Data Intensive Astronomy

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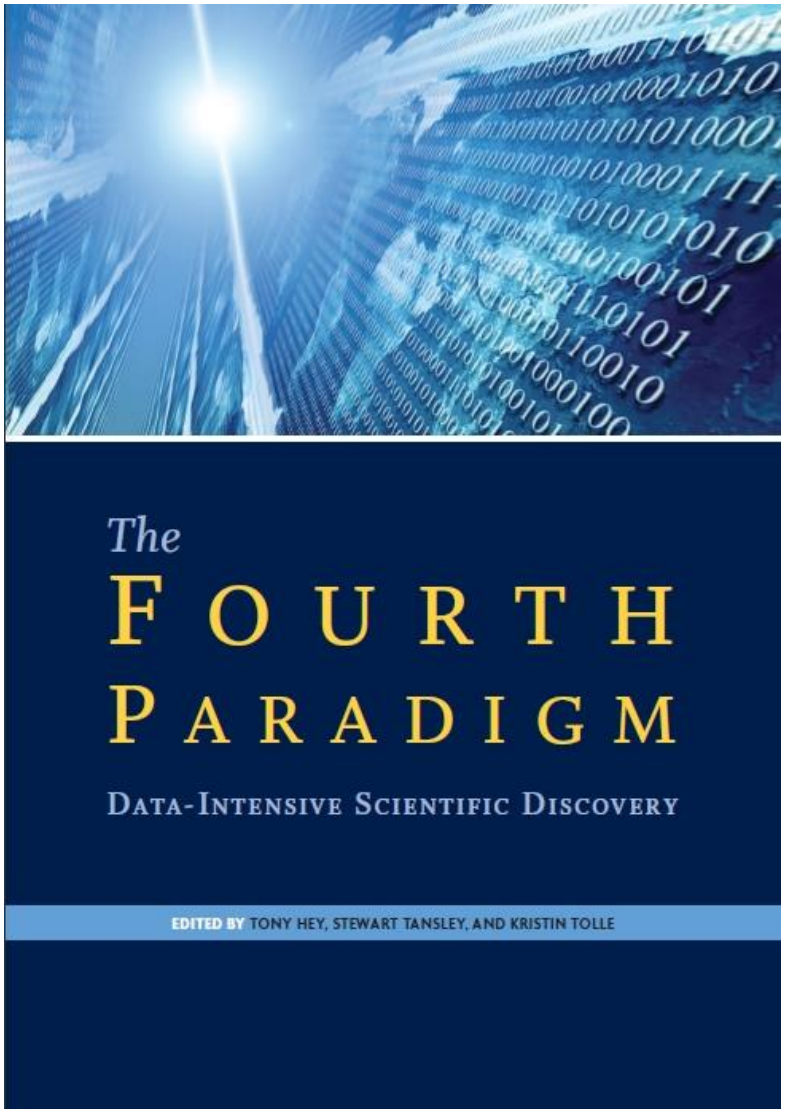
Data Intensive Astronomy

国立天文台 NAOJ National Astronomical Observatory of Japan

- Data deluge
  - Huge Image data
  - Wide spectral range
  - Transient data
  - time-domain

- New paradigm in astronomical research by introducing data management and advanced data analysis

