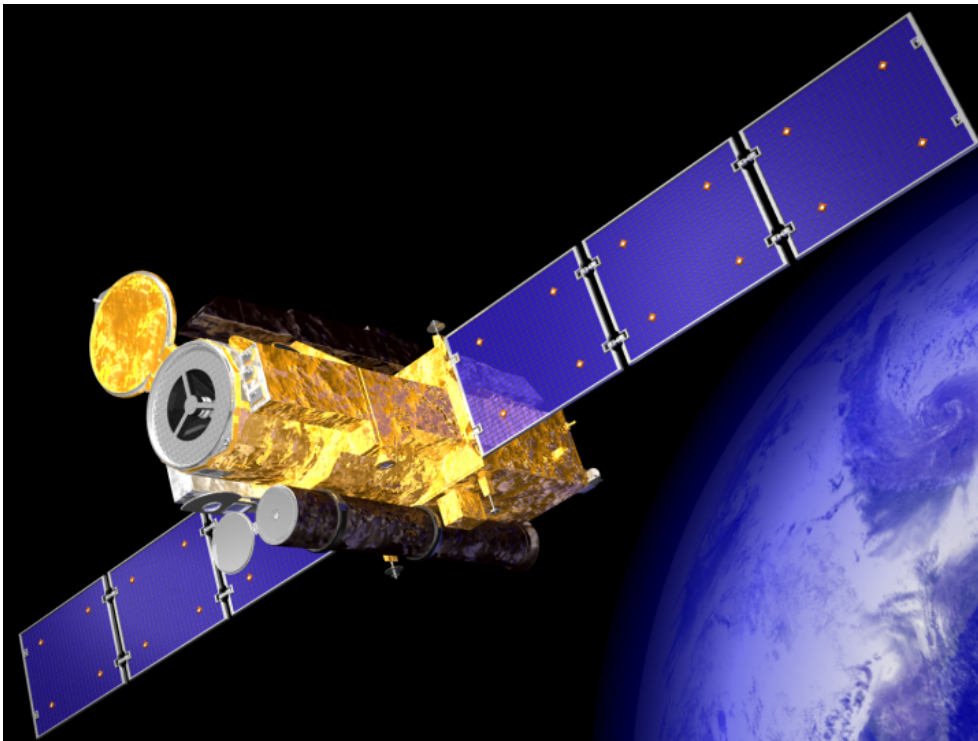# Hinode Project and Science Center (Hinode-SC)
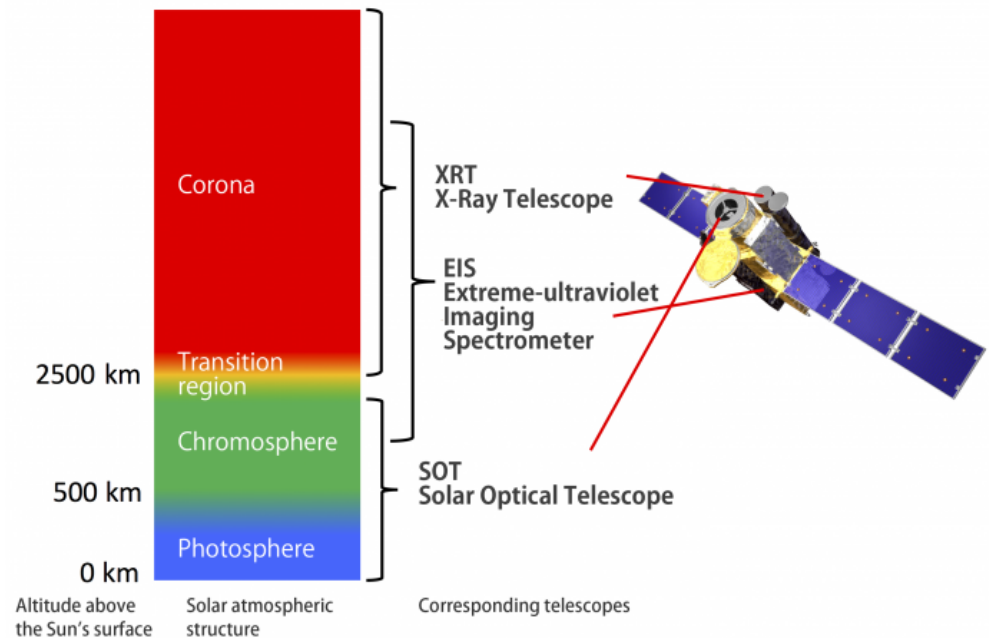
Shinsuke Imada (Nagoya Univ., ISEE)

