Motivation: Evolution of solar wind current sheets

How does the current sheet change with the radial distance from the Sun?

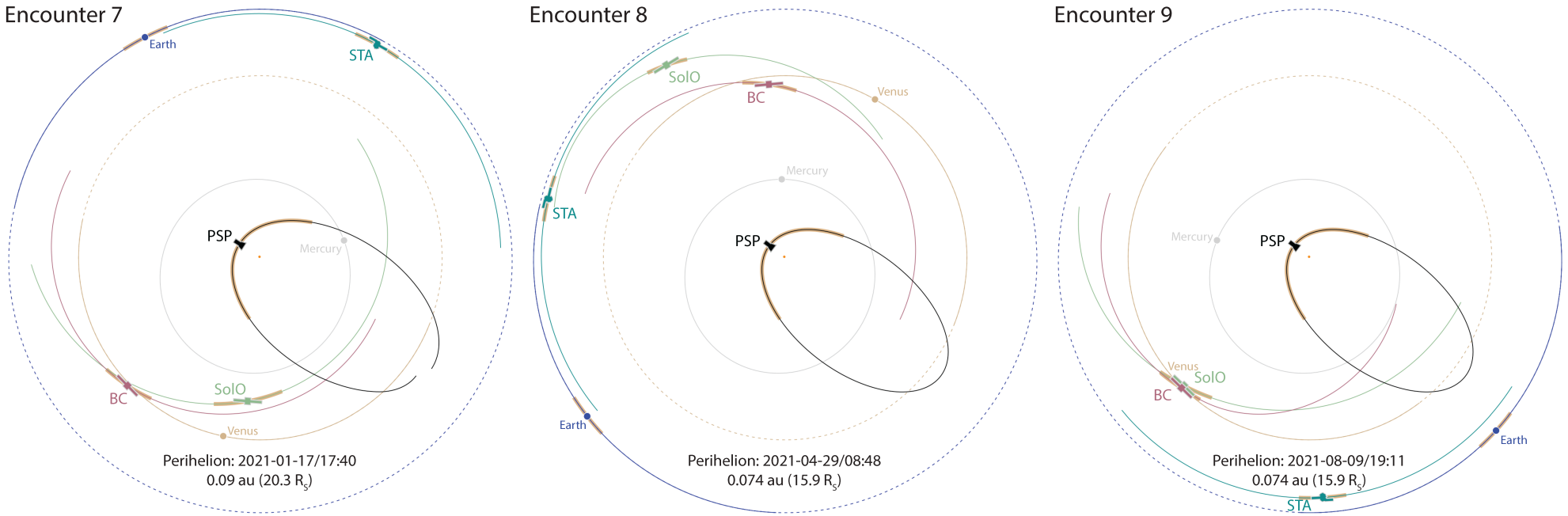
Synergistic observations of PSP with ARTEMIS and Wind.

Motivation: Evolution of solar wind current sheets

How does the current sheet change with the radial distance from the Sun?

Synergistic observations of PSP with ARTEMIS and Wind.

