Supporting Information for

"Relating observed locations of energetic proton isotropic boundaries with magnetic field geometry during quiet times"

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2. Caption for Data Set S2

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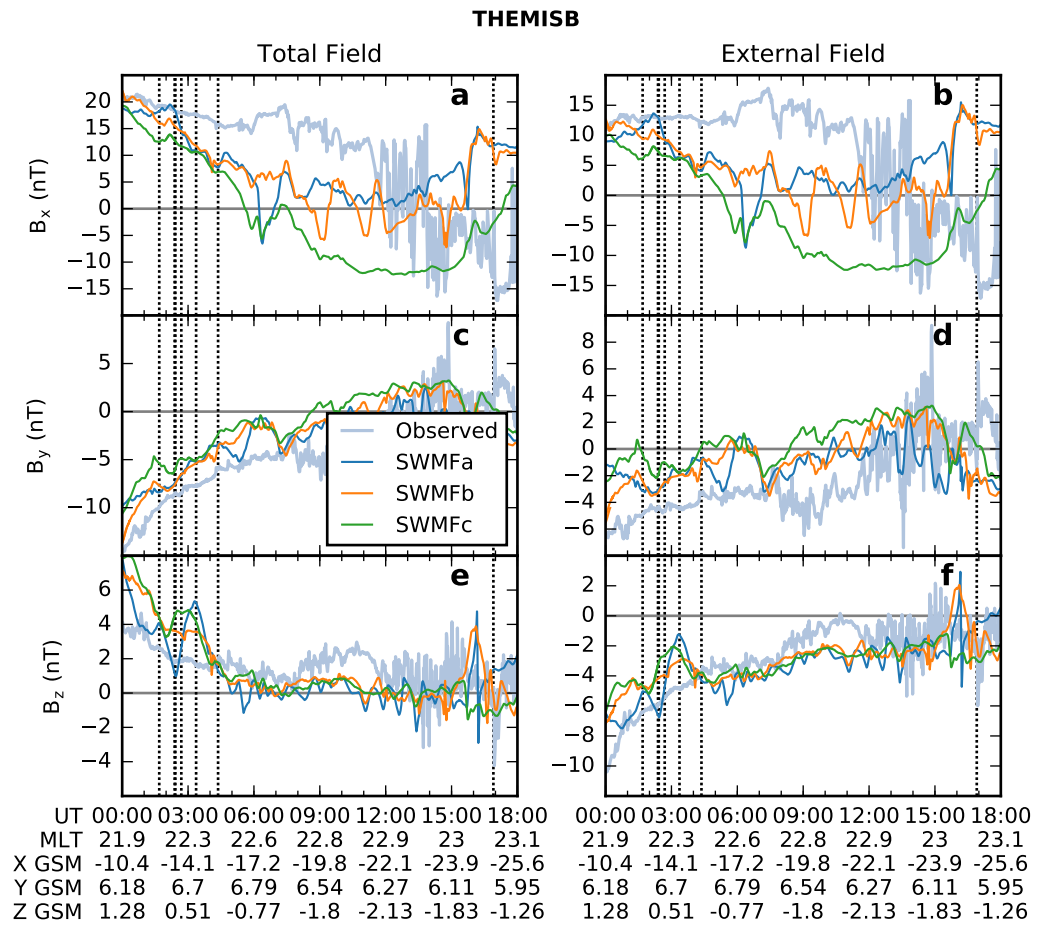
Figures S1-S6

