Supporting Information for ”The Lifetimes of Equatorial Plasma Structures”

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Contents

This document contains four supplementary figures (Figures S1 -- S4) and their caption texts.

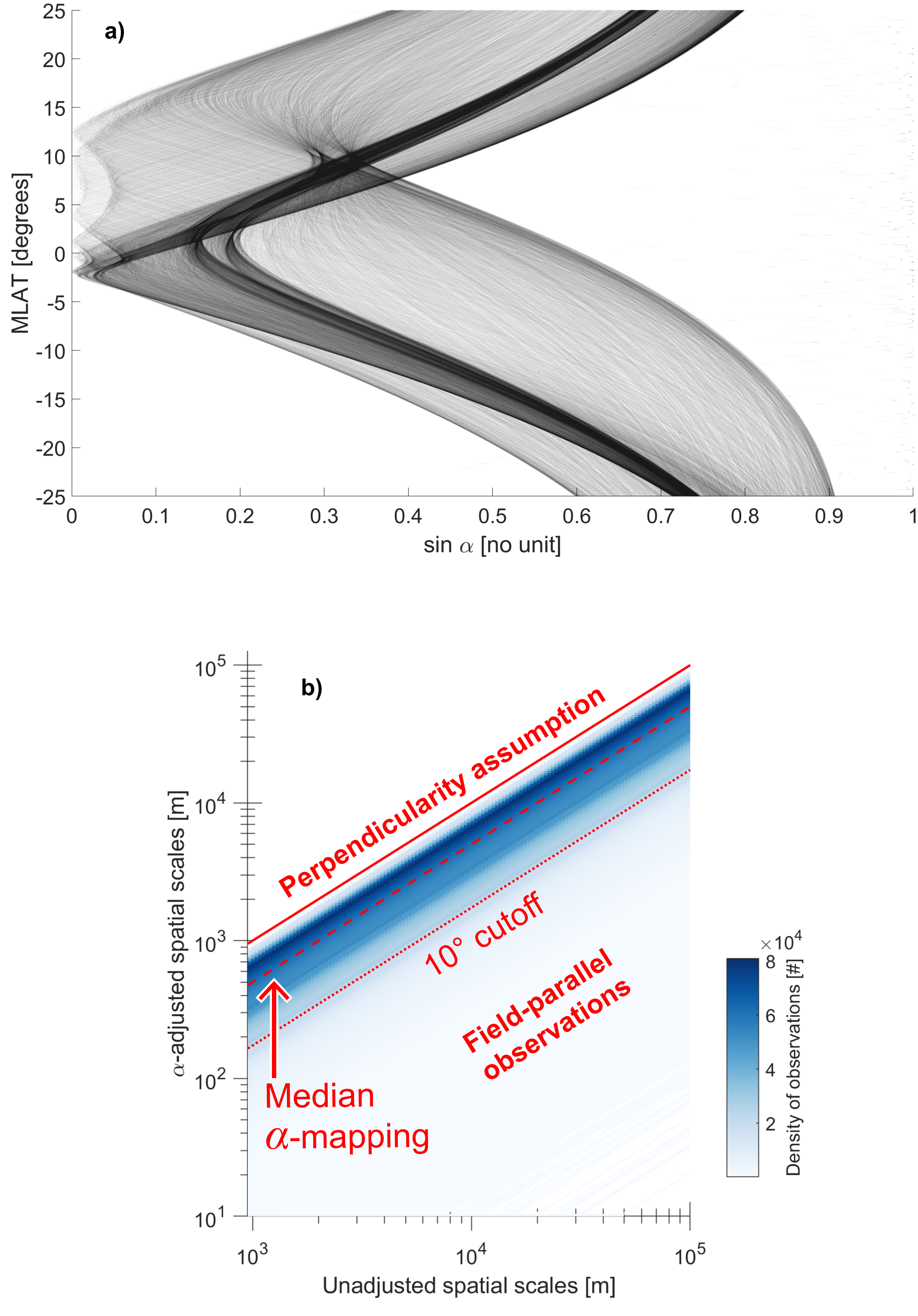

Figure S1. The geometry of a spacecraft orbiting obliquely against Earth's magnetic field lines near the magnetic equator, making an angle α against the field-line. **Panel a)** shows some three millions calculations of α made during plasma irregularity observations, with magnetic latitude on the y-axis and sin α on the x-axis.