Solar Observing Satellite "Hinode" (SOLAR-B)
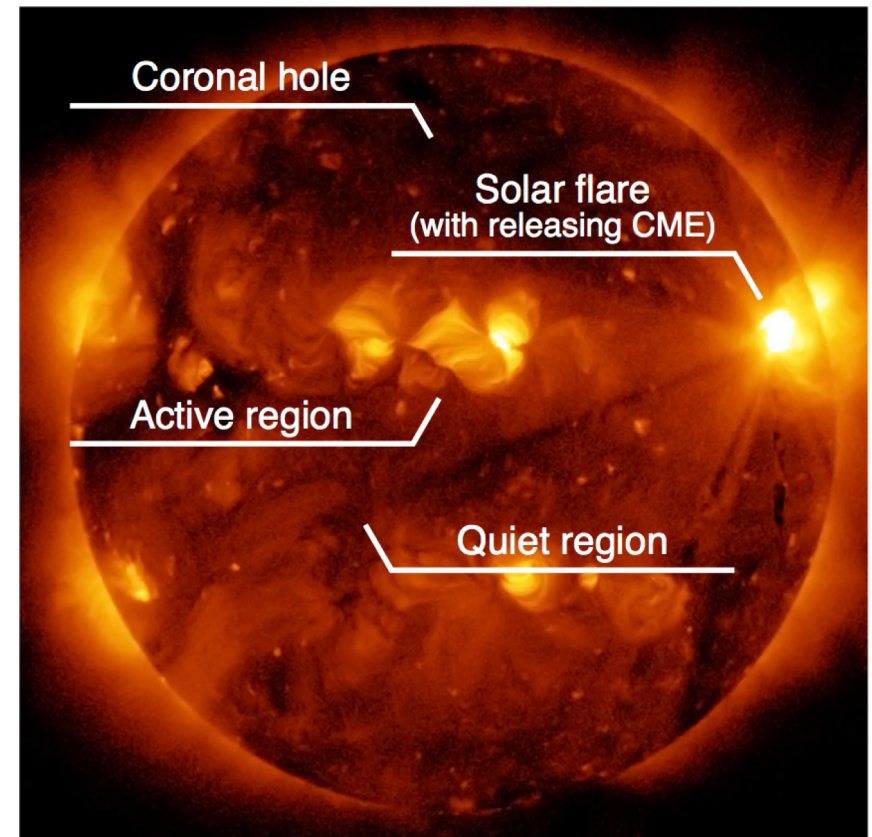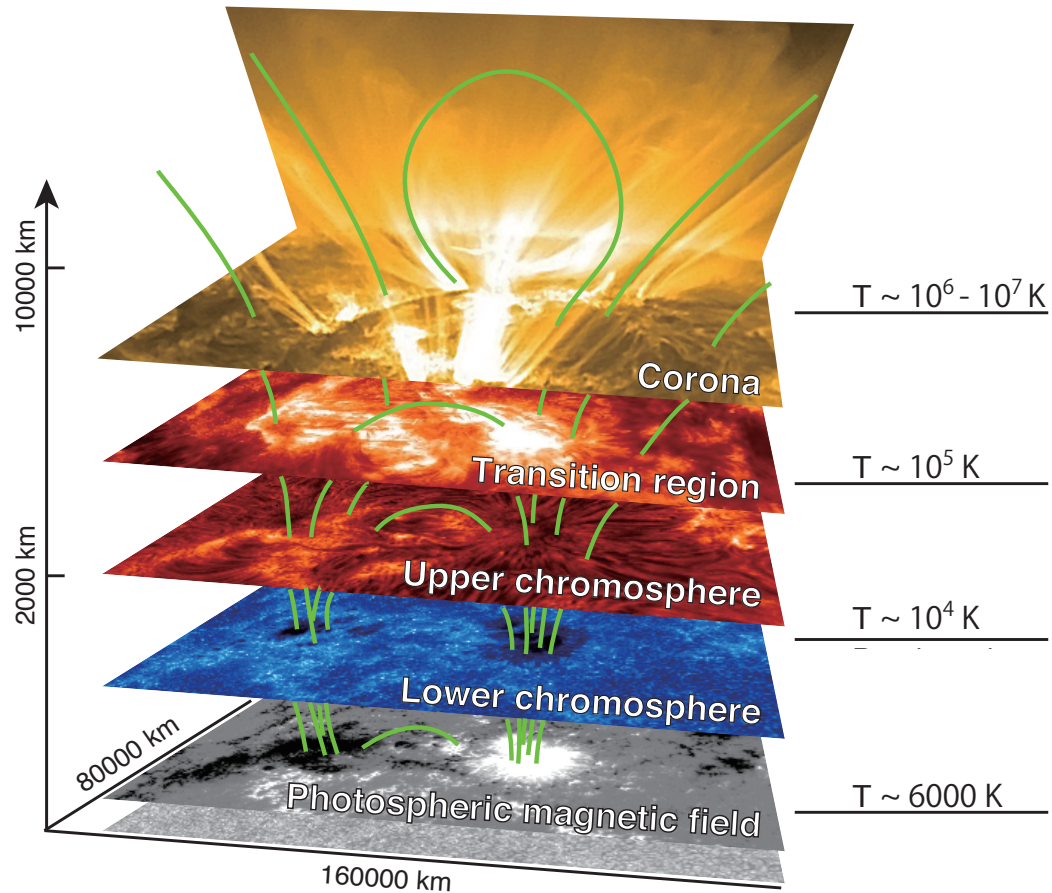

