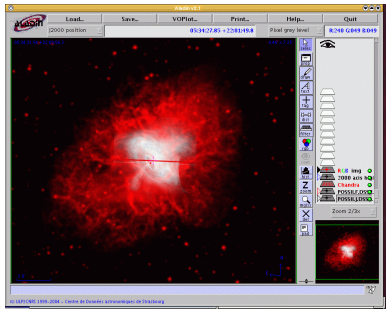
# Integrating repositories with research infrastructure

## The astronomical Virtual Observatory

# Role of repositories in evryday life

- Everyday tool for the research community
- Major scientific objectives
  - *Long term observations of variable natural phenomena*
  - *A large number of objects, complex interactions, many scales*
- Observations with different techniques, at different scales (ground- and space-based observatories, large surveys)

  *Multi-wavelength astronomy makes a significant and increasing fraction of publications*
- Optimize the science return of large infrastructure



# What does openess means for me? (1)

- Data policy
  - Observational data is available after a proprietary period (1 year)
  - Academic journals (a few ‘large’ journals)
    - Table of contents and abstracts freely available
    - Full content in general available after 3 years – some in open access
    - Some data tables immediately available through data centres

# What does openess means for me (2)

- Re-useable data

  Data + metadata +tools

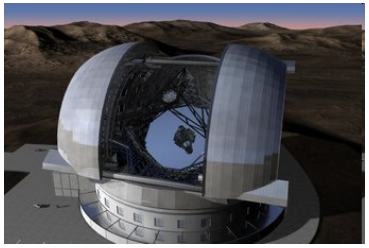
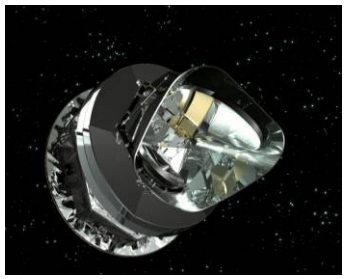
- Easy circulation among on-line information

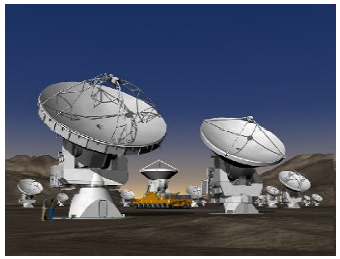
  A network of on-line information, which begun soon after the advent of the internet, and has revolutionized the way astronomers work

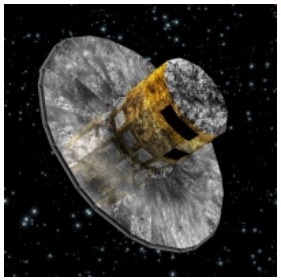
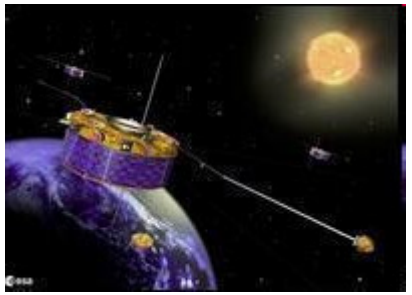
- Use of generic standards when possible (OAI-PMH, SKOS, …)

# How would I define research infrastructure?

# Research Infrastructures in astronomy



# The virtual research infrastructure of astronomy

- Heterogeneous, distributed 'data' services: archives of observations, value-added data bases, bibliographic data (including e-journals), simulation data, tools
- The Virtual Observatory concept

  *Seamless and transparent query of data centres*

  *New analysis and visualisation tools*

  *A standard structure for data centres to publish their data and services*

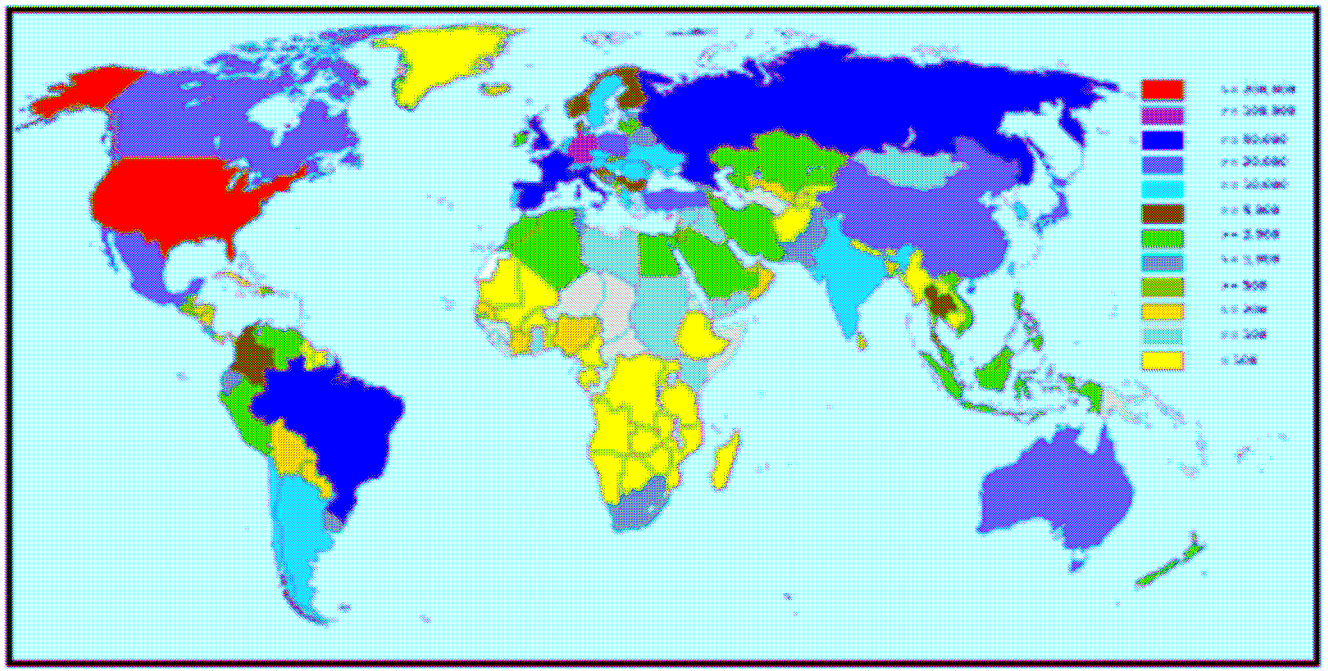
  Data + services + interoperability of data and tools

  Made incrementally available to the community
- Recognized as an important part of the Research Infrastructure for astronomy in the European Roadmap

# What is your contribution to the repository-based research infrastructure? (1)

- Director of the Strasbourg astronomical data centre
  - Funded in 1972 to serve the international astronomical community
  - Value-added data bases and tools

  (observational data is in Observatory data bases)
  - 300,000 queries/day in 2009



223 countries, territories and islands have accessed SIMBAD in the last 30 months. Red and blue covered countries correspond probably to the most active countries in astronomy. Surprisingly, there are very few countries remaining in white (no user at all) on this map.

