

ILWS WG; 14 April 2003

Japanese Contribution to ILWS



Takeo Kosugi, ISAS

Maki Akioka, CRL

1. Solar Physics Mission: **SOLAR-B** (2006)

2. Terrestrial Magnetosphere Missions:

Akebono & GEOTAIL \Rightarrow **SCOPE** (201?)

3. Heliospheric (Planetary) Missions:

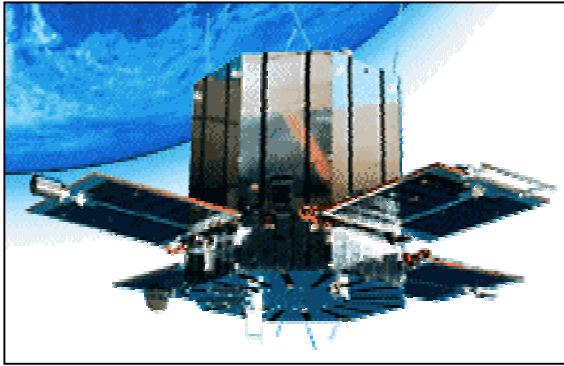
Nozomi \Rightarrow **Venus Climate Orbiter** (2008)

BepiColombo MMO (2011)

4. Space Weather Mission: **L5** (201?)

5. Ground-based Observations

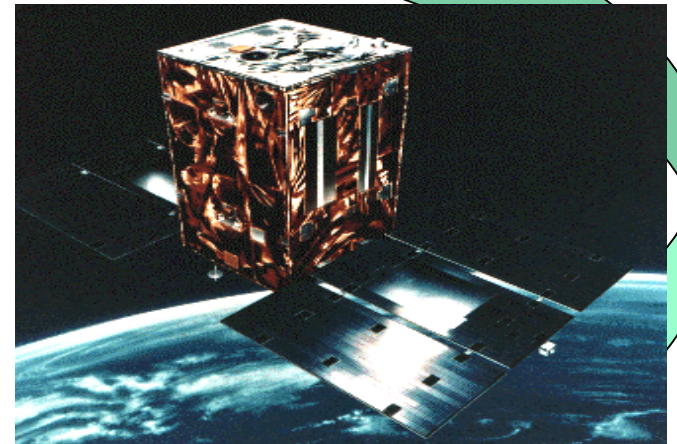
Solar Physics (ISAS)



Hinode (1981-1982)

Yohkoh (1991-2001)

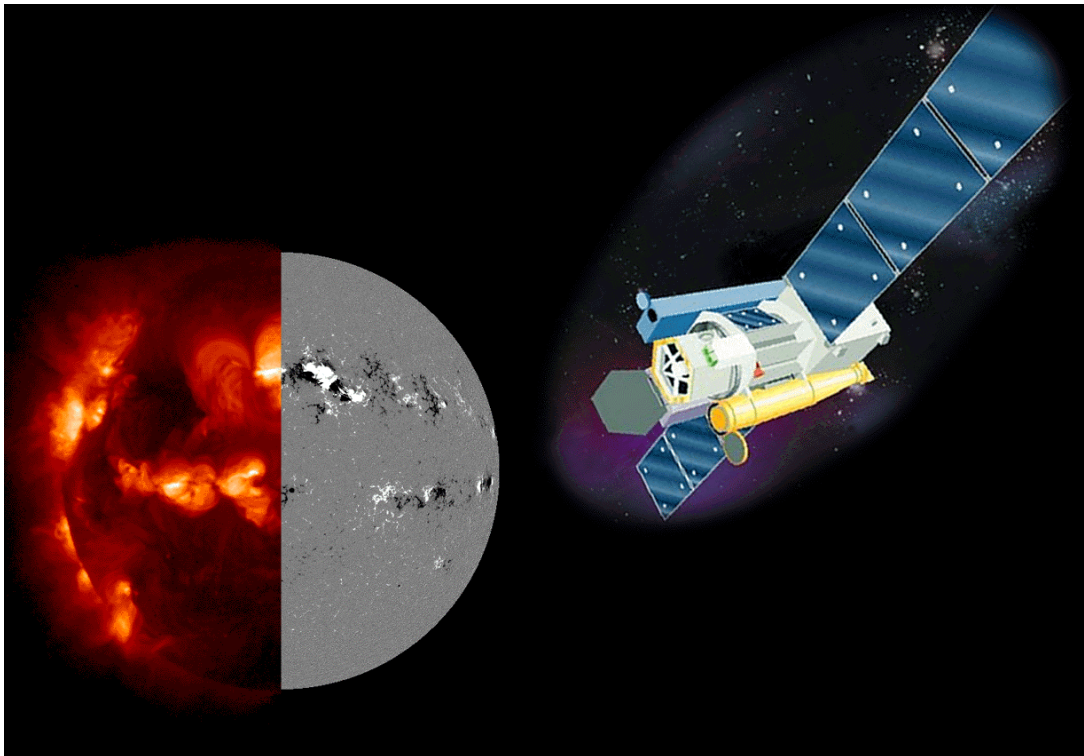
SOLAR-B (2005)