©NAOJ

Launch date: September 23, 2006

Launch Rocket: JAXA M-V7 Rocket

Orbit: Sun-synchronous polar orbit, altitude ~680 km

Weight: ~900 kg

Dimensions: Main Body - ~1.6 m x 1.6 m x 4 m

Solar array paddles - ~ 10 m end to end

From NAOJ website

Two Main Science Objectives

$T \sim 10^6 - 10^7$ K

Corona

$T \sim 10^5$ K

Transition region

Upper chromosphere

$T \sim 10^4$ K

Lower chromosphere

$T \sim 6000$ K

Photospheric magnetic field

10000 km

2000 km

80000 km

160000 km

Coronal hole

Solar flare
(with releasing CME)

Active region

Quiet region

▶ Coronal Heating/ Solar wind acceleration

▶ Solar Flare / CME

High Spatial Resolution

NAOJ

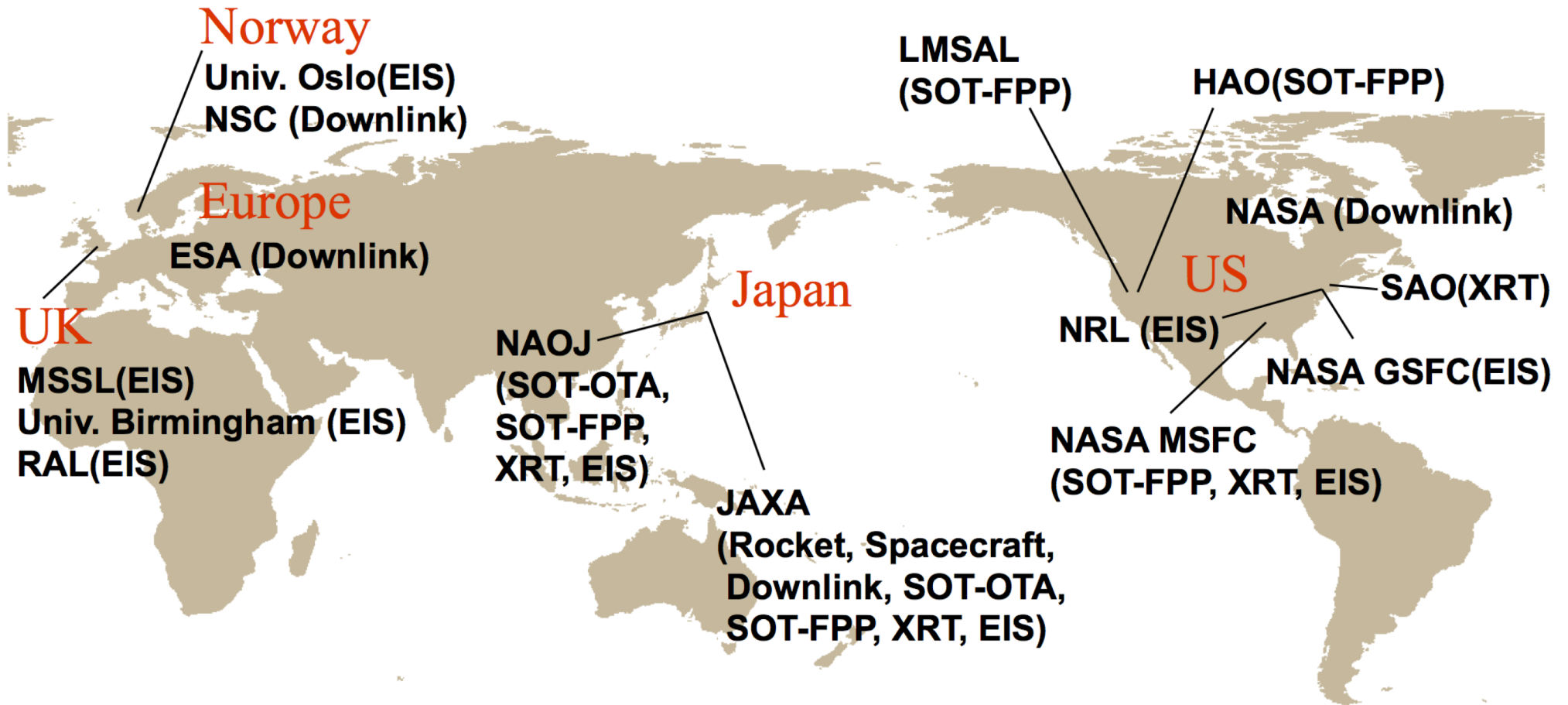# Active Chromosphere observed by Hinode
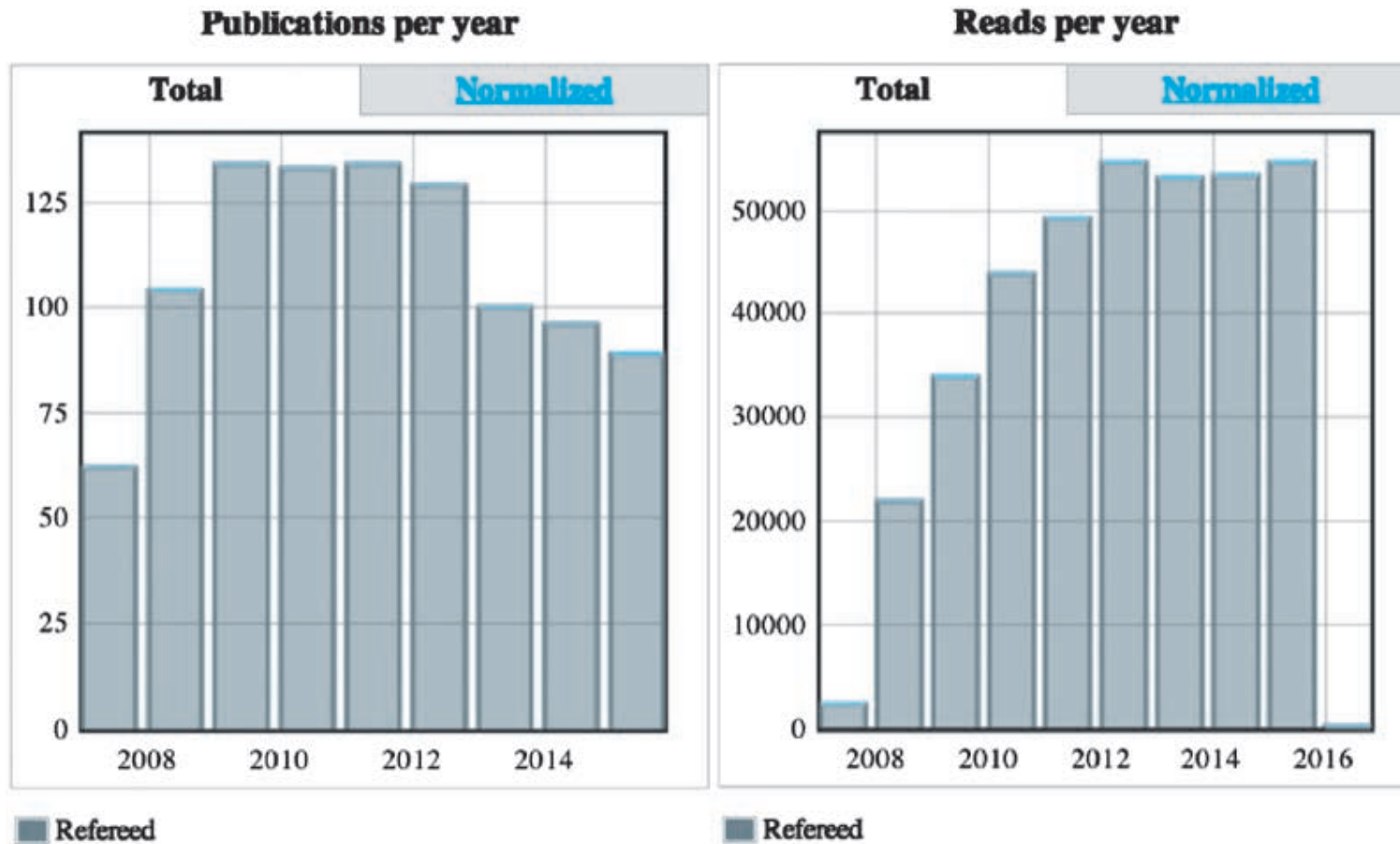
Corona

