

Subaru Data Analysis on Japanese Virtual Observatory

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on behalf of the JVO Project team

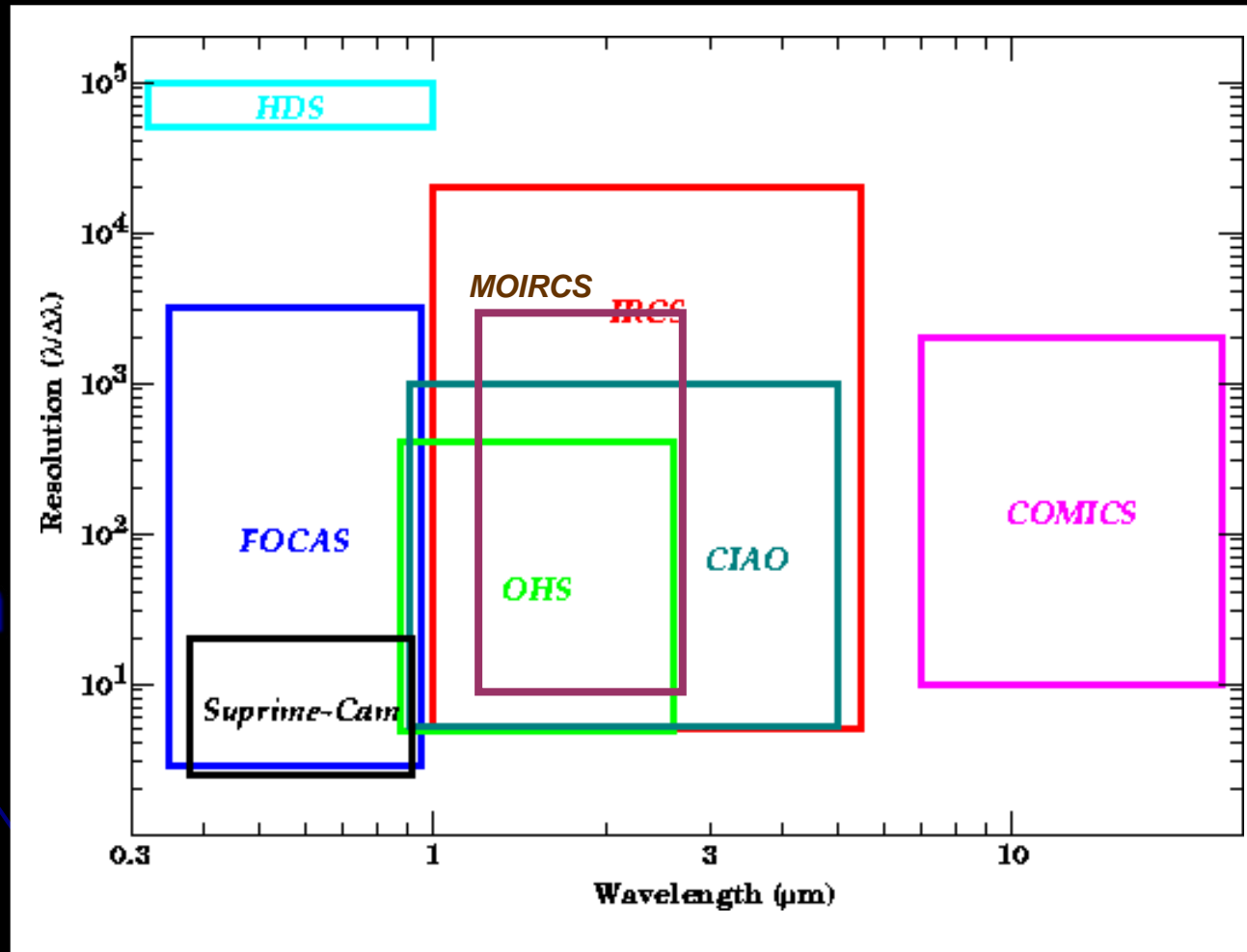
Subaru Telescope

Subaru Telescope is an optical-infrared 8.2 m telescope at Hawaii, operated by NAOJ.

