Design and Implementation of the Japanese Virtual Observatory (JVO) system

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Introduction

- **What can you do on Japanese Virtual Observatory (JVO) ?**
  - Web portal to the Astronomical Data
  - On-line data visualization
  - Simple and Easy Subaru data reduction
- **Who can use the JVO**
  - Anyone can use the most of the functionality (Guest)
  - Registered user can have a permanent storage area on the JVO and can submit a job for Subaru data reduction. (Astro. study only)
- **How can you access to the JVO**
  - http://jvo.nao.ac.jp/portal
  - Search on google with a keyword "JVO"

Why we develop the JVO

- **Many astronomical data sites in the world**
  - many are unnoticed even though they provide good data
  - need a broker system (portal site)
- **Server side web service vs stand-alone application**
  - UI is a Web browser: very familiar and easy to use.
  - Always provide the most recent feature.
  - Doesn't require high-spec PC.
- **Increase the usability of the Subaru data**
  - especially of Suprime-Cam
  - Data reduction of large format data is time-consuming.

IVOA Standards

- Registry
  - Data service discovery
  - Metadata exchange and search
- SIAP/SSAP/SkyNode/SCS
  - Database query interface
- VOTable
  - Table data transport format

…

Architecture

Grid System

Analysis Servers

Subaru Archive

MDS

LDAP

Auth.

User Storage

Invoke

Service Discovery

User Request

Invoke

SDSS

QSO

SkyNode 1.0

Subaru

...

2MASS

Data Service

Web Service

HTTP Get

FTP

LDAP

S. Reg.

P. Reg.

Metadata Harvesting

Registry

Invoke

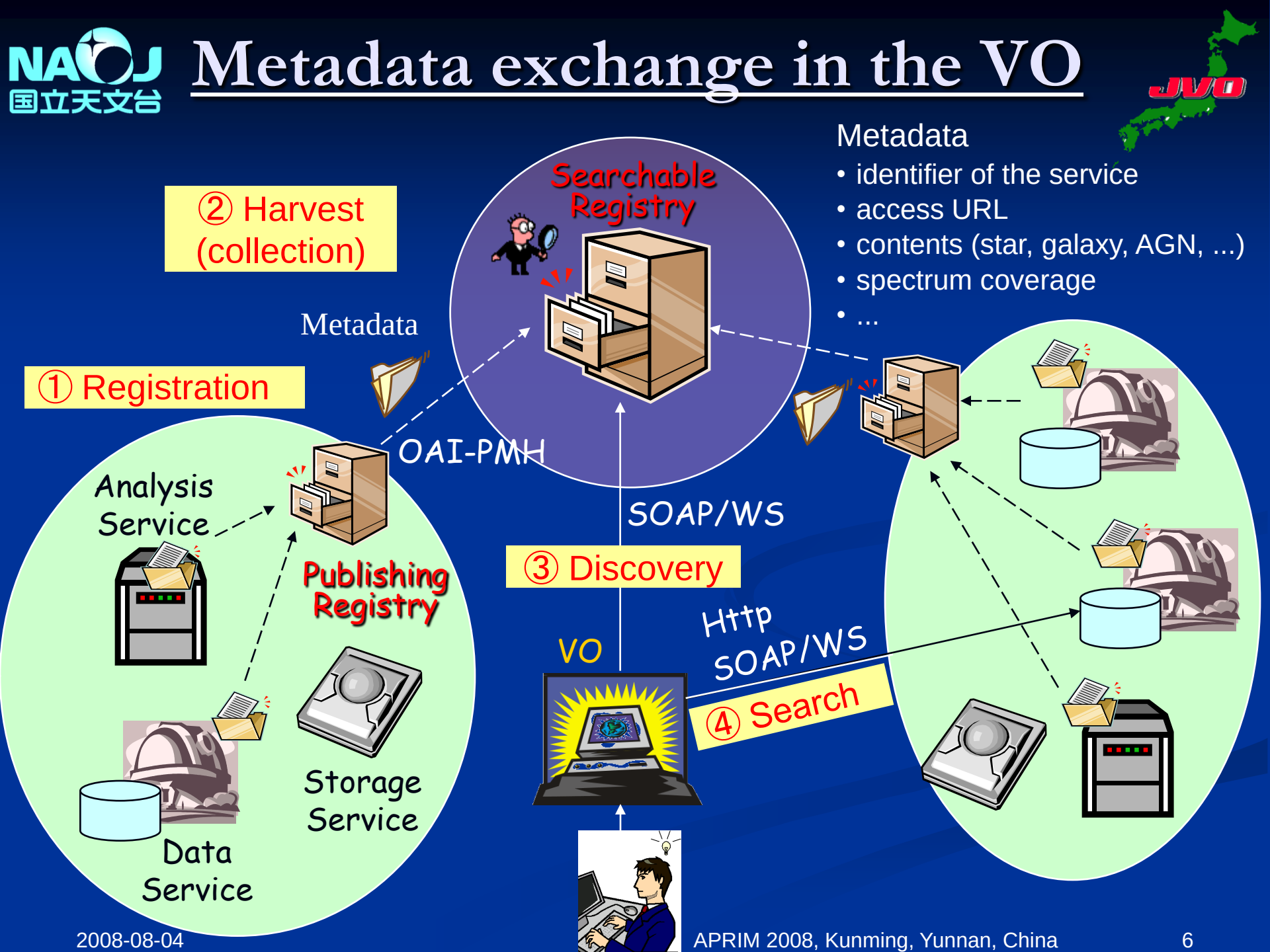
Other VOs

SIAP/SSAP

P. Reg.

SkyNode 0.7.4

Metadata exchange in the VO

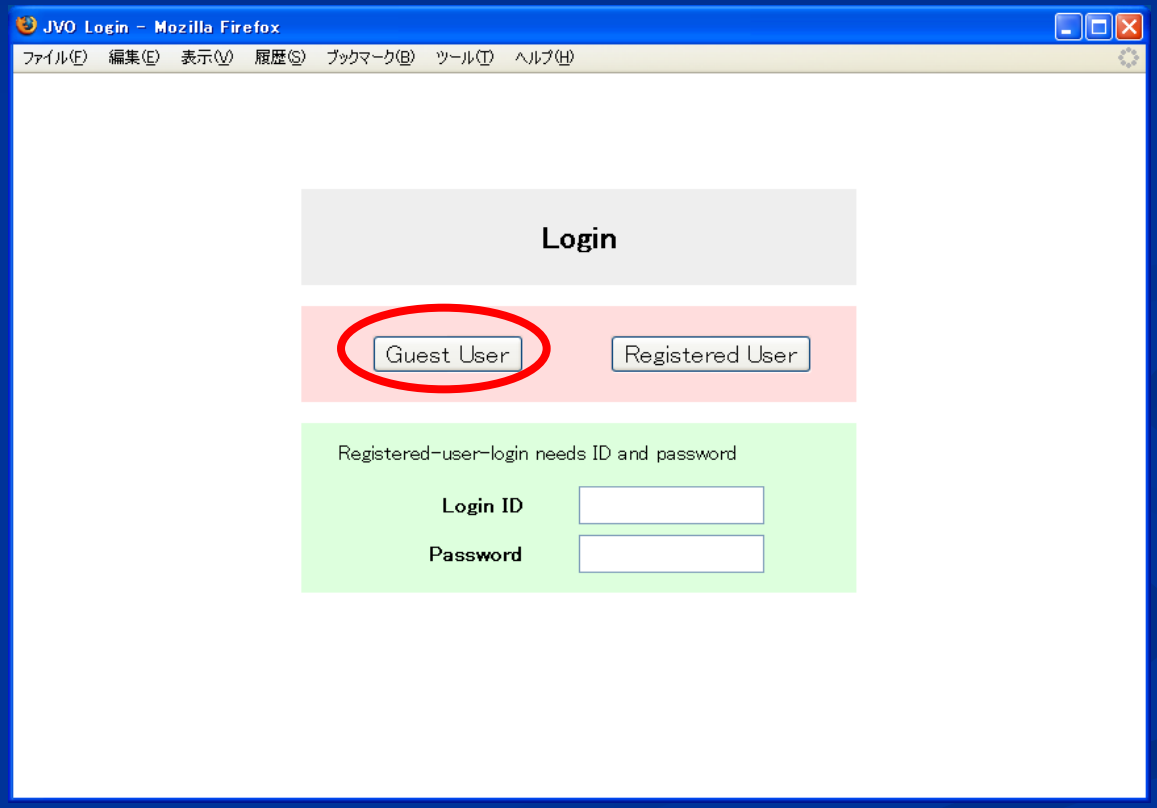


JVO SkyNode toolkit

- SkyNode toolkit is developed to help people who want to open their own data to the VO.
- Enables to expose the content of the local database thorough the VO standard interface
  - SkyNode (will be replaced by TAP)
  - SIAP
  - SSAP
- http://jvo.nao.ac.jp/download/skynode-toolkit