Chromosphere

Photosphere   Sunspot
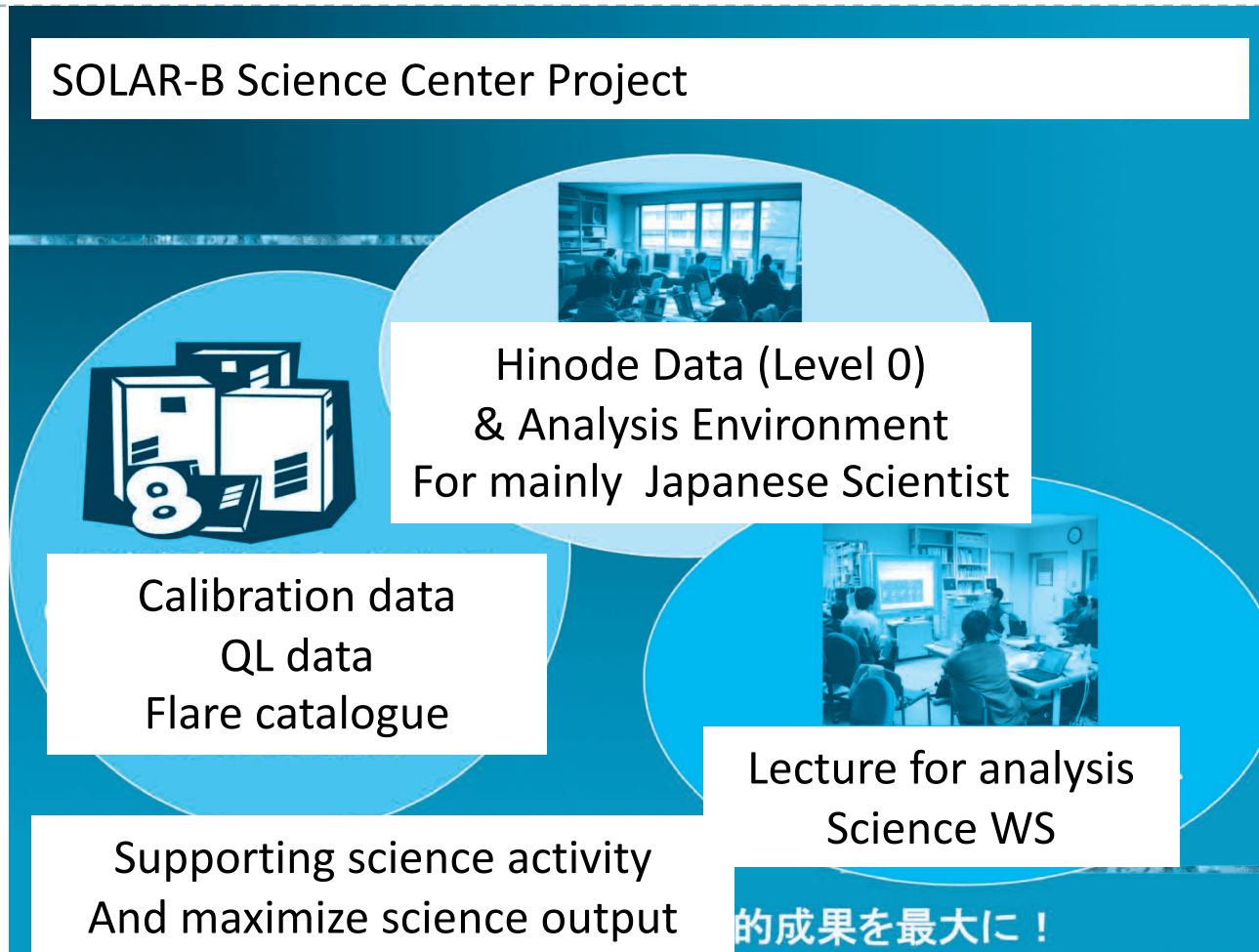
20-Nov-2006
19:11:34 UT

# Inter national Collaboration

Published Papers

Publications per year

Total | Normalized

Reads per year

Total | Normalized

Refereed

Refereed

Hinode Science Center (HSC)
Originally HSC@NAOJ → @ISEE

SOLAR-B Science Center Project

Very similar to ERG SC

Hinode Data (Level 0)
& Analysis Environment
For mainly Japanese Scientist

Calibration data
QL data
Flare catalogue

Lecture for analysis
Science WS

Supporting science activity
And maximize science output

的成果を最大に！

Originally HSC was at National Astronomical Observatory Japan.
After 2011.3.11 Earth Quake, we set up HSC@Nagoya (Non-Tokyo Area).
ISAS is Tokyo area.

SOLAR-B
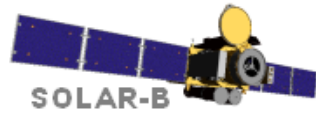
日本語 ここをクリック

Hinode Science Center at Nagoya

"Hinode Science Center at Nagoya (HSC@Nagoya)" is now available.

Institute for Space-Earth Environmental Research (ISEE), Nagoya University and Hinode Science Project, National Astronomical Observatory of Japan (NOAJ) have started the joint-operation of the Hinode Science Center at Nagoya (HSC@Nagoya). This new center is built as the back-up site of the Hinode Science Center at NAOJ (HSC@NAOJ) and also as a leading site for developing a new research field in terms of Hinode and the database developed by ISEE.
Any users registered in HSC@NAOJ are able to access HSC@Nagoya. Refer to
http://hinode.nao.ac.jp/sbsc/HSC_Nagoya/
on the detailed instructions for HSC@Nagoya.