THEMISB

Figure S1: Magnetic field components of the total field in GSM coordinates at the THEMIS B satellite, modeled and predicted, for February 13, 2009.
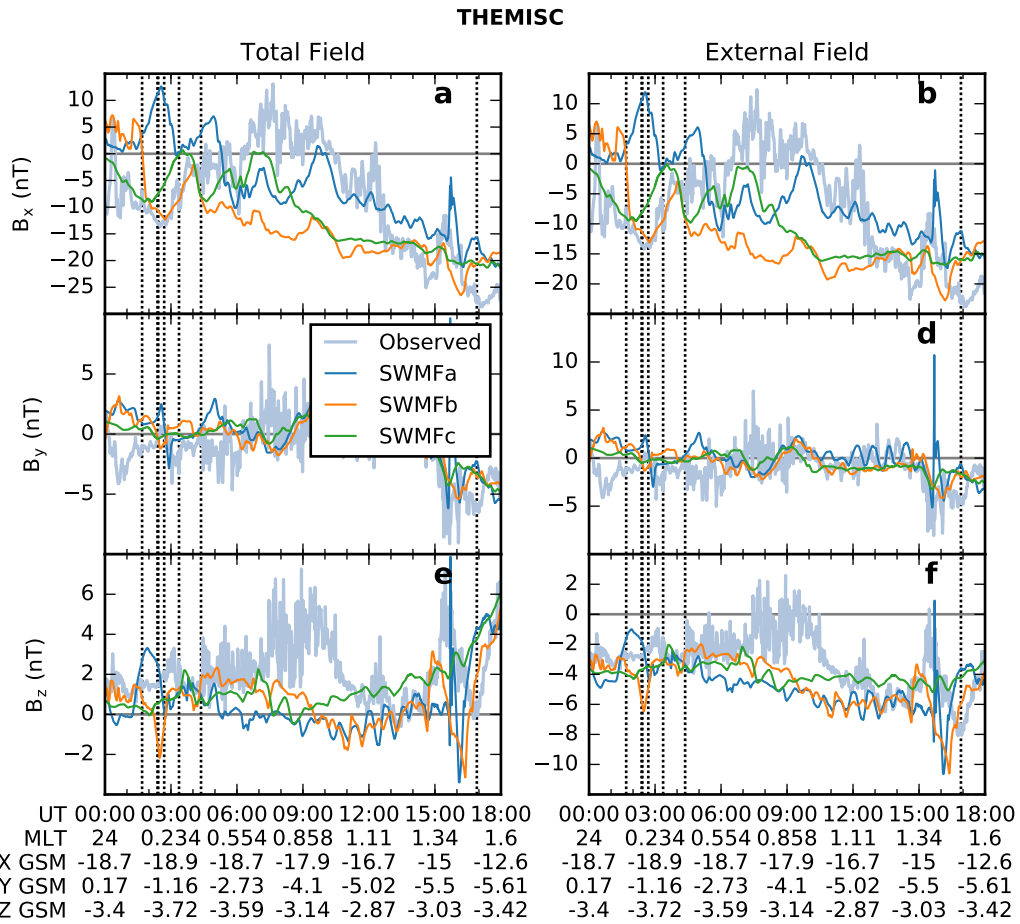
THEMISC

Figure S2: Magnetic field components of the total field in GSM coordinates at the THEMIS C
satellite, modeled and predicted, for February 13, 2009.

THEMISD

Figure S3: Magnetic field components of the total field in GSM coordinates at the THEMIS D satellite, observed and predicted, for February 13, 2009.