Login

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



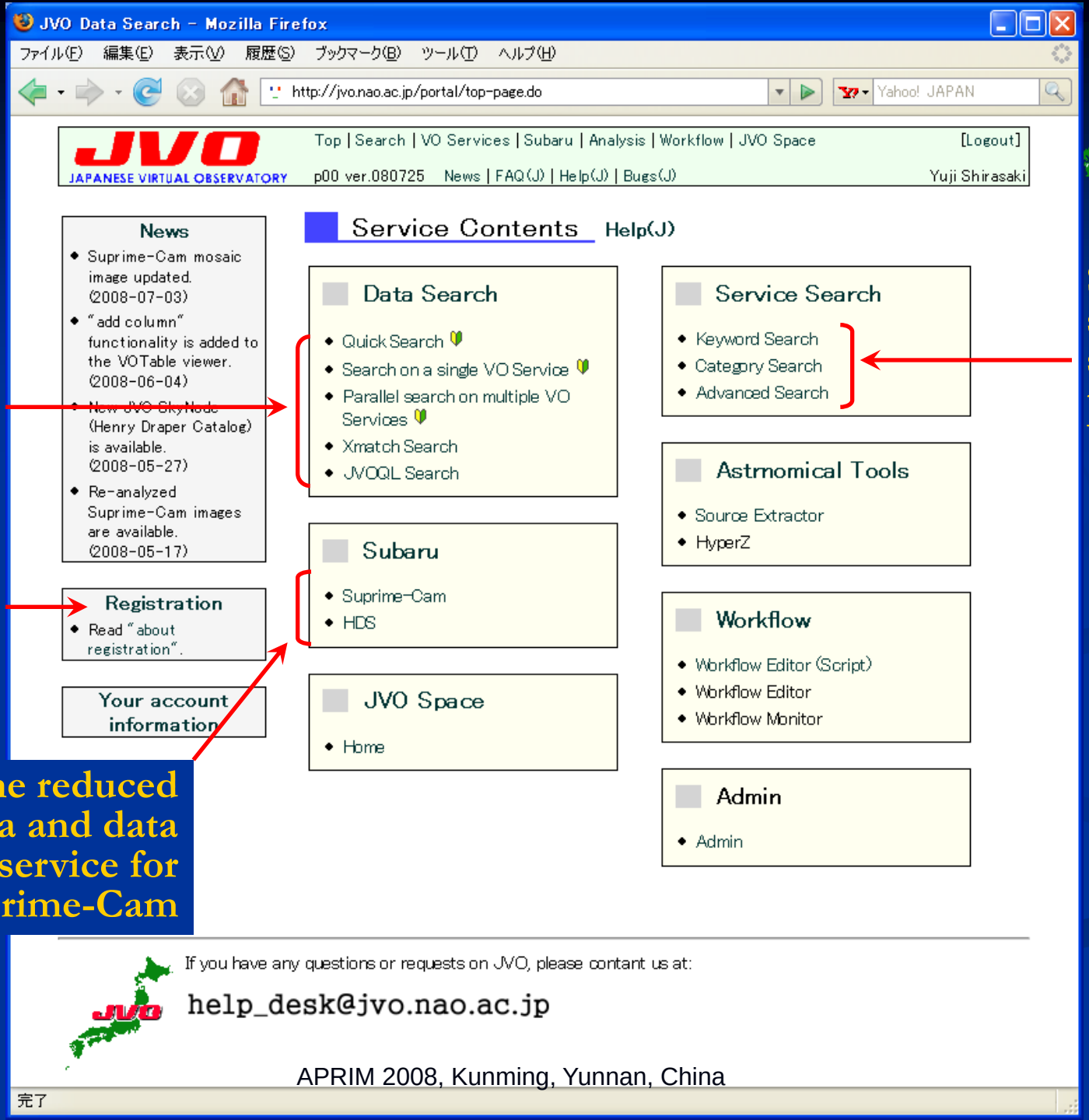
Top Page

Data search by several types of UI

User registration

Access to the reduced Subaru data and data reduction service for Suprime-Cam

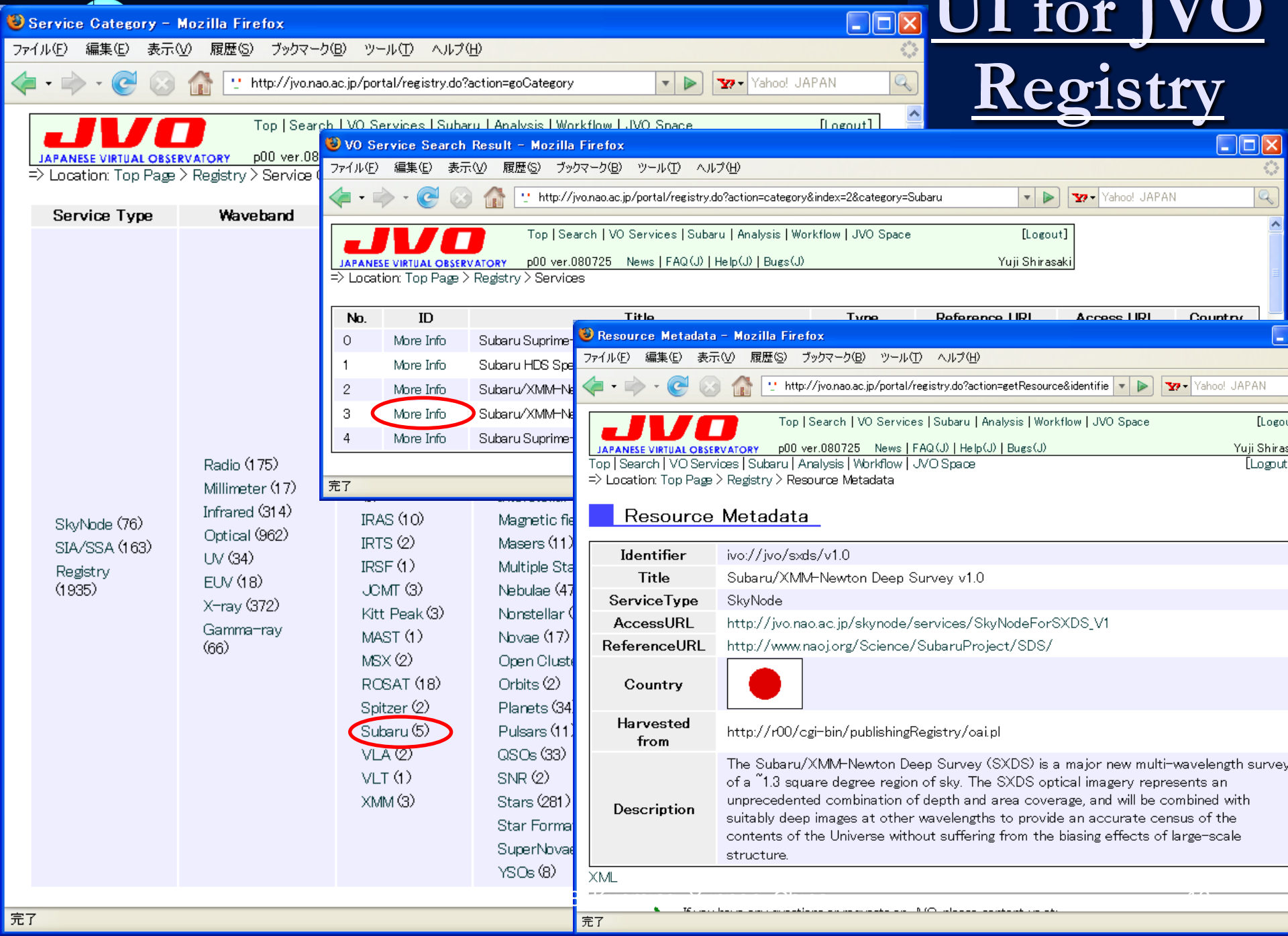
Service search by several types of UI



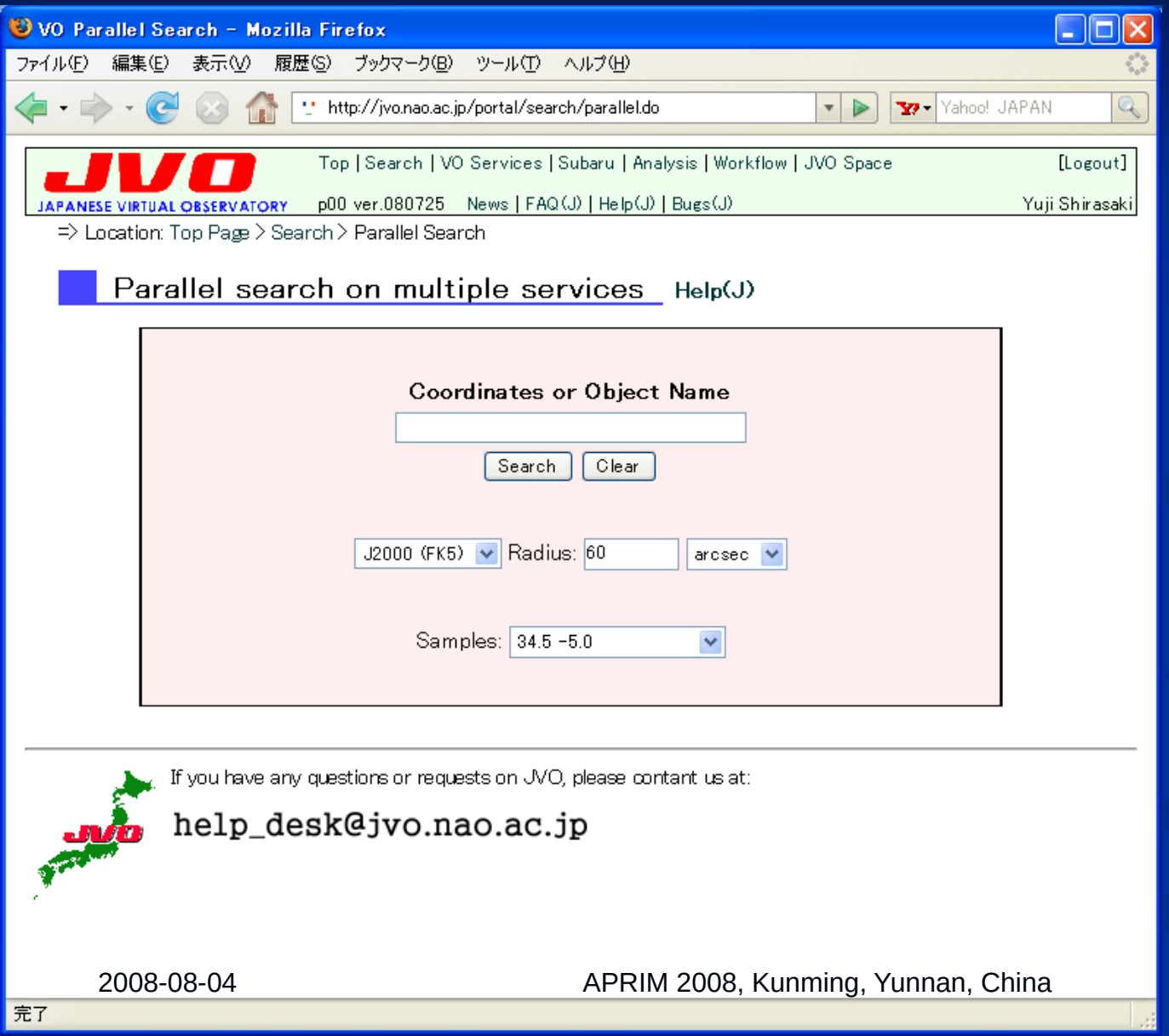
VO Data Service Search

- VO Service Registered in the JVO Registry
  - 1967 Resource Metadata as of 2008-08-01