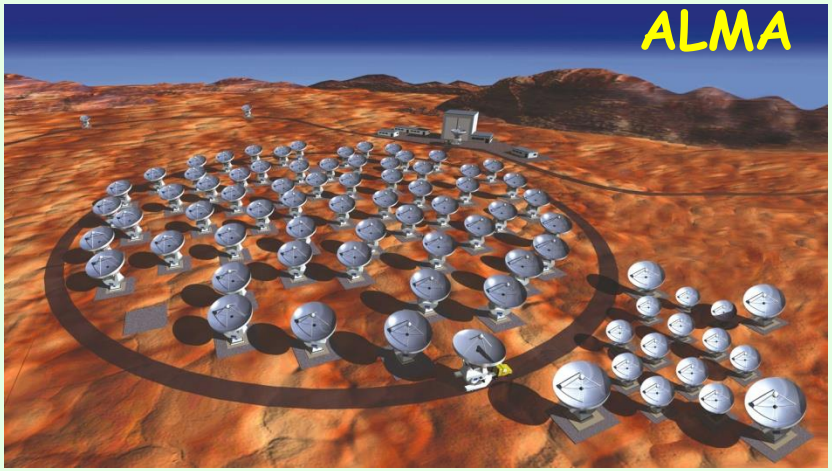


Planned Future Projects

- ALMA
- JWST
- LSST
- LOFAR
- SKA
- TMT
- Pan-STARRs
- E-ELT

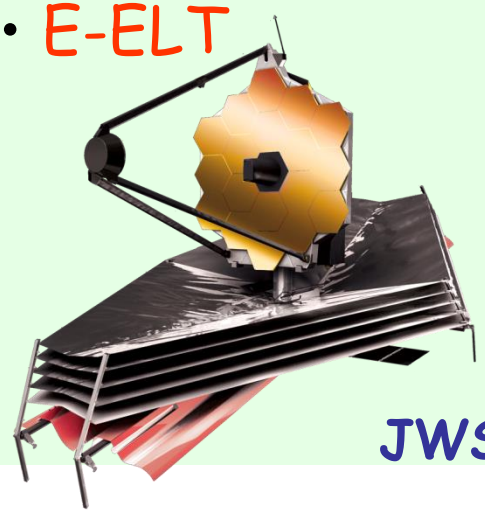
45 PB/yr x 10 yr ~ 450 PB

Credit: LSST Corporation



~ 200 TB/yr

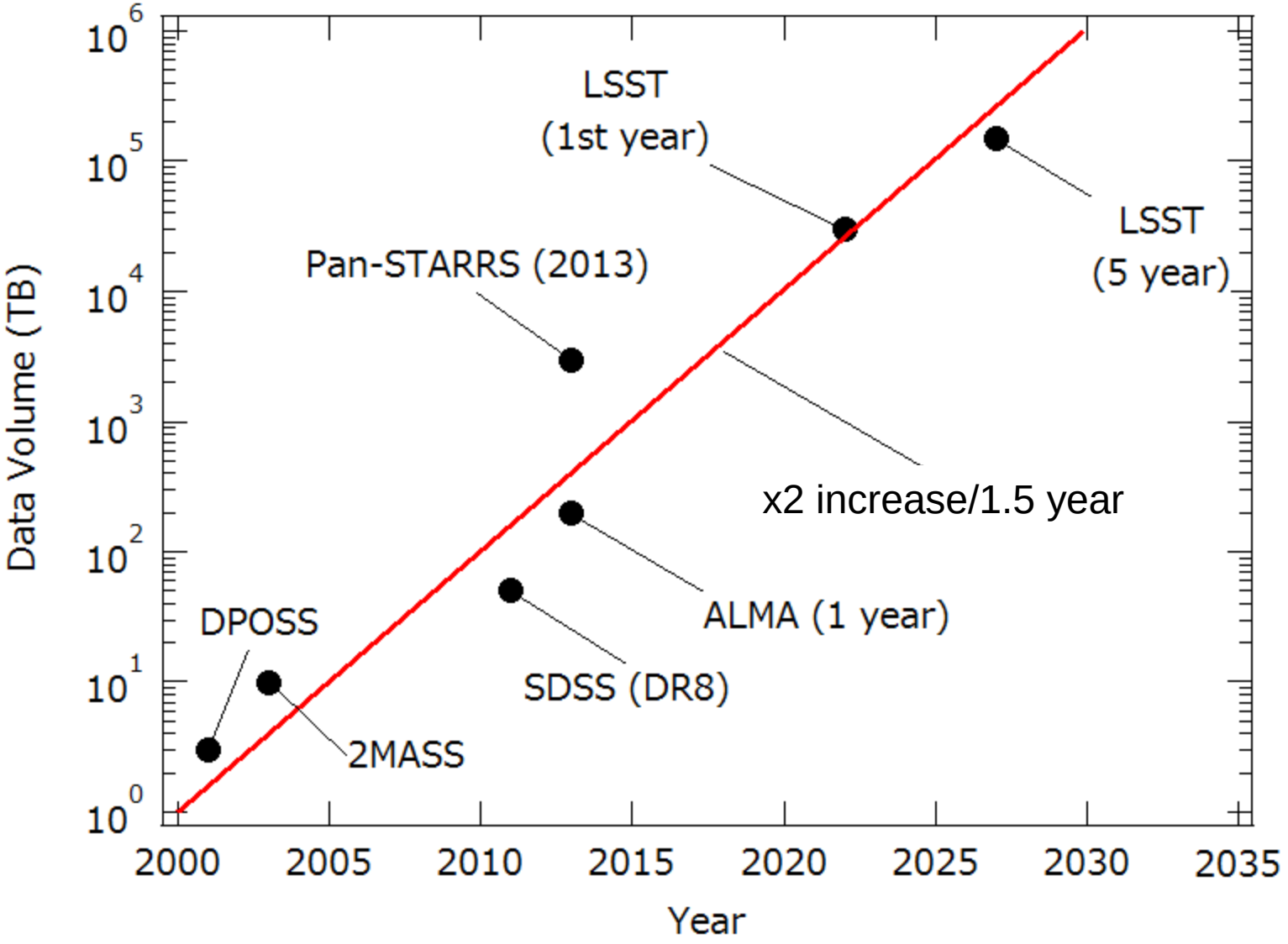
~ a few TB/night , only object params stored



