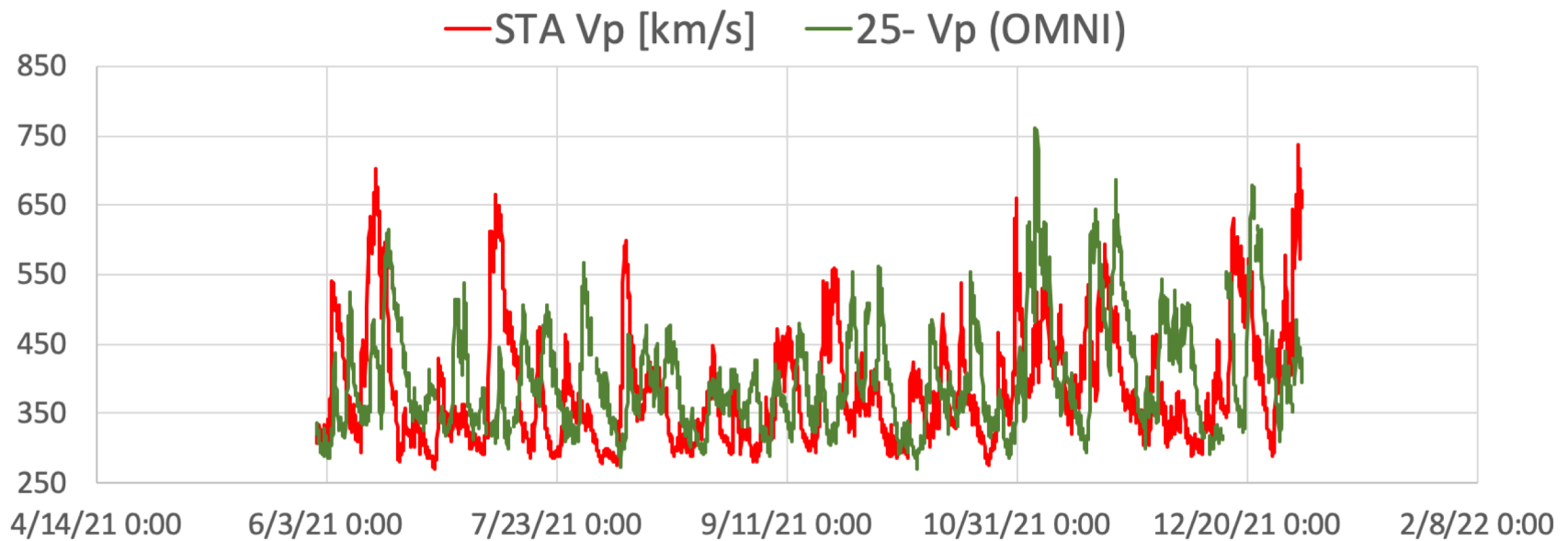


# STEREO PLASTIC

STEREO SWG January 19 2022

A.B. Galvin and L. Ellis



# Science Team

- UNH\*:
  - Profs. Toni Galvin, Charlie Farrugia, Noe Lugaz, Reka Winslow, Lynn Kistler (Beacon), Harald Kucharek, Nada Al-Haddad, Eberhard Moebius
  - Drs. Emma Davies, Bin Zhuang, Tarik Salman, Camilla Scolini; (primary mentors for post docs are Lugaz and Winslow)
  - Dr. L. Ellis (Ops and Data Management)
  - Mr. Jonathan Bower
  - Graduate Students Tarik Salman (now post doc), Sarah Auriemma (moved to different project in summer 2021)
- MPE:
  - Dr. Berndt Klecker
- Kiel
  - Prof. Robert Wimmer-Schweingruber
  - Dr. Lars Berger

\* Some UNH scientists receive additional STEREO analysis funding from other grant sources

## Dissertation

Salman, T. M., The Propagation and Evolution of Coronal Mass Ejection Driven Sheath Regions: Insight from Multi-Spacecraft Measurements and Statistical Approaches, PhD Thesis, University of New Hampshire, 08/2021.

# PLASTIC Instrument Status

PLASTIC is operating in a moderate background mode with reduced high voltages.

Outgassing incident of December 2019 created a high current condition which triggered current-limiting red limits and automatic safety shut down of high voltages.