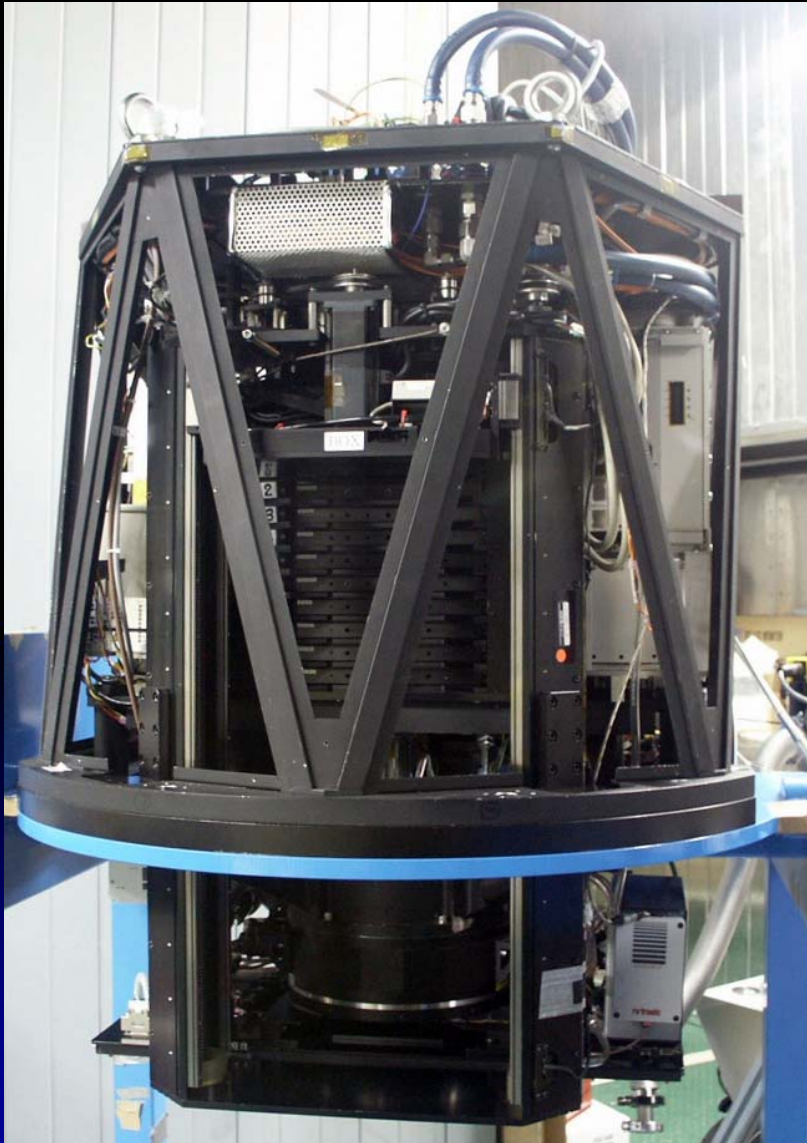


Instruments for Subaru

- CIAO
- COMICS
- FOCUS
- IRCS
- MOIRCS
- **SuprimeCam**
- HDS
- AO/CIAO



Suprime-Cam



Size: 1035 mm x 960 mm ϕ

Weight: 295 kg

Power: 420 W

F: 1.86

FOV: 30' ϕ

CCD: MIT/LL CCID20

Format: 4096x2048 per CCD

of CCD: 10 (2 x 5)

Filter: B, V, Rc, Ic, g', r', I', z'