➤ Hinode-10 Science Meeting (Sep. 5-8, 2016 at Nagoya University, Japan)
➤ Hinode Doctor/Master Thesis
➤ Hinode flare catalogue
➤ Nonlinear force-free field calculation code

Service @Nagoya HSC

➤ NAOJ Hinode
➤ NASA Hinode (Solar-B)

NAOJ NINS ISEE

Hinode Science Center Project
Institute for Space-Earth Environmental Research, Nagoya University
2017-04-27

Hinode Flare Catalogue

Hinode project data

▶ **Hinode data**

  ▶ Many data sets (exposure time, scanning, data summing…)

  ▶ Science objects are also different ($\rightarrow$ meta data)

  ▶ Data format, availability, etc. differs for different data sets.

    ▶ SOT: Spectropolarimeter (Spatial 2D, Wavelength 4D, Time)
        : Imager (Spatial 2D, Time)

    ▶ EIS: Spectrometer (Spatial 2D, Wavelength 1D, Time)

    ▶ XRT: Imager (Spatial 2D, Time)

    ▶ All data are FITS format.

    ▶ Many metadata are in fits header. (e.g., observed region, exposure time..)

    ▶ Typically ~30 GB for one day, originally (~ 2008/03).

    ▶ After X-band antenna trouble we use S-band antenna (~1/16)

    ▶ We try to recover by using many downlink station.

Analysis Software: SolarSoftWare (SSW)

- Solar data analysis software package

- From Yohoko era (~1990)

- Base IDL (Now python version: SunPy)

- Most important tool: ***_prep (create Lv. 1)

- Time plot, Image plot, Movies, etc can can be done with this software.

SolarSoft http://www.lmsal.com/solarsoft/

S.L.Freeland, freeland [at] lmsal.com, Last Revision: 14-October-1999

Latest version of this document is available here

Related Documents

- **SolarSoft Concepts - Coordinated analysis concepts and tutorials**
- **SolarSoft Installation** (UNIX / PC-FreeBSD, PC-Linux)
- **SolarSoft Under Windows**
- **SolarSoft Upgrades**
- **SolarSoft Setup - Running SSW IDL**
- **SolarSoft DataBase description**

What is SolarSoft?

The SolarSoft system is a set of integrated software libraries, data bases, and system utilities which provide a common programming and data analysis environment for Solar Physics. The SolarSoftWare (SSW) system is built from Yohkoh, SOHO, SDAC and *Astronomy* libraries and draws upon contributions from many members of those projects. It is primarily an *IDL* based system, although some instrument teams integrate executables written in other languages. The SSW environment provides a consistent look and feel at widely distributed co-investigator institutions to facilitate data exchange and to stimulate coordinated analysis. Commonalities and overlap in solar data and analysis goals are exploited to permit application of fundamental utilities to the data from many different solar instruments. The use of common libraries, utilities, techniques and interfaces minimzies the learning curve for investigators who are analyzing new solar data sets, correlating results from multiple experiments or performing research away from their home institution.

Some of the primary goals of the SSW are...

Provide a large reuse SW library

The software library represents an evolutionary system tracing back to SMM, through Yohkoh and SOHO, TRACE, and eventually will incorporate SXI, HESSI, and other solar observatories. Many common "solar physics" , file i/o, system, IDL structure manipulation, data display, etc. tasks have already been addressed by others (many others in some cases!)

Very small sample of existing SSW capabilities...
- Time series analysis, time conversions, **UTPLOT** (millennium safe)
- Spectral fitting
- Image and Image cube (movies) display
- IDL data manipulation (structure, string, array, mathematics...)
- File I/O (generic binary, ascii), FITS
- Solar (limb fitting, grid overlay, coordinate tranformations...)
- WWW related (html conversion, file conversions, FORM handling, movie making,...)
- WWW Client<->**SolarSoft IDL server** interface permits execution of SSW/IDL utilities over the Web
  Examples include SXT dynamic WWW movie maker and WWW GOES X-Ray light curve display

Integrated science data archive developed by Hinode-SC

Hinode satellite data

Hinode simulation/modeling data

JAXA/ISAS

packet data — raw data processing

ground data processing
Produce Fits data (Lv.0)

Nonlinear Force Free Field Extrapolation
Magnetic field inversion
Etc…

DATA: FITS
Software: SSW

Hinode-SC

Give analysis environment → SSWIDL provide ***_prep
(calibration program) for producing Lv. 1 data

Research community

CIDAS system @ISEE