THEMISE
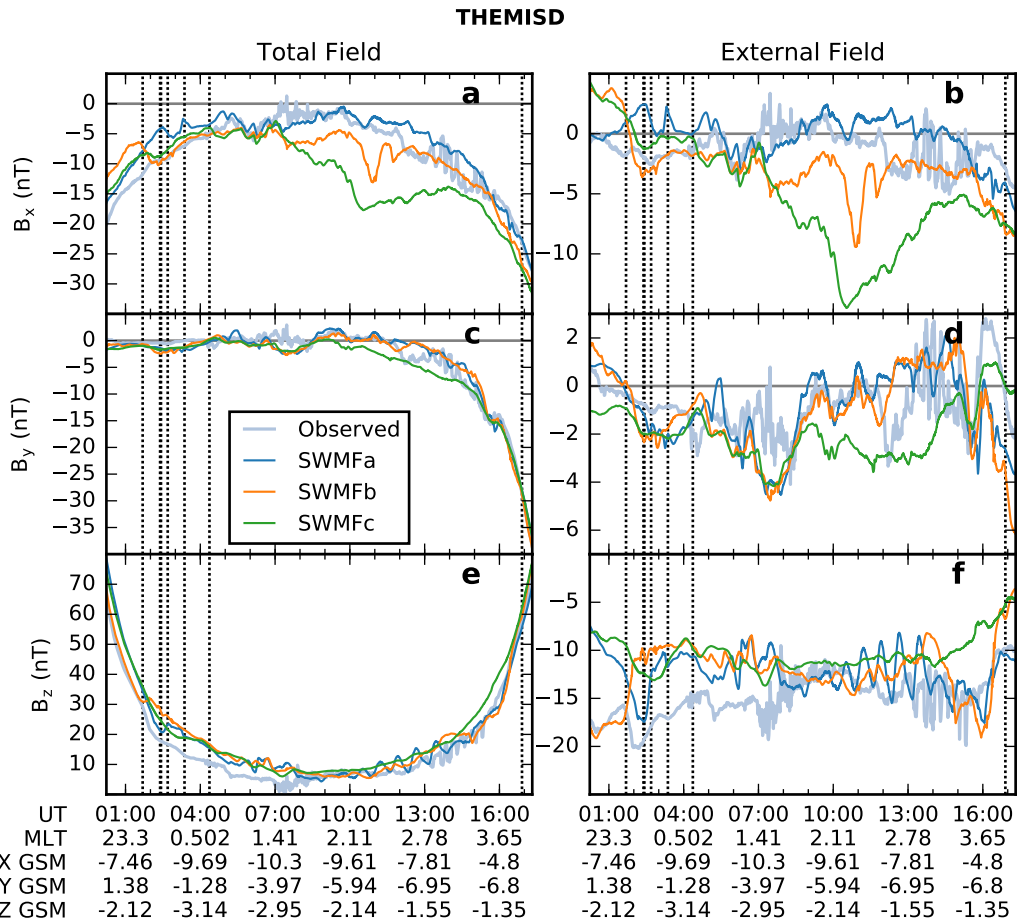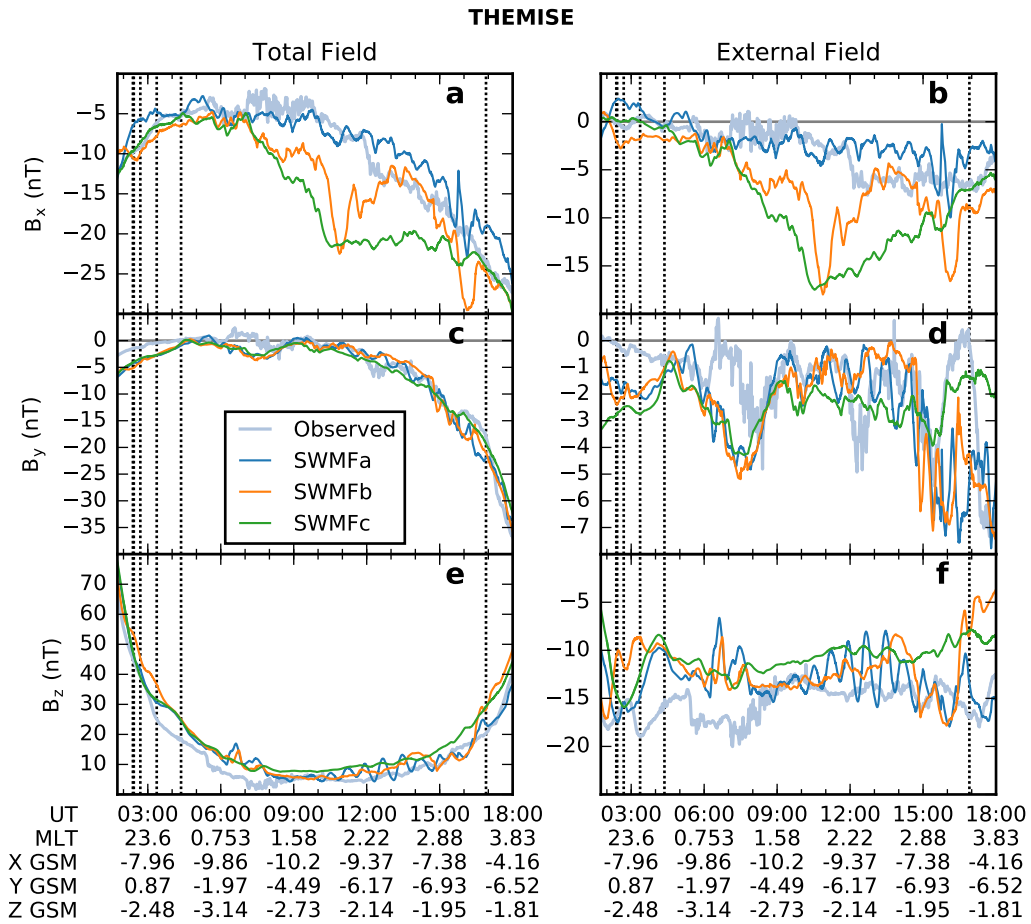