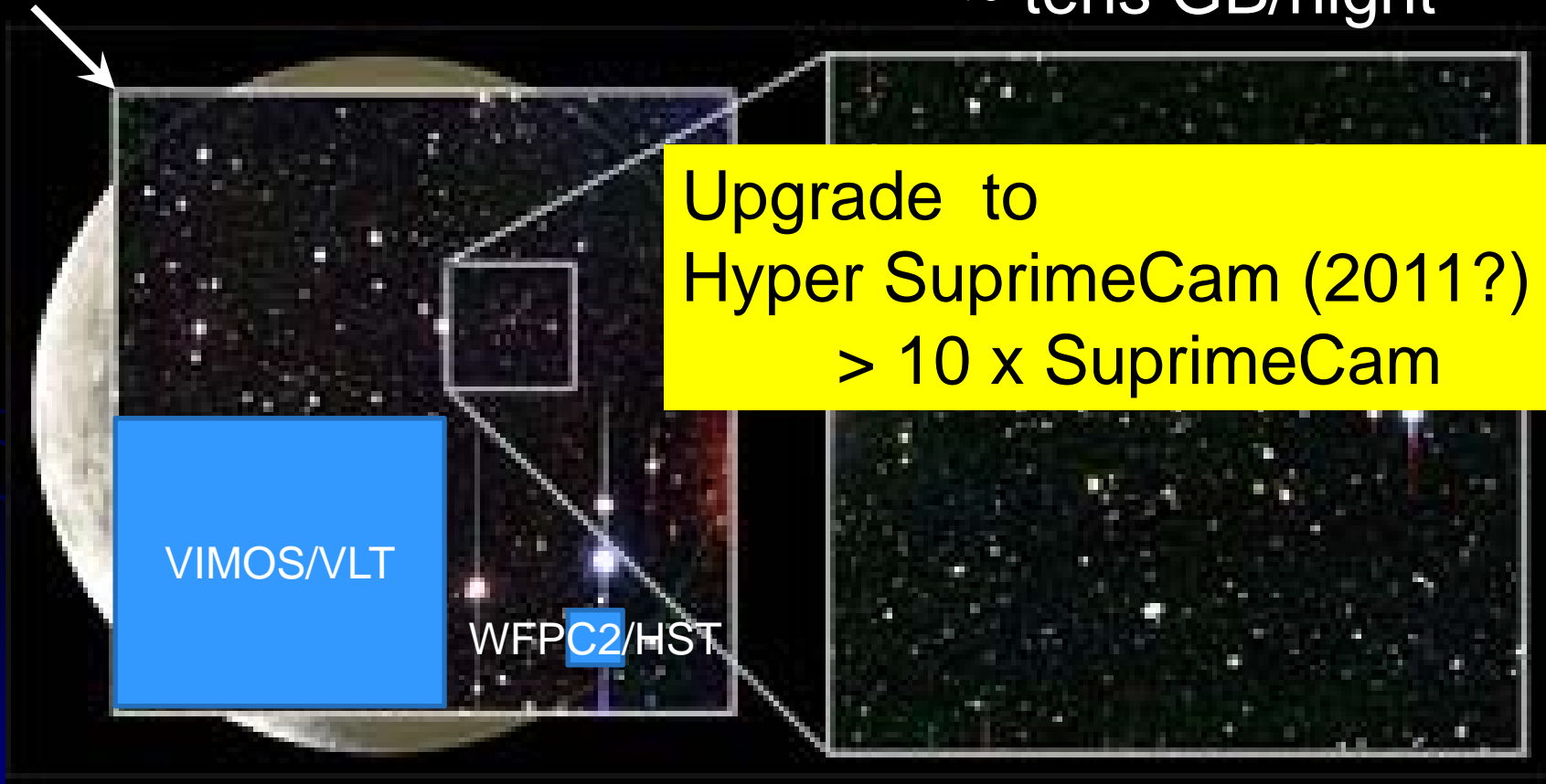
SuprimeCam Field of View

SuprimeCam FOV

0.2"/pix

160MB/shot

~ tens GB/night

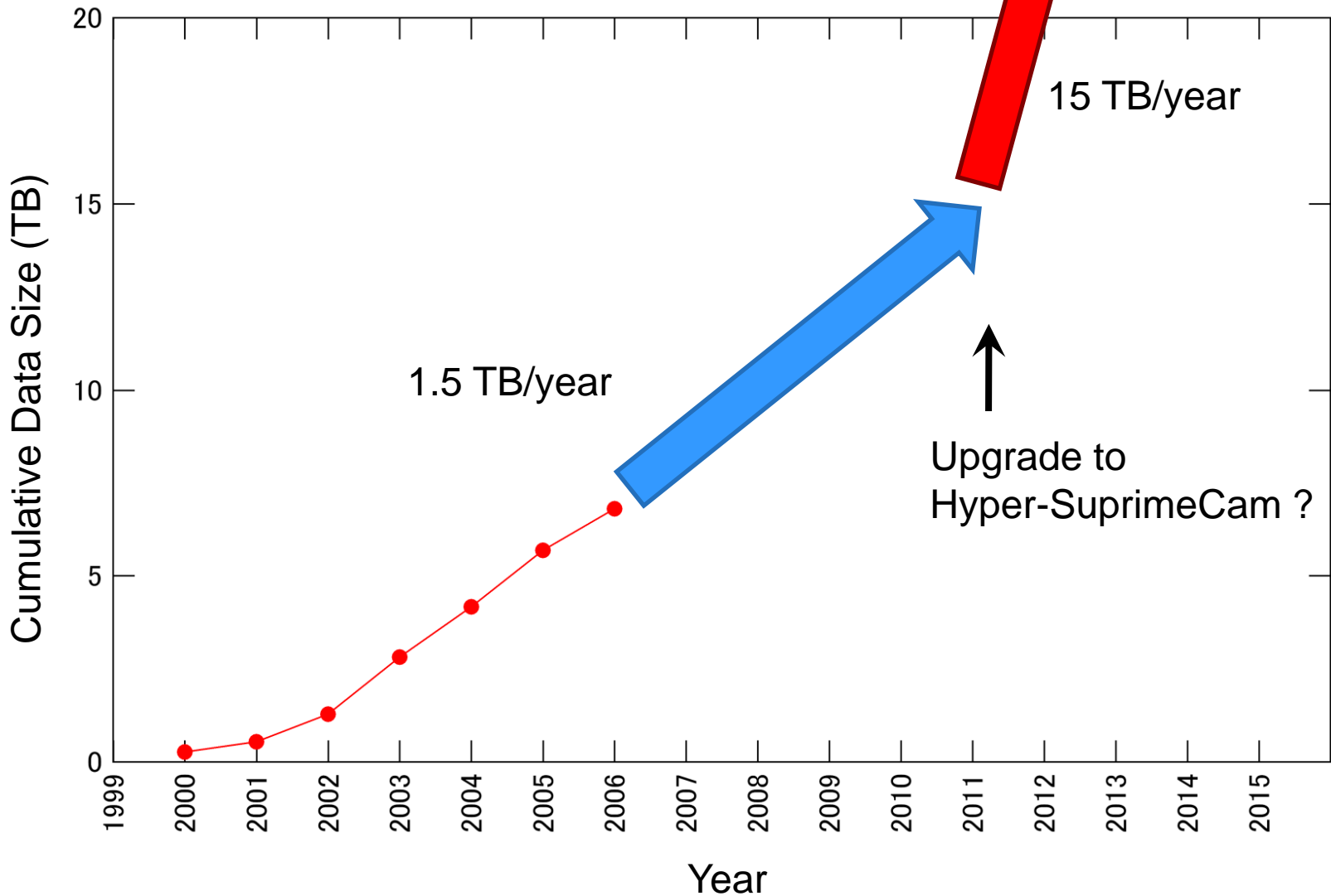