Panel b) shows the mapping in irregularity spatial scale by α from assumed perpendicularity (solid red line) to the adjusted spatial scales (blue colormap) for the same 3 million calculations of α. Mapping: the spacecraft velocity vector can be decomposed into a field-parallel and field-perpendicular component. The adjusted (α-mapped) spatial scale is written, $L_\alpha = f \sin\alpha / v_{sc}$, f being sampling frequency, L_α the perpendicular spatial scale, and v_{sc} the spacecraft velocity. The lower right corner of the plot represents the relatively few observations that are virtually paralell with Earth's magnetic field lines.

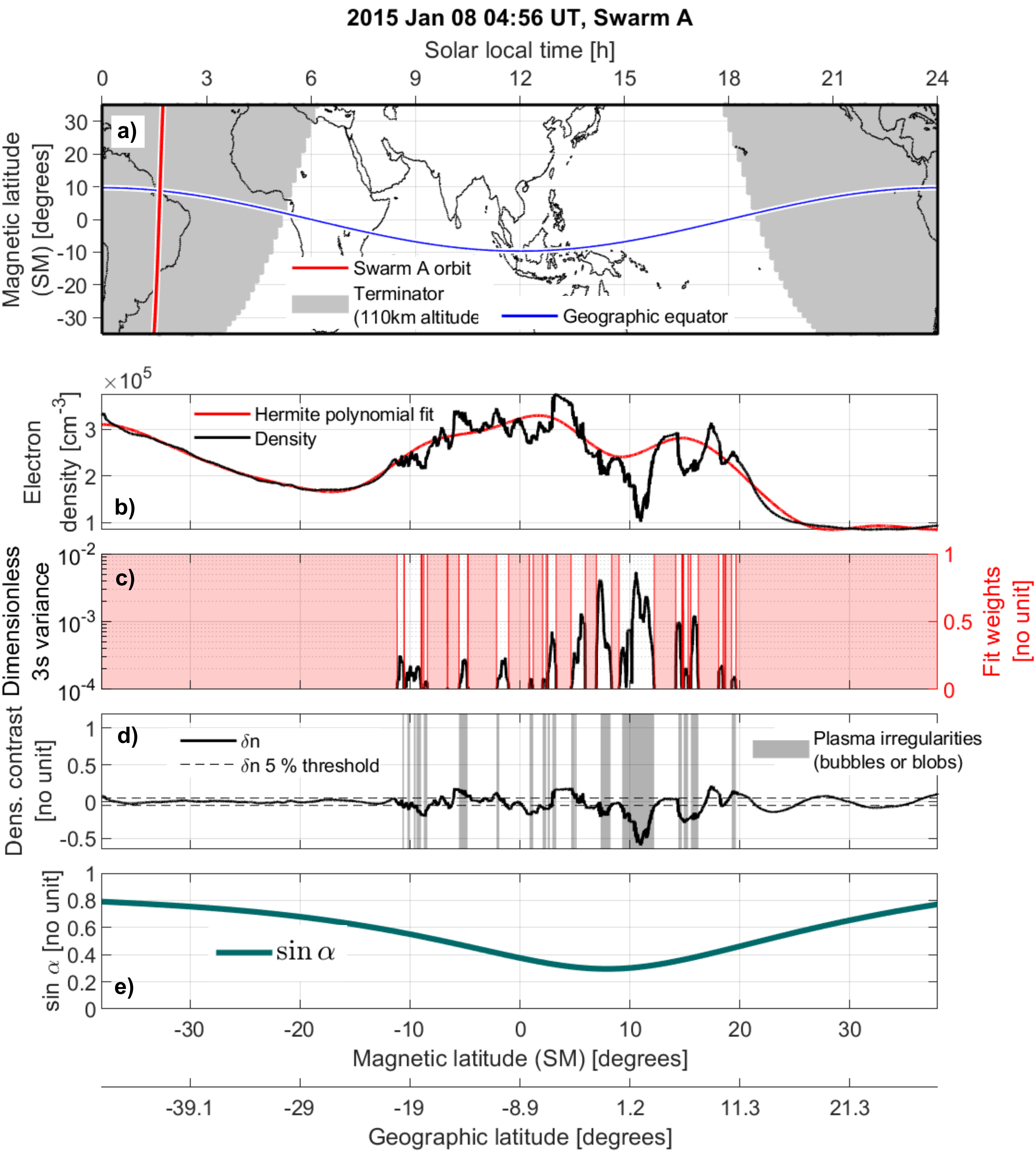

Figure S2. Example of a equatorial pass made by Swarm A at 05:00 UT on 8 January 2015. For explanations, see Figure 1 in the Main Article.