  - 12 countries
    - USA, France, Canada, Italy, UK, Brazil, Australia, Spain, Mexico, ESA, China, and Japan
  - Harvest once a day from 6 sites (STSCI, NCSA, GSFC, CDS, ESAC, JVO)
- Search Interfaces for JVO Registry
  - Keyword Search
  - Directory (Category) Search
  - Search by Detailed Condition

UI for JVO Registry



Parallel Search

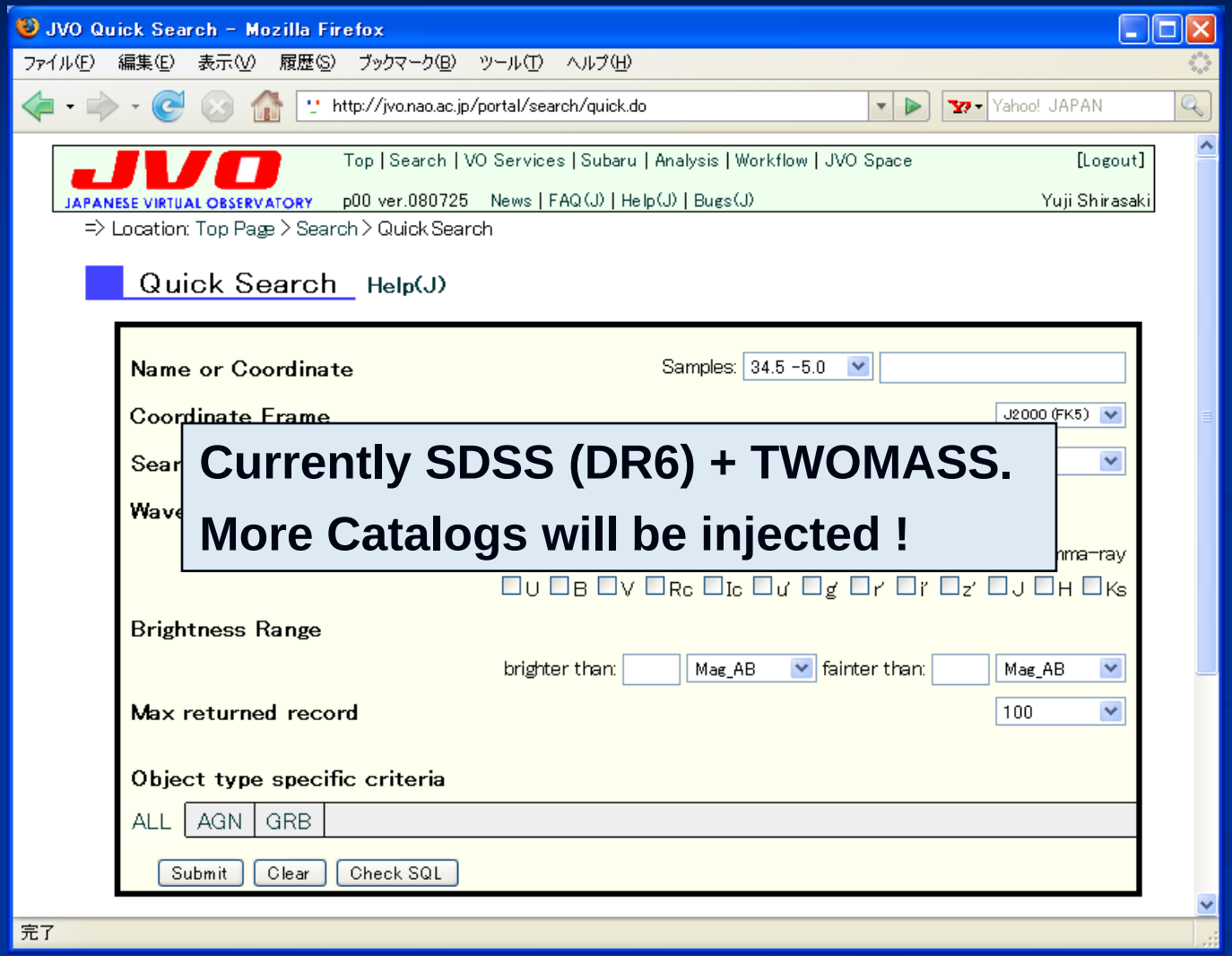


- Only a search region can be specified
- Query to the multiple VO services by one click !