Upgrade to
Hyper SuprimeCam (2011?)
> 10 x SuprimeCam

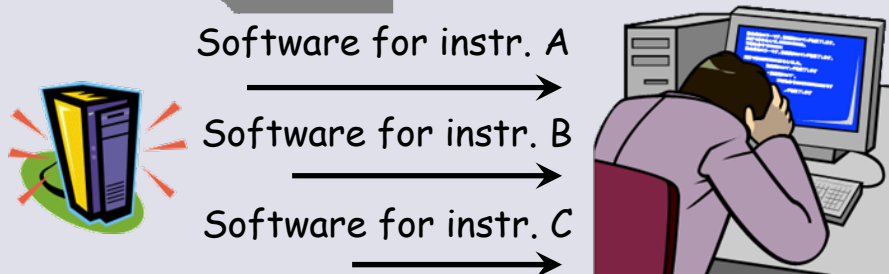
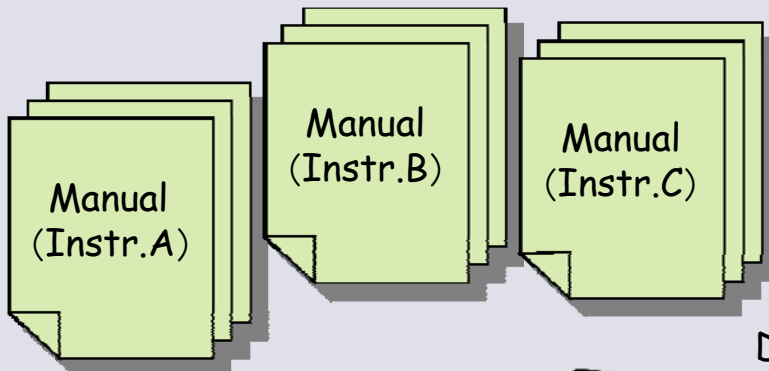
VIMOS/VLT

WFPC2/HST

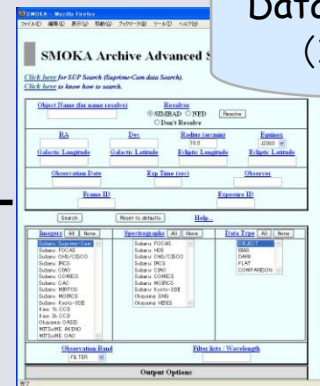
Cumulative Data Volume of SuprimeCam



Current situation in astronomy



Download by hand



Subaru Data Analysis and Virtual Observatory



1. Request Data



JVO Portal Service

2. Reduce raw data

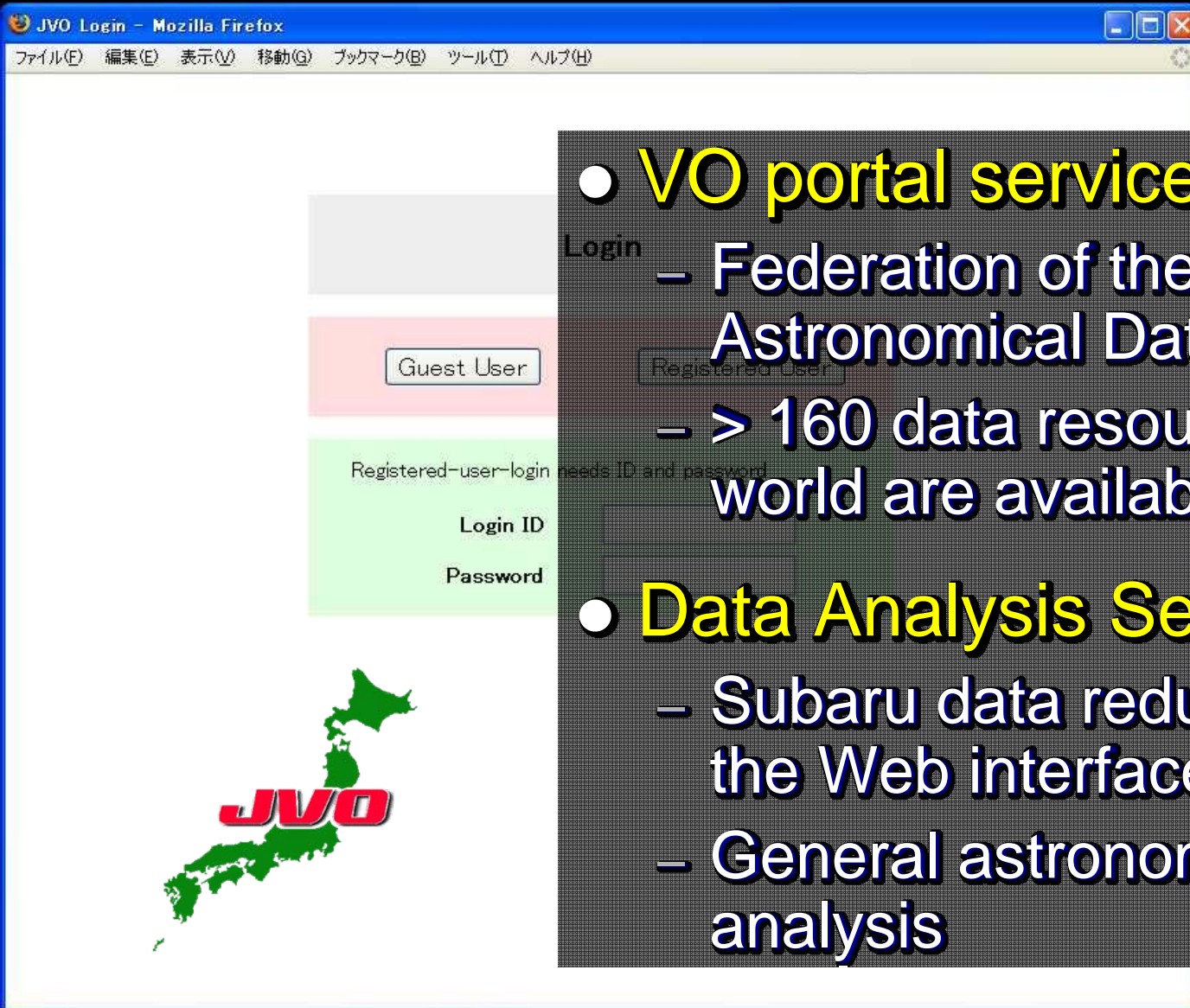
3. Save the reduced data



4. Retrieve reduced data

Japanese Virtual Observatory (JVO)

<http://jvo.nao.ac.jp/portal>



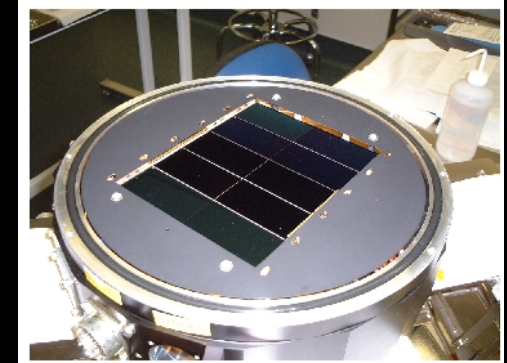
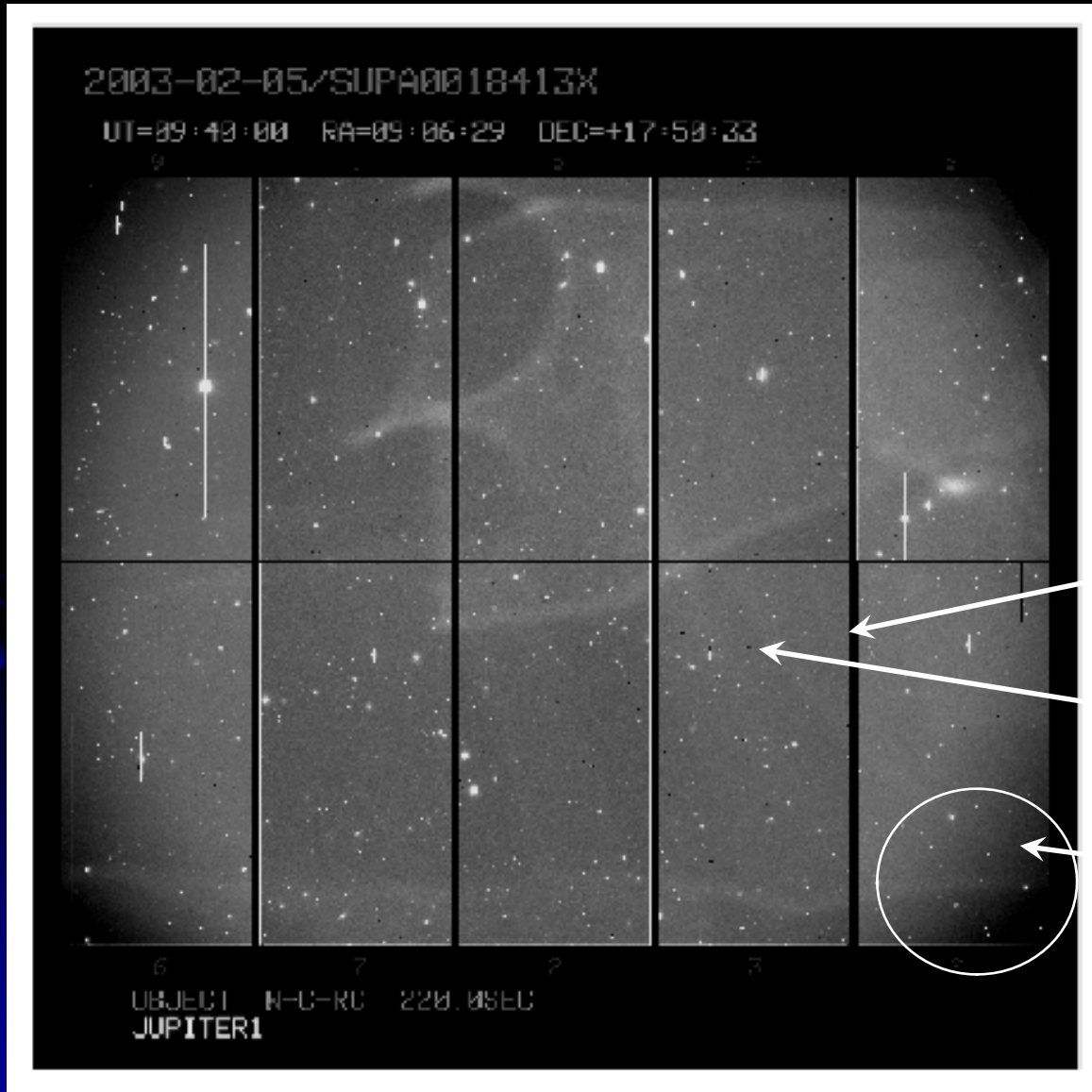
● **VO portal service**

- Federation of the Distributed Astronomical Databases
- > 160 data resources from the world are available

● **Data Analysis Service**

- Subaru data reduction through the Web interface
- General astronomical data analysis

SuprimeCam CCD

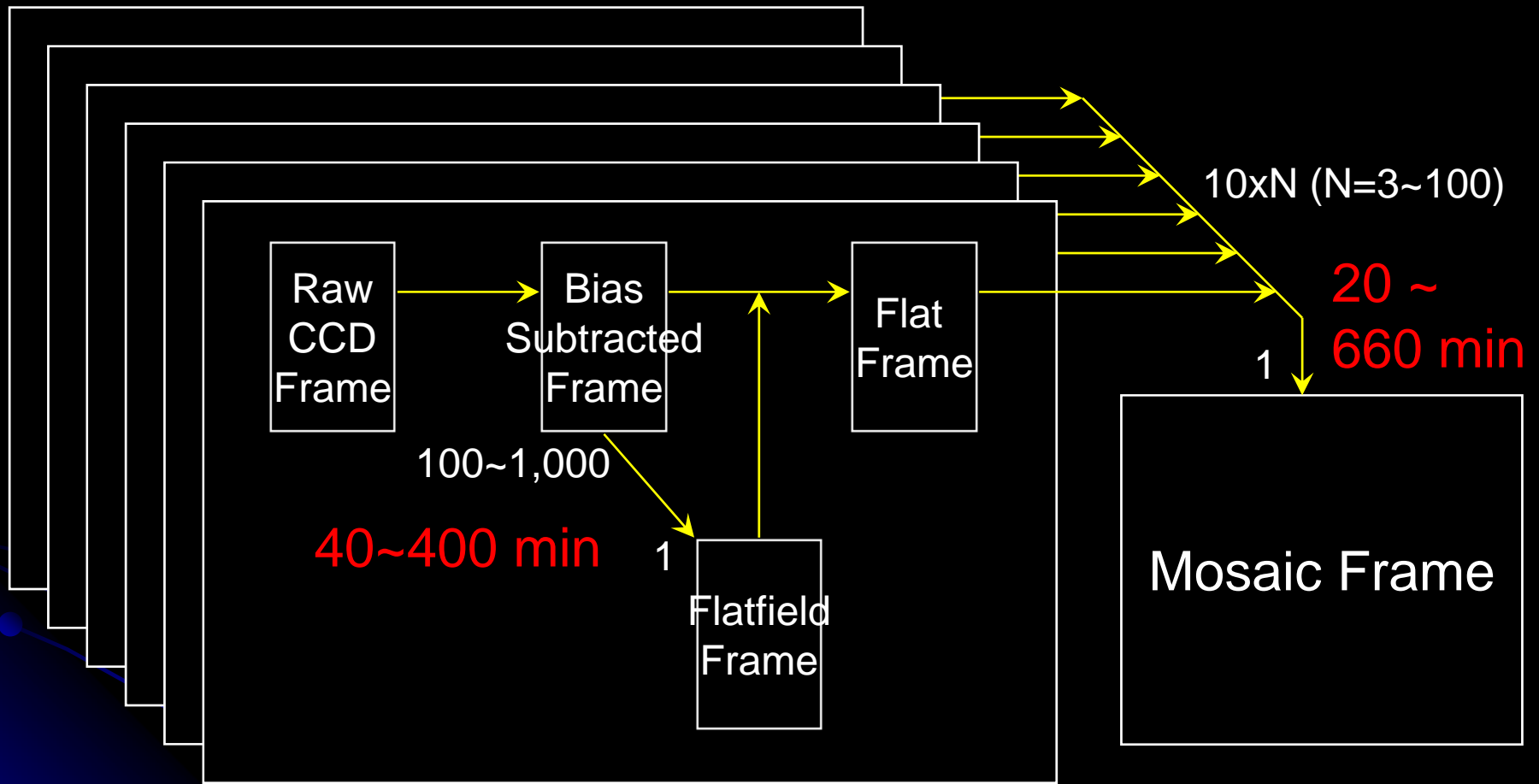


CCD gap

Bad pixel /
Cosmic Ray

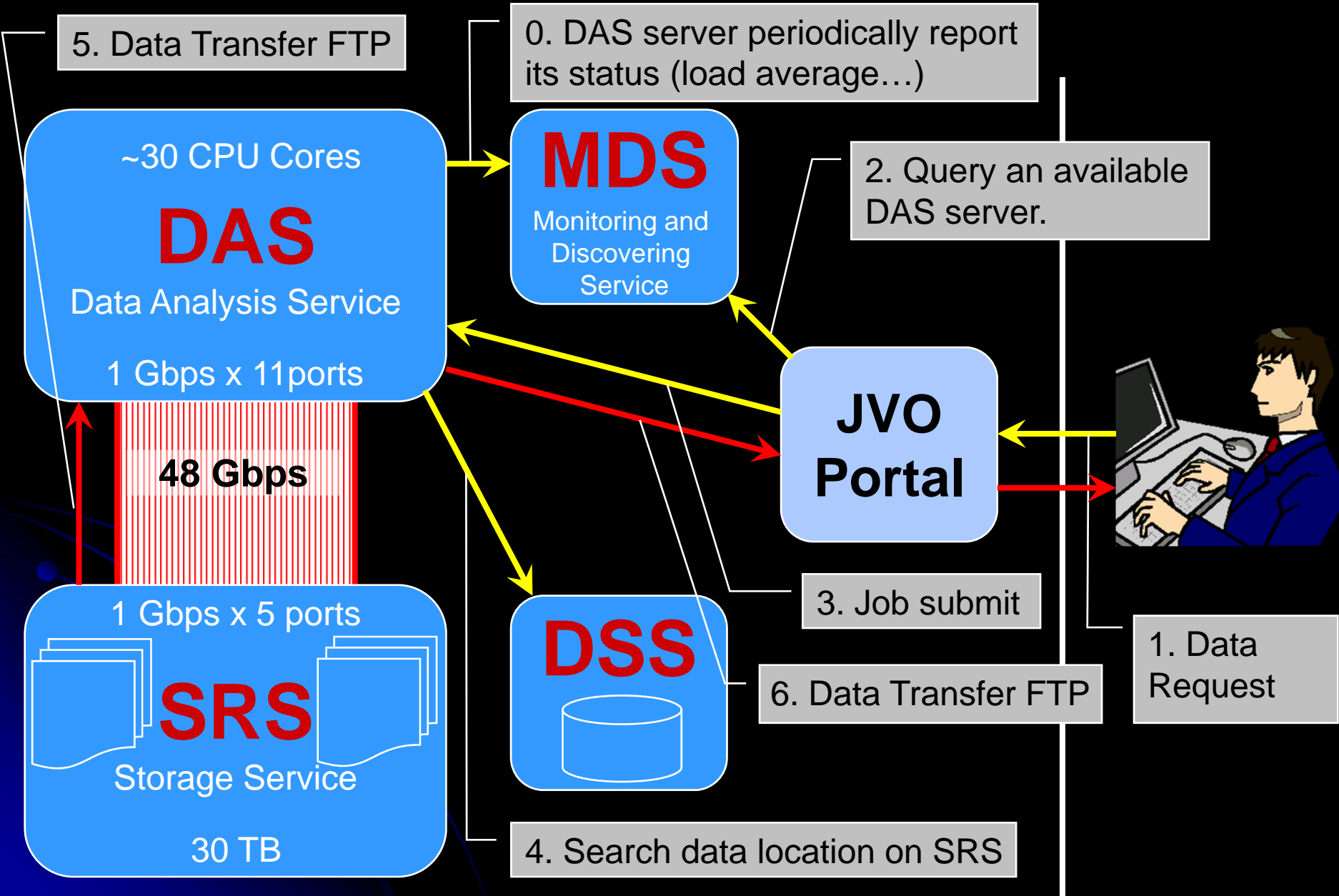
Non-uniformity

CCD Image Reduction



One day for each observation night

Subaru Data Analysis GRID system



Flat-field frame calculation GUI

The screenshot shows a Mozilla Firefox browser window displaying a web application. The main content area is titled "Create Flat Calibration Frames". It features a search interface with a "Date:" label and a "Search" button. Below this is a table with columns for dates and numerical values. A modal dialog box is open over the table, containing a form for creating calibration frames. The form includes fields for "From:" (2002-04-06), "To:" (2002-04-15), "W-C-RC" (W-C-RC), and a dropdown menu for "All". It also has input fields for "exptime: 100 sec", "max frames: 999", and "max hum". A "Submit Job" button is present. Below the form is a "Message:" field containing a URL: "action=submitJob&start=2002-04-06&end=2002-04-15&exptime=100&maxFrame=999&maxHum=100".

Observation

Date: Search

2002-04-13	0	0	9	5	0	26
2002-04-14	0	0	9	5	0	26
2002-04-15	0	3	0	0	11	35
2002-04-16	0	0	0	0	21	0

Skip: days

Message:

Create Flat Calibration Frames

From: To: W-C-RC

exptime: sec | max frames: | max hum:

Message:

- All
- si001s (3)
- si002s (4)
- si005s (2)
- si006s (5)
- w4c5 (8)
- w67c1 (0)
- w6c1 (1)
- w7c3 (9)
- w93c2 (6)

SuprimeCam Mosaic Service

[Status](#) | [Registry](#) | [Search](#) | [Workflow](#) | [Result](#) | [QSO](#) | [DataViewer](#) | [Tools](#) | [SubaruAnalysis](#) | [VOspace](#) | [MDS](#) | [Usage](#) | [Logout](#)