JWST

TMT

Courtesy TMT Observatory Corporation



Courtesy Tony Tyson

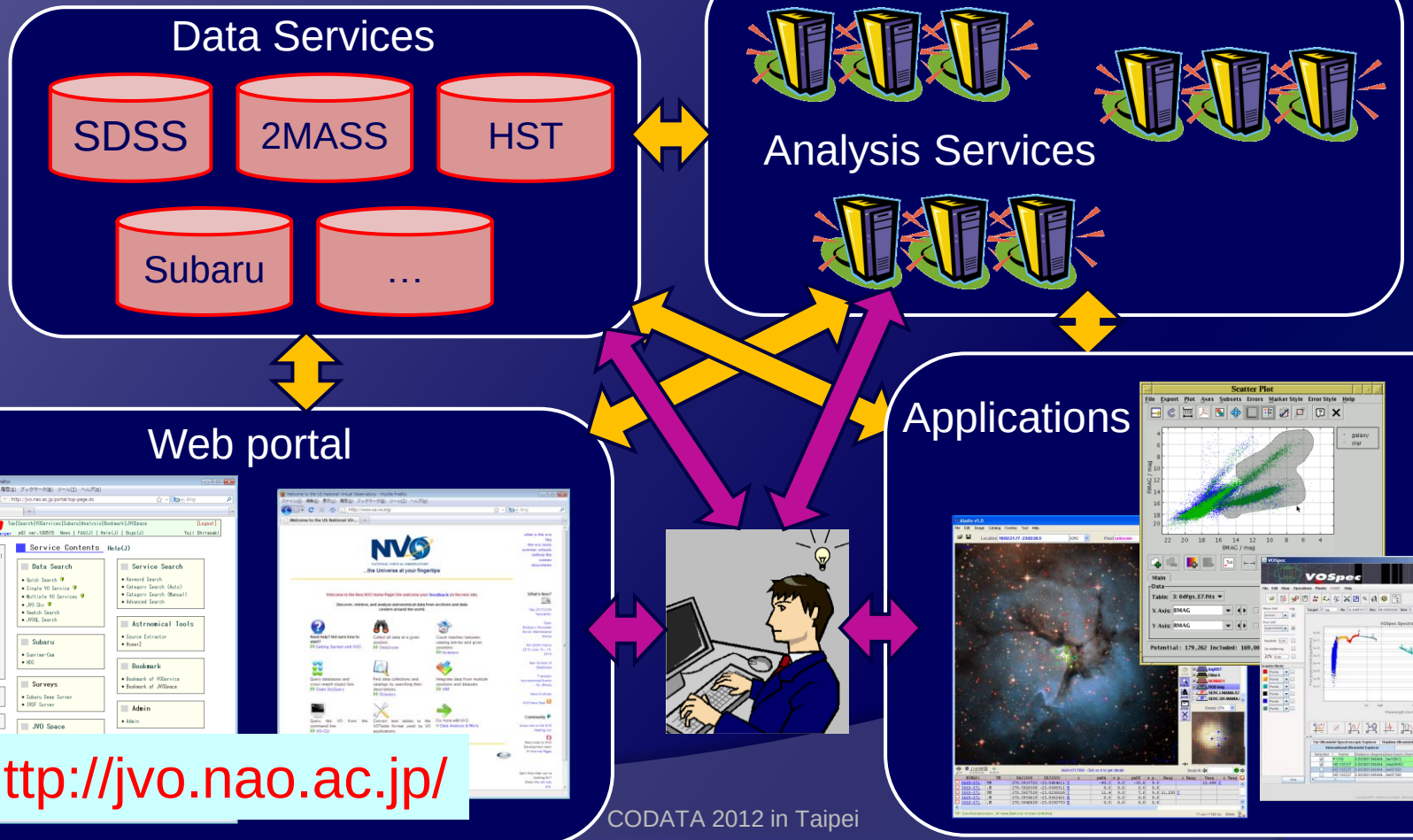
IAU GA
Beijing
August, 2012

- Scientific Impact of Past and On-Going Large-Scale Observations and Surveys to Astronomy
- Current Status and Challenges of Future Large-Scale Observations and Surveys (1) Near- and Mid-future projects, (2) Far-future projects
- Data Management and Data Access: Past, Present and Future
- Advanced Data Analysis in the Data Intensive Astronomy Era
- Synergy of Data Intensive Astronomy with other field
- Expectation on Scientific Insights in the Data Intensive Astronomy
- Education, Public outreach related with Data Intensive Astronomy

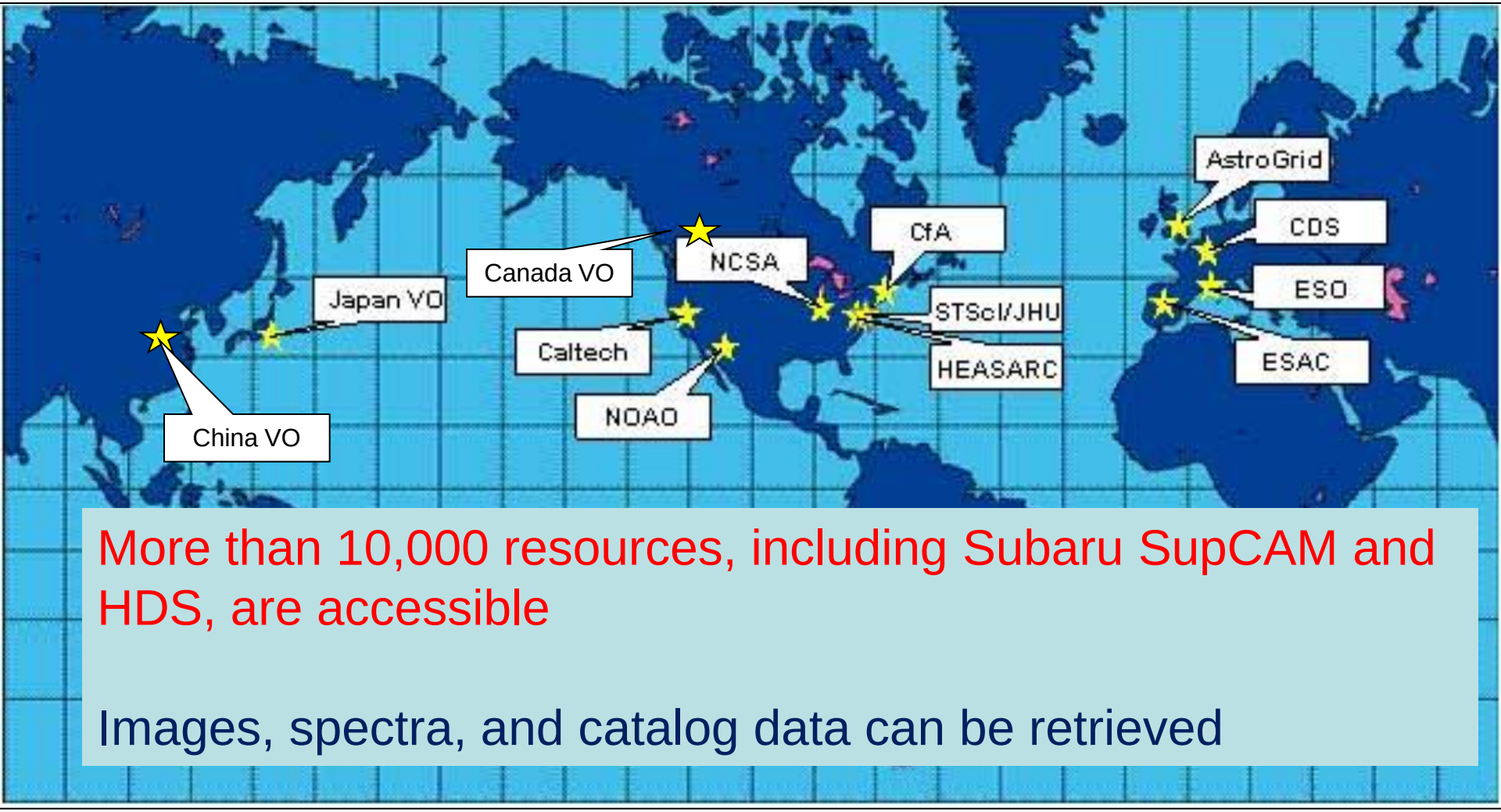
Its program and presentation files are available at
http://www.adc.nao.ac.jp/SpS15/program.html

Virtual Observatory

- ✓ Infrastructure for efficient research environment
- ✓ International standards for data publication & access
- ✓ Sharing data worldwide, Maximize scientific return



Astronomical Virtual Observatories

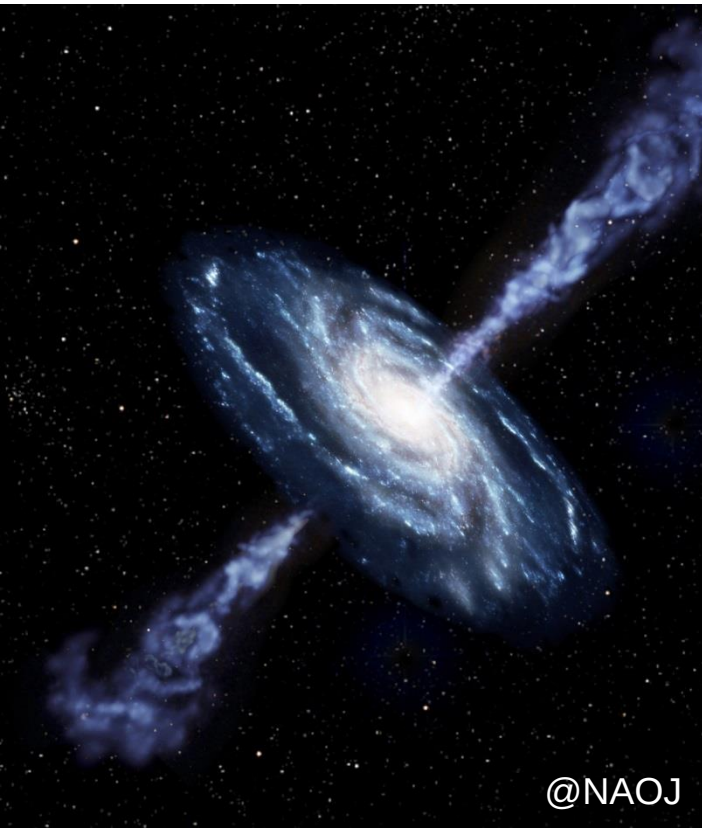


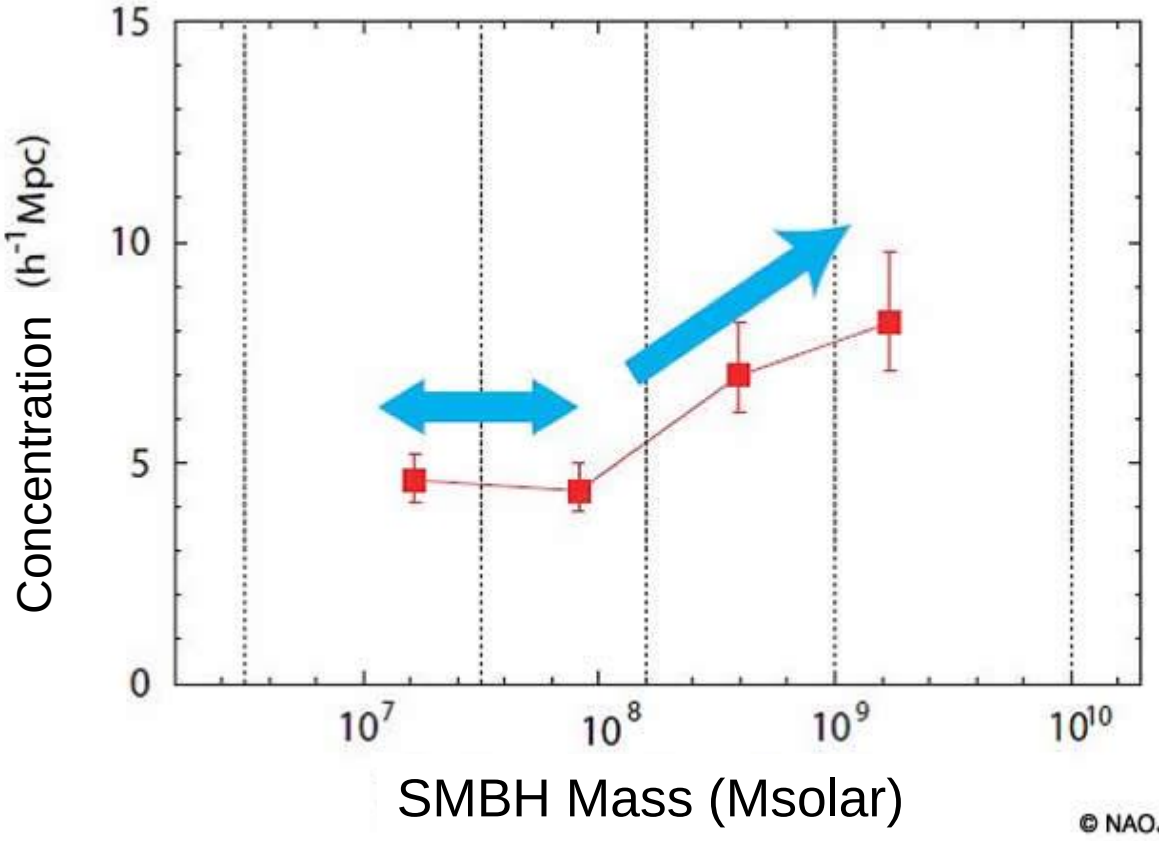
More than 10,000 resources, including Subaru SupCAM and HDS, are accessible

Images, spectra, and catalog data can be retrieved

Science output by JVO

- Concentration of galaxies around SMBH
  - 10,000+ SMBH & 7×10^7 galaxies collected by JVO
- Komiya et al., ApJ, 775, 43 (2013)