# What is your contribution to the repository-based research infrastructure? (2)

- Active member of the International Virtual Observatory Alliance

  The IVOA is a world-wide alliance of Virtual Observatory projects

  - Coordination
  - Definition of interoperability standards

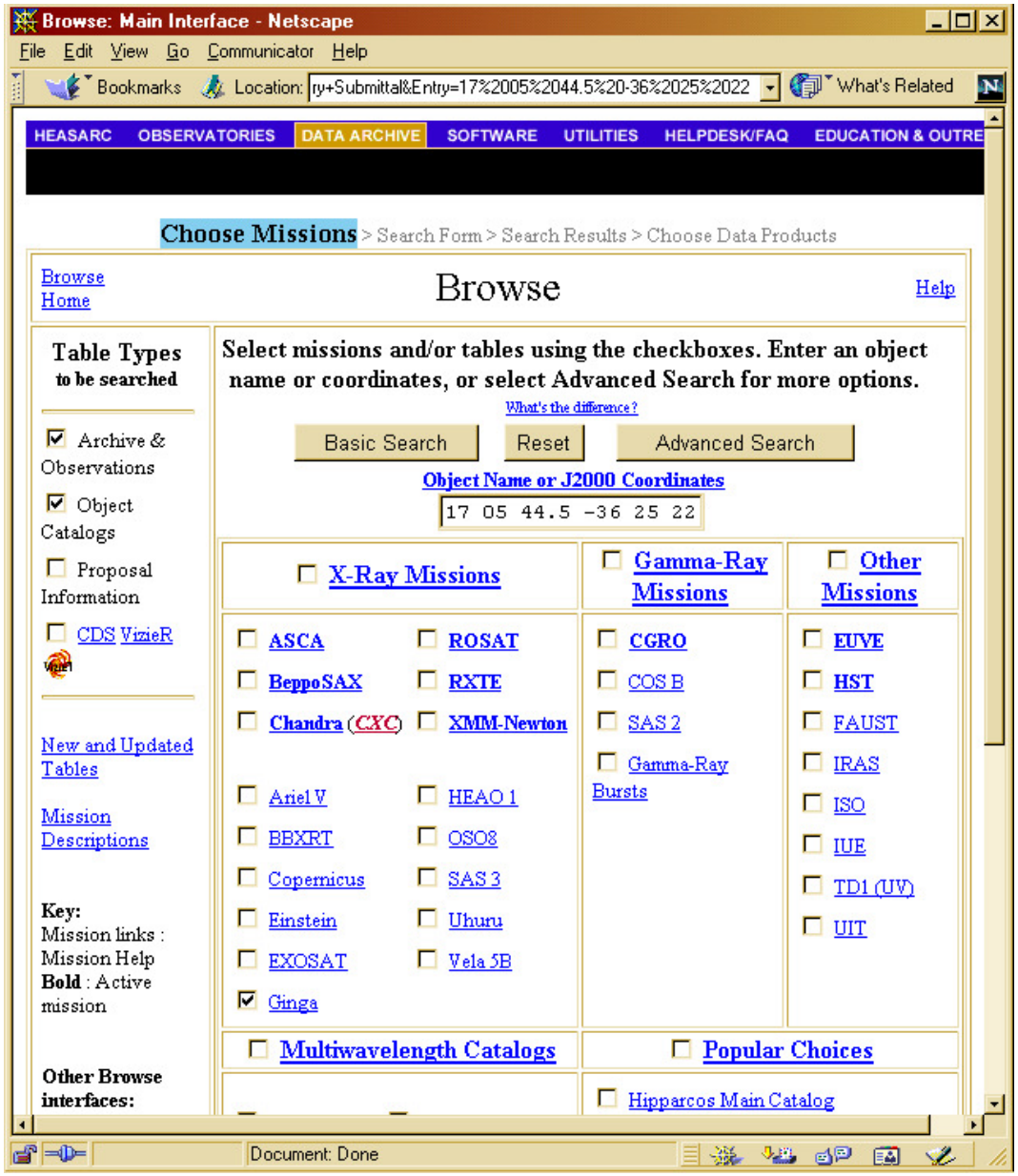
# What is your contribution to the repository-based research infrastructure? (3)