Science

- Coronal heating
- Coronal structure / dynamics
- Elementary processes in Magnetic Reconnection

SOLAR-B



Launch Date:

**Summer 2005,
with ISAS M-V-7**

Orbit:

**Sun synchronous
altitude ~ 600 km**

Weight: ~ 900 kg

Solar Optical Telescope (SOT) **SOLAR-B** X-ray Telescope (XRT) EUV Imaging Spectrometer (EIS)



International Collaboration

SOLAR-B

ISAS (Japan): Integration of S/C; Launch & Operation

Mission Instruments:

SOT (optics), XRT (camera), EIS (I/f to S/C)

NASA (US):

SOT (focal plane package), XRT (optics / mech.),

EIS (optics components), NASA polar station(s)

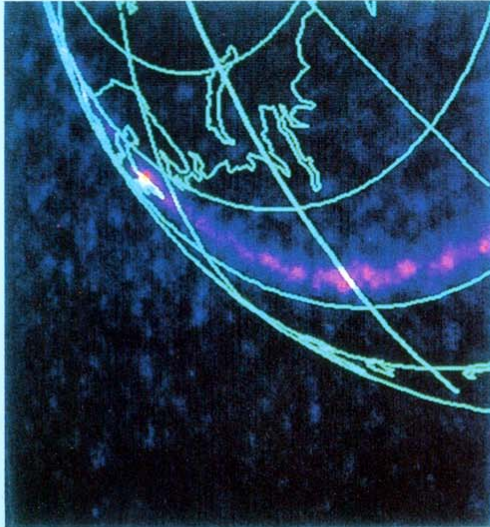
PPARC (UK): EIS (structure, detectors & electronics)