Search Status for Parallel Search

- over 1,000 data resources are queried at once.
- impossible to do this by hand !
- Takes ~ 10 minutes to complete

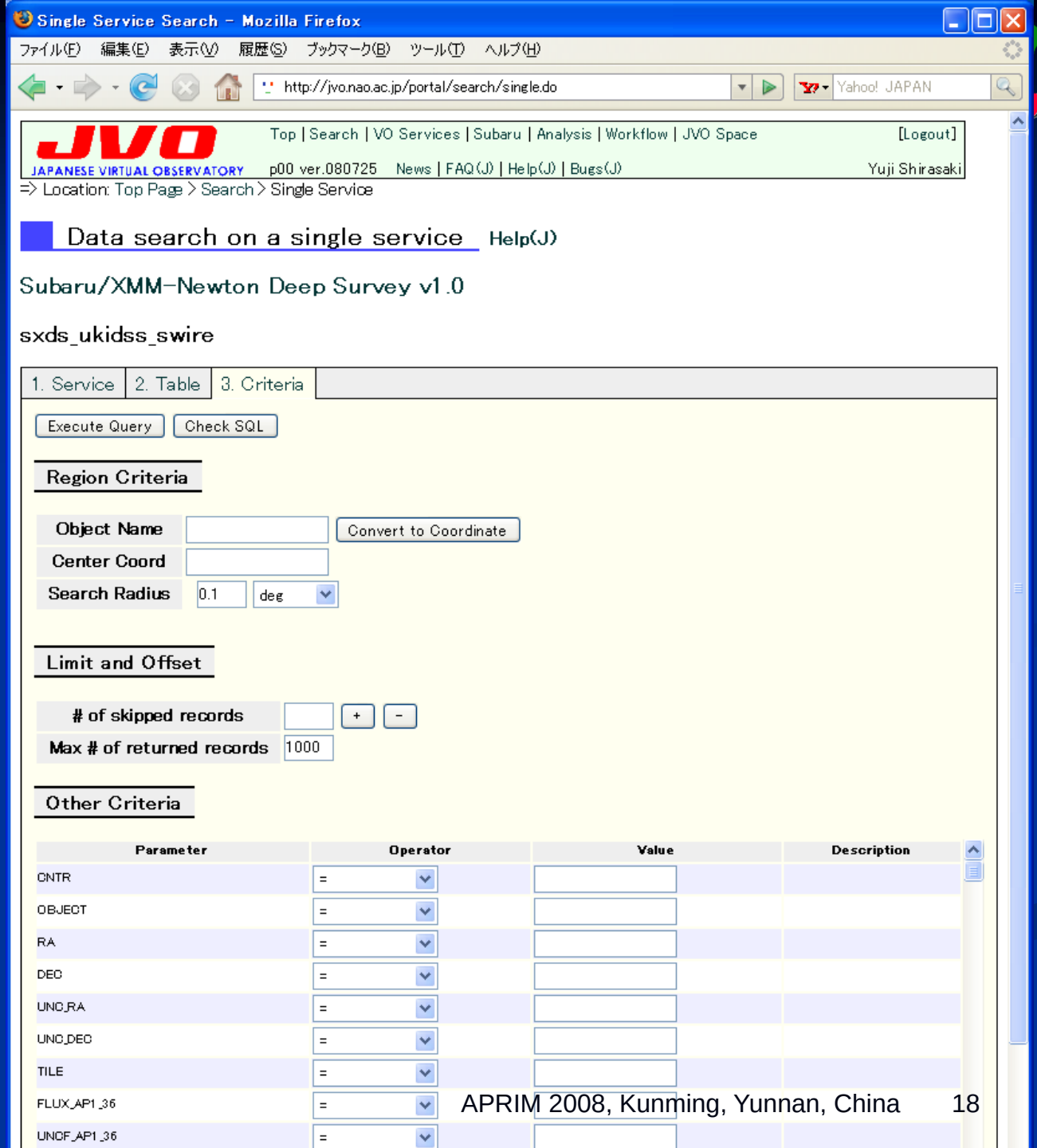
Quick Search



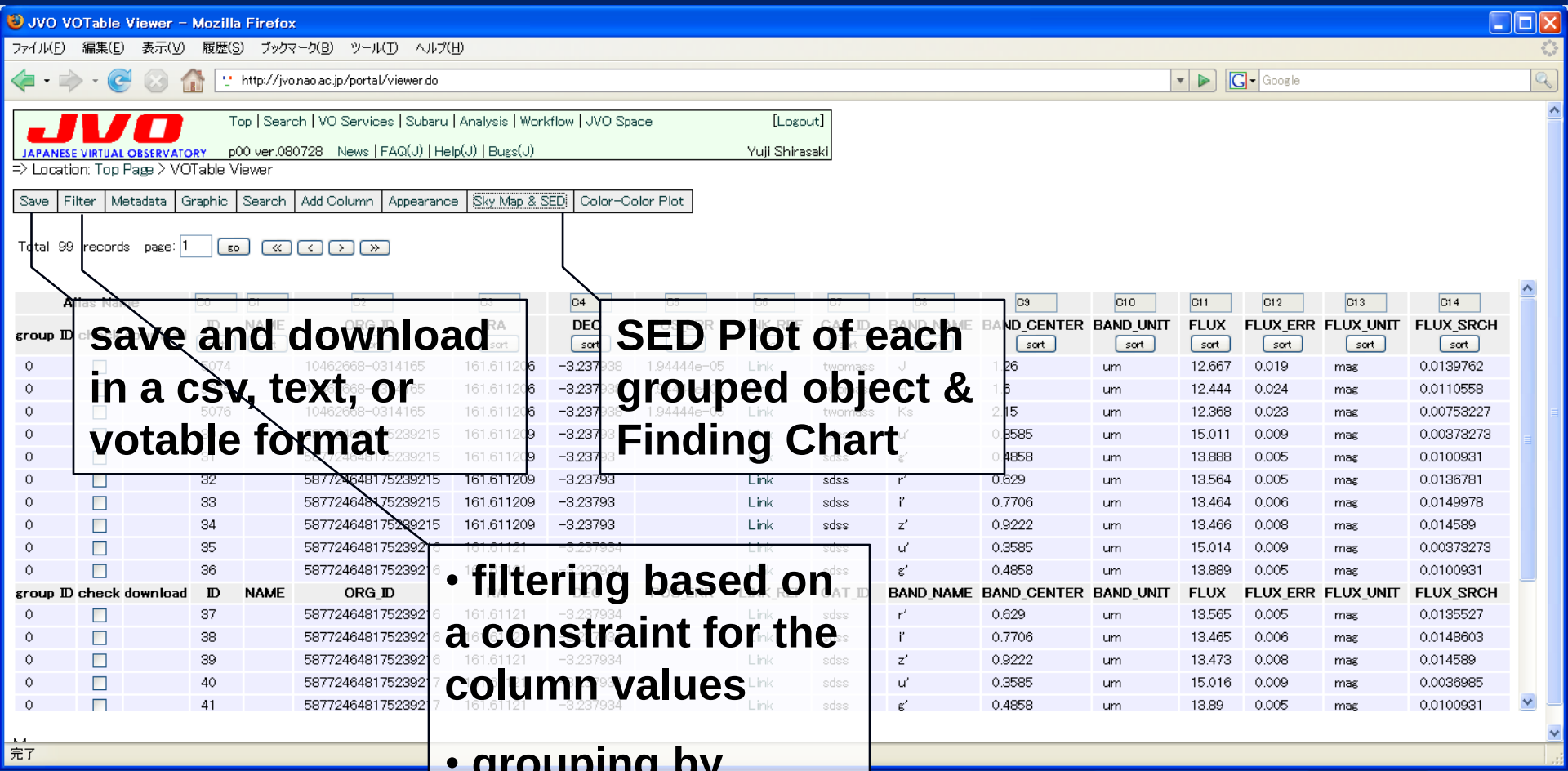
- QI for the Virtual Universe
- Single Database from multiple catalogs
- Only RA, Dec, Brightness
- Quick Region Search algorism is employed
- 0.8 sec for thousands of objects from three billions objects

Search with a detailed criterion

- Single VO Service
- Criteria on each attribute
- Uniform QI for every VO service