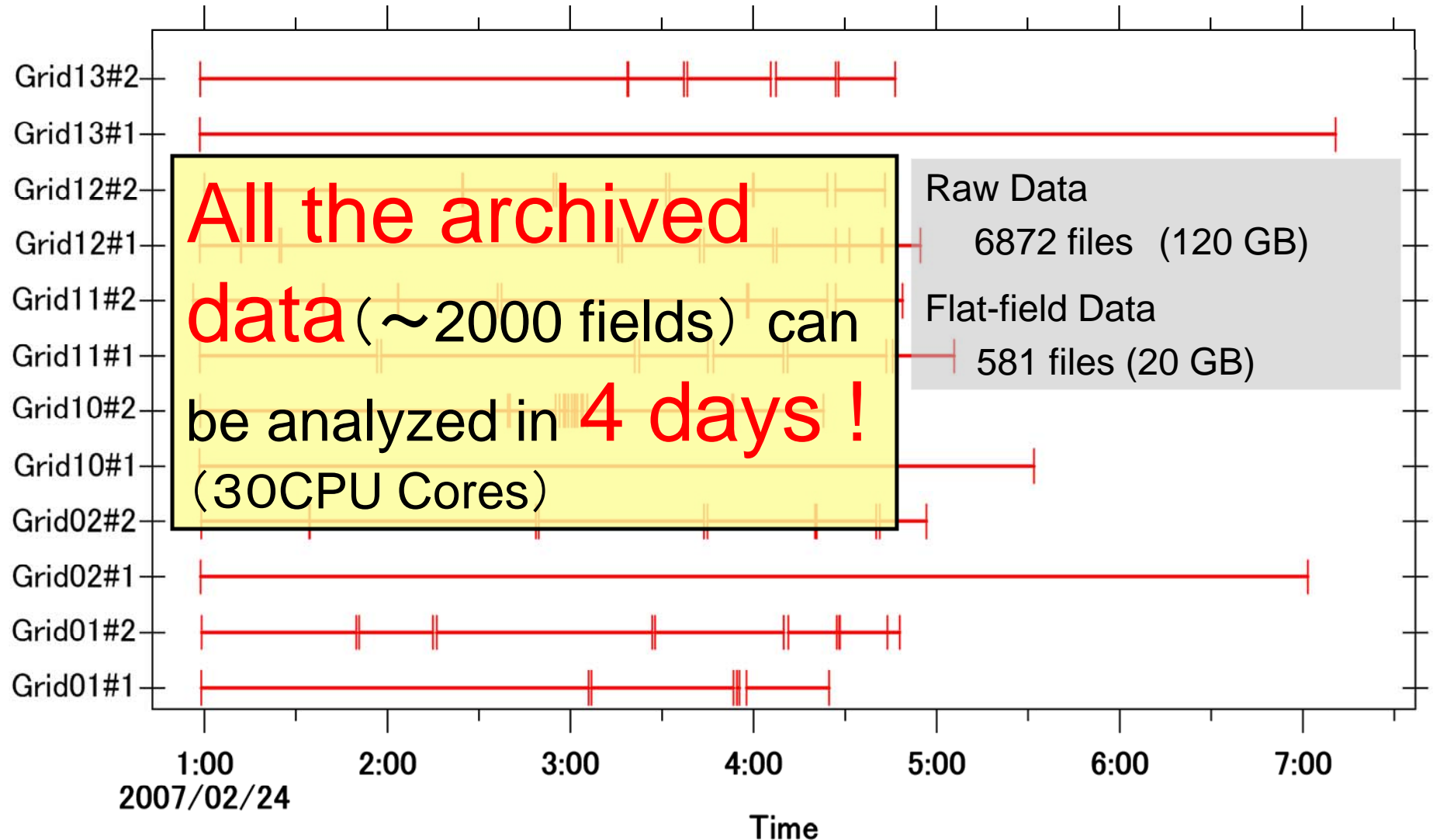
Requireid Parameters

Object Name: Filter: W-J-B

[A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#) [N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#)

Object	W-J-B	W-J-V	W-C-RC	W-C-IC	W-S-I+	W-S-Z+
XRF030723	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> <u>830</u>	<input type="checkbox"/> 0	<input type="checkbox"/> 0
XMM_deep	<input type="checkbox"/> 0	<input type="checkbox"/> <u>208</u>	<input type="checkbox"/> <u>100</u>	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> <u>220</u>
XRF040916	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> <u>80</u>	<input type="checkbox"/> 0	<input type="checkbox"/> 0
XRF040924	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> <u>50</u>	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> 0
XRF040912	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> <u>40</u>	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> 0
XMM_1	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> <u>32</u>	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> 0
XMM_c1	<input type="checkbox"/> 0	<input type="checkbox"/> <u>12</u>	<input type="checkbox"/> <u>30</u>	<input type="checkbox"/> 0	<input type="checkbox"/> <u>24</u>	<input type="checkbox"/> 0
XMM_c2	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> <u>16</u>	<input type="checkbox"/> 0	<input type="checkbox"/> <u>24</u>	<input type="checkbox"/> 0
XMM_c3	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> <u>4</u>	<input type="checkbox"/> 0	<input type="checkbox"/> <u>24</u>	<input type="checkbox"/> 0
XMM_c4	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> <u>2</u>	<input type="checkbox"/> 0	<input type="checkbox"/> <u>24</u>	<input type="checkbox"/> <u>2</u>
XMM_c5	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> <u>18</u>	<input type="checkbox"/> 0	<input type="checkbox"/> <u>24</u>	<input type="checkbox"/> <u>1</u>

Experiment (58mosaic/12CPU Core)



Summary

- We developed GRID computing system for Subaru data analysis
 - **One night observation**
One day (1CPU) → **One hour**
 - **All the archived data (6 years)**
More than one year (1CPU) → **One week**
 - Accessible from Web browser.
- Operation System will be completed next year.
- Experimental use of NAREGI Grid middleware is underway