ESA: Polar station(s) for data downlink

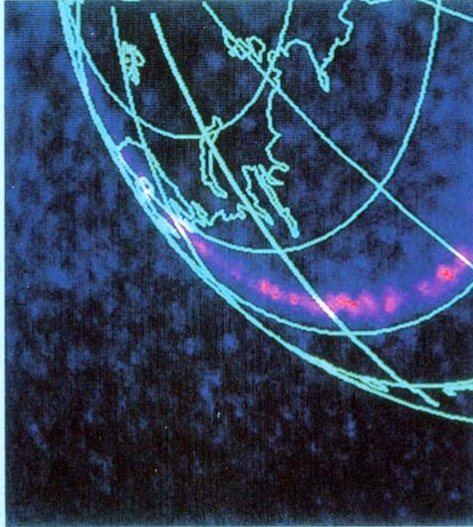
Joint Operations and Data Analysis

Aurora observe by AKEBONO

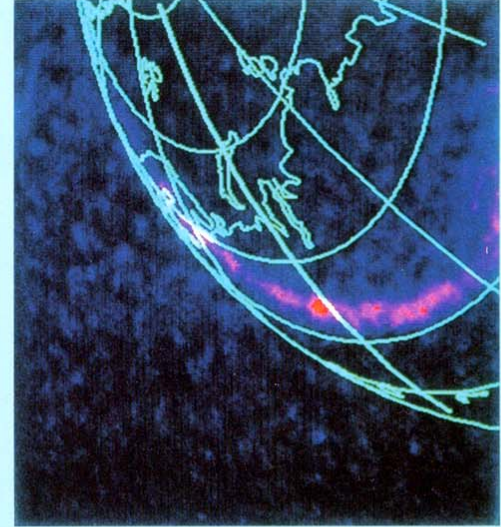
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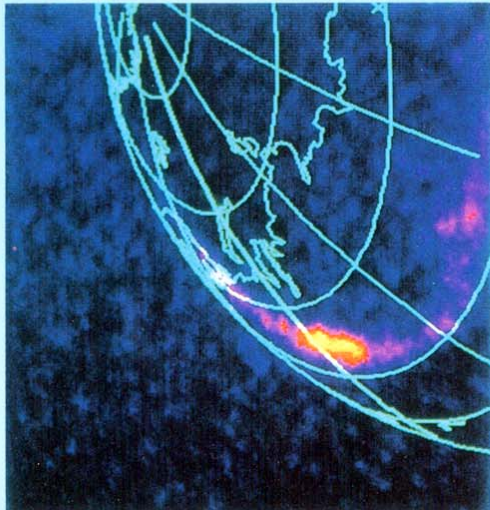
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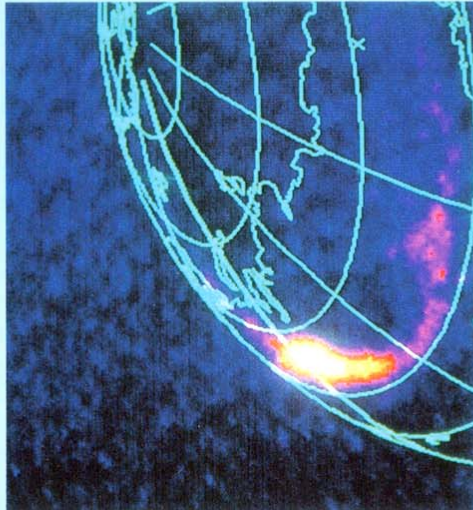
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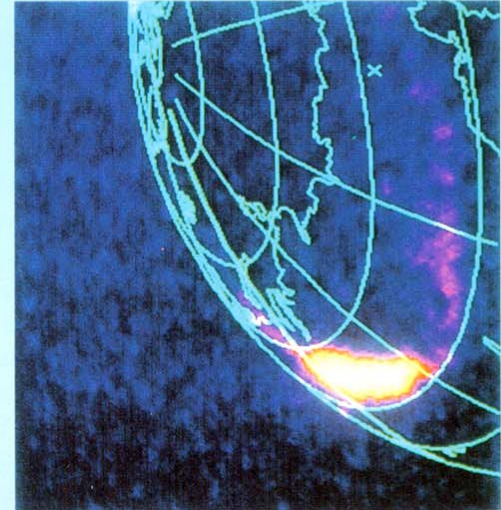
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19:26:00 UT Nov.17,1989