VOTable Viewer

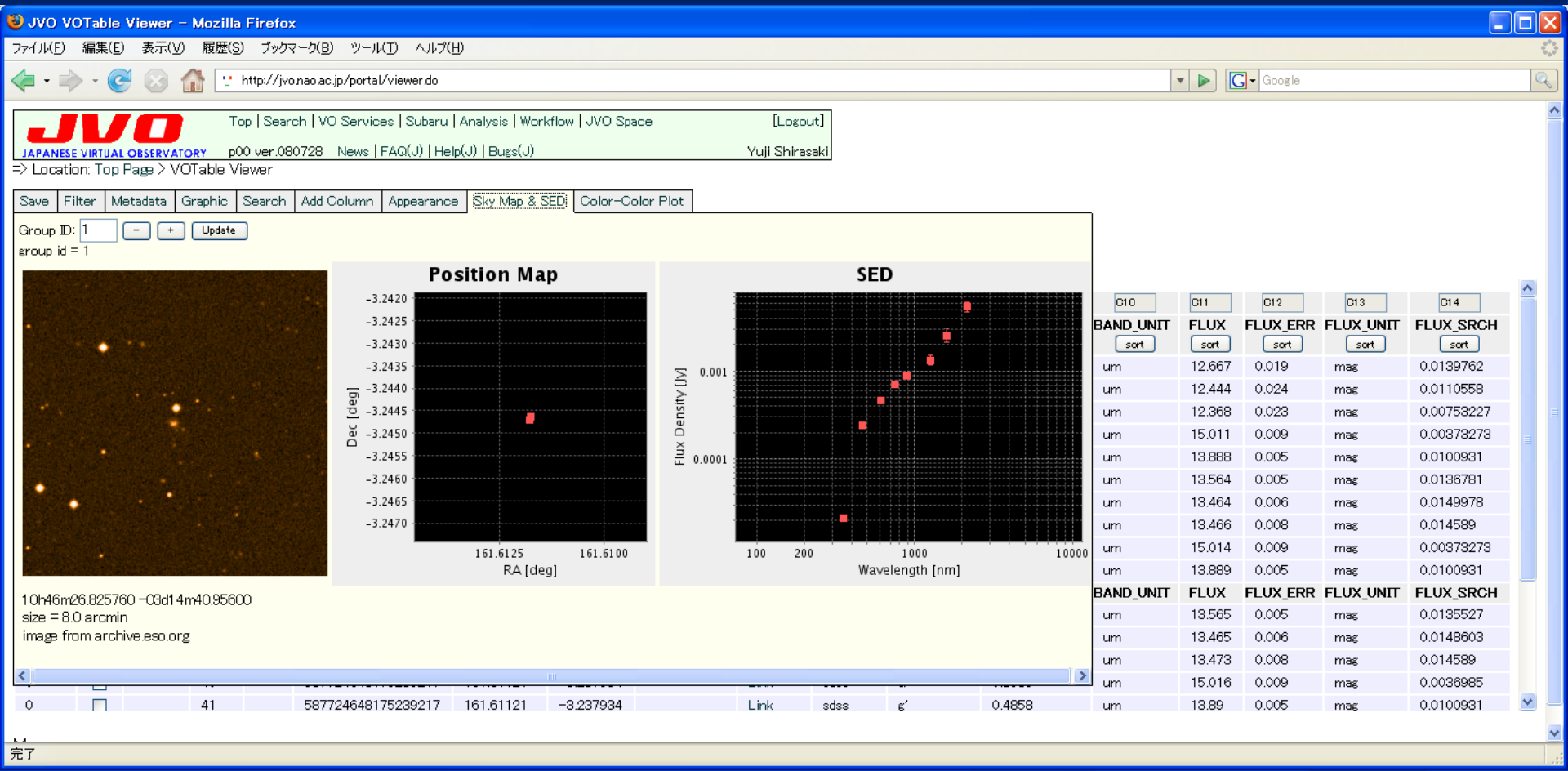


save and download in a csv, text, or votable format

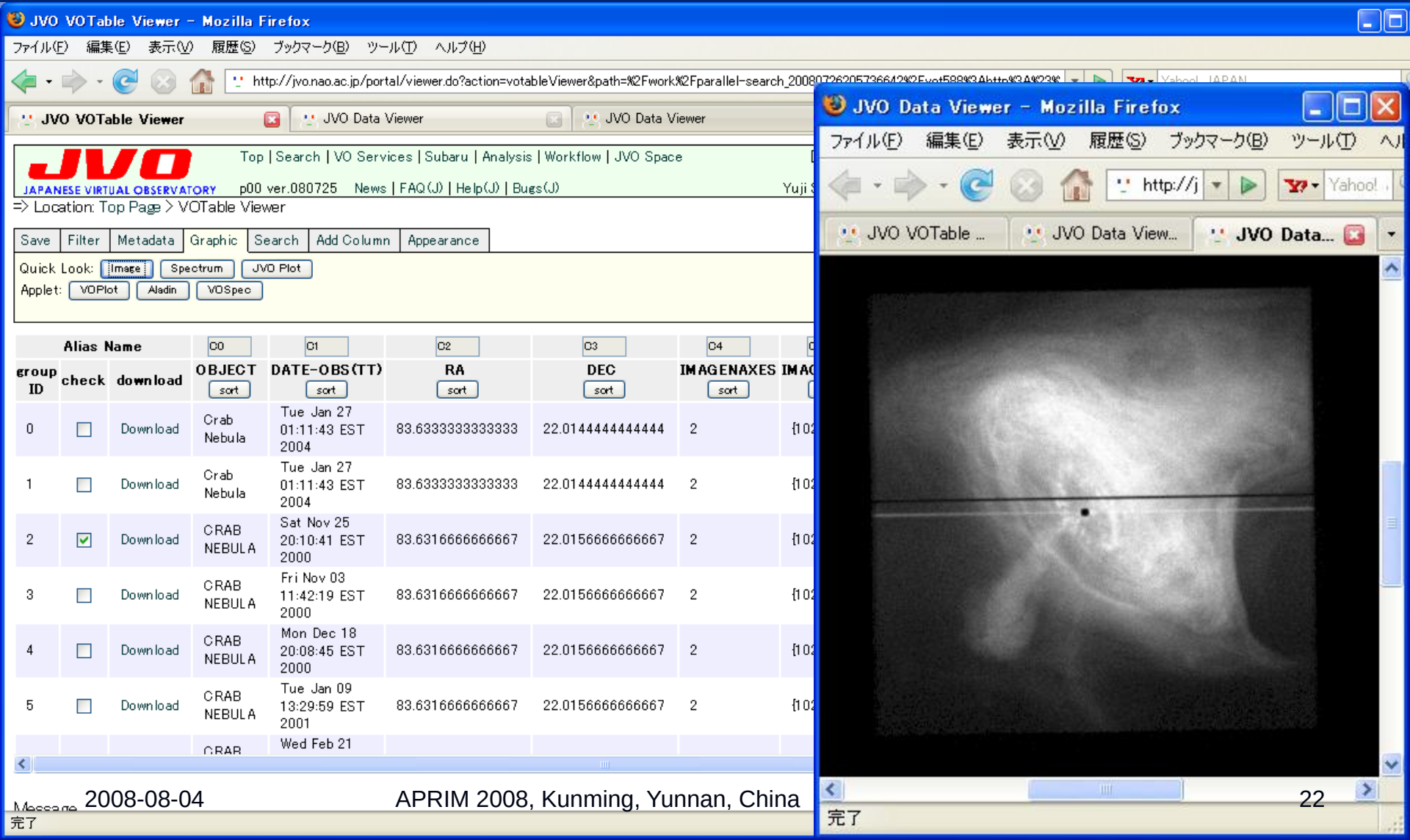
SED Plot of each grouped object & Finding Chart

- filtering based on a constraint for the column values
- grouping by celestial coordinate

