SOHO Joint Observing Programme 28

STREAMERS

Authors: R.A. Harrison (CDS), J.L. Culhane (CDS), J. Raymond (UVCS), P. Lemaire (SUMER) and R. Howard (LASCO)

Progress:

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Objective: Investigation of plasma diagnostics, structure and evolution of streamer legs, footpoints, cusps and current sheets using CDS, SUMER, UVCS and LASCO.

Conditions Necessary to Run: Minimum requirement is the operation of CDS or SUMER on known components of a streamer structure (which can be identified by SOHO or ground-based observations).

Scheme: CDS and SUMER are to be directed to a series of locations covering the legs, footpoints, cusp region and current sheet regions of a streamer above the limb, while UVCS and LASCO monitor the higher portions of the streamer.

There are many outstanding questions concerning streamer structure, evolution and stability. For example:

- What is the temperature, density and flow structure of a streamer? Why is a streamer stable? What is the nature of any cavity region?
- What is the flow structure in and around the leg structures? Can this be related to the slow speed solar wind?
- What differences in diagnostic and structural properties can be detected between the legs, the cusp region and the current sheet region?

In this campaign we co-ordinate the diagnostic capabilities of the SOHO payload to examine selected regions of a streamer. This can be done with the streamer at the limb but, for vertical velocity fields, it would be useful to also include some streamers some tens of degrees off the limb.

Pointing: A streamer should be selected and several regions of interest identified in which to centre the CDS and SUMER pointing. These should include the legs and footpoints, the cusp region and the current sheet. Generally one should choose streamers close to the limb, for better alignment with UVCS and LASCO, but occasionally we should select a streamer some tens of degrees off the limb.

Frequency: This scheme could be run as part of a streamer campaign but should certainly be run several times in the first months of the SOHO scientific operation.

Operating Details:

- **CDS**

Spectrometer: Normal Incidence
Slit: 4 x 240 arcsecond
Raster area: 4 x 4 arcminute, 60 locations with 4 arcsecond steps.

Exposure time of 250 seconds giving total raster duration of 255 min including overheads.

Line selection: 11 lines comprising the Iron Line Selection which provides a wide temperature range of Fe ions from Fe X to Fe XII. These are relatively bright ground transition lines and includes a He I line for co-registration with cooler temperature observations (522.2Å is chosen rather than 584Å to avoid overflow. The lines are -

Ion	Wavelength (Å)	Log Te	Comment
He I	522.20	4.3	Cool line
Fe X	345.74	6.1	
Fe XI	369.16	6.1	
Fe XII	338.26	6.2	Density diag. w. 364Å
Fe XII	364.47	6.2	(see above)
Fe XIII	348.18	6.2	Density diag. w. 359Å
Fe XIII	359.64	6.2	(see above)
Fe XIV	334.17	6.3	
Fe XVI	335.40	6.4	
Fe XXI	335.9	7.1	Hot, flare-like
Fe XXII	349.3	7.1	Hot, flare-like

Select 21 bins across each line - no compression required.
The sequence is not run in response to a flag.
Repeat on 3-4 selected locations as required.
CDS Study = STREM.

- **SUMER**

Pointing must be done in a way which is consistent with the CDS locations as the campaign progresses. It is suggested that SUMER use a version of POP 25 with longer exposure times.

- **UVCS**

TBD

- **LASCO**

TBD

Other Instrumentation:

Coronal support may be given by the Mk III K-coronameter on Mauna Loa, Hawaii - for the identification of streamers and monitoring during the campaign.

Global X-ray imaging of the streamer base area can be supplied by the Yohkoh, SXT instrument. Given the fact that the CDS and SUMER devices can only image portions of the streamer and the UVCS and LASCO instruments will be concentrating on the higher corona, such imaging may be extremely useful.