SOXS

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The SOXS (Solar X-ray Spectrometer) payload flown on the GSAT-2 mission was built by PRL (Physical Research Laboratory) in Ahmedabad, India, part of the Indian Space Research Organisation, Department of Space. The primary objective was to study X-ray spectra from solar flares with high spectral and temporal resolution. GSAT-2 was launched on 8-May-2003, and SOXS was operational from 1-Jan-2004 to 2-May-2011.

SOXS observed full disk integrated flux from the Sun in the 4 keV to 10 MeV energy range with high spectral and temporal resolution. SOXS consisted of a Low Energy Detector (SLD) and a High Energy Detector (SHD). This site provides only data from the SLD. The SLD consisted of the following two solid state detectors:

- Silicon P-intrinsic-N (Si-PIN) - provides counts in 252 energy bins between 4 and 25 keV (with sub-keV resolution for the full range) with 3s time bins during quiet time, and 100ms time bins during flares
- Cadmium-Zinc Telluride (CZT) - provides counts in 238 energy bins between 4 and 56 keV (with ~1.7 keV resolution for the full range) with 3s time bins during quiet time, and 100ms time bins during flares

The SLD is mounted on the Anti-Earth View Deck of GSAT-2, allowing observation of the Sun for 12 hours continuously. However, the data files provided by PRL usually contain one to three hours of data.

The SOXS data are collected in an archive, in daily files called dd-mmm-yyyy.les where dd, mmm, yyyy are the day, month, and year of the data. Both the the Si and CZT data are contained in the single daily .les file.

Two SSWIDL tools provide easy access to the SOXS data - OSPEX, a spectral analysis software package and SHOW_SYNOP, a synoptic data viewing tool. In addition, the routine read_soxs_4_ospex.pro in SSW can be called directly to read a .les file and return a structure containing the count rates, time bins, energy bins, livetime, response matrix and more.

To analyze SOXS data in OSPEX,

1. Start the OSPEX GUI in SSWIDL, e.g. o=ospex()
2. Click File / Select Input
3. On the Select Input widget, click Browse / On remote sites...
4. On the Select Time or Flare widget, enter the time interval directly, or select a flare from the GBM or RHESSI flare catalogs to select a time
5. Change Data Type pulldown to SOXS
6. Click Search

7. The .les files found (if any) that cover your time interval will be displayed and highlighted
8. Highlight the files you want
9. Click Accept and Close
10. A popup menu will appear - choose either Si or CZT

The SOXS files will be copied to your current working directory. You can now proceed to plot and analyze the SOXS data you've selected in OSPEX.

Notes:

- If you selected more than one .les file, the first one in the list will be selected for use in OSPEX; the others are on your computer now, and can be selected by clicking Browse / On this computer in the Select Input widget.
- To select the other SOXS detector (Si or CZT), put your cursor on the file name field in the Select Input widget and hit Enter - the popup menu should appear allowing you to choose Si or CZT.
- The SOXS response matrix is computed, so you don't need to provide a separate response file.
- The default location of the SOXS archive is https://umbra.nascom.nasa.gov/soxs/. The user can change that through two environment variables, SOXS_HOST and SOXS_TOPDIR via, for example:
    setenv,'SOXS_HOST=hesperia.gsfc.nasa.gov'
    setenv,'SOXS_TOPDIR=/soxs'

To view the SOXS data in SHOW_SYNOP,

1. Start the show_synop GUI by typing: show_synop in SSWIDL
2. Select the time of interest
3. Select SOXS from the remote sites pulldown list and click Search
4. Highlight the found filenames you want and click Download
5. The requested files will be copied to the local directory specified in the widget
6. Highlight the desired file(s) and click Display

Resources:

- [Solar S-Ray Spectrometer (SOXS) Development at Physical Reserach Laboratory/ISRO, 2001](#)
- [Study of Microflares through SOXS Mission, 2006](#)
- [Solar X-ray Spectrometer (SOXS) mission - Low energy payload - First results, 2006](#)
- [Solar X-ray Spectrometer (SOXS) mission: Observations and new results, 2006](#)