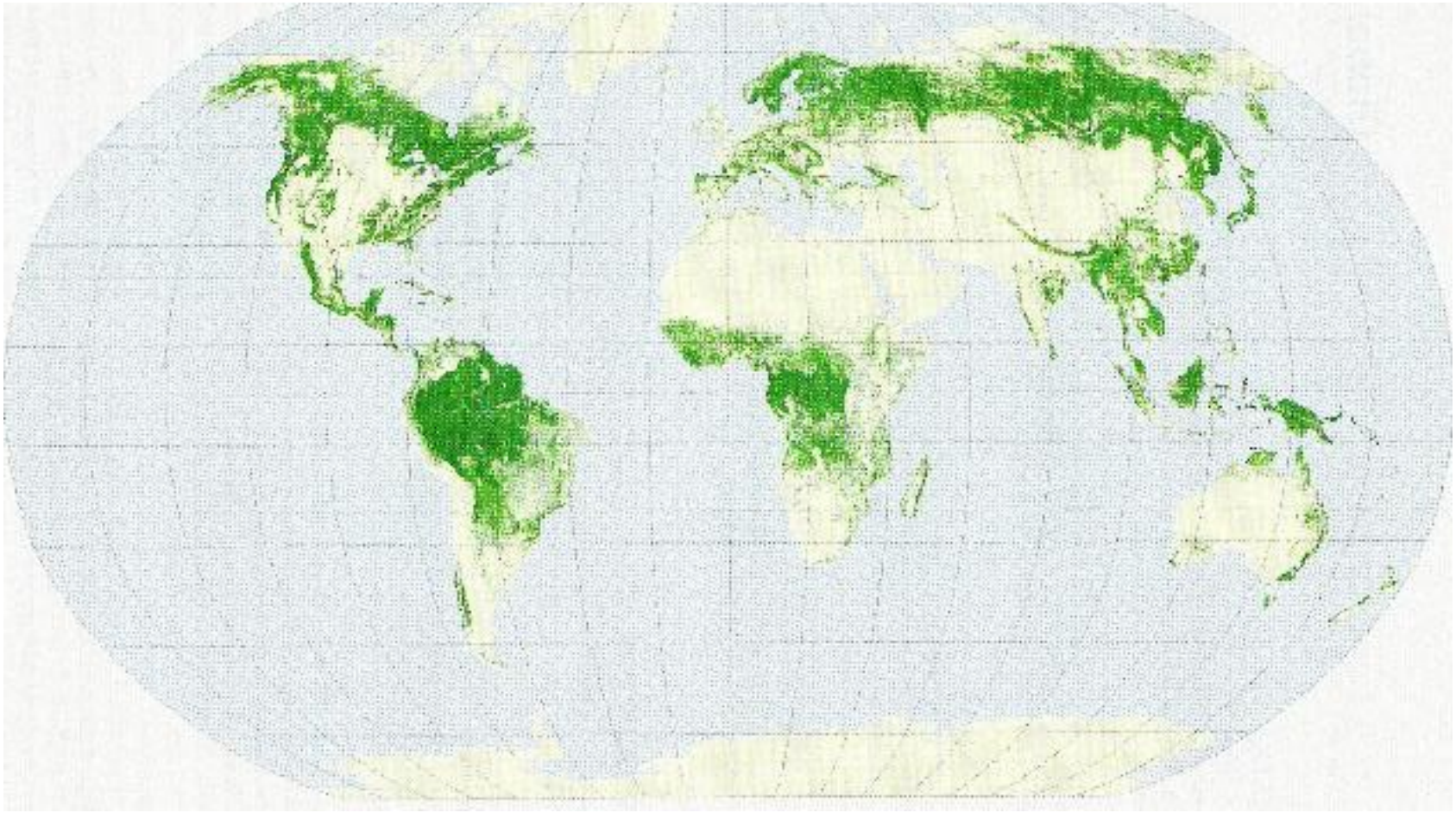
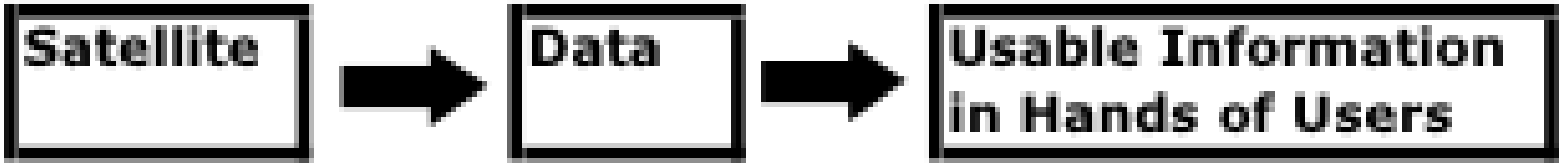
# ASTROTROP