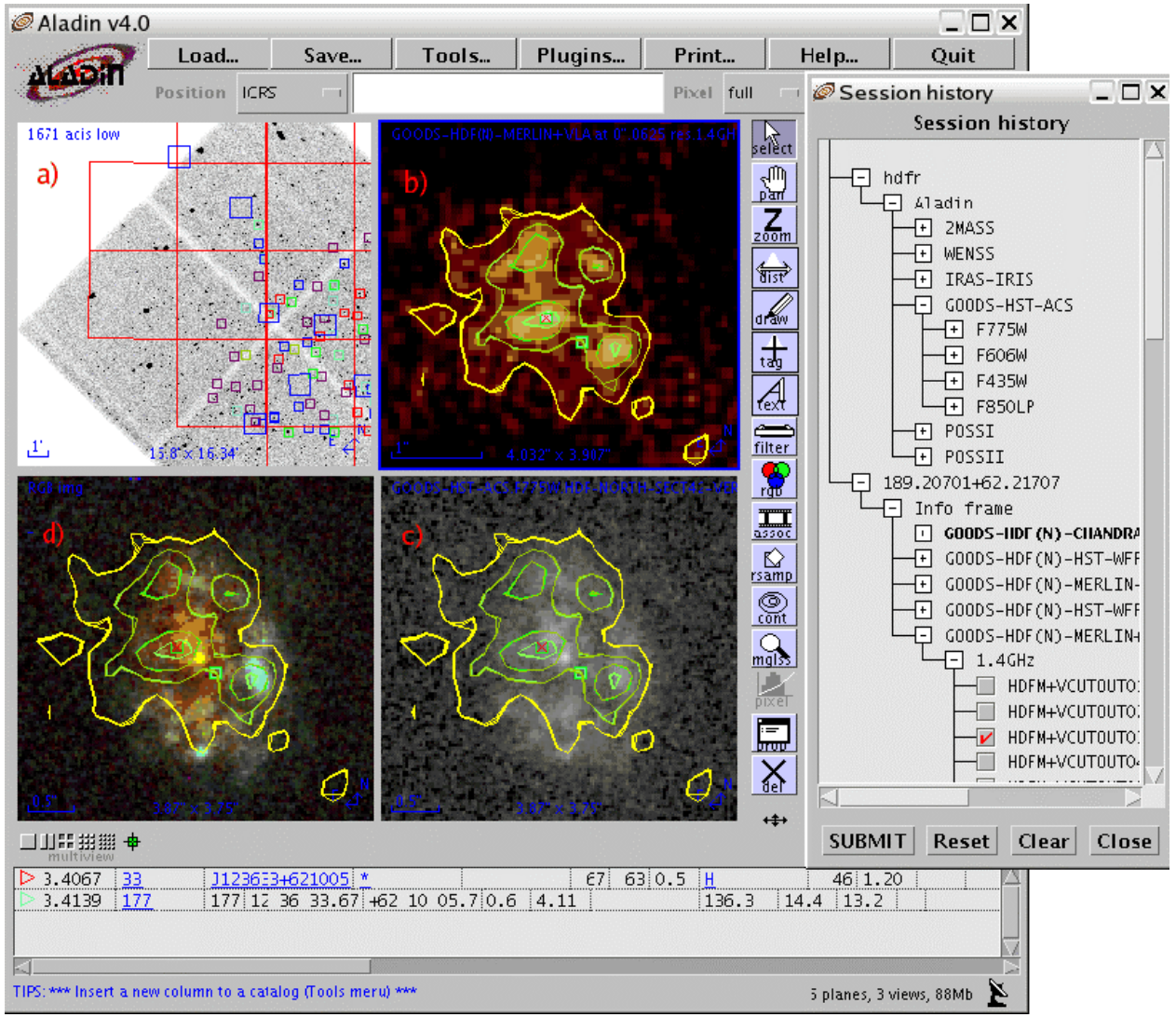
- President of the 'Specific action Virtual Observatory France'
  - Coordination at national level
  - Formation of data centre staff and users
  - Support to collaborations and to participation in IVOA (travel money)

# What do I expect to receive from other players?

- This is rather ‘give to and receive from’
- Links from and to their services
- Co-operation in the definition of standards
- Data to integrate with my services
- Tools to access, visualise, use my and their data

‘Name resolver’:
1993 (SIMBAD)

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TIPS: *** Insert a new column to a catalog (Tools menu) ***
5 planes, 3 views, 88Mb

# Challenges

- Sustainability
  - Support to data centres
  - Support to the national and international actions needed to develop and maintain the Virtual Observatory
  - Define a sustainable governance
- Teach users how to use the very advanced functionalities we are developing (VO Days)
- Get as much data/information in the VO as possible
- Interoperability with ‘nearby’ disciplines