Encounters (7–9) selected for their differing geometric alignments



Current sheet thickness δ, current density J, and magnetic field jump ΔB

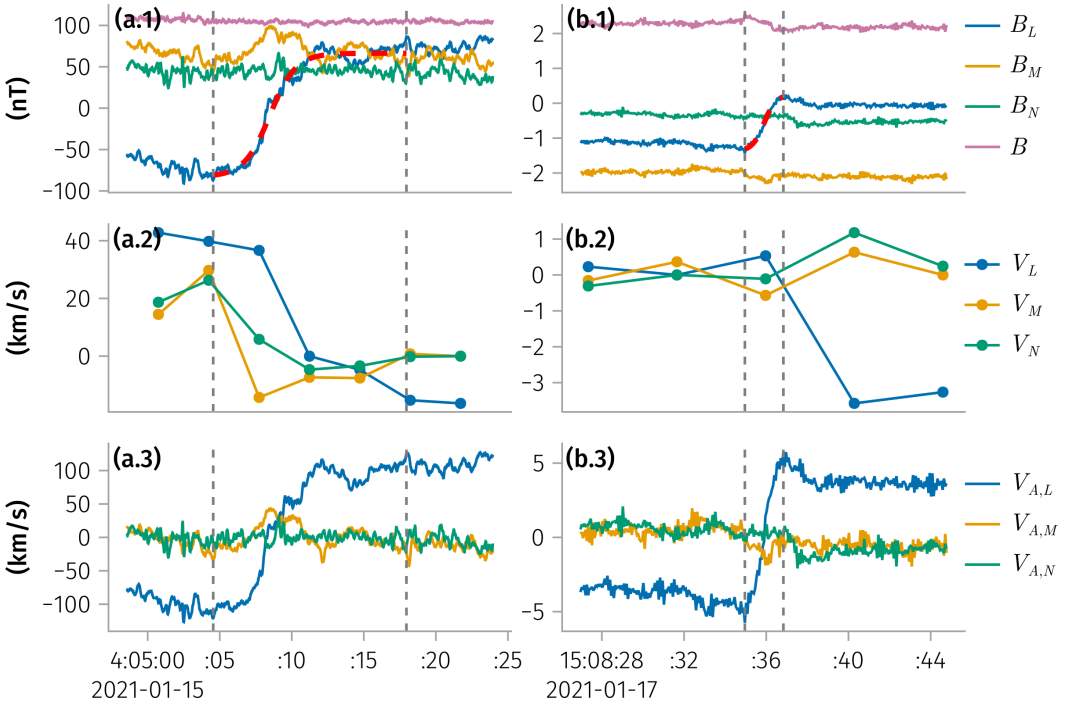


Figure 1: examples of current sheets observed by the Parker Solar Probe (PSP; panels a.1–a.3) and ARTEMIS (panels b.1–b.3)