**Alan Grainger**

University of Leeds

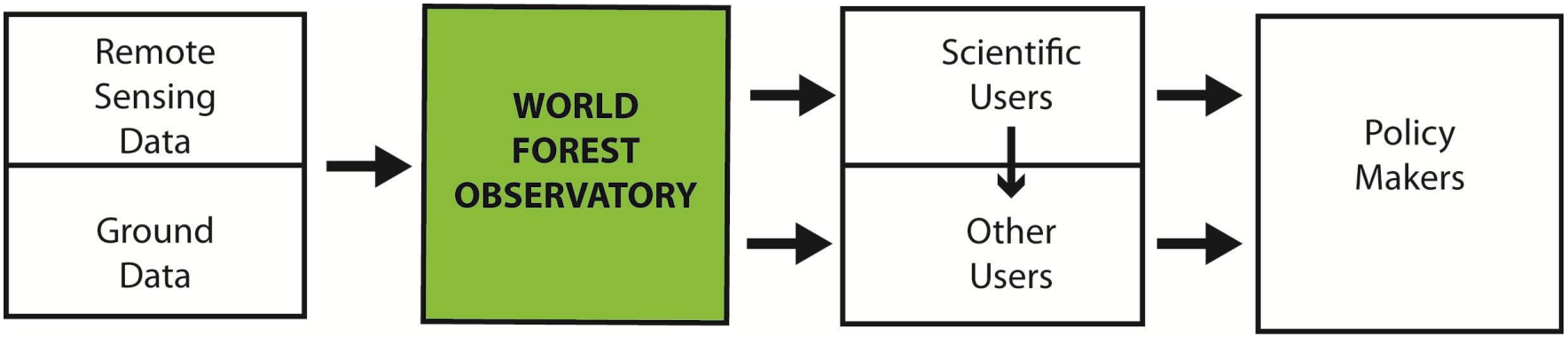



Satellite
Data
Usable Information
in Hands of Users

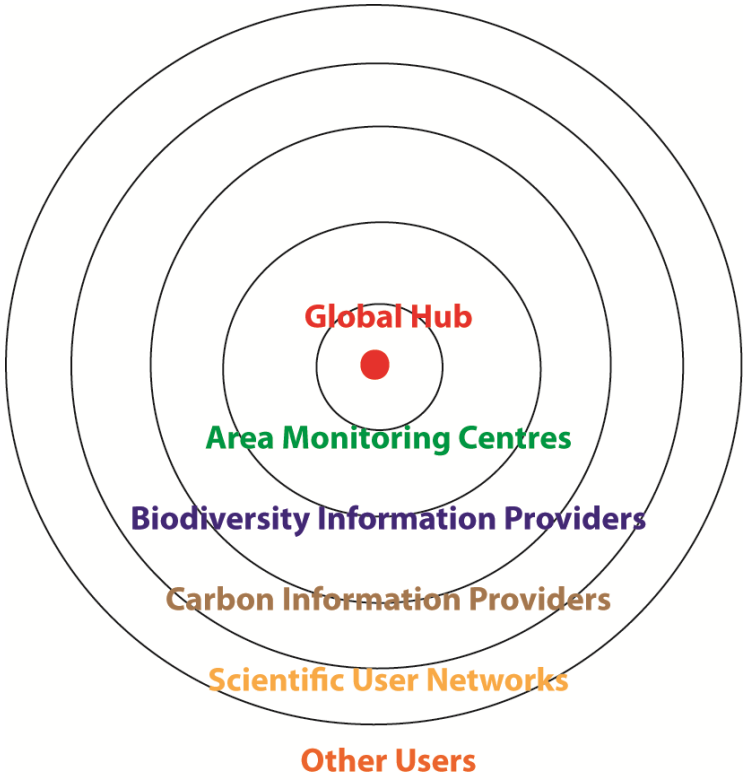
# World Forest Observatory Proposals 2010-11

ESA
ENVISAT Symposium

# A Scientific Community Collaborating to Use a New Global Instrument



# World Forest Observatory Structure




BIODIVERSITY

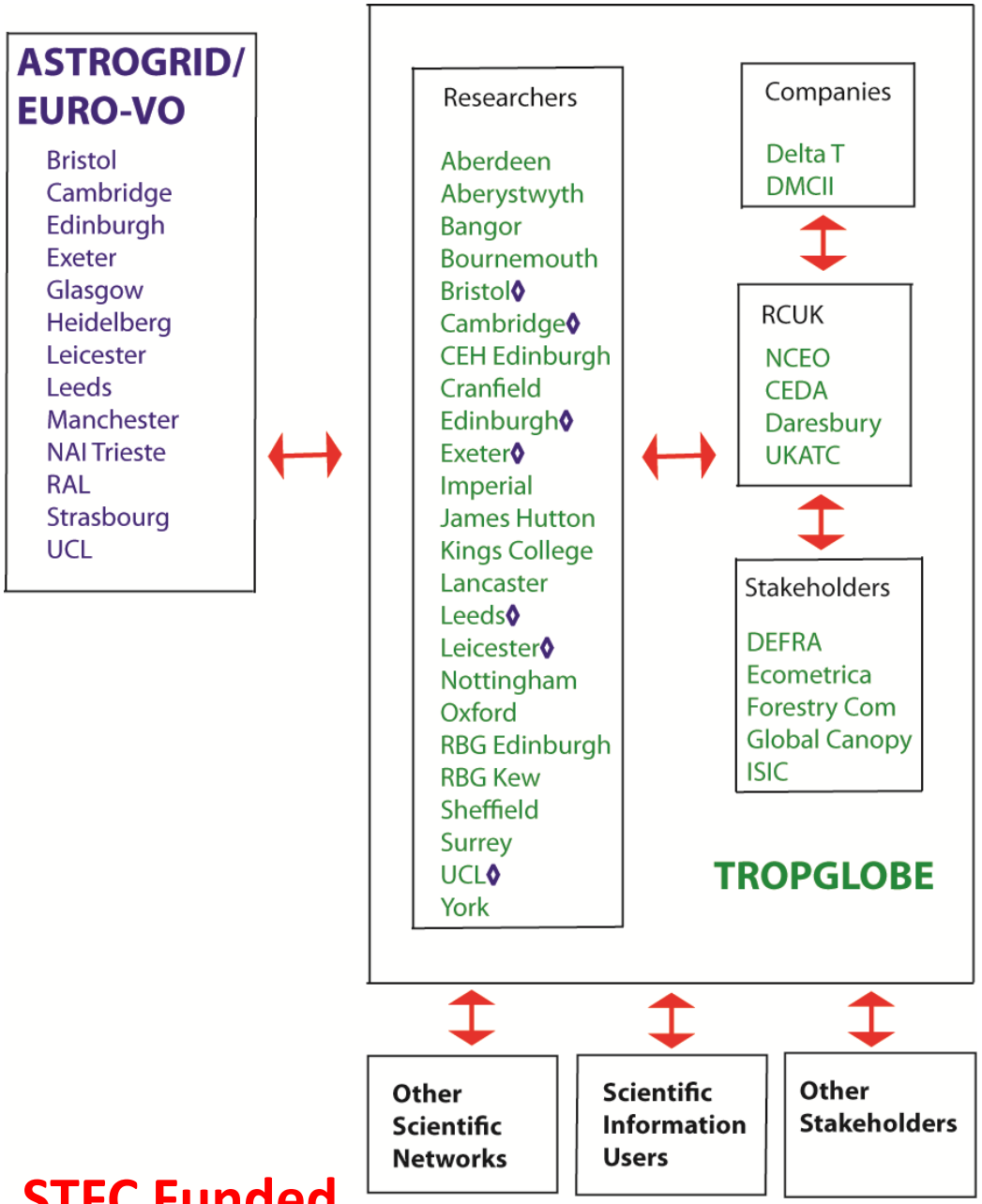
CARBON

AREA

# Roles and Partners

| Role | Partners |
|---|---|
| Regional monitoring centres | Columbia U, U Jena, Keio U, Peking U, S Dakota State U, VTT, Woods Hole RC, Conabio |
| Carbon | Woods Hole RC, IIASA, Carnegie I |
| Biodiversity | UNEP WCMC, Smithsonian |
| Global hub & synthesis | U Leeds, Smithsonian |
| In situ | Smithsonian, U Leeds |
| Networking | U Helsinki, IIASA |
| Validation | Columbia U, Wageningen U |
| Verification | Resources for Future, IIASA, Wageningen |

# ASTROTROP PROJECT
# 2013-16




# ASTROTROP Partners

**Information Inputs**

Area Maps from
Kings College
(L. America)
Leicester
(Congo)