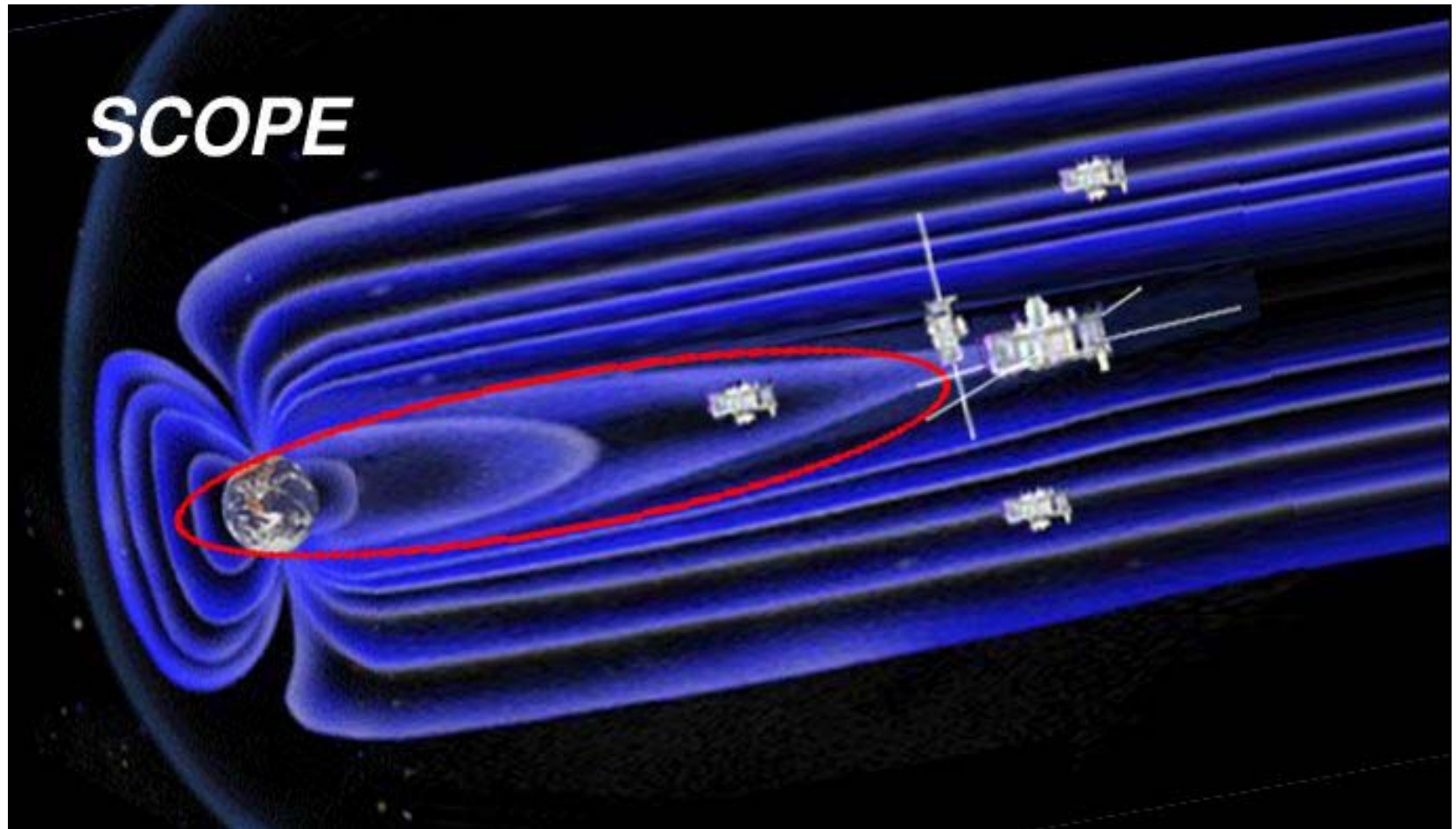
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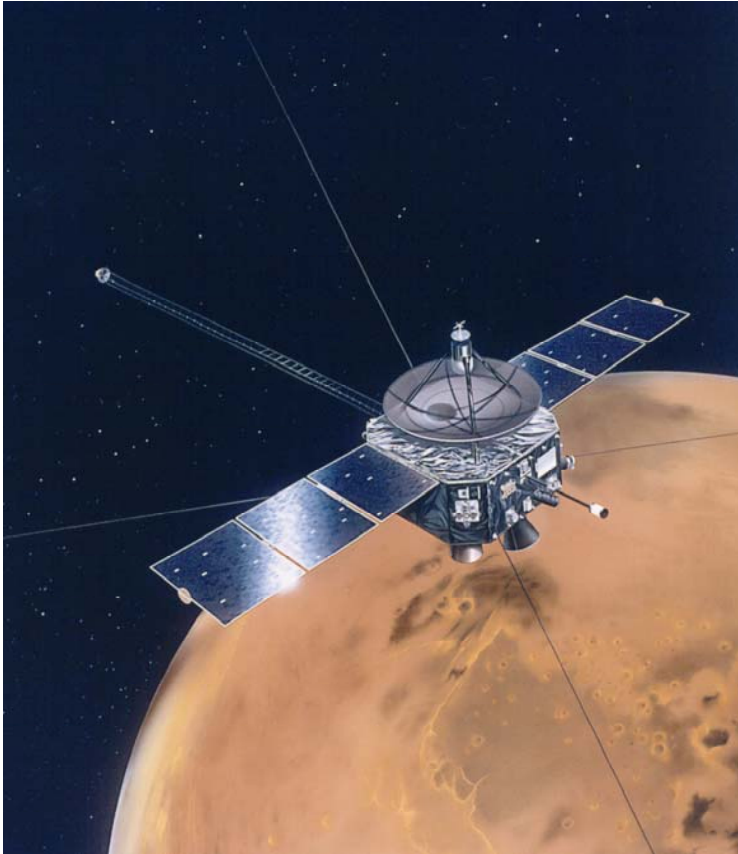
GEOTAIL: an ISTP mission



SCOPE *Formation Flight
for the Study of Magnetospheric Physics*



Nozomi (Mars Orbiter)



Science targets

- Upper atmosphere
 - Solar wind interaction
 - Atmosphere escape
 - Magnetic field
- Moons and dust
- Surface and sub surface

Launched :

July, 1998

Mars Orbit Insert :

January, 2004

PLANET-C: Venus Climate Orbiter

Atmospheric dynamics

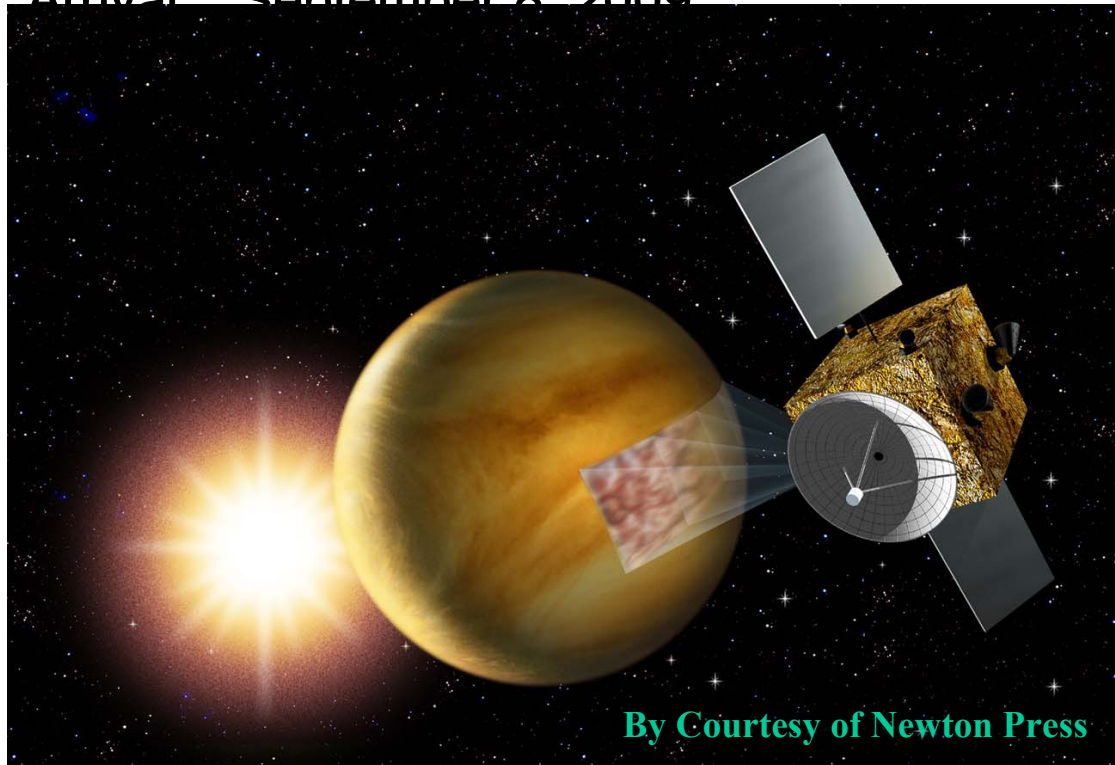
Remote sensing

mission

Launch : Feb.-Apr. 2007 (backup in 2008)

