README FOR STEREO PLASTIC ALPHA_RA VALIDATED DATA FILES
Last update: March 27, 2012 (ABG, LBE, KDS)

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

Alpha data provided here is courtesy of K. Simunac, S. Wang, A. Galvin, and L. Ellis.

STEREO solar wind data presented are meant to provide an overview of large-scale solar wind behavior and for selection of interesting event periods.

These data are delivered to the public domain as soon as possible. Efforts are made to include the latest known calibration and background determinations, 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 "Readme" file.

If used in presentations or publications:

We strongly suggest that Dr. Galvin (toni.galvin@unh.edu) and Dr. Simunac (K.Simunac@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 this data to the PLASTIC PI:

Dr. A.B. Galvin
toni.galvin@unh.edu

If you have questions regarding the 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_Alpha_RA_1DMax_1hr_YYYY_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.

“Alpha” indicates alpha (He^{2+}) data.

“RA” indicates the primary data set used is from the instrument’s “RA” rate.

"1DMax" indicates the solar wind alpha bulk parameters V, N, and Vth, were calculated from a 1D Maxwellian fit, as described below.

"1hr" or “10min” indicates the averaging interval (instrument cadence is 1 minute). The ASCII data are provided in yearly files for "1 hr" format, and monthly files for “10 min” format.

"YYYY” represents the year.

"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).

ALPHA PARAMETERS FROM 1D MAXWELLIAN FITS:

Alpha bulk parameters provided here are derived from a 1D Maxwellian fit to a single coincidence (the “RA”) rate that is measured in both the S-channel and Main Channel. Background and dead-time corrections are applied. Note: Another alpha product uses composition-based priority rates covering both channels (http://fiji.sr.unh.edu).

Data are processed at the ~1 minute instrument cadence and then averaged into 10 minute and 1 hour resolution products.

Alpha_RA versions 3 and below are limited to S-channel data. Versions 4 and above incorporate the Main channel.

PARAMETERS PROVIDED IN THIS DATA SET:

The first set of parameters gives the time the data were acquired:

YEAR: Year of cycle start time

DOY: Day of year of cycle start time

hour: Hour of cycle start time

min: Minute of cycle start time (10 min format only)

date and time: format yyyy-mm-dd/hh:mm:ss

The next set of parameters gives the solar wind alpha data:

Na [1/cc]: Solar wind alpha number density in [alphas per cubic centimeter]

Va [km/s]: Alpha bulk speed (s/c frame) in kilometers per second

Vtha [km/s]: Alpha thermal speed in kilometers per second, defined here as sqrt(2kT/m)

Na/Np: Ratio of alpha to proton number densities (a unitless quantity)

Va-Vp [km/s]: The scalar difference between the alpha and proton bulk speeds in kilometers per second (s/c frame)

Version 3 and below:

Alpha Cycle Count: The number of instrument cycles averaged together to create the alpha parameter records.

Version 4 and above:

num cycles(Na, Vtha): The number of instrument cycles averaged together to create Na and Vtha.

num cycles(Va, Va - Vp): The number of instrument cycles averaged together to create Va and Va - Vp.

num cycles(Na/Np): The number of instrument cycles averaged together to create Na/Np.

Caution: A data quality flag implemented with processing version 3 and above.
0 – no known issues
1 – use with caution, Na/Np may be omitted
2 – alpha and/or proton density is suspect, Na/Np is omitted
3 – data removed after visual inspection, Na/Np is omitted
-1 – no data

STEREO PLASTIC SENSOR INFLIGHT PERFORMANCE

PLASTIC is a novel sensor in that each flight unit functions like three separate instruments: a solar wind proton/alpha monitor, a solar wind composition (m, m/q) experiment, and a low energy m/q sensor for observing ions from opposite the Sun-spacecraft direction. Multi-functionality gives rise to a need for multiple geometric factors and fields-of-view within the same instrument. The first major subdivision within the instrument is based upon the in-ecliptic (azimuth) field-of-view. The region that covers the Sun-spacecraft line +/- 22.5 degrees is the Solar Wind Sector (SWS). The remaining portion is called the Wide Angle Partition (WAP). The SWS can be further subdivided into two entrance apertures (Main Channel and Small Channel) with different geometric factors. The Main channel geometric factor allows for sufficient counting statistics of heavy solar wind ions. The switch to the smaller geometric factor S-channel prevents the saturation of the electronics and controls the lifetime fluence on the MCP and SSD detectors. The PLASTIC Entrance System's electro-static analyzer (ESA) steps through 128 logarithmically spaced energy per charge (E/Q) steps from about 80 keV/e, down to about 0.3 keV/e in a one-minute cadence. At the start of each 1-minute ESA sweep the Small channel is off, and the Main channel is open. Upon reaching a set (but command-able) count threshold, the Main channel is electrostatically closed and the S channel is enabled. Extended analysis of in-flight data indicates a major variance in the performance of the S-channel instrumental response (geometrical factor, E/Q, and polar and azimuth angular response) from expectations based upon the pre-flight testing and calibrations. The effect is attributed to insufficient fringe-field control within the aperture section of the Entrance System. The results provided here are based upon an extensive in-flight calibration of the S-channel response to protons which has been performed by the PLASTIC team utilizing Main channel data and confirming results by cross-calibrations of early mission data with Wind SWE (courtesy K. Ogilvie and A. Lazarus) and SOHO PM (courtesy F. Ipavich). We extend special thanks to our Wind and SOHO colleagues for the use of their data.

Modification History
April 2010 First issue of Level 2 alpha_RA. (V01)

August 2010 This version includes a counter to reflect how many instrument cycles were used to create each record. In addition, the instrumental efficiency table was updated. (V02)

April 2011 First issue of STB alpha data (V03).

March 2012 Second issue of STB alpha data (V04). Main channel data has been incorporated. Separate averaging of speed, density and thermal speed, and Na/Np have been implemented to reduce data loss.