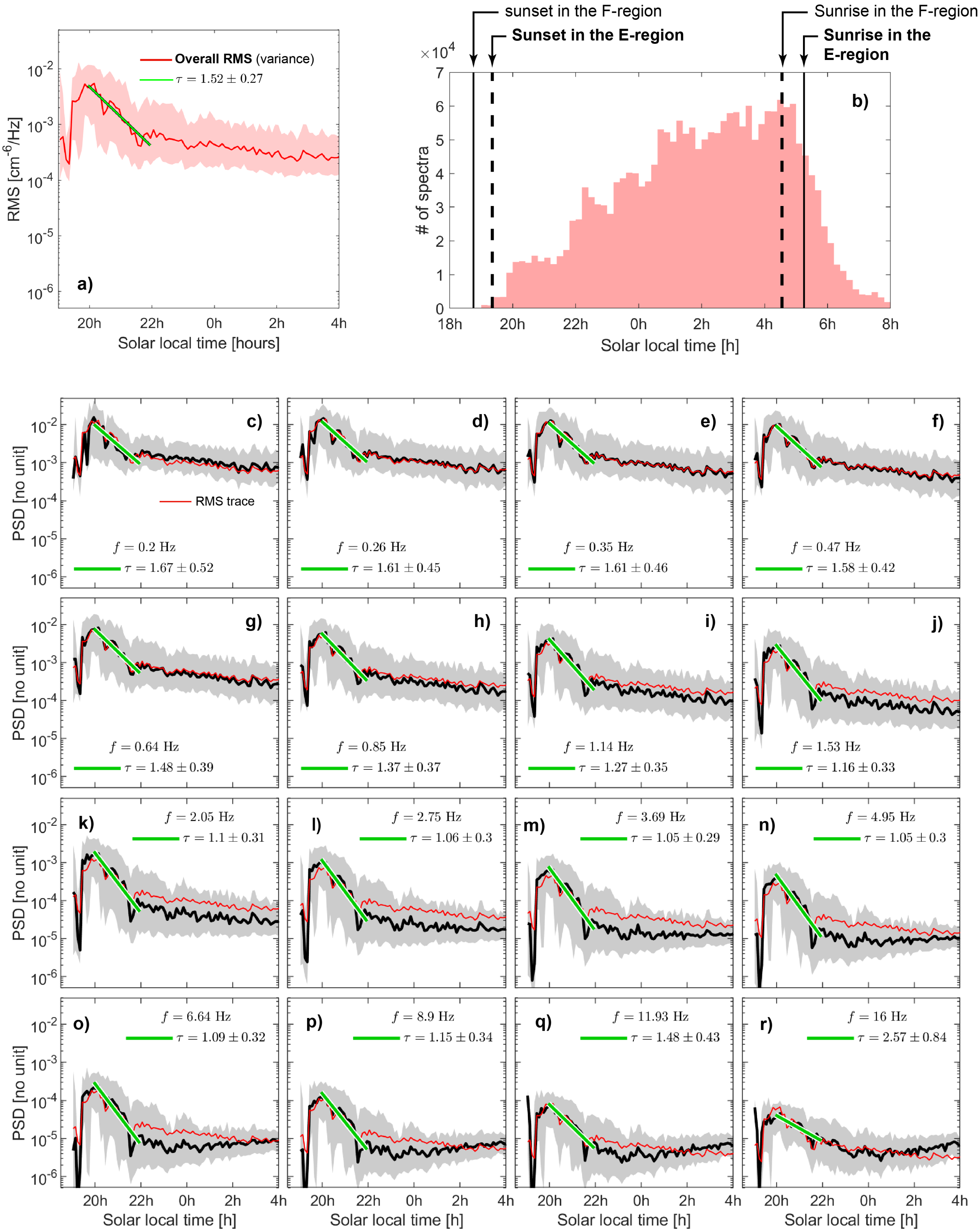

Figure S3. The exponential decay in each wavenumber calculated using density contrast, or Δn/n - 1. For explanations, see Figure 4 in the Main Article.