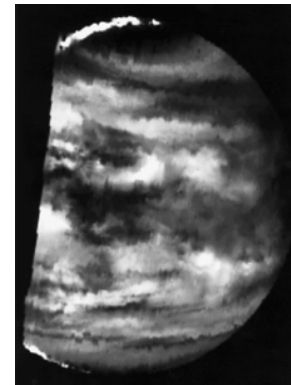
Arrival : September 8, 2009

3-D meteorological
observation by
multi-wavelength
cameras



By Courtesy of Newton Press

Near-IR
UV



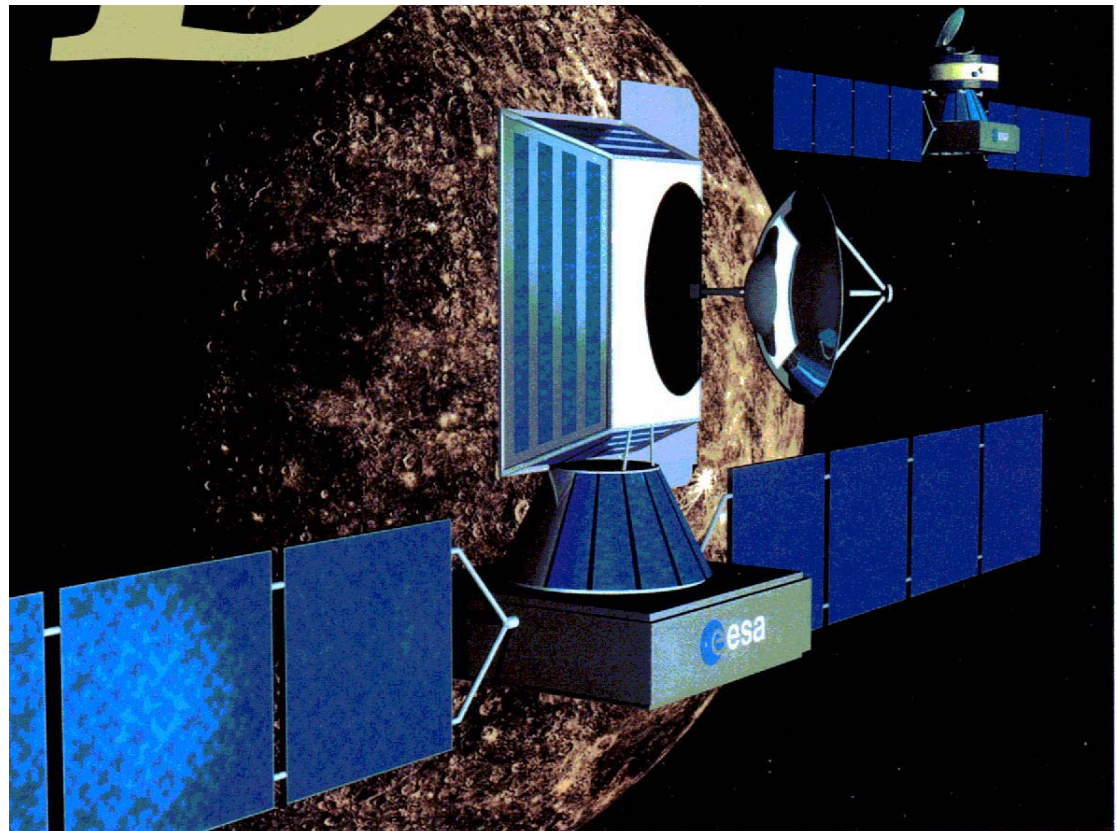
BepiColombo (Mercury Exploration)

*Comprehensive study of
Mercury*

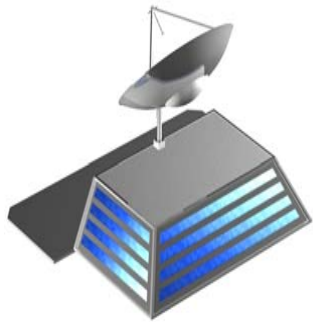
*global mapping
magnetism
atmosphere
magnetosphere*