Figure S4: Magnetic field components of the total field in GSM coordinates at the THEMIS E satellite, observed and predicted, for February 13, 2009.
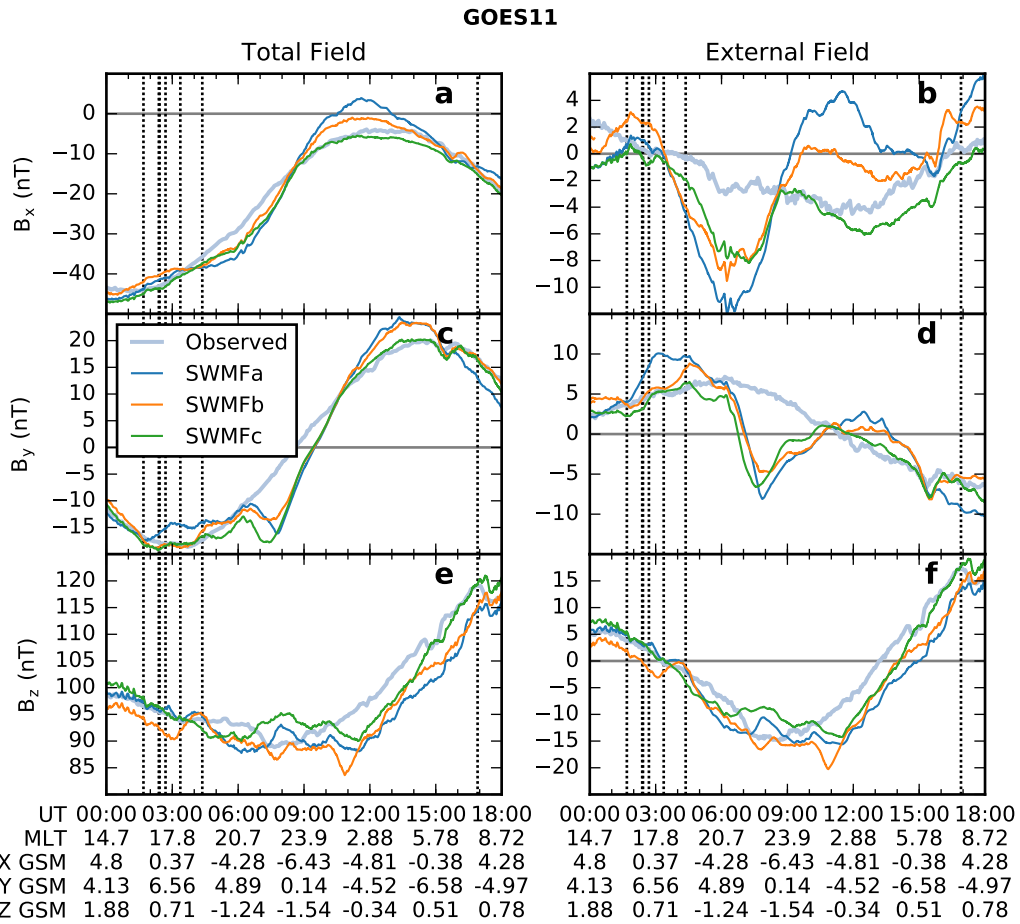
GOES11

Figure S5: Magnetic field components of the total field in GSM coordinates at the GOES 11 satellite, modeled and predicted, for February 13, 2009. Spacecraft locations in GSM coordinates are displayed below the time scale, and profiles of the spacecraft orbit are shown in the boxes at right.
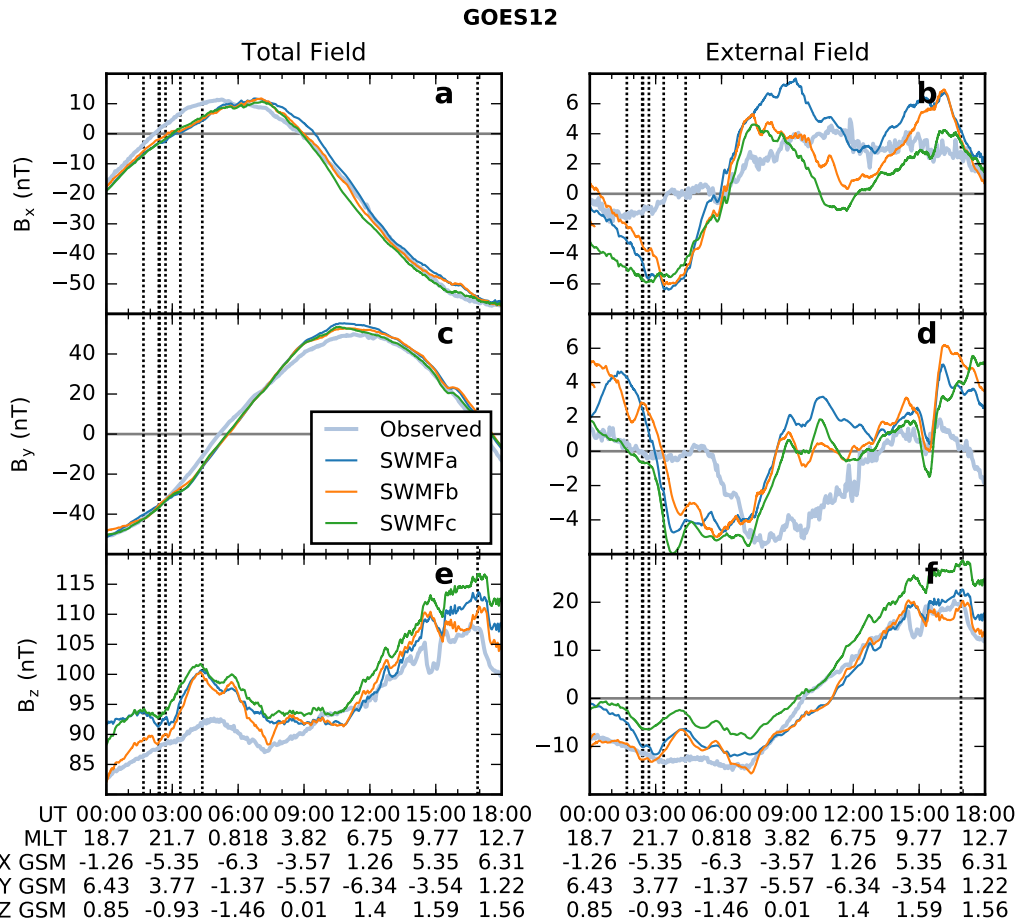
Figure S6: Magnetic field components of the total field in GSM coordinates at the GOES 12 satellite, modeled and predicted, for February 13, 2009. Spacecraft locations in GSM coordinates are displayed below the time scale, and profiles of the spacecraft orbit are shown in the boxes at right.

Data Set S1

Data Set S1 consists of a zip archive containing the mapping data from the empirical models (T01, T96, TA15B, TA15N, TA16, and TS05). Mapping data is stored in a separate file for each model. The format is whitespace delimited text with the following columns:

- Date/Time: Time of IB observation, in UTC, formatted as (YYYY-MM-DD/hh:mm:ss)
- ZGSM_A: Z (GSM) coordinate of THEMIS A (Re)
- ZGSM_E: Z (GSM) coordinate of THEMIS E (Re)
- BrOBS_A: Observed B_r at THEMIS A (nT)

- BrOBS_E: Observed B_r at THEMIS E (nT)

- BrMOD_A: Model B_r at THEMIS A (nT)

- BrMOD_E: Model B_r at THEMIS E (nT)

- BzOBS_A: Observed B_z at THEMIS A (nT)

- BzOBS_E: Observed B_z at THEMIS E (nT)

- BzMOD_A: Model B_z at THEMIS A (nT)

- BzMOD_E: Model B_z at THEMIS E (nT)

- Gobs: $G = \frac{dB_r}{dz}$ estimated using observed fields from THEMIS A and E (nT/Re)

- Gmod: $G = \frac{dB_r}{dz}$ estimated using model fields from THEMIS A and E (nT/Re)

Data Set S2

Data Set S2 consists of an HDF5 file (swmf_ib_mapping_data.h5). This file contains IB mapping data produced using the three SWMF simulations, in HDF5 format. It contains four groups, one for each of the three SWMF simulations plus one more for the observational data. The groups corresponding to the SWMF simulations contain the following datasets:

- time: Time of IB observation in UTC, formatted as an ISO 8601 string. Note that for SWMFc the time 2009-02-13T02:23:16 appears twice because the simulation was re-started, and the other data arrays in the SWMFc group similarly contain two entries for that time.

- int_r: Radial distance to the $|B|_{min}$ points mapped from eachIB location (Re).

- int_pos: Location of the $|B|_{min}$ points in GSM coordinates (Re).

- int_B: $|B|$ at the $|B|_{min}$ points (nT).

- int_kappas: K evaluated at the $|B|_{min}$ points.

- G: Gmod: $G = \frac{dB_r}{dz}$ estimated using model fields from THEMIS A and E (nT/Re)

- B_GOES11, B_GOES12, B_THEMISA, B_THEMISB, B_THEMISC, B_THEMISD, B_THEMISE: Model magnetic field at each spacecraft location, in GSM coordinates (nT).

The group 'obs' contains the following observational datasets:

- time: Time of IB observation in UTC, formatted as an ISO 8601 string.

- G: Gmod: $G = \frac{dB_r}{dz}$ estimated using model fields from THEMIS A and E (nT/Re)

- B_GOES11, B_GOES12, B_THEMISA, B_THEMISB, B_THEMISC, B_THEMISD, B_THEMISE: Observed magnetic field at each spacecraft location, in GSM coordinates (nT).