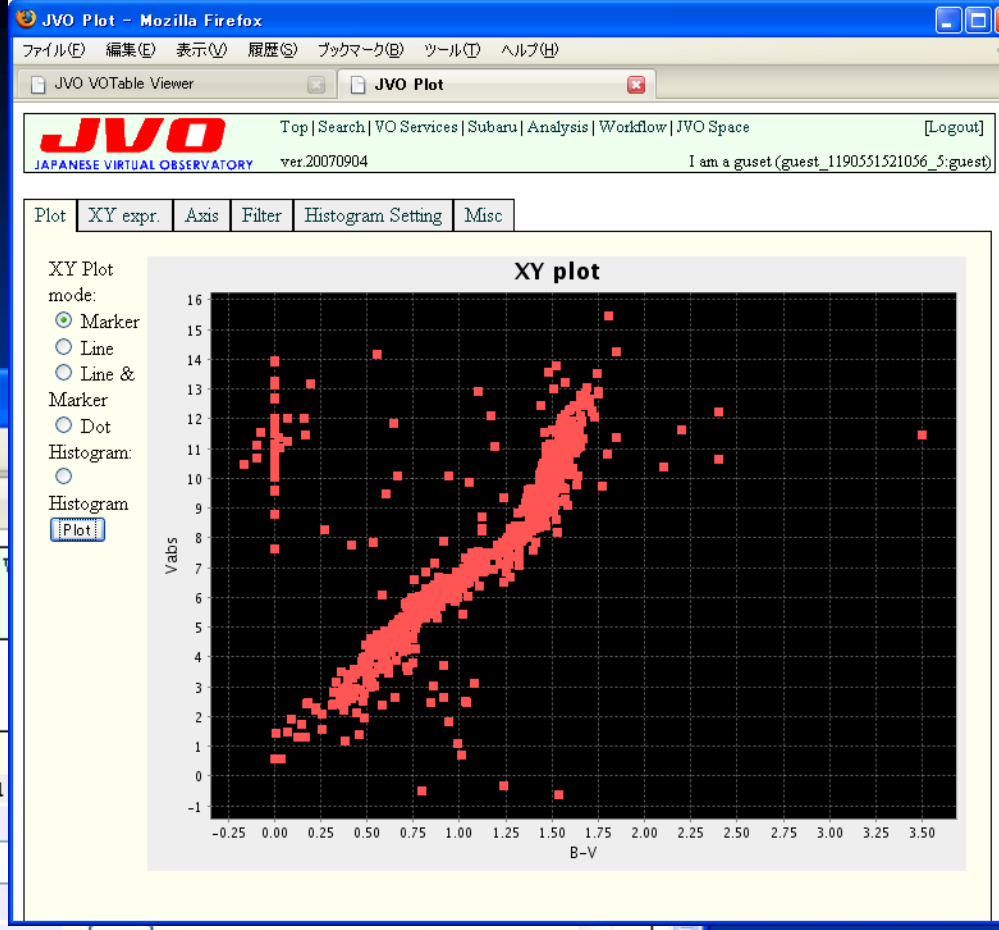
VOTable Viewer



VOTable Viewer



JVO Plot


JVO Plot – Mozilla Firefox
JVO VOTable Viewer
JVO Plot
JAPANESE VIRTUAL OBSERVATORY
Top | Search | VO Services | Subaru | Analysis | Workflow | JVO Space
[Logout]
ver.20070904
I am a guset (guest_1190551521056_5:guest)
Plot
XY expr.
Axis
Filter
Histogram Setting
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XY Plot mode:
Marker
Line
Line & Marker
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Histogram:
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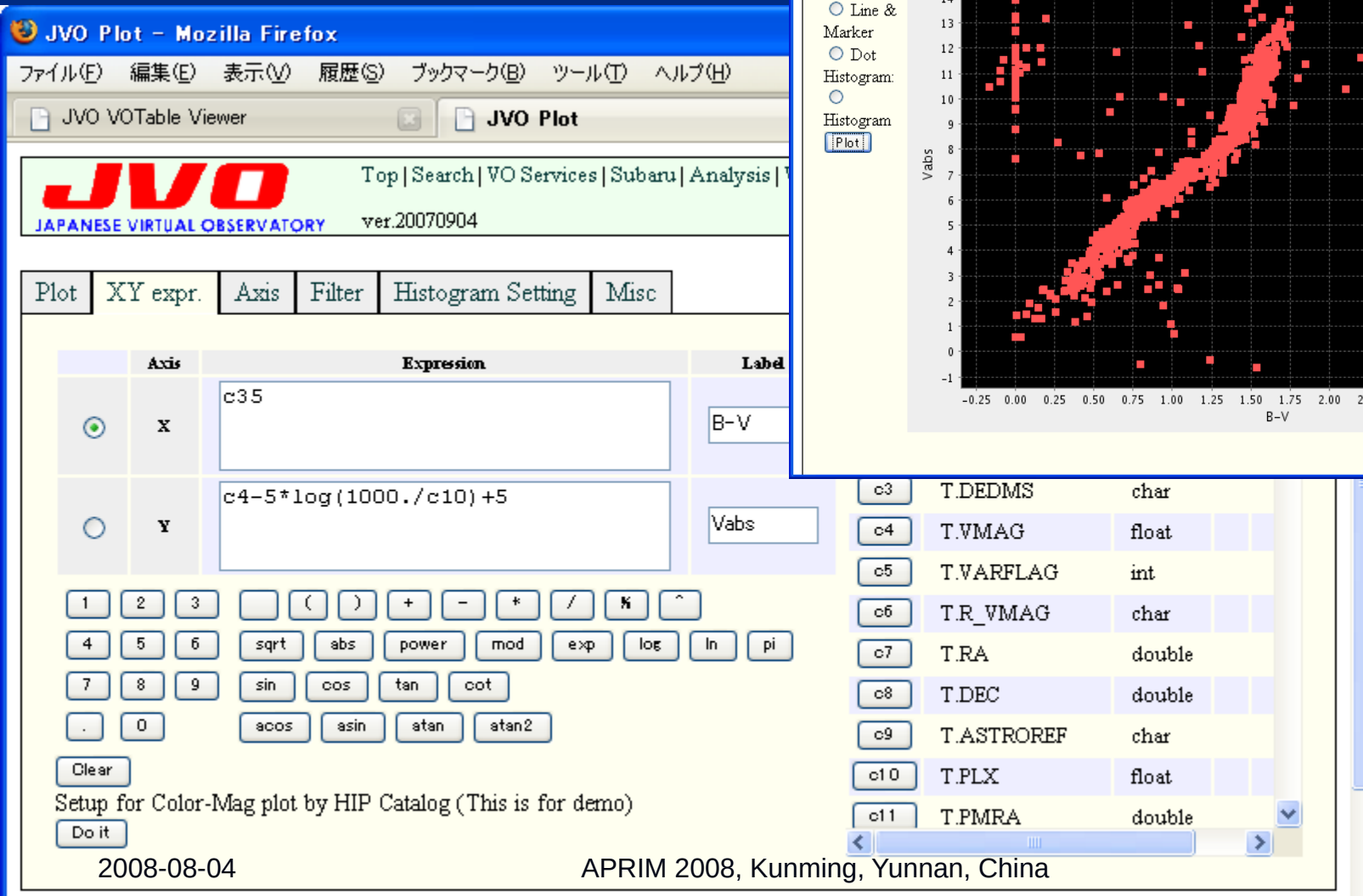
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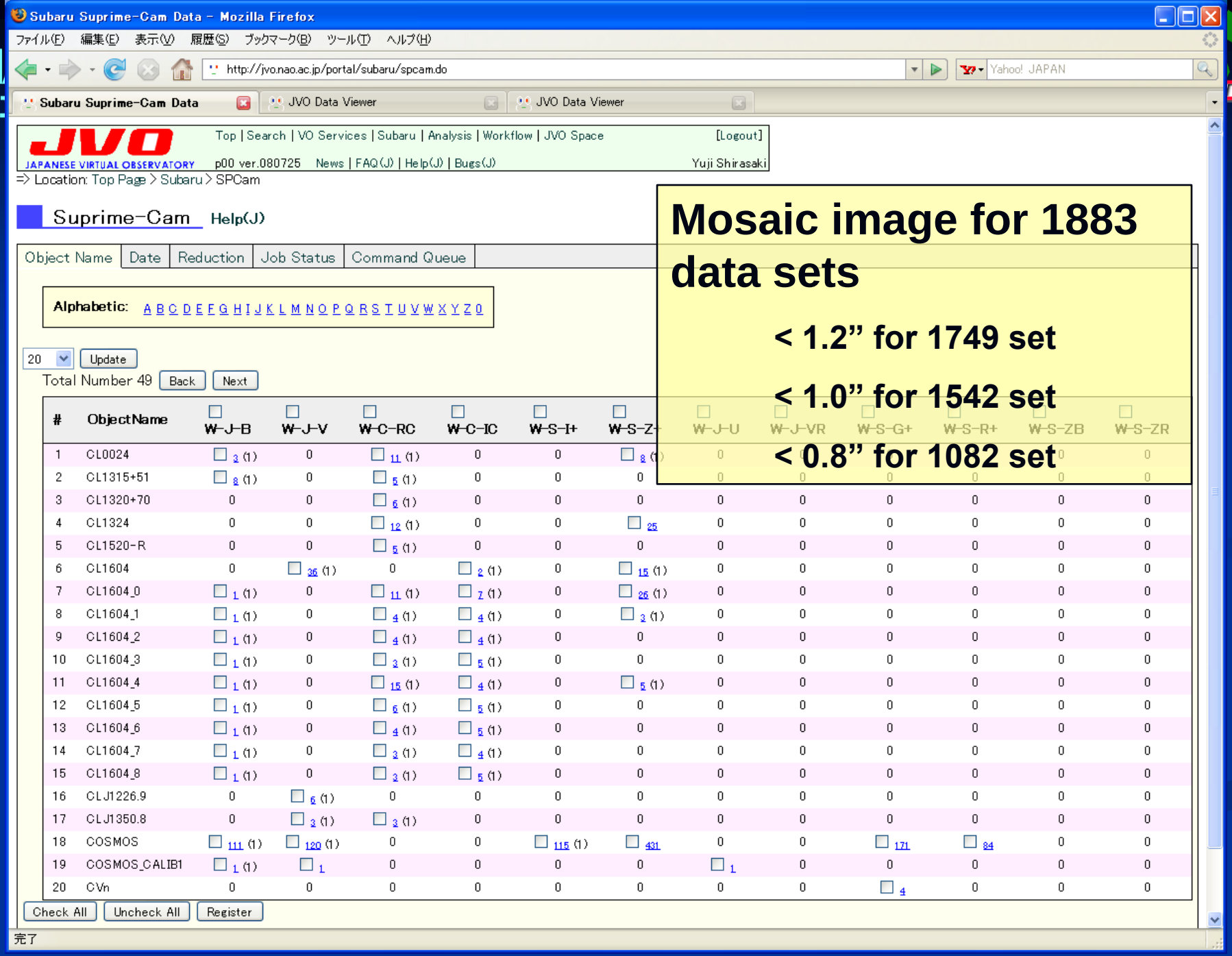
ver.20070904
Plot
XY expr.
Axis
Filter
Histogram Setting
Misc
Axis
Expression
Label
X
c35
B-V
Y
c4-5*log(1000./c10)+5
Vabs
Clear
Setup for Color-Mag plot by HIP Catalog (This is for demo)
Do it
c3 T.DEDMS char
c4 T.VMAG float
c5 T.VARFLAG int
c6 T.R_VMAG char
c7 T.RA double
c8 T.DEC double
c9 T.ASTROREF char
c10 T.PLX float
c11 T.PMRA double

