IHOP_Submission

Title of Proposed Observation:

Solar Flare Sounding Rocket Campaign: FOXSI-5

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SSC Point of Contact: General: Adam Kobelski, Jessie Duncan (NASA/MSFC) / Tetsuya Watanabe (NAOJ) / Bart De Pontieu (LMSAL), XRT -- Katharine Reeves/Paola Testa (SAO)

Main Objective:

To perform coordinated observation with the FOXSI-5 solar flare sounding rocket campaign.

Scientific Justification:

The solar flare sounding rocket campaign aims to observe a solar flare (>C5 class) with the Focusing Optics X-ray Solar Imager (FOXSI-5). FOXSI is a direct imaging telescope, designed for imaging spectroscopy in soft and hard X-rays. It aims to probe some of the fundamental questions of solar flares, such as (a) understanding the mechanism of particle acceleration, (b) studying the reconnection process, and (c) investigating plasma heating mechanisms and determining the effects of energy input into the chromosphere. We propose to perform coordinated observations with Hinode EIS and XRT during the FOXSI-5 flight, along with other participating observatories, to obtain unprecedented coverage of plasma diagnostics (such as temperature and density) of the flaring region and take advantage of an invaluable opportunity for coordinated solar science. We propose EIS observations with the widest slot, sit-and-stare mode, and with almost the entire detector, to determine spectrally pure maps of the FOV. For XRT, we propose high-cadence filter-pair observations with flare mode to track the time evolution of the hot plasma from the impulsive phase. This provides a unique opportunity to cross-validate inversion of the EIS spectroheliogram and XRT impulsive phase data in conjunction with sounding rocket observations, which will be helpful for several upcoming solar space missions.

Dates: Start date to End date: 01 May 2026 to 15 May 2026; we note that the launch window may be moved up to late April 2026, and we will provide any updates as they are available.
Reason: A two-week window is assigned for the solar flare sounding rocket campaign. The date of launch will be fine-tuned based on solar activity. Once launched, FOXSI observations will last 5-6 minutes. Consecutive days are desired.

Time window: Time window: 19:18 - 00:18 UT.
Short interruptions: Not allowed during the observing period; if poorly timed, the whole FOXSI-5 observing period could be missed.

Target(s) of interest: Flaring active region

SOT requests:

None

EIS requests:

In the previous campaign the following study was used:
EIS study ID: 649 DHB_HiC_FOXSI_01
This study is being modified to reduce the exposure time to 10s and will be updated to DHB_HiC_FOXSI_02

To reduce telemetry consumption, EIS will be set to respond to the XRT flare trigger.
EIS CO should set up hunter study Flare266_Hunter01 and enable the XRT flare trigger with response study #TBD DHB_HiC_FOXSI_02.
Run each day during observing window: 19:18 - 00:18UT.

The below text gives a description of the basic outline of the study.

Observation of almost the entire EIS detector including the entire long wavelength channel detector and list of lines in the short wavelength channel outlined below. This requirement is important to perform high-fidelity inversion on the EIS spectroheliogram data.

This is a 266" (full CCD) slot Sit and Stare study designed to coordinate flare observations with the flare sounding rocket campaign.

TARGET : Flaring Active Region
SLIT : 266" slot
FOV : 266"x256"
EXPOSURE TIME : 10s
DELAY : - (20s)
DURATION : - (TBD)
VOLUME : 3 Mbits per exposure (for full detector)
COMPRESSION : JPEG75

List of EIS lines required : Entire detector for long wavelength channel and the following line list for the short wavelength channel.

Required EIS line list for SW channel
ION WAVELENGTH (ANG) ION WAVELENGTH (ANG)
FeX 174.531 FeX 177.24
FeXI 180.401 FeXI 182.167
FeX 184.537 FeVIII 185.213
FeVIII 186.598 FeXII 186.854
FeXII 186.887 FeXI 188.216

FeXI 188.299 FeIX 188.493
FeIX 189.935 FeX 190.037
FeXII 190.04 FeXII 192.394
FeXI 192.813 FeXII 193.509
FeVIII 194.661 FeXII 195.119
FeXIII 196.525 FeXII 196.64
FeIX 197.854 FeXIII 200.021
FeXIII 202.044 FeXI 202.705
FeXII 203.728 FeXIII 203.795
FeXIII 203.826 FeXIII 204.942
FeXIII 209.916 FeXIV 211.317

XRT requests:

Please use the XOB for HOP 0480;
Normal mode: Thin/Be and Med/Be AR program, 384”x384”, AEC = 1, ~60 s cadence
Flare mode: Thin/Be and Med/Be, 384”x384”, AEC = 3, ~5 s cadence (or as fast as possible) | No G-band or darks | No stop for BAD_PHOTO events

Pre-flare buffer same as Flare Mode

IRIS requests:

An IRIS observing proposal has been submitted to iris_request@lmsal.com by Juliana Vievering, and the campaign dates have been added to the IRIS calendar.

Additional instrument coordination:

FOXSI-5
DKIST
BBSO/GST

Previous HOPs:

No prior HOP from PI

Additional remarks: