

# Hinode Project and Science Center (Hinode-SC)

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Solar-C(EUVST) Team

# Solar Observing Satellite “Hinode” (SOLAR-B)



©NAOJ

**Launch date:** September 23, 2006

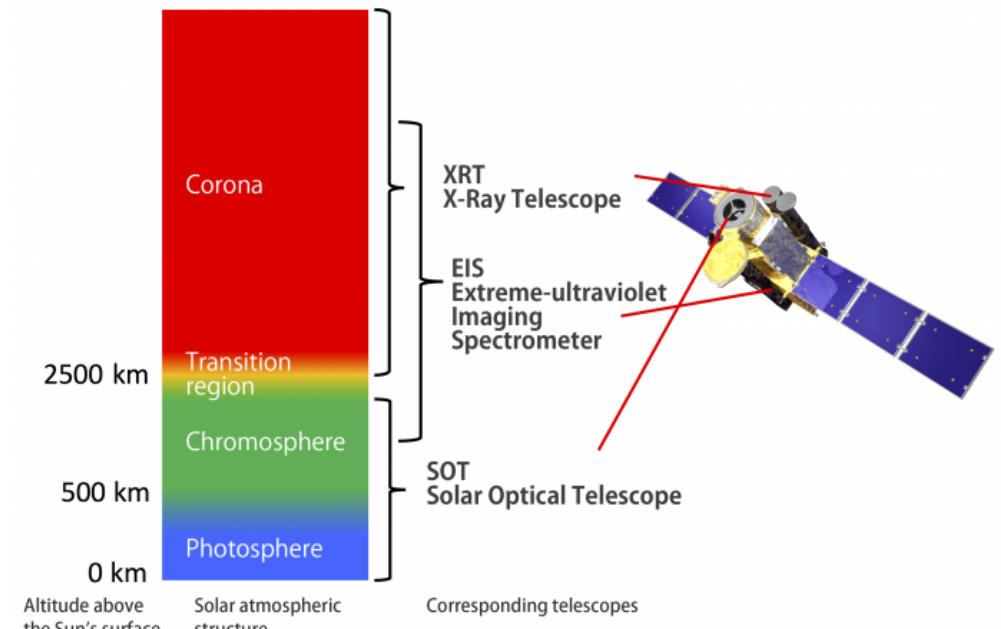
**Launch Rocket:** JAXA M-V7 Rocket

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

**Weight:** ~900 kg

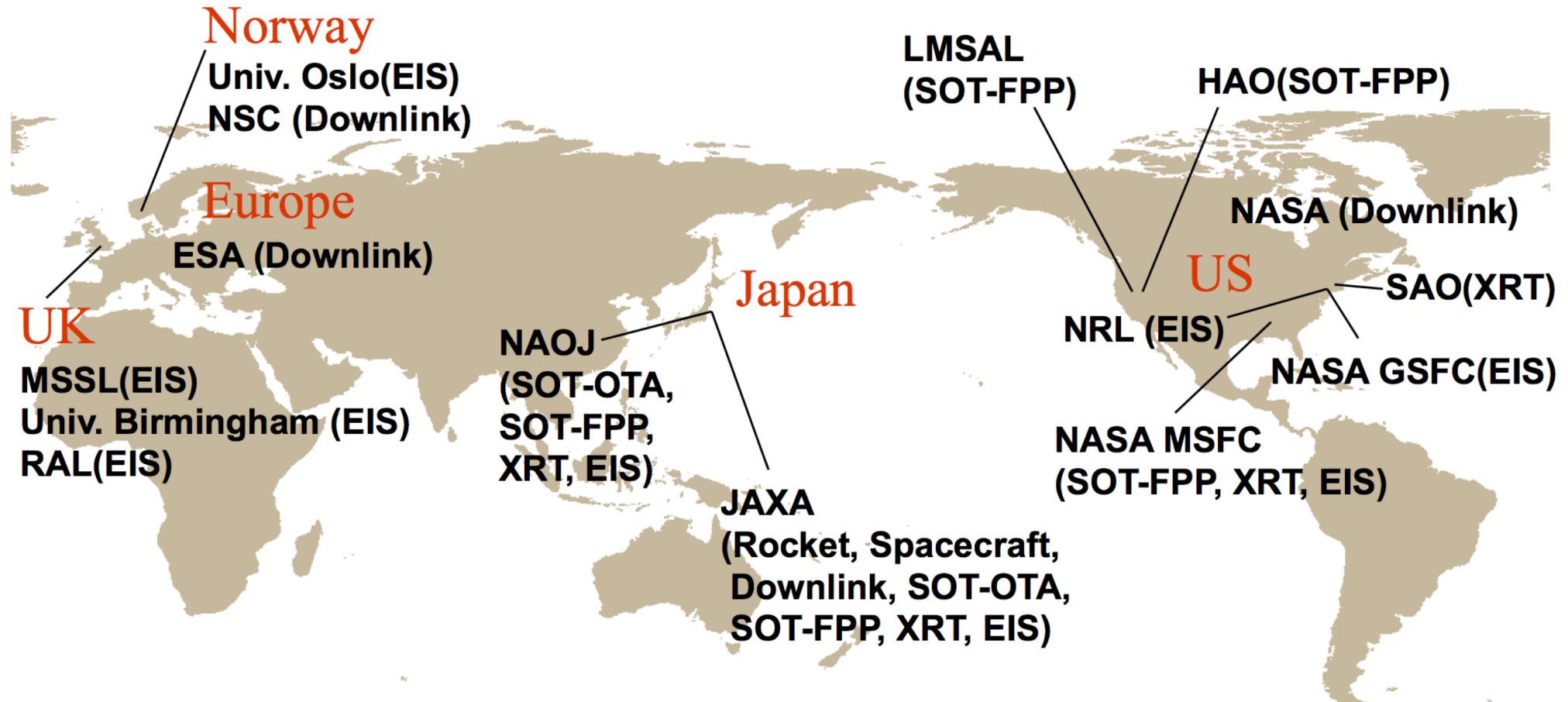
**Dimensions:** Main Body - ~1.6 m x 1.6 m x 4 m

Solar array paddles - ~10 m end to end



From NAOJ website

# International Collaboration



# Hinode Science Center (HSC)

## Originally HSC@NAOJ → @ISEE

SOLAR-B Science Center Project

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

Calibration data  
QL data  
Flare catalogue

Supporting science activity  
And maximize science output

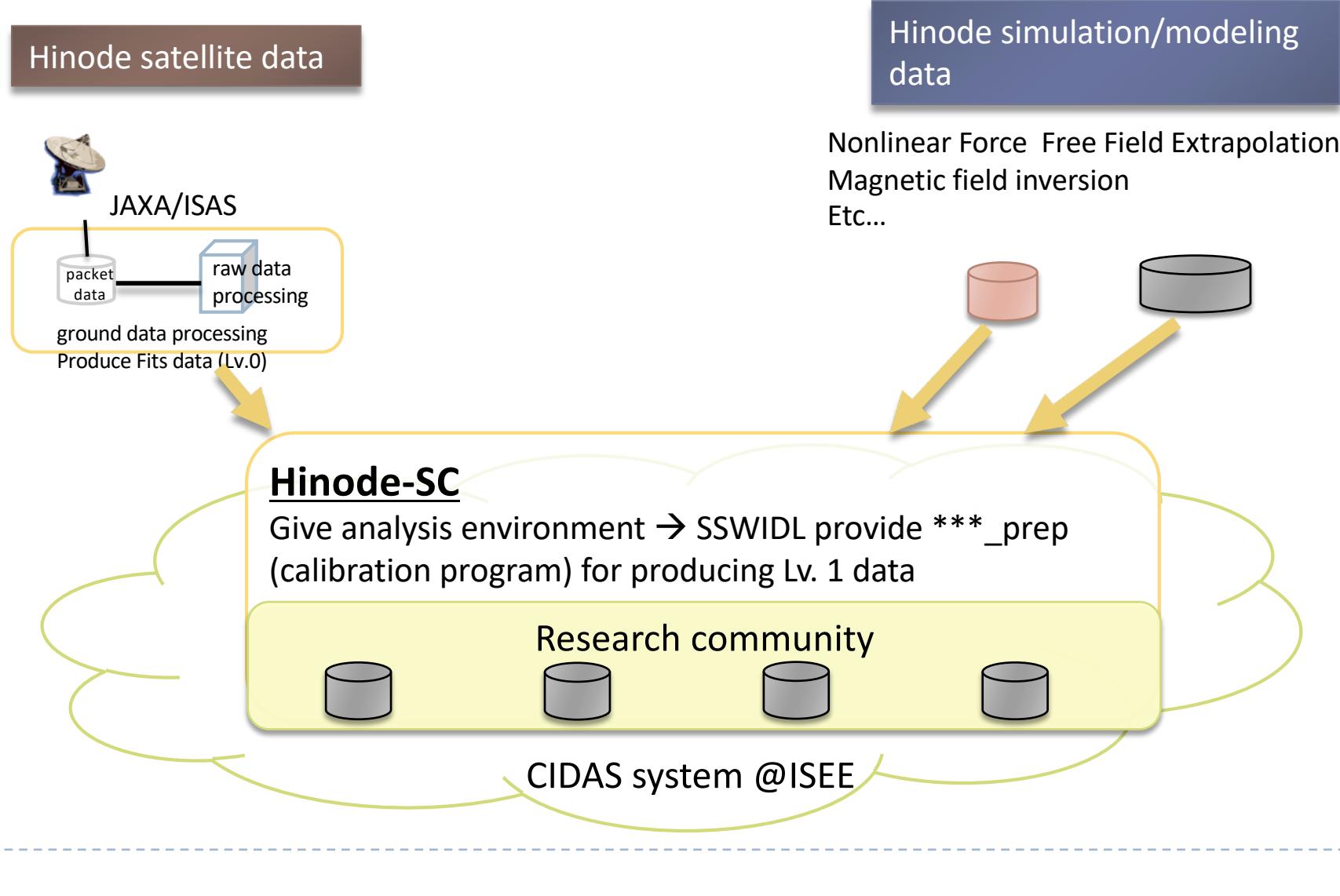
Lecture for analysis  
Science WS

的成果を最大に！

Very similar to ERG SC

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.

# Integrated science data archive developed by Hinode-SC



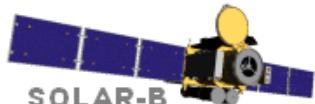
# Hinode project data

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## ▶ Hinode data

- ▶ Many data sets (exposure time, scanning, data summing... )
- ▶ Science objects are also different (→ 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)
- ▶ 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.





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 (NAOJ) 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.

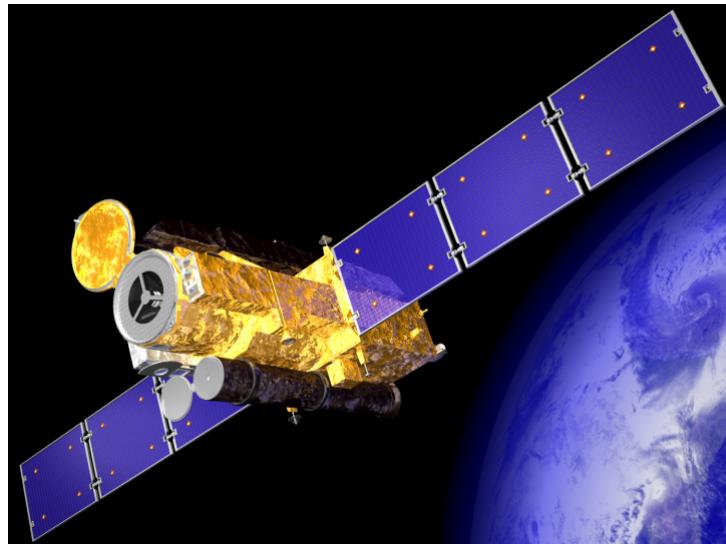
Any users registered in HSC@NAOJ are able to access HSC@Nagoya. Refer to  
[http://hinode.nao.ac.jp/sbsc/HSC\\_Nagoya/](http://hinode.nao.ac.jp/sbsc/HSC_Nagoya/)  
on the detailed instructions for HSC@Nagoya.

- ▶ 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
- ▶ NAOJ Hinode
- ▶ NASA Hinode (Solar-B)

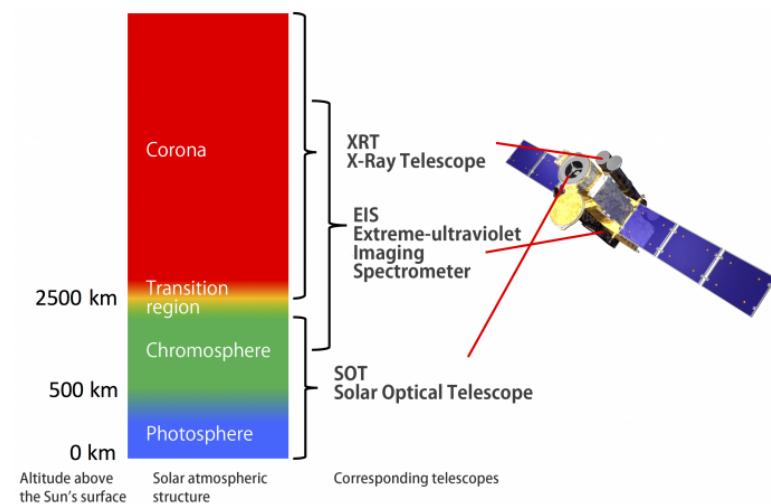
Original Service @Nagoya HSC



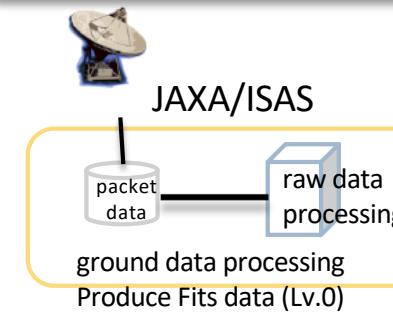
# Integrated science data archive developed by Hinode-SC



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## Hinode satellite data



## Hinode simulation/modeling data Original Contents

Nonlinear Force Free Field Extrapolation  
Magnetic field inversion  
Hinode flare catalogue  
Hinode Doctor/Master Thesis List

## Hinode-SC

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

## Research community

## CIDAS system @ISEE

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-C\_EUVST

JAXA Epsilon M-class mission

A fundamental step towards answering how the plasma universe is created and evolves, and how the Sun influences the Earth and other planets in our solar system

## Science objectives;

- I. Understand how fundamental processes lead to the formation of the dynamic solar atmosphere and the solar wind
- II. Understand how the solar atmosphere becomes unstable, releasing the energy that drives solar flares and eruptions

**Strategy;** Quantify the processes of mass loading and energy transport / conversion at work

## Key features (not ever done);

### A) *Wide T-coverage* ( $10^4$ - $10^7$ K)

Observe the whole regimes of the solar atmosphere as a single, coupled system

### B) *High resolution* (spatial $\sim 0.4''$ , temporal $\sim 1$ sec)

Capture the dynamic evolutions of elementary structures

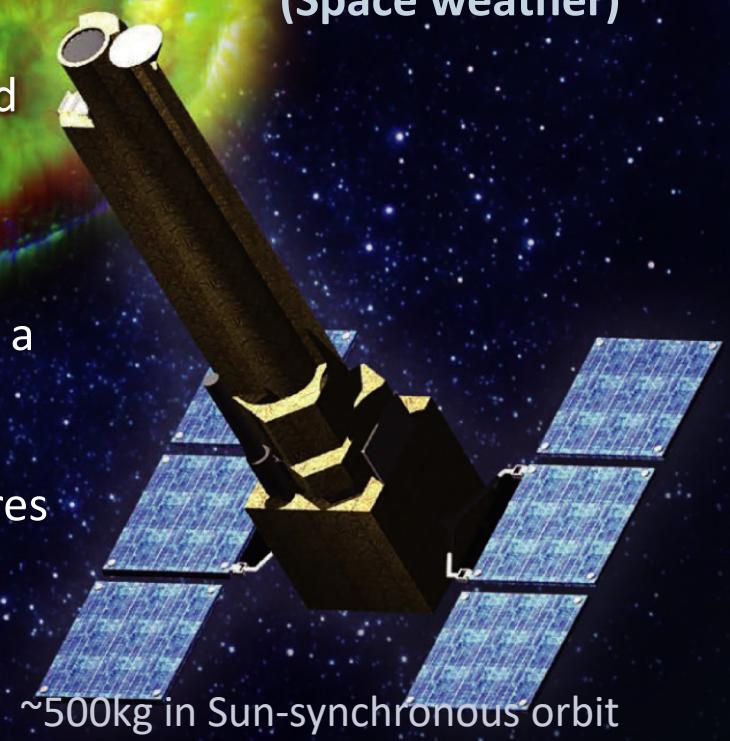
### C) *Spectroscopy*

Determine the physical states of the targets  
(V,  $\rho$ , T, composition, ionization)

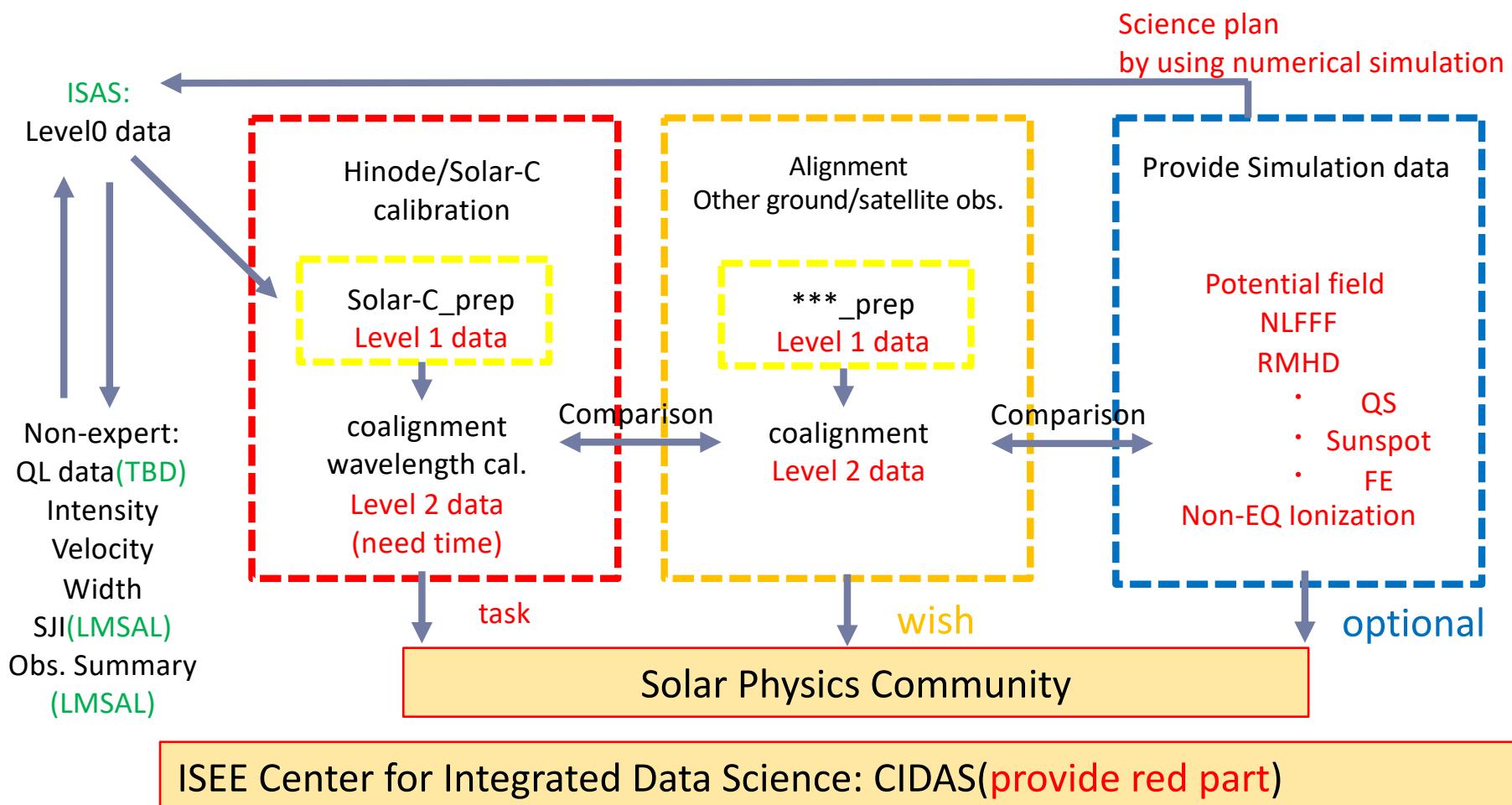
Close connection to  
Astrophysics

Plasma physics

Geo-space physics  
(Space weather)



# From Hinode Science Center to Solar-C Science Center



# Scope of the Solar-C\_EUVST science center

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- ▶ Priority 1 (should be done as the task of Solar-C\_EUVST project)
  - Set workstations for data analysis (**ISEE task**)
  - Create and install data analysis tools for Solar-C\_EUVST (for example, SSWidl) (**international task sharing**)
  - Data linkage to ISAS/DARTS system (**ISEE task**)
  - Create L1 data (execute euvst\_prep) and distribute to users (this should be done automatically after data open) and US&Europe science center (**ISEE task**)



# Scope of the Solar-C\_EUVST science center

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- ▶ Priority 2 (wish to do as the task of Solar-C science center)
  - Create L2 data (Wavelength/coordination calibration) and distribute to users (this may need time, not automatically) (**ISEE task**)
    - Create QL (Intensity, Velocity, and Width map) and distribute to users through Website (international collaboration) (**Europe task**)
    - Create SJI QL (**LMSAL**)
    - Create flare catalogue (**ISEE task**)
    - Create observation data search system (**LMSAL**)



# Scope of the Solar-C\_EUVST science center

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- ▶ Provide numerical simulation data for comparison.
- ▶ Optional (outside of the Solar-C\_EUVST project)
  - Provide radiative magnetohydrodynamic (MHD) simulation data (ISEE task)
  - Provide magnetic field extrapolation results such as potential field and non-linear force free field extrapolation (ISEE task)
  - Provide solar wind simulation results (ISEE task)
- ▶ Provide Solar-C\_EUVST data analysis environment collaboration with ground-based observatories (GBOs)
- ▶ Priority 2 (wish to do as the task of Solar-C\_EUVST science center)
  - Provide calibrated data sets (alignment, etc.) observed by Solar-C\_EUVST and GBOs. (ISEE task)



# Schedule of Solar-C(EUVST)

