

**Identifying the variety of jovian X-ray auroral structures: tying the morphology of X-ray emissions to associated magnetospheric dynamics**

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**Contents of this file**

Data Set S1

Figures S1 and S2 (caption only)

Figure S3

**Additional Supporting Information (Files uploaded separately)**

Data Set S1 given in .zip file

Figures S1 and S2 given in uploaded PDFs

## Introduction

The datasets and figures presented here are not crucial to understand this paper but used to emphasize and aid in recreating the main results. We present the following:

- Coordinates (in SIII lon, lat) of the vertices used to define the X-ray auroral structures described in Figure 1 (separate file; **Date Set S1**).
- List of figures showcasing our CML spatial selection (i.e., motivation behind our selected CML range) from the X-ray light curves and the spatial distribution of the selected photons (separate file; **Figure S1**).
- List of figures showing **all** 2D histograms used in our analysis in the style of Figure 1 and the various morphologies as highlighted in Figure 3 (separate file; **Figure S2**).
- Scatter plots showing the correlation between %LLE and %polar photons with each other and solar wind dynamic pressure inferred from the Tao et al., (2005) model (shown here; **Figure S3**).

The files are designed to allow the reader to gain extra information and context about the main results of the paper, and to potentially identify case studies for further research.

**Data Set S1.** Zip file containing text files for location each X-ray structure boundary. Coordinates are in System III system (SII lon, lat). Zip file name: **dataset\_S1.zip**. **NOTE:** each text file provides the vertices of each polygon. Each has file name of format: <X-ray\_region>\_boundary\_v1.txt

**Figure S1.** 2D histograms of all auroral observations analyzed in this research in the same format as Figure 1. The Observation ID (ObsID) of each Chandra observation is shown at the top of each figure. More information of each ObsID (e.g., date, concurrent HST observation etc.) can be found in Table 1 in text. **See FigureS1.pdf**

**Figure S2.** Multipaneled plot showing which portion of the light curve was selected for analysis using our CML thresholding, for all Chandra observations. The full X-ray light curve and down selected region (shown by dashed red box) are displayed in panels (a) and (b). Panels (c) and (d) show comparisons of the CML distributions of each photon with the SIII longitude and latitude. The purpose of this figure is to show that we always select the peak of the X-ray curve when the full auroral region is view, and disregard any

emergences of the envelope that can appear at the beginning/end of the observation window. **See FigureS2.pdf**

**Figure S3.** Scatter plots showing the correlation between (a) % of photons observed in the polar region vs LLE region; (b) % of photons in polar region vs. solar wind dynamic pressure (in log scale) found from Tao model during each interval and (c) similarly for LLE photons. Different colors represent each single Chandra observation. Figure on next page.