Subaru Data Service

- Provides reduced Subaru data
  - Mosaic image for Suprime-Cam
  - Reduced 1D spectrum of HDS
- Data reduction by your own criteria
  - Mosaic service for Suprime-Cam
  - Doesn't require detailed knowledge about Subaru
  - No installation of any software on your PC is required
  - Just click and wait about one hour



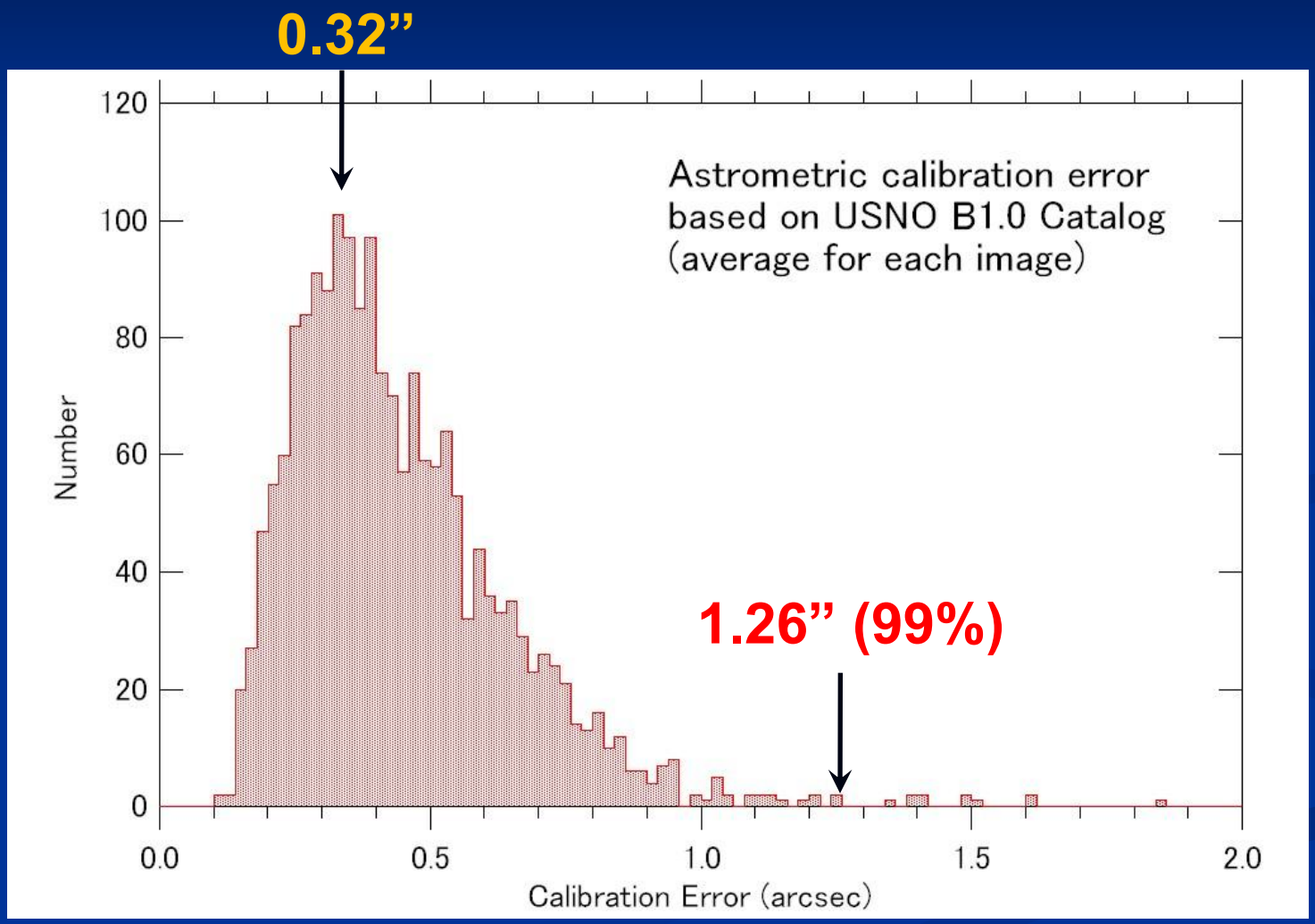
Mosaic image for 1883 data sets

< 1.2” for 1749 set

< 1.0” for 1542 set

< 0.8” for 1082 set

Astrometric Calibration Error



Suprime-Cam Mosaic Info. - Mozilla Firefox

ファイル(F) 編集(E) 表示(V) 履歴(S) ブックマーク(B) ツール(T) ヘルプ(H)

http://jvo.nao.ac.jp/portal/subaru/spcam.do?filter=W-S-I%2B&object=COSMOS&action=redInfo&redId=080620_21

Yahoo! JAPAN

Suprime-Cam Mosaic Info. | JVO Data Viewer | JVO Data Viewer

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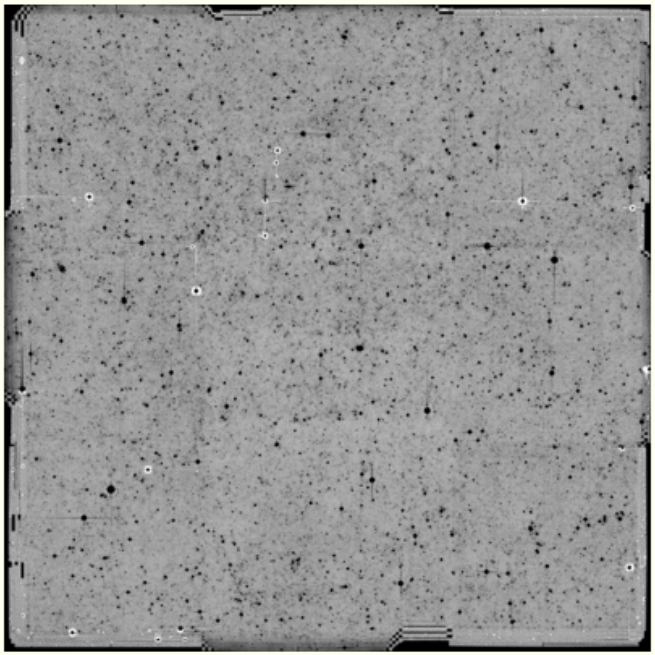
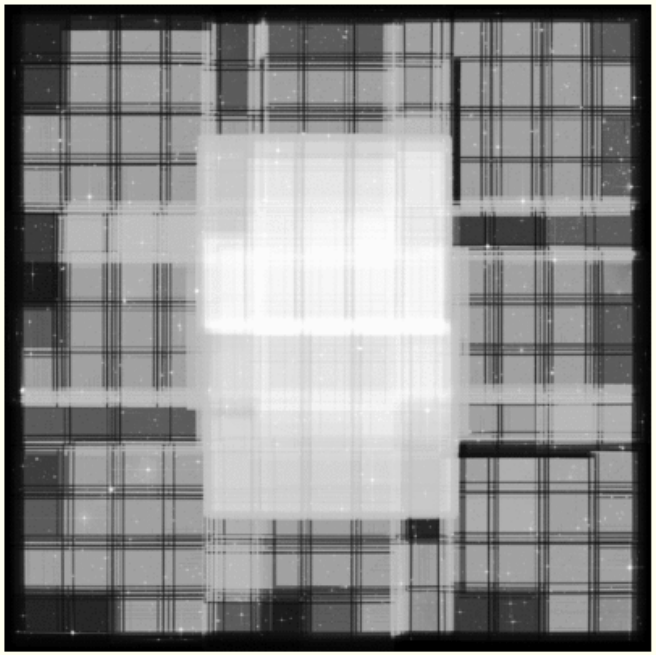
=> Location: Top Page > Subaru > SPCam > Object Info > Mosaic Info

COSMOS W-S-I+ (080620_214814_g08_94) Help(J)