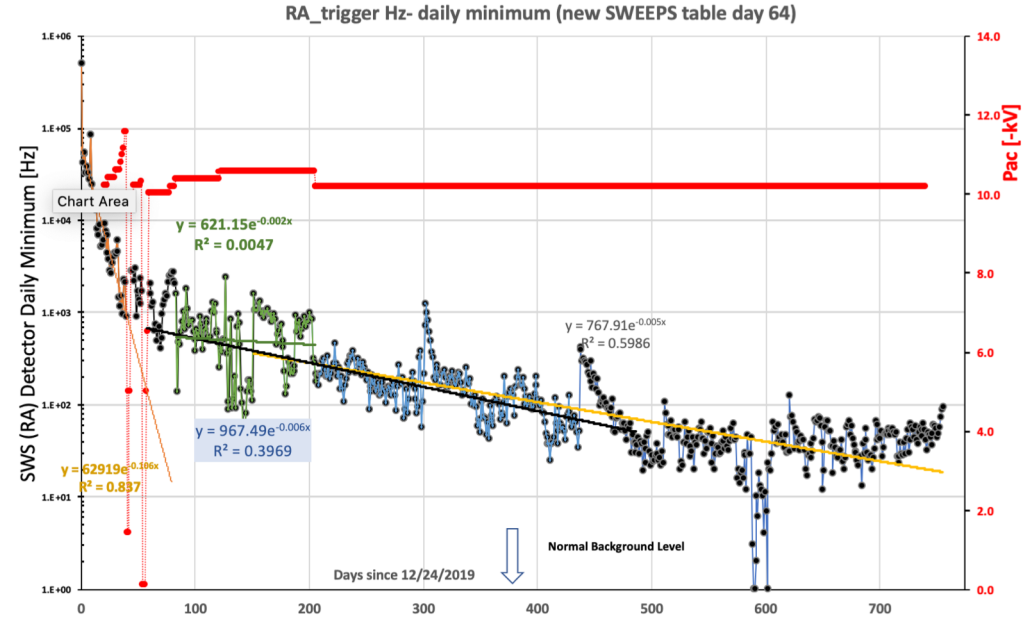


Figure 1. The background rate contribution from the outgassing is being tracked and is reducing in a quasi-exponential fashion, but with continued sporadic (but lowering in intensity) outbursts. Background is down by >4 orders of magnitude from original values. The recent data may be indicating a leveling background value of about 40x normal.

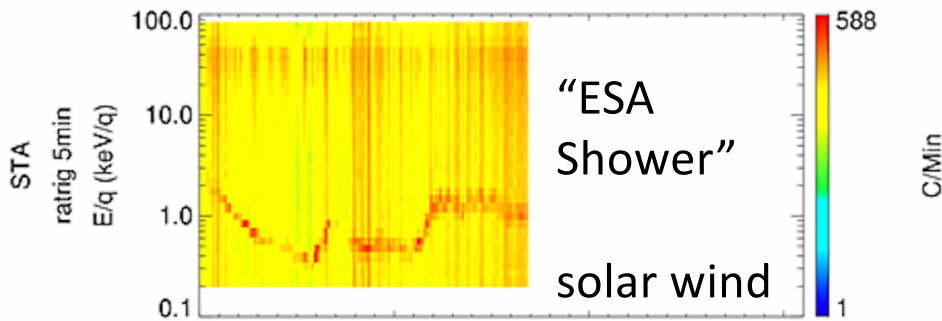


Figure 2. Data above from Jan 2022. As the background has declined, it has become evident that there is a large contribution for the higher voltage ESA steps, above 17 keV/e (1780 km/s protons). Note all instrument data shown can be retrieved from <https://fiji.sr.unh.edu>

Background and Efficiency curves are established using typically three to six month baseline.

## Moderate Background Operations

- The instrument has 10 event trigger modes for the solar wind sector, to accommodate various potential failure modes. We have utilized the ‘position’ trigger on the Solar Wind side to assist with beacon data determination with these lower operational voltages. This however prevents use of TOF (ergo composition) data from the solar wind section.
- We plan to further refine the ESA SWEEP table this spring as there are still indications of background-related effects at the higher (non-solar wind) SWEEP values. The present configuration is stable (it is not tripping any current limiters), but we want to minimize the background ‘ESA showers’.
- We now restore the instrument manually after each thruster operation because the auto recovery macro includes high settings for ESA voltages.
- We are monitoring the MCP efficiency. The MCP voltage was reduced (12/24/2019) to limit charge extraction during the high background and resulting contamination. We expect to restore to the normal voltages after the SWEEP table upload.

The onboard programming for generating the beacon data products has been an issue under these conditions, as the coding assumes low or absent background contributions when creating moment products. Nor does the existing algorithm allow flexibility in what rates are used, hence need to use the position trigger.

## Data Products

At the present power supply voltages, background signal levels, and logic trigger mode, the retrievable science measurements include solar wind proton bulk parameters ( $N_p$ ,  $V$ , Temperature,  $N/S$ ) in the solar direction and Time-of-flight ( $M/Q$ ) measurements of suprathermals in the non-solar direction. Solar wind alphas appear to be retrievable under certain conditions.

