

SOLAR-A

Y. Ogawara

SOLAR-A MISSION

(1) Mission Objectives

Investigation of the high energy phenomena
on the sun with a coordinated set of instruments

(2) Launch

Date: August/September 1991
Site: Kagoshima Space Center (KSC)

(3) Mission Life

Nominal: 2 years
(Orbital Life 3-4 years)

(4) Management: ISAS

Participating Institutes
ISAS, NAOJ, U.Tokyo, Kyoto U., Nagoya U.,
Rikkyo U., etc. (Japan)
LPARL, Stanford U., UC Berkeley, U. Hawaii,
NIST (U.S.A.)
MSSL, RAL (U.K.)

SOLAR-A

DESIGN PHILOSOPHY

CONCENTRATE OF THE OBSERVATION OF HIGH ENERGY
RADIATION (X-RAYS AND GAMMA-RAYS) WITH AN EMPHYASIS
ON THE IMAGING OF SOFT AND HARD X-RAYS

HIGH SPATIAL RESOLUTION: A FEW ARC-SEC
HIGH TIME RESOLUTION : ONE SECOND OR LESS
WIDE ENERGY RANGE : SOFT X-RAY TO HARD X-RAY
(AND GAMMA-RAY)
WIDE FIELD OF VIEW : WHOLE SUN

SOLAR-A

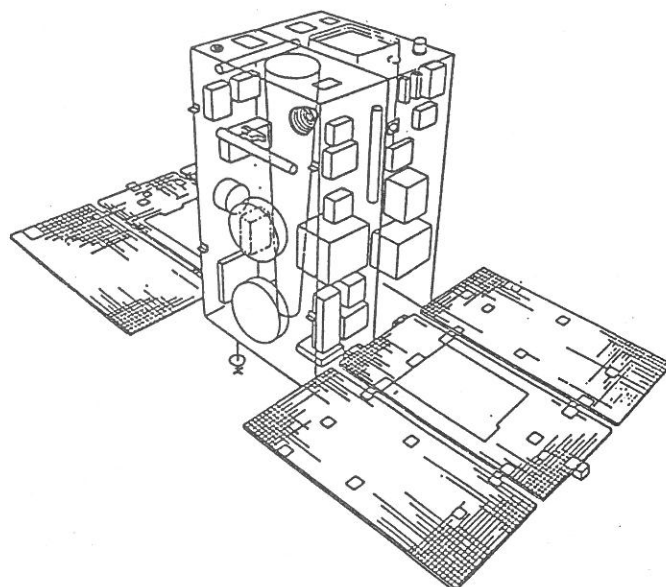
SPACECRAFT

SIZE	: 1m x 1m x 2m
TOTAL WEIGHT	: 400 kg
SCIENTIFIC PAYLOAD	: 100 kg
DATA RATE	: 32 kbps (4 kbps, 1 kbps also available)
DATA RECORDER	: 80 Mbits (mag. bubble) play back 262 kbps
TELEMETRY	: S-band and X-band
ATTITUDE CONTROL	: 3 axis stabilization pointing the sun stability 1 arcsec/1 sec 7 arcsec/1 min. max. offset angle 45 arcmin
ORBIT	: altitude 600 km (apogee) eccentricity = 0 inclination 31 deg period 97 min.

SOLAR-A

SCIENTIFIC PAYLOAD

HARD X-RAY TELESCOPE (HXT)	: JAPAN
SOFT X-RAY TELESCOPE (SXT)	: US - JAPAN
BRAGG CRYSTAL SPECTROMETER (BCS)	: UK - JAPAN
WIDE BAND SPECTROMETER (WBS)	: JAPAN



The Solar-A Observatory

The Solar-A Observatory

Bragg Crystal Spectrometer

Soft X-ray Telescope

X-ray Optics

Mirror	Nariai-Werner Double Hyporboloid single piece, gold on Zerodur (Walter Type I modified)
Diameter	230 mm
Geometric Area	250 mm ²
Focal Length	1550 mm
Wave Range	4 ~ 50 Å
Resolution	2.5 arc sec (over Solar diameter)

Aspect Telescope

Aperture	50 mm
Focal Length	1550 mm
Transmission Band	
W. Band	4600 - 4800 Å
N. Band	4293 - 4323 Å

Wavelength Range

S XV:	5.0160-5.1143 Å
Ca XIX	3.1631-3.1912 Å
Fe XXV	1.8298-1.8942 Å
Fe XXVI	1.7636-1.8044 Å

Sensitivity/SMM

About 10X improvement

Spectral Resolution

3000 - 6000

Time Resolution

1 sec

Field of View

Whole sun (no imaging)

Data Rate

2 Kbps

Data queue size

384 Kbits

The Solar-A Observatory

Filter Wheels

- 6 position filter wheel x 2 in series
- 6 X-ray analysis filters
- 1 10 % Tr. X-ray mask
- 2 Opt. filters
- 1 Opt. diffuser
- 2 Open Position

Detector

VPCCD 1024 x 1024 (18.3 µm pixels)

Hard X-ray Telescope

Telescope Type

Fourier Synthesis Collimator

Number of Subcollimators

64 (32 sine-cosine pairs)

Angular Resolution

~ 5 arc sec

Field of View

Full Solar Disk

Image Synthesis Aperture

2 arc min

Total Area

~ 88 cm²

Detector Type

NaI(Tl) on Square Phototubes

Energy Range

10 - 100 keV

Energy Bands

4 Channels

Time Resolution

0.5 sec

The Solar-A Observatory

Wide-Band Spectrometer

Instrument	Detector	Energy	PH Data mode	PC Data Mode
SXS	Prop. C.	2-30 keV	128 ch/2 s	2 ch/0.25 s
HXS	NaI(Tl)	20-400 keV	32 ch/1 s	2 ch/0.125 s
GRS	BGO (2)	0.2 - 10 MeV	128 ch/4 s	2 ch/0.25 s
		8 - 100 MeV	16 ch/4 s	2 ch/0.5 s
RBM	NaI(Tl)	4 - 400 keV	32 ch/1 s	2 ch/0.25 s
	Si SSD	> 20 keV	-----	1 ch/0.25 s