Summary | QL Image | Exposures | Flat Field

Mosaic Frame ID : SUPM2C3D69E956E0000





Mosaic frame: Download 2818.85 MB

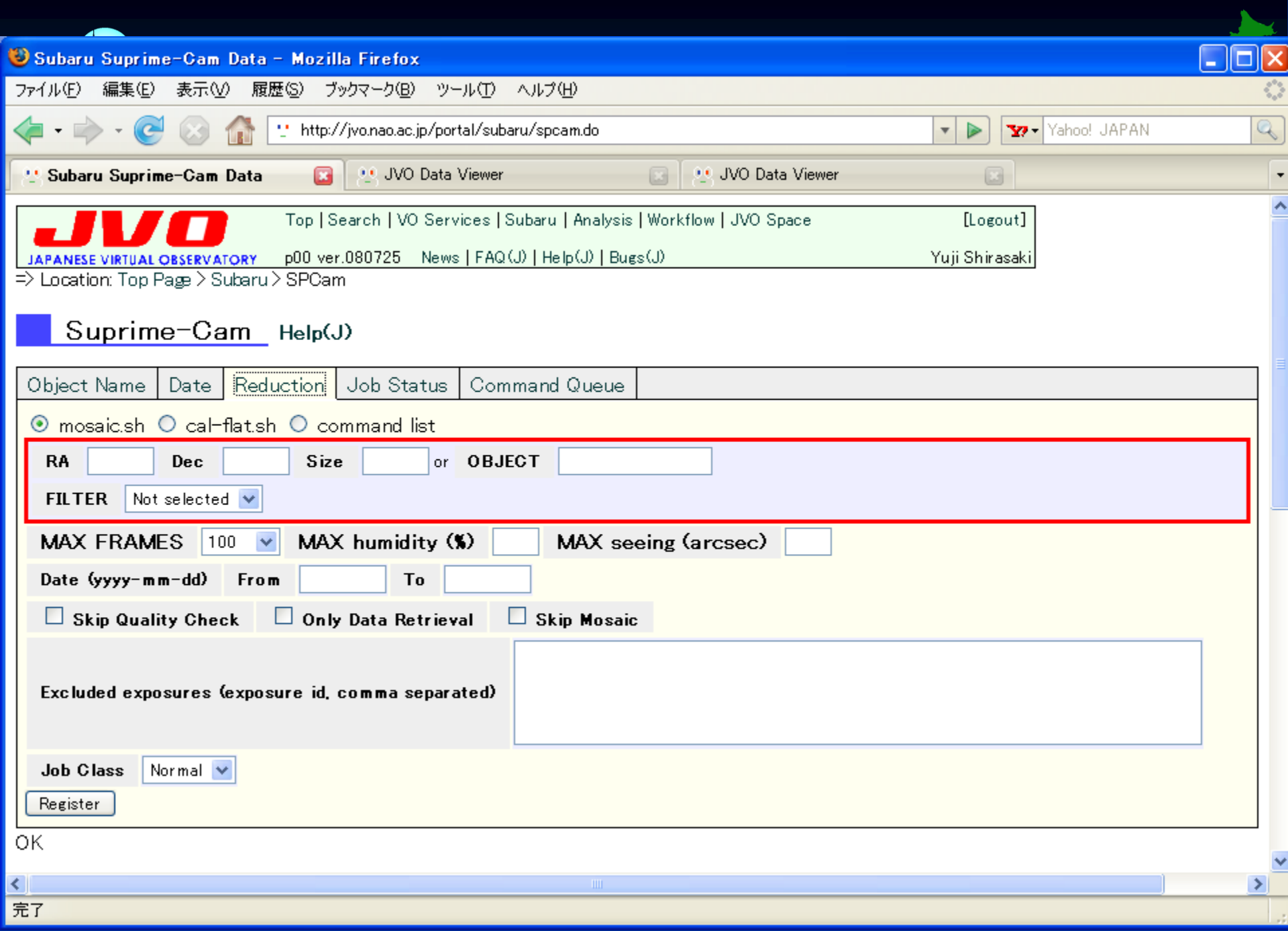
Exposure frame: Download 2818.84 MB

Super fine frame: Download 2798.1 MB (FWHM < 0.8 arcsec)

Fine frame: Download 2818.84 MB (FWHM < 1.0 arcsec)

Good frame: Download 2818.84 MB (FWHM < 1.2 arcsec)

完了


Subaru Suprime-Cam Data - Mozilla Firefox
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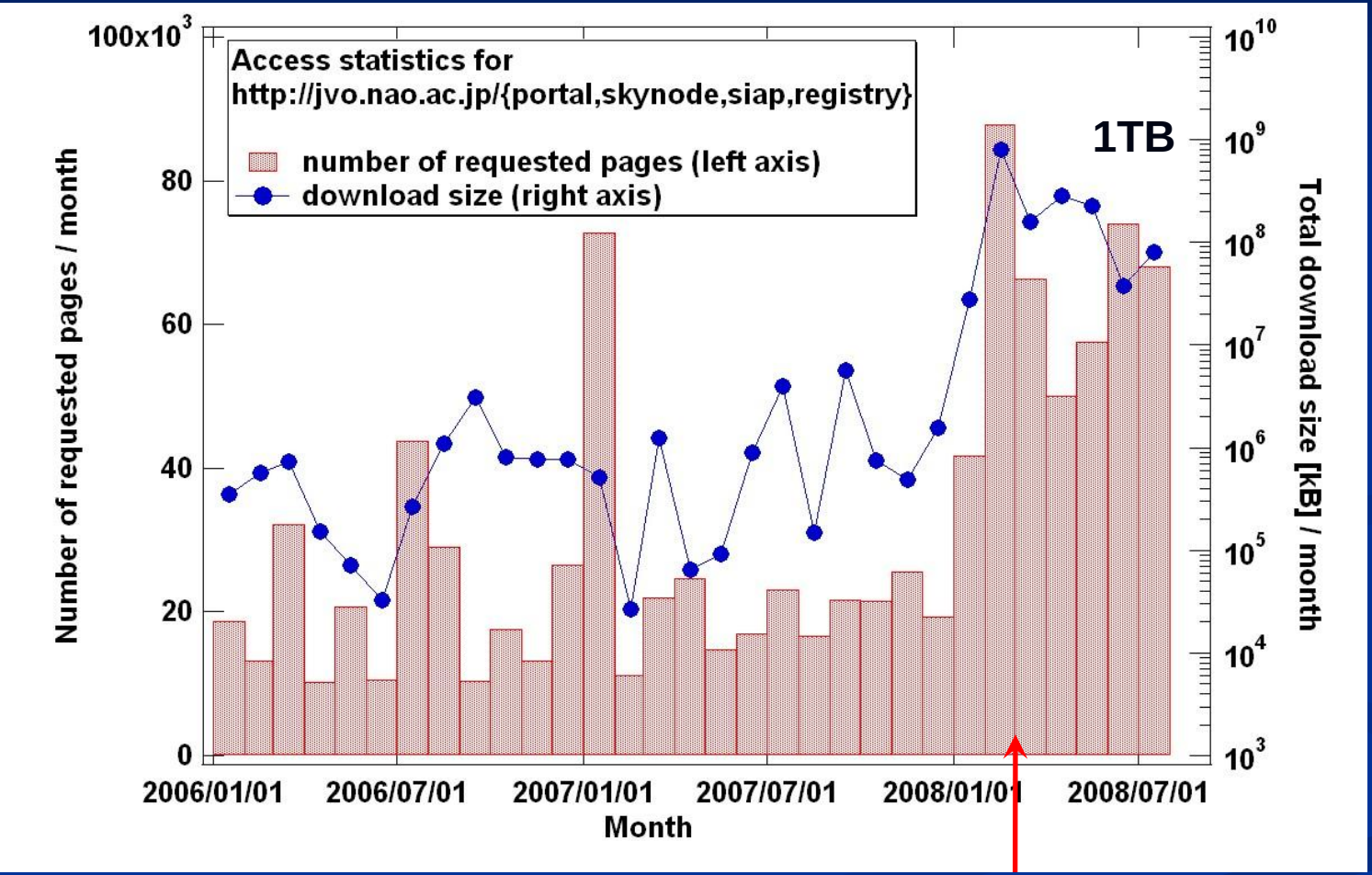
Yuji Shirasaki
=> Location: Top Page > Subaru > SPCam
Suprime-Cam Help(J)
Object Name
Date
Reduction
Job Status
Command Queue
mosaic.sh
cal-flat.sh
command list
RA
Dec
Size
or
OBJECT
FILTER
Not selected
MAX FRAMES
100
MAX humidity (%)
MAX seeing (arcsec)
Date (yyyy-mm-dd)
From
To
Skip Quality Check
Only Data Retrieval
Skip Mosaic
Excluded exposures (exposure id, comma separated)
Job Class
Normal
Register
OK
完了

Access Statistics



Start of official operation

Summary

- JVO Portal provides an integrated astronomical research environment
  - Web browser as an user friendly UI
  - Data access with the IVOA standard
  - Huge amount of computing/storage resource are available
- http://jvo.nao.ac.jp/portal
- http://jvo.nao.ac.jp/download/skynode-toolkit
- help_desk@jvo.nao.ac.jp