Current sheet thickness δ, current density J, and magnetic field jump ΔB

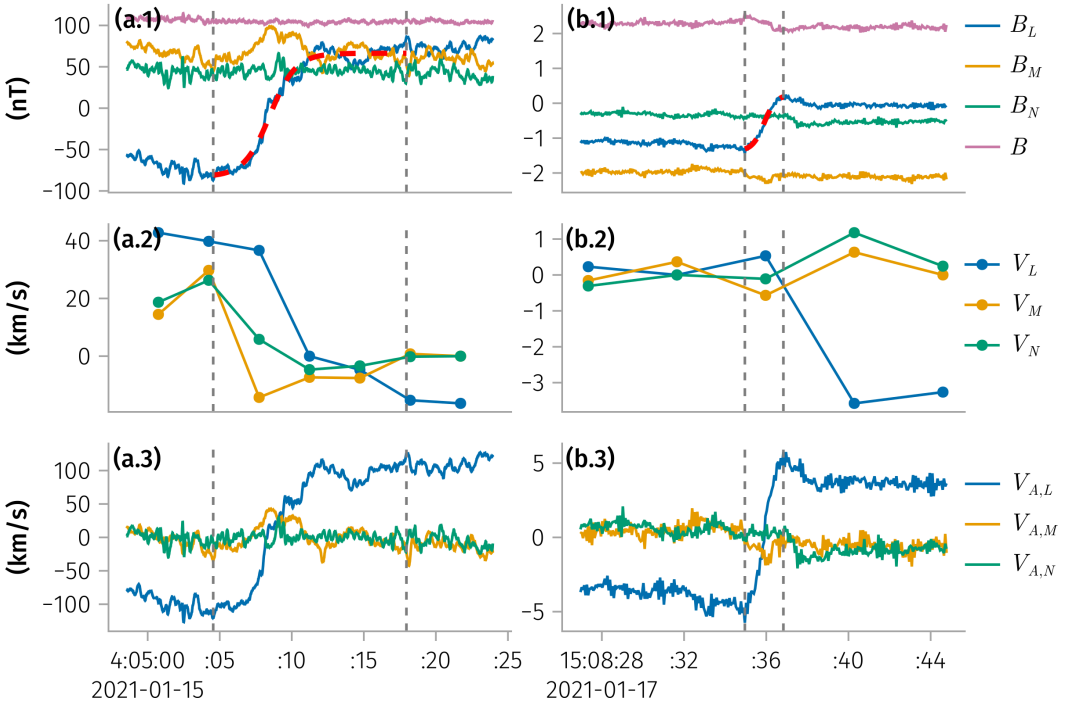


Figure 1: examples of current sheets observed by the Parker Solar Probe (PSP; panels a.1–a.3) and ARTEMIS (panels b.1–b.3)

$$\delta/d_i = V_n \Delta t / c/\omega_{\mathrm{pi}}, \quad J/J_A = \frac{dB_l}{dt}\frac{1}{\mu_0 V_n} \Big/ eNV_A$$

