with time. Tables S8 – S10 contain the probabilities presented in Figures 7 (a–c), which show the change in IMF Cone angle with time. Finally, Tables S11 – S13 show the probability of a change in polarity of IMF B_z with time as presented in Figures 8 (a–c).

⁶Department of Atmospheric, Oceanic

and Space Sciences, University of Michigan,

Ann Arbor, Michigan, USA

Table S1. Probabilities of a change in IMF magnitude with time as presented in Figure 5a. Rows of the table correspond to the maximum change in field magnitude in nT within the time period in seconds at the top of each column.

Table S2. Probabilities of a change in IMF magnitude with time as presented in Figure 5b, using only data collected near perihelion, using the same format as Table S1.

Table S3. Probabilities of a change in IMF magnitude with time as presented in Figure 5c, only using data from near aphelion, using the same format as Table S1.

Table S4. Probabilities of a change in $\Delta B/|\mathbf{B}|$ with time as presented in Figure 5d, where each row represents a maximum change in $\Delta B/|\mathbf{B}|$ within the time period of each column in seconds.

Table S5. Probabilities of a change in clock angle with time as presented in Figure 6a. Here, each row corresponds to a maximum change in clock angle in degrees within the time at the top of each column in seconds.

Table S6. Probabilities of a change in clock angle with time as presented in Figure 6b, using only data collected near perihelion, using the same format as Table S5.

Table S7. Probabilities of a change in clock angle with time as presented in Figure 6c, only using data from near aphelion, using the same format as Table S5.

Table S8. Probabilities of a change in cone angle with time as presented in Figure 7a, where the rows correspond to maximum changes in cone angle in degrees within each time period.

Table S9. Probabilities of a change in cone angle with time as presented in Figure 7b, using only data collected near perihelion, using the same format as Table S8.

Table S10. Probabilities of a change in cone angle with time as presented in Figure 7c, only using data from near aphelion, using the same format as Table S8.

Table S11. Probabilities of a reversal in polarity of IMF B_z with time as presented in Figure 8a, where each row corresponds to an initial field magnitude range at the start of the time period shown at the top of each column.

Table S12. Probabilities of a reversal in polarity of IMF B_z with time as presented in Figure 8b, using only data collected near perihelion, using the same format as Table S11.

Table S13. Probabilities of a reversal in polarity of IMF B_z with time as presented in Figure 8c, only using data from near aphelion, using the same format as Table S11.