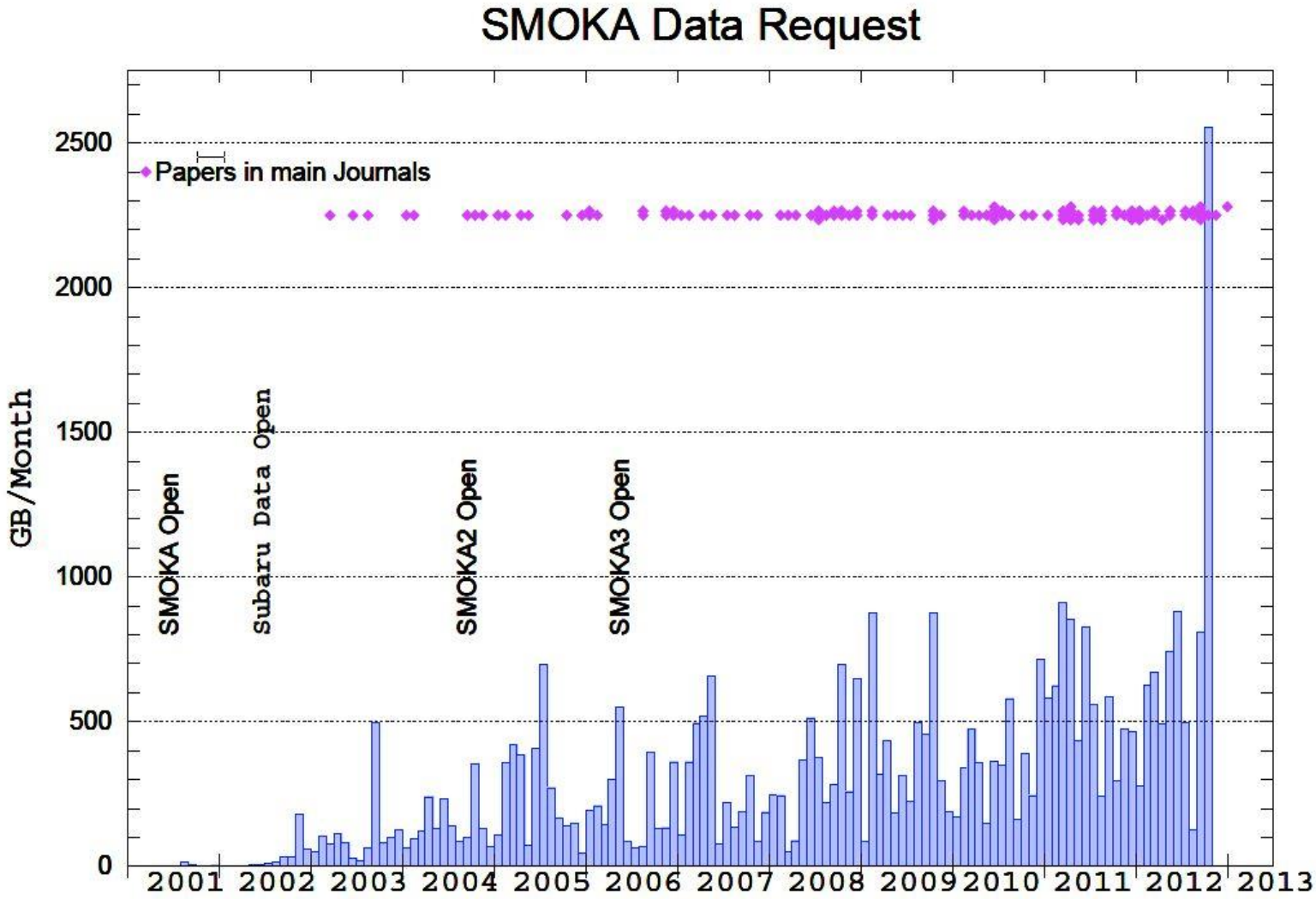




Scientific Results from SMOKA
(Subaru-Mitaka-Okayama-Kiso Archives)

National Astronomical Observatory of Japan

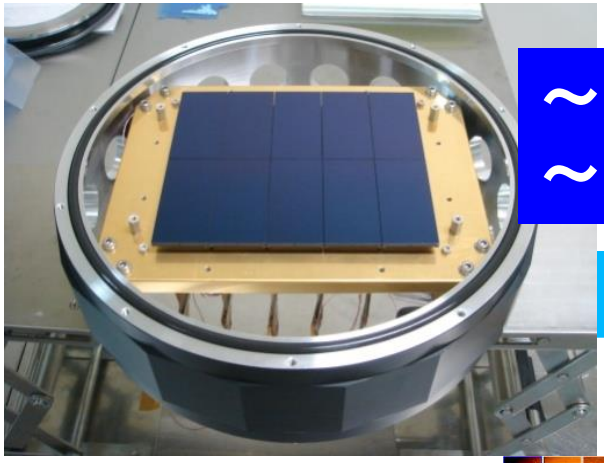
2012 October 3

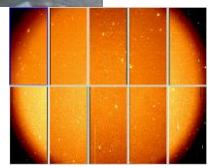


HSC (Hyper Suprime-Cam)

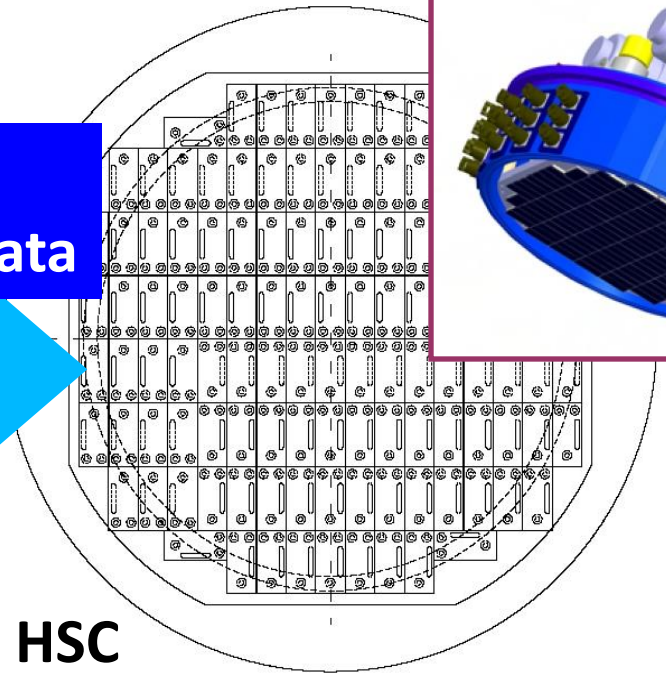
National Astronomical Observatory of Japan

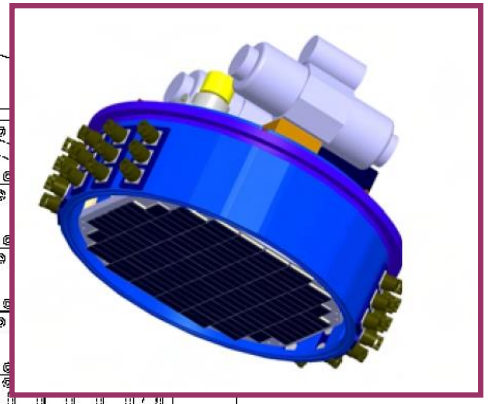
- A new prime-focus camera for Subaru
  - Cosmology (weak lensing)
  - FL in October, 2012