Current sheet thickness δ, current density J, and magnetic field jump ΔB

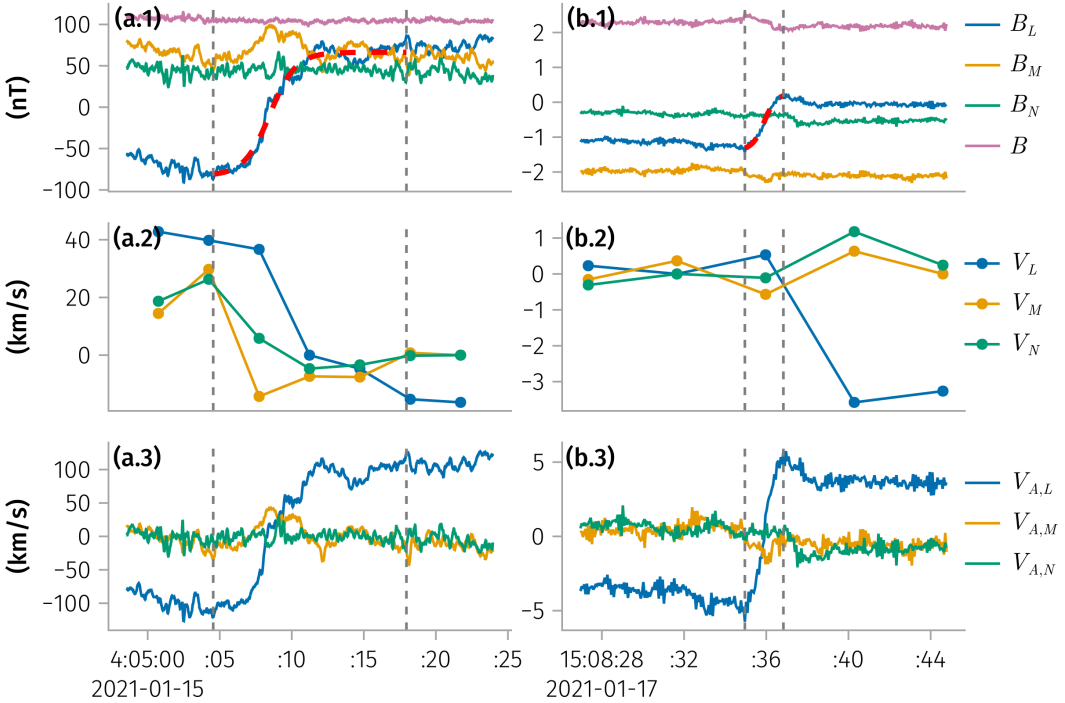
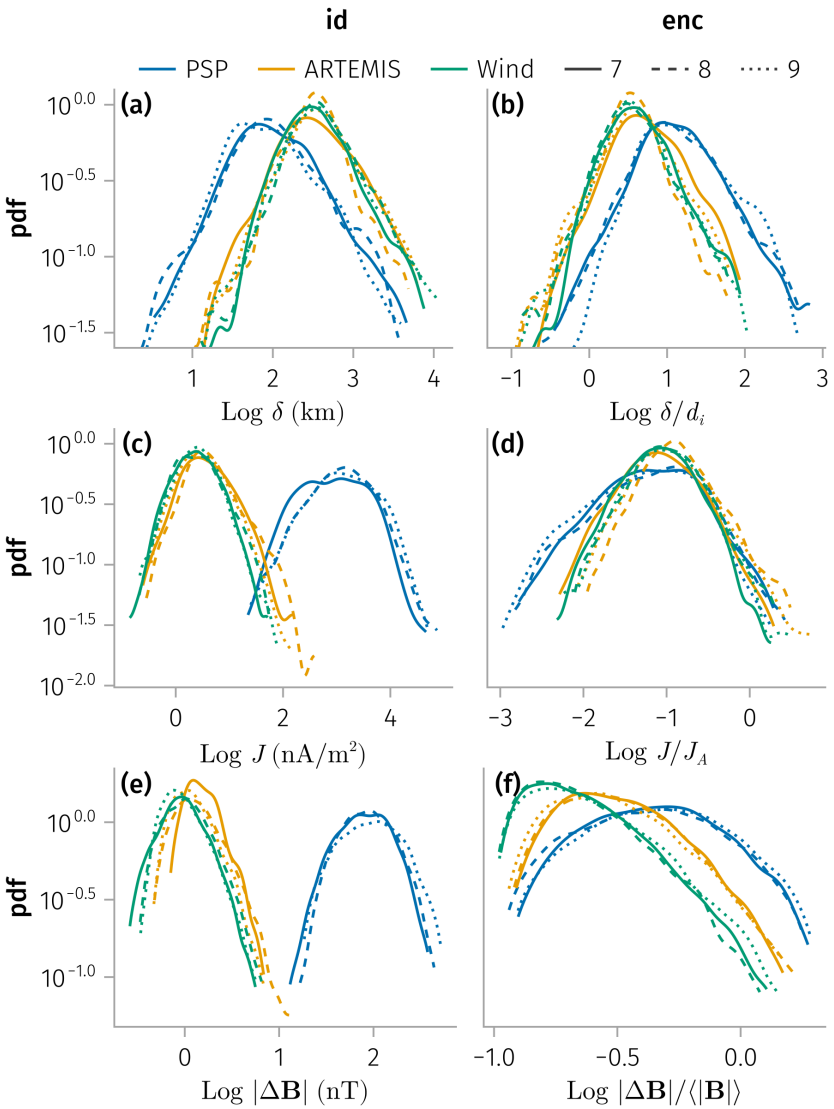