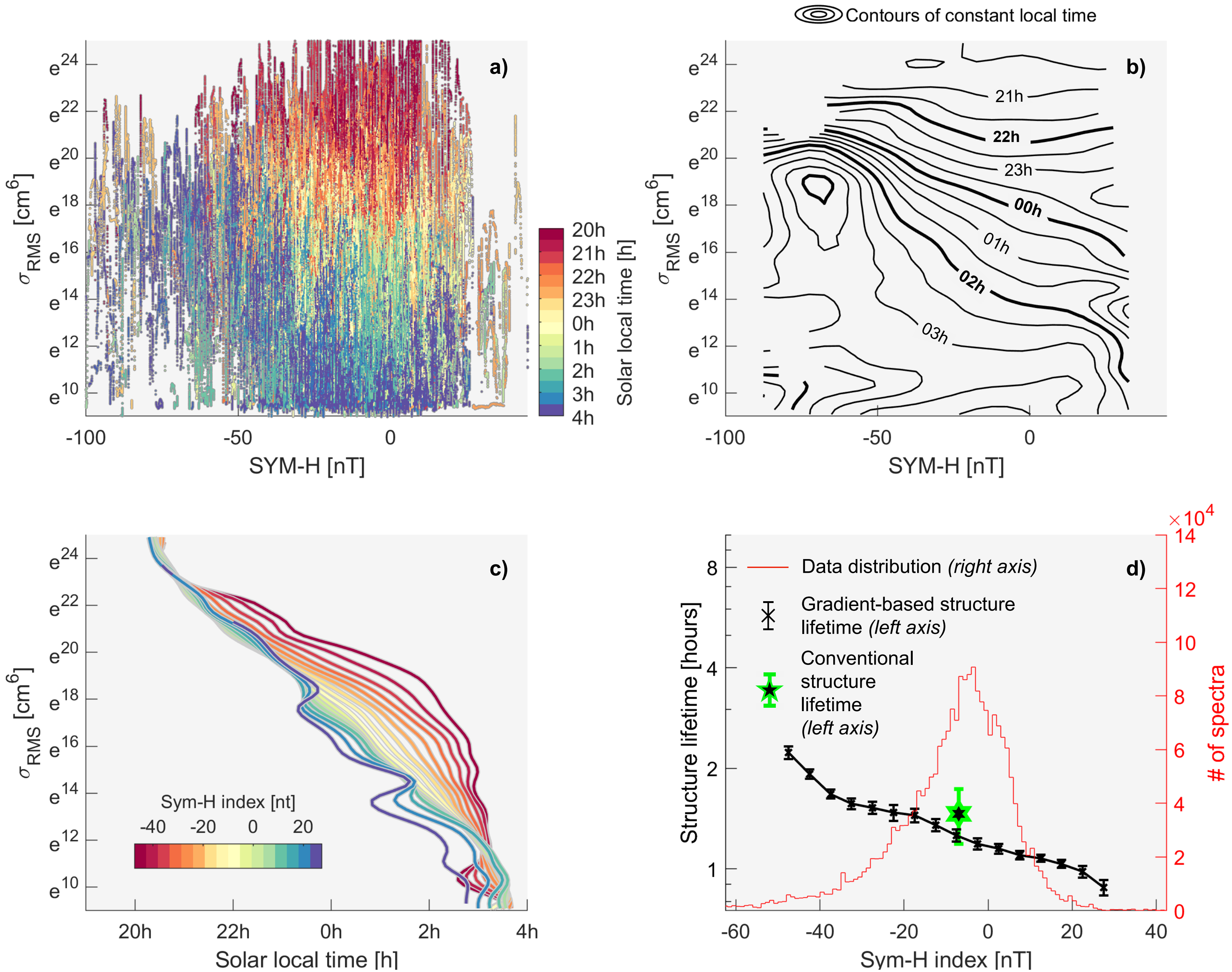

Figure S4. Panel a) shows a scatterplot of 2.1 million irregularity spectra, with total RMS (variance) along the y-axis and the Sym-H index along the x-axis, with solar local time colorcoded in each point. **Panel b)** shows a smooth surface based on the data in Panel a), created with a Gaussian blur filter, with contours of constant solar local time in solid black lines. **Panel c)** shows vertical solar local time-gradients at 16 different values of Sym-H (colorcoded). **Panel d)** shows structure lifetimes based on the exponential decay $\sigma_{RMS} = \exp(-2\times SLT/\tau)$ in the 16 same gradients, black cross symbols, with errorbars denoting the fit's 95th percent confidence intervals. The single absolute density-based structure lifetime estimate (Figures 4 and 5 in the Main Article) is shown in green, and the total distribution in Sym-H values is plotted with red (right axis).