

<u>Temperature enhancements coincident with</u> <u>intermittent structures.</u>

UD PSPfest Team

Data used :

Magnetic Field: psp_fld_12_mag

Temperature and velocity: spp_swp_spc_l3i (everything in RTN coordinate system)





- Regions with high PVI values implies presence of coherent structures, and is a measure of discontinuity.
- Anisotropy appears in sheet like structure.
- Strong heat flux in upstream regions.

Greco et. Al. (2012)

Partial Variance of Increments (Magnetic):

PVI works as a proxy for current sheet structures.

$$PVI(t, \tau) = \frac{\left|\Delta \vec{B}(t, \tau)\right|}{\sigma}, \quad \sigma = \left(\left|\Delta \vec{B}(t, \tau)\right|^2\right)^{1/2}$$

Where,

$$\left|\Delta \vec{B}(t,\tau)\right| = \left|\vec{B}(t+\tau) - \vec{B}(t)\right|$$

 τ is the lag (generally of the order of inertial length).

Greco et. al. (2008)

Inertial length :

$$\mathbf{d}_i = c/\omega_{p_i}$$

Can also use velocities instead of magnetic fields.



"This plot suggests that higher PVI values, which are related to higher intensity current sheets, are associated with PDFs that have fewer low temperature values, greater high temperature values, and an increased mean ion temperature."



Histogram of data distribution on the log-log plot of PVI and Temperature.

For this study, $\tau = 1$ second, and PVI is normalized by the 8hr standard deviation.



PDF of data distribution on the log-log plot of PVI and Temperature.

Diurnal Variation of PVI during encounter





Conditional average temperature for different PVI thresholds at the point of a PVI event.



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$$\widetilde{T}_p(\Delta t, \theta_1, \theta_2) = \langle T_p(t_{\mathcal{I}} + \Delta t) | \theta_1 \le \mathcal{I}(t_{\mathcal{I}}) < \theta_2 \rangle$$



Brazil plot for the first PSP encounter

Huang et al., ApJ Supp. Series, 2020



Distribution of instability on Brazil plot for the first PSP encounter



Distribution of various physical parameters on Brazil plot for the first PSP encounter

Thank you!