Figure 1: examples of current sheets observed by the Parker Solar Probe (PSP; panels a.1–a.3) and ARTEMIS (panels b.1–b.3)

$$\delta/d_i = V_n \Delta t / c/\omega_{\mathrm{pi}}, \quad J/J_A = \frac{dB_l}{dt}\frac{1}{\mu_0 V_n} \Big/ eNV_A$$



Scale-dependence and Alfvénicity

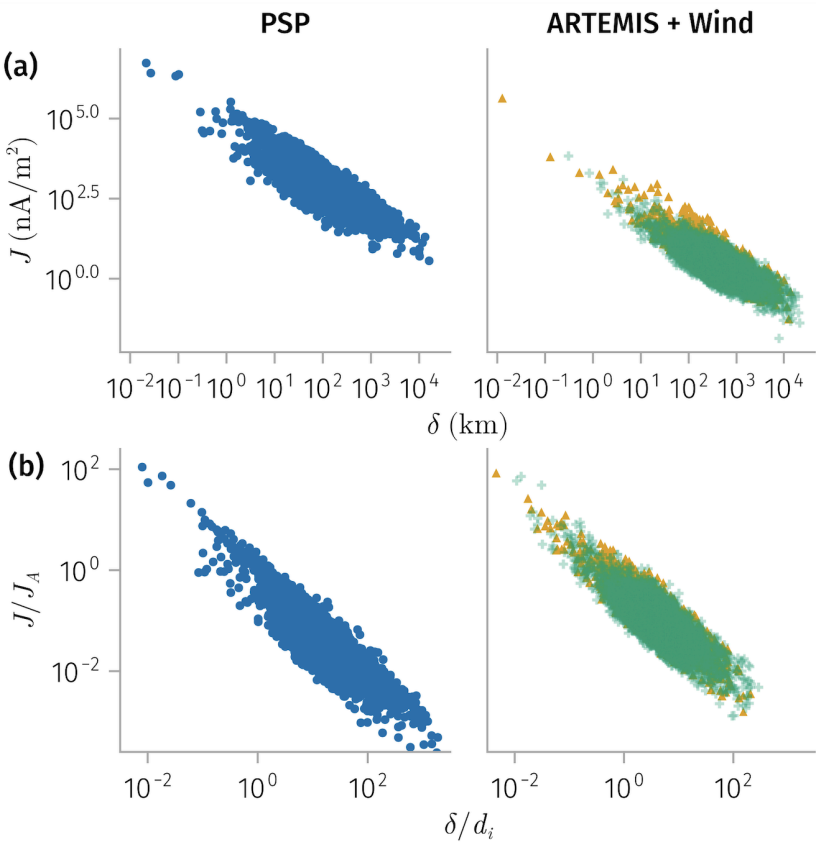


Figure 3: Similar inverse correlation: smaller-scale current sheets tend to be more intense.

Scale-dependence and Alfvénicity

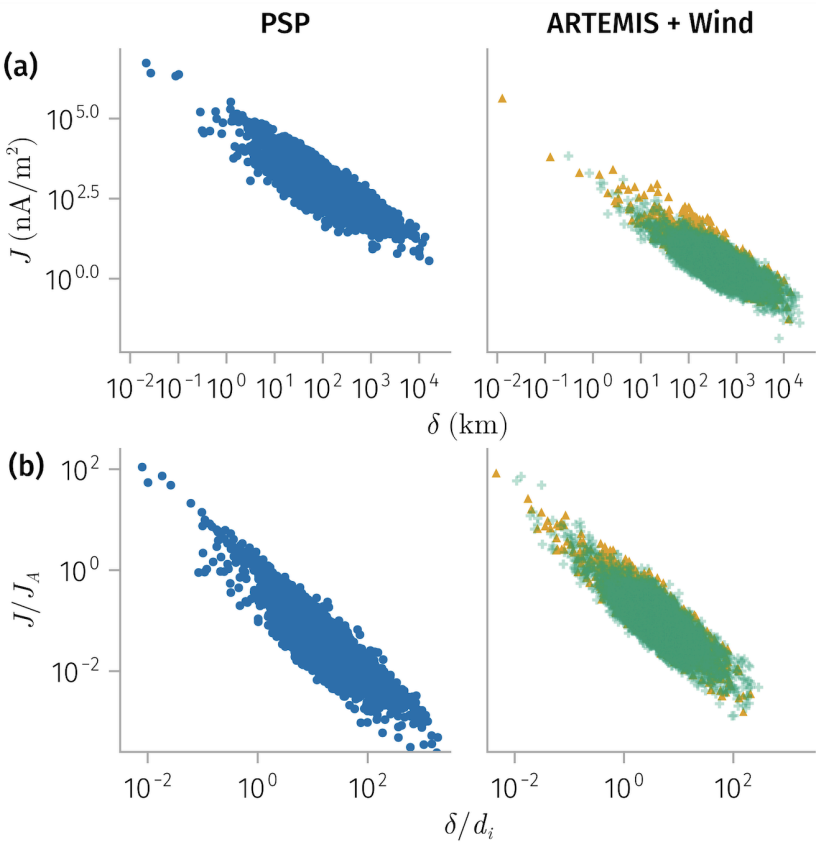


Figure 3: Similar inverse correlation: smaller-scale current sheets tend to be more intense.

