README FOR STEREO PLASTIC IRON DATA FILES
Last Update: September 26, 2011 (MP, LBE, ABG)

DATA USAGE:

Data provided by the PLASTIC team at the University of New Hampshire under NASA contract NAS5-00132.

Iron data provided here are courtesy of M. Popecki, with plots by L. Ellis.

These data are delivered to the public domain as soon as possible. Efforts are made to include the latest known calibrations; however, these are expected to undergo revision. We therefore suggest that users regularly return to this page and check the "Modification History" at the end of this "READ_ME" file.

If used in presentations or publications:

We strongly suggest that Dr. Popecki (mark.popecki@unh.edu) be contacted to ensure that you are working with the latest release.

Please acknowledge STEREO PLASTIC Investigation (A.B. Galvin, PI) and NASA Contract NAS5-00132.

For reporting purposes, we request bibliography information for any publication, etc., using these data. Please send information on the use of these data to the PLASTIC PI:
> Dr. A.B. Galvin
> toni.galvin@unh.edu

If you have questions regarding data formats, please contact the PLASTIC Data System Manager:
> Dr. Lorna Ellis
> lorna.ellis@unh.edu

FILE FORMAT:

> ASCII files are tab-delimited text.
> CDF files are Common Data Format.

File Naming convention:

> STx_L2_PLA_Iron_Q_xhr_YYYY0101_Vxx.txt

Where:
"STx" is given as "STA" or "STB" for STEREO A and STEREO B, respectively.

"L2" indicates Level 2 data in the STEREO PLASTIC convention.

"PLA" indicates Plasma and Suprathermal Ion Composition (PLASTIC) Investigation.

"Iron" indicates iron data.

"Q" indicates charge state data.

"xhr" indicates the accumulation interval for the pulse height data (for example, if the iron data is derived from PLASTIC PHA data accumulated over one hour, this data set would be designated "1hr"). "PHA" is explained below.

"YYYY" represents the year.

"0101" indicates that the file begins on the first of January.

"Vxx" indicates Version number, with the processing version given by the xx.

"txt" or "cdf" indicates ASCII file and Common Data Format, respectively.

Missing data is given as -1E+31 (for floats) and -1 (for integers).

Parameters provided are:

1. YEAR:	Year of the cycle start time for first cycle in the data accumulation period. (ASCII version only)
2. DOY:	Day of year of cycle start time for first cycle in the data accumulation period. (ASCII version only)
3. Hour:	Hour of cycle start time for first cycle in the data accumulation period. (ASCII version only)
4. Date and Time:	Cycle start time for first cycle in the data accumulation period (format yyyy-mm-dd/hh:mm:ss)
5. Fe aveQ:	Average charge state for iron calculated as described below. Typical uncertainty is half a charge unit.
6. Qty:	Normalized counts used in the fitting process. Provided as a measure of counting statistics.
7-27. Q:0…Q:20:	Counts for each ionic charge state "Q" of iron, taken over the E/Q range. Further described below.

PLASTIC IRON PLOTS:
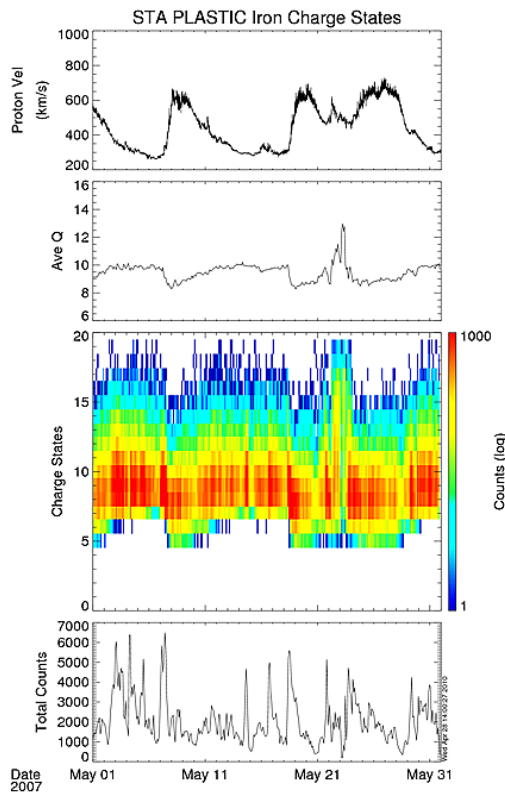
Monthly plots are provided at both the STEREO Science Center (http://stereo-ssc.nascom.nasa.gov/data/ins_data/plastic/level2/Iron/plots/) and through the PLASTIC home page (http://stereo.sr.unh.edu, link to "Browse Data Plots" in menu).

Example shown on left: Solar wind proton bulk speed, average iron charge state <Q>, contour plot of charge state distributions, and total counts (to indicate statistics). Changes in the charge state are observed at the interface of slow to fast solar wind, and (shown here) at the May 22, 2007 ICME event.

STEREO PLASTIC IRON PARAMETERS:

The instrument's one minute measurement cycle consists of 128 logarithmically spaced energy-per-charge (E/Q) steps from ~80 keV/e down to ~0.3 keV/e. These are called ESA steps. Within each cycle, the instrument changes from the "main channel" aperture to a "small channel" aperture, with different geometric factors. The ESA step at which this change occurs is called the schan_switch. Solar wind iron is typically contained fully within the main channel.

Pulse height analysis (PHA) data consist of single event information, including the time of the event, the energy-per-charge (E/Q), the polar and azimuth position, the measured energy (Essd), and the measured time-of-flight (TOF). The Essd, TOF, and E/Q are used to identify the ion species, including the calculation of the ionic charge state for each ion. Charge state histograms are formed from these calculations.

Only a fraction of the PHA data for the heavy ions is brought to the ground because of telemetry limitations. However, all ions are counted and classified into four categories, known as priorities. In case of limited telemetry, the distribution of charge states for ions

entering the instrument may be recovered from the downloaded set by normalizing the downloaded set with these priority rates. This is done by multiplying the downloaded histograms of each priority by the ratio of the number of PHA events counted by the instrument in each priority, to the number of PHA events actually brought down.

The iron charge state distribution histograms are formed by binning the calculated charge states along the iron species track. Presently, the binning standard counts the integer value of a calculated charge state. For example, the histogram bin 10 includes all calculated charge states greater than or equal to 10.0, but less than 11.0. An average charge state may be calculated from the histogram by combining the counts at each bin with the bin value of bin+0.5. For example, the number 10.5 would best represent bin 10.

Iron charge state distributions and average charge state provided here are derived from the PHA data from the "main channel" accumulated over 2 hours. Data are acquired from ESA steps 2-100. This is approximately $E/Q = 0.8\text{-}79$ keV/e, which for Fe+10 is the velocity range $165 - 1670$ km/s.

Modification History

Jan.	15, 2010	First issue of 2-hour data sets for STEREO A and B.
April	01, 2010	Changed file format.
Sept.	03, 2010	Added CDF files.
Sept.	26, 2011	Change filenames (add "0101") for inclusion in CDAWeb.