～x 10 FoV
～x 10 of Data





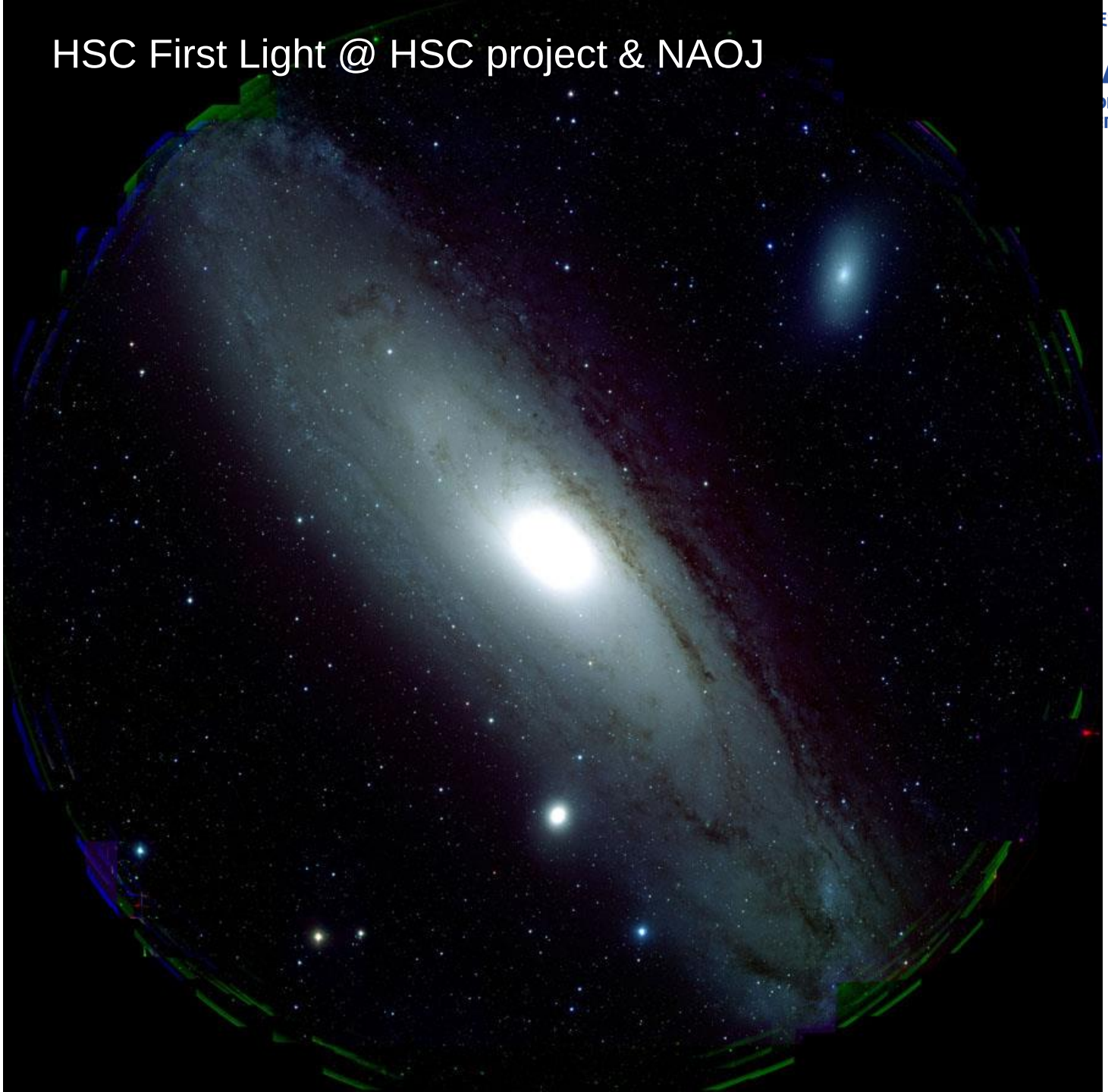
Suprime-Cam

FoV: 34′×27′（10 x 2k4k CCDs）
Data: 185MB/shot（～30GB/night）
Survey Area: 1～10 sq. deg.

HSC

FoV: 1.5 d x 1.5 d（104 x 2k4k CCDs）
2GB/shot (～300GB/night)
Survey Area ～2000 sq. deg.

HSC First Light @ HSC project & NAOJ



nal Astronomical
rvatory of Japan

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

National Astronomical Observatory of Japan

JVO Portal

Search Result

JVO Service

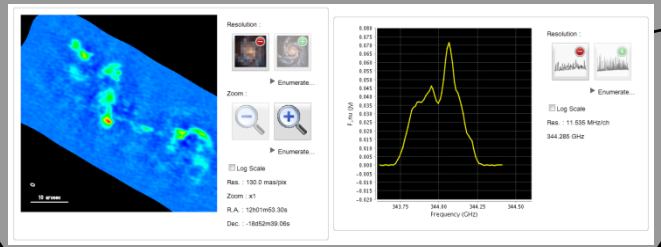
VO Search

Link

FITS Data

Select subset of the data cube and download for local application

ALMA VO Web Viewer



FITS Data

VO Search

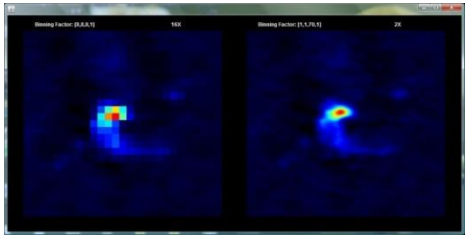
ALMA VO Service

Web Service

User's PC Application

Examine downloaded data from several aspects. Comparison of the data taken from other VO services is available.