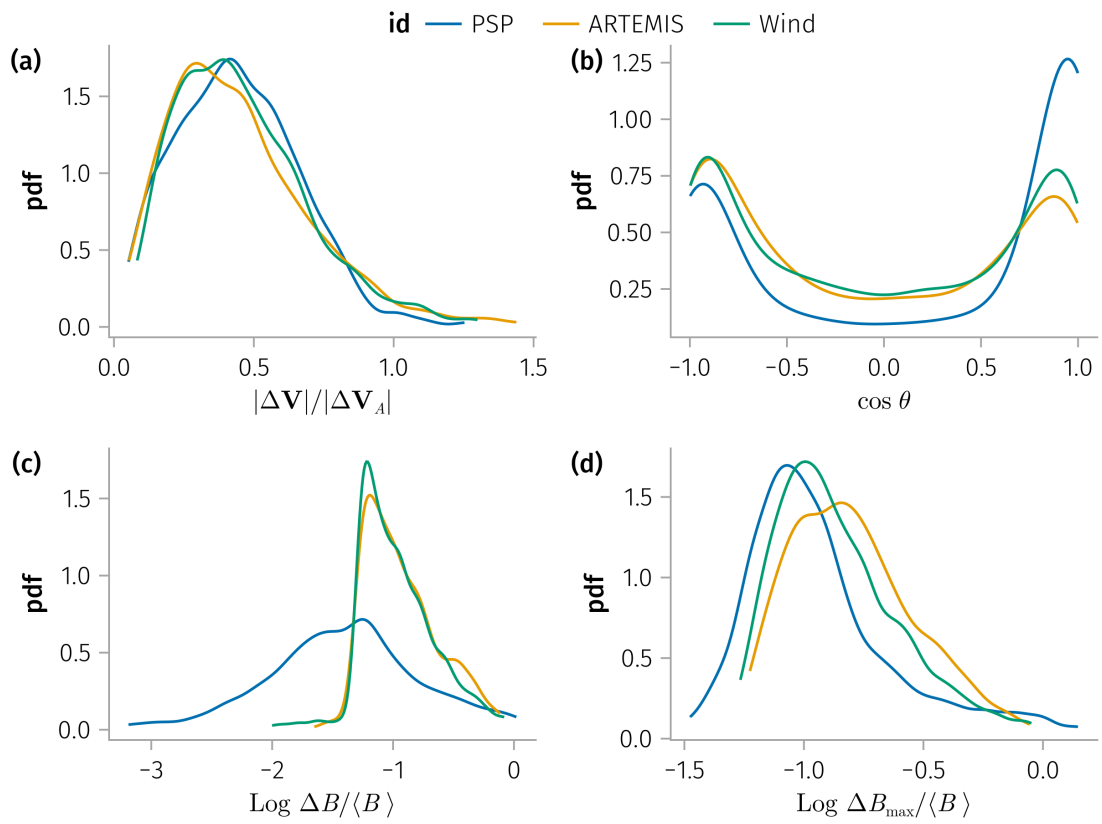
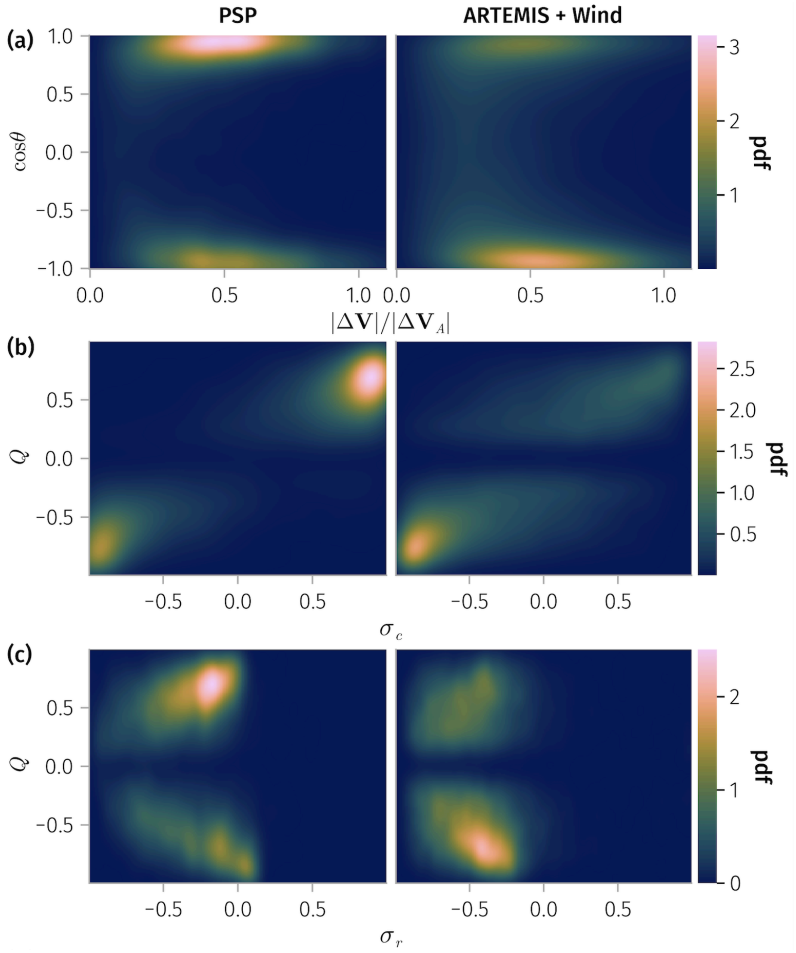


Figure 4: ARTEMIS (1AU) show a broader angular spread, $\cos\theta = \frac{\Delta\mathbf{V}\cdot\Delta\mathbf{V}_A}{|\Delta\mathbf{V}|\,|\Delta\mathbf{V}_A|}$, and larger fractional change in magnetic field magnitude.

Alfvénicity, in-plane rotation angle ω_{in} and B_n



$$Q^{\pm} = \pm\left(1 - \frac{|\,\Delta\mathbf{V} \mp \Delta\mathbf{V}_A|}{|\,\Delta\mathbf{V}| + |\,\Delta\mathbf{V}_A|}\right)$$

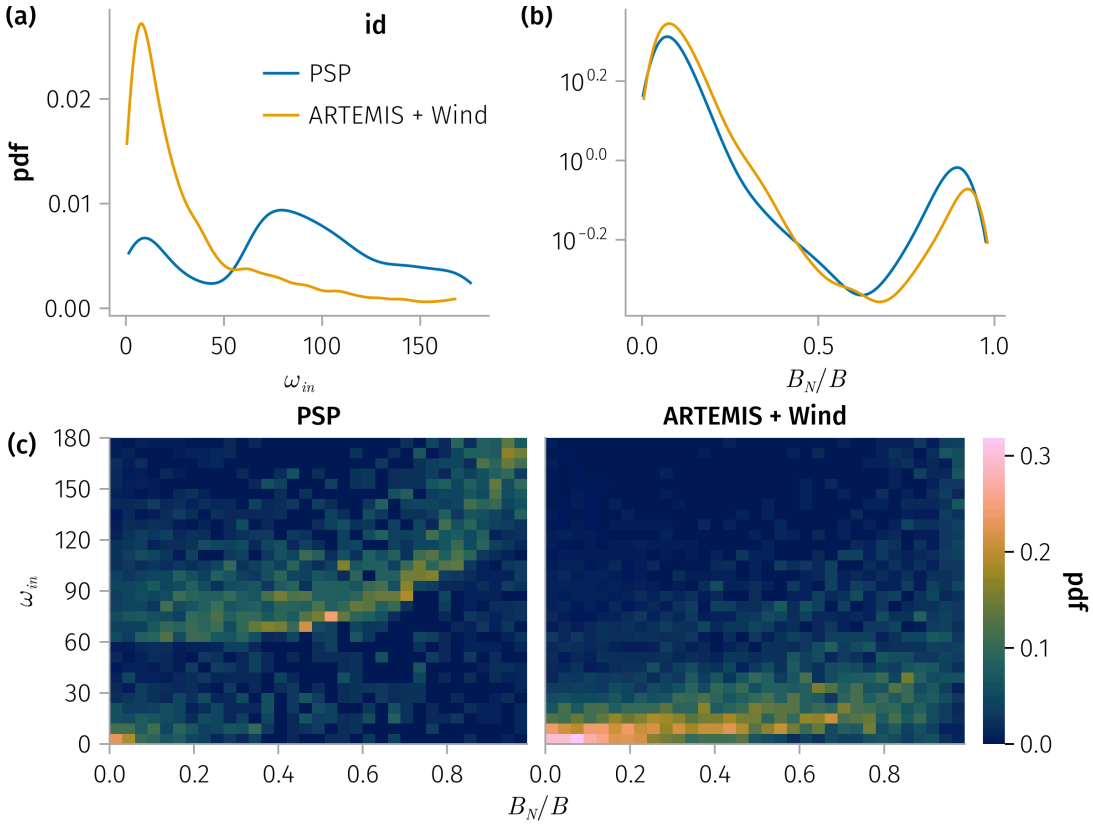


Figure 6: In-plane rotation angle, ω_{in}, evolves significantly. Bimodal $\frac{B_N}{B}$ likely reflect the coexistence of several populations.