**Collaboration
with ESA**

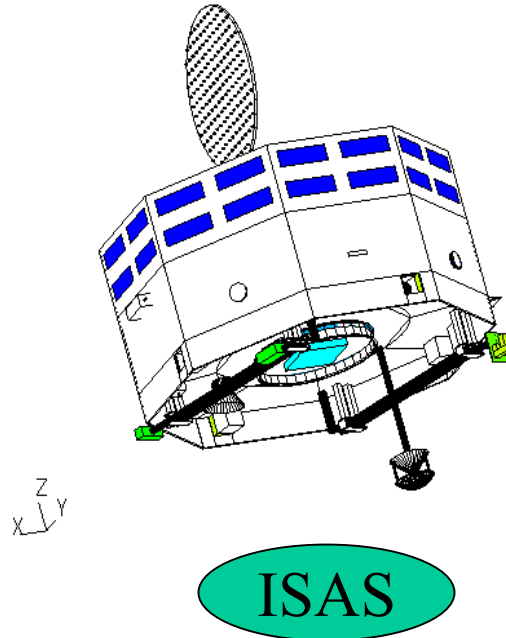
*Launch :
2011*



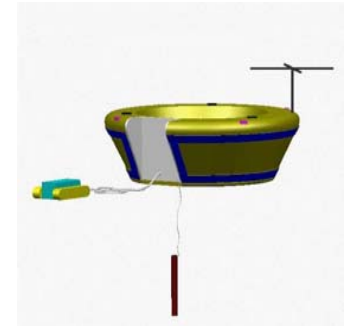
BepiColombo Collaboration with ESA



MPO (ESA)
400km x 1500km



MMO (ISAS)
400km x 12000km



MSE (ESA)
Lander at 85° lat.

L-5 Mission (CRL & NASDA)

Leading patrol of active region

Advance monitoring of solar wind

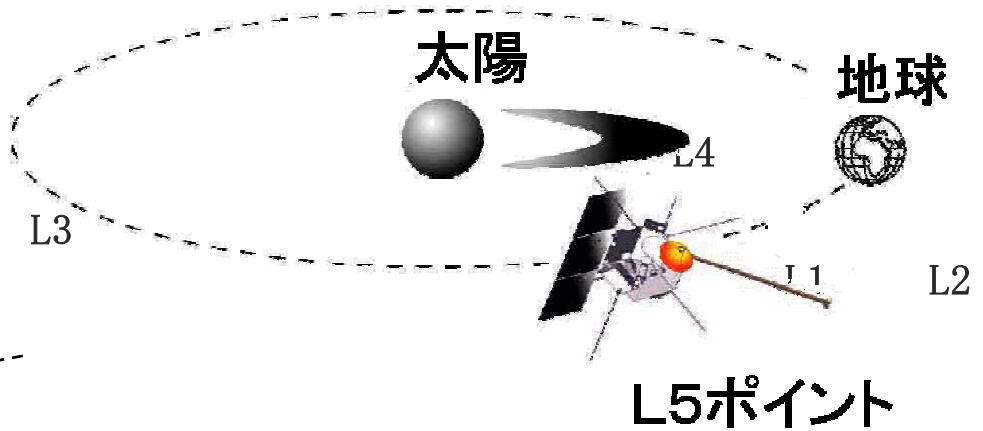
L5 S/C

3D observation with ground based facilities

Observation from the ground and near-Earth

Launch Target:

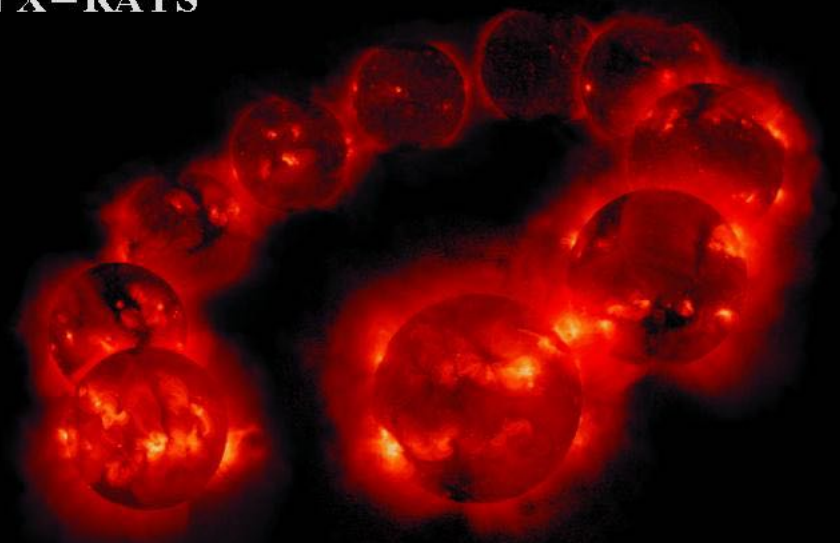
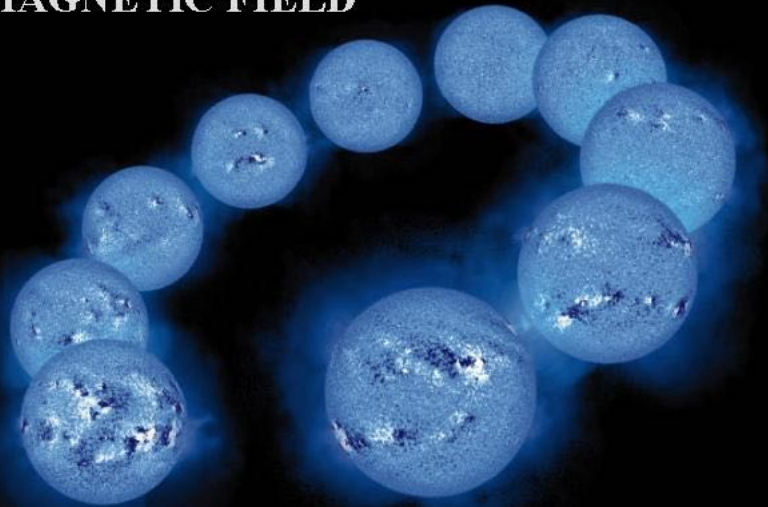
Next Solar Max. (2008-2013)



- Side view observation of CME propagating toward the earth
- Leading patrol and 3D observation of hazardous sunspot group
- Advance detection and measurements of high speed stream

THE SOLAR CYCLE IN MAGNETIC FIELD

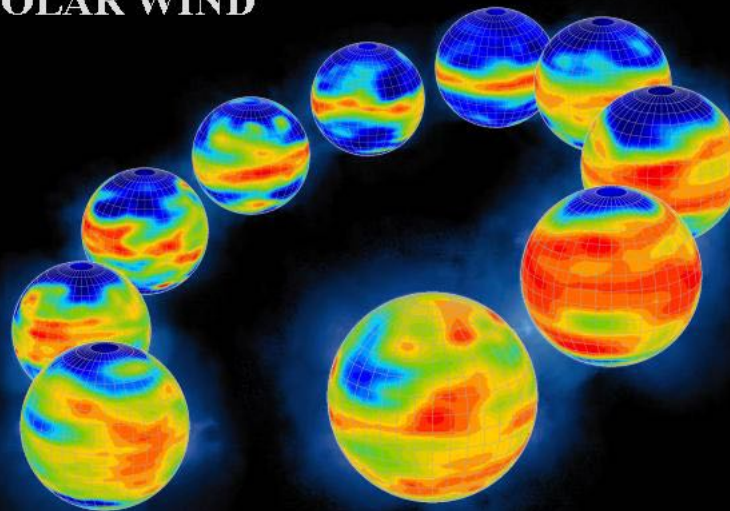
THE SOLAR CYCLE IN X-RAYS



NATIONAL SOLAR OBSERVATORY

Ground-based IPS Observations

THE SOLAR CYCLE IN SOLAR WIND



SOLAR-TERRESTRIAL ENVIRONMENT LABORATORY, NAGOYA UNIV.

Conclusion: Japan

- 1. Has been contributing significantly to SEC science for more than two decades.**
- 2. Has covered SEC fields in a well-balanced manner:
from the Sun,
through terrestrial and planetary magnetospheres,
to interplanetary space.**
- 3. Has been & will be developing International collaboration.**
- 4. Has, in addition, ground-based observation networks of the sun, magnetosphere, ionosphere, thermosphere, etc, all of which will contribute to ILWS.**

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