ALMA VO Desktop Viewer

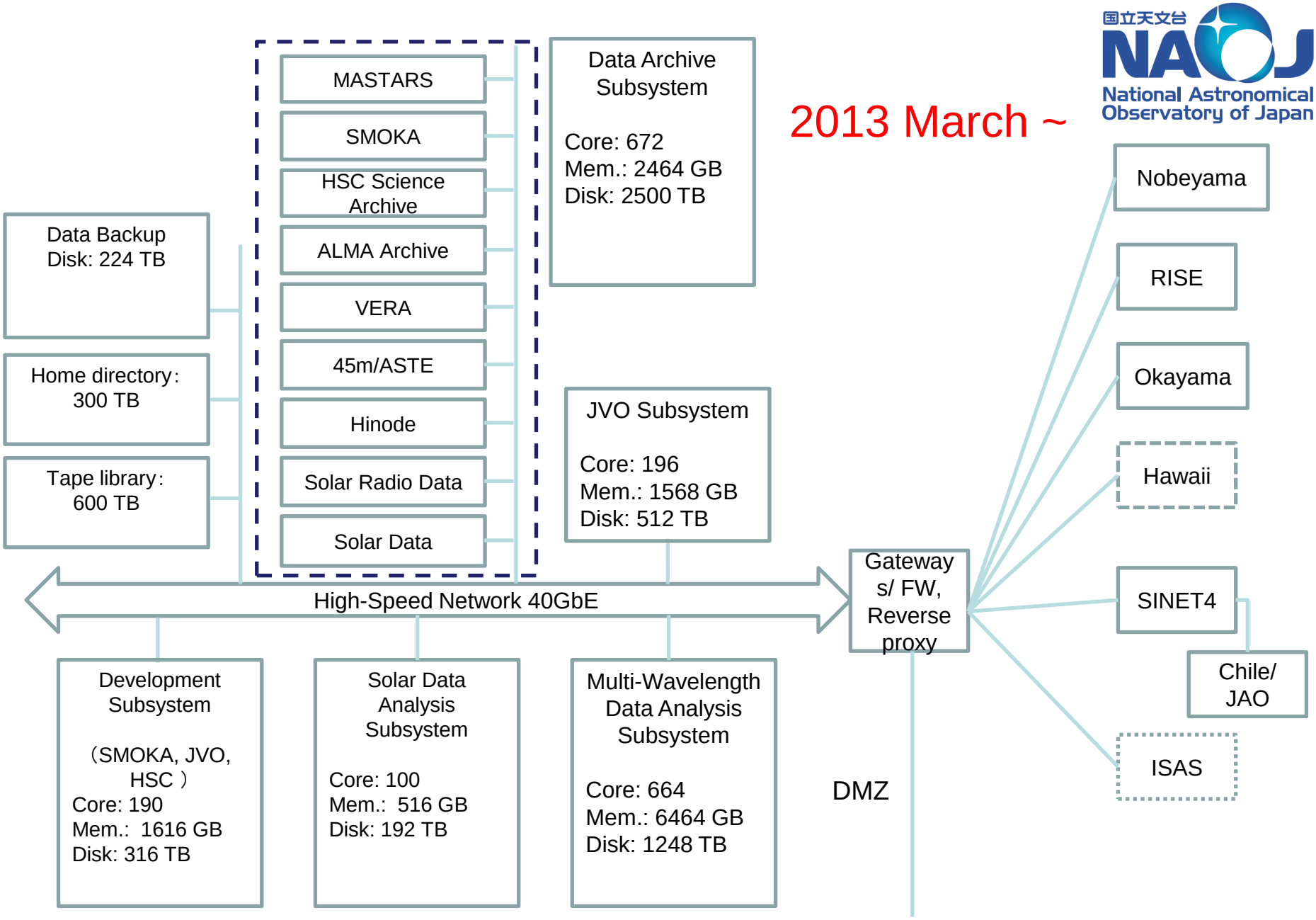


VO Search

FITS Data Retrieval

ALMA EA-ARC

User PC Environment



~12.6 TB of memory and ~6 PB of storage, in total

Available Data @ ADC, NAOJ

National Astronomical Observatory of Japan

- Raw data from Subaru and others (SMOKA)
  http://smoka.nao.ac.jp/
- Japanese Virtual Observatory – Reduced data from all around the world
  http://jvo.nao.ac.jp/portal/
  - ALMA Archival Data
    http://jvo.nao.ac.jp/portal/alma.do
- Hinode Science Archive
  http://hinode.nao.ac.jp/SDAS/index_e.shtml
- Nobeyama Data Archive
  http://nrodb.nro.nao.ac.jp/
- VERA, RISE, Nobeyama radio heliograph and others

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Contact me if you are interested in the "Data-Intensive Astronomy"

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