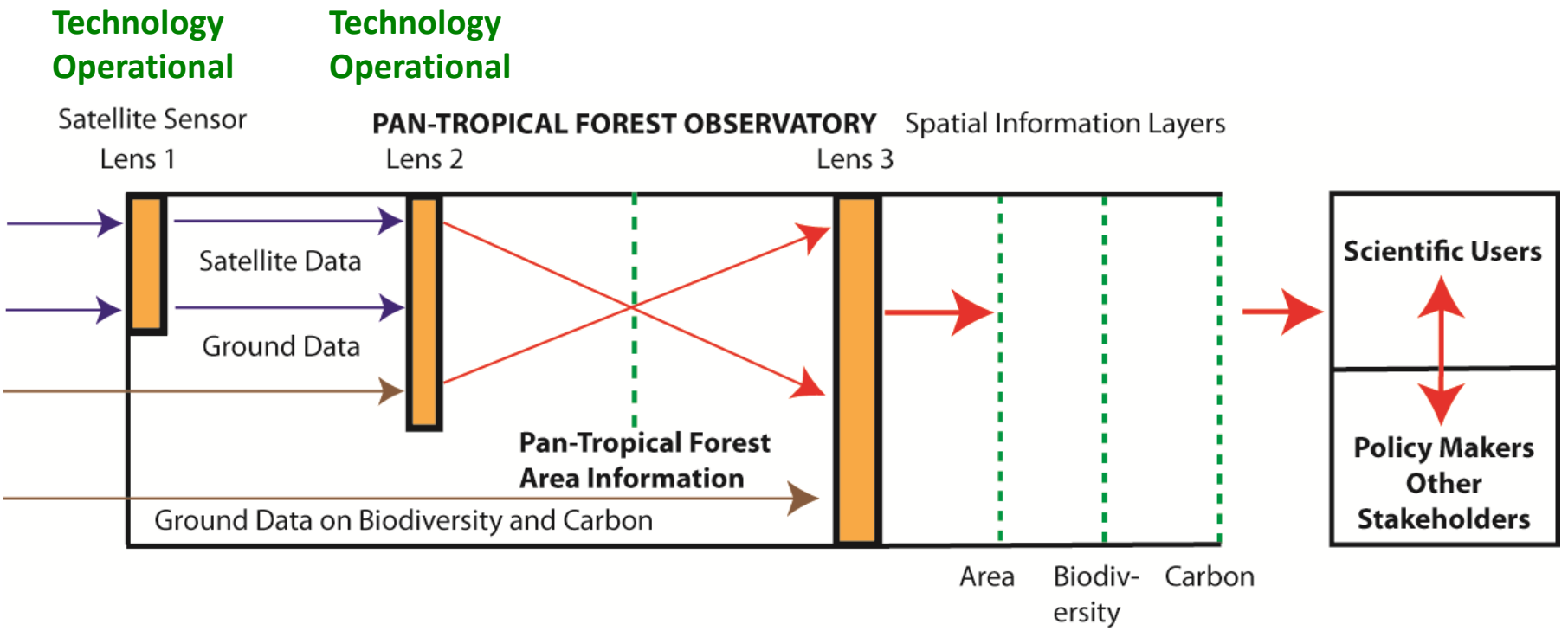
Maps of Other Attributes from Other Partners

1.8 billion hectares
400 billion trees
Attributes: area, location, carbon density, species
Functions: combine information from 100s of sources
overlay information on different attributes

# Managing Tropical Forest Information and Astronomical Data

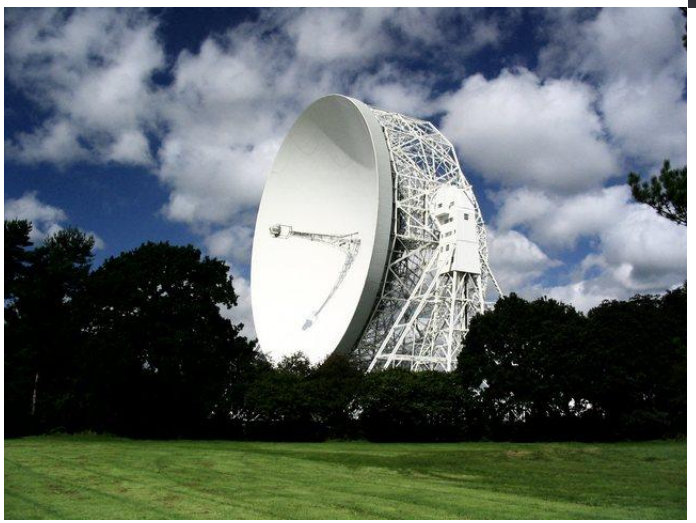
200 billion stars in the Milky Way
Attributes: location
Functions: combine information from 100s of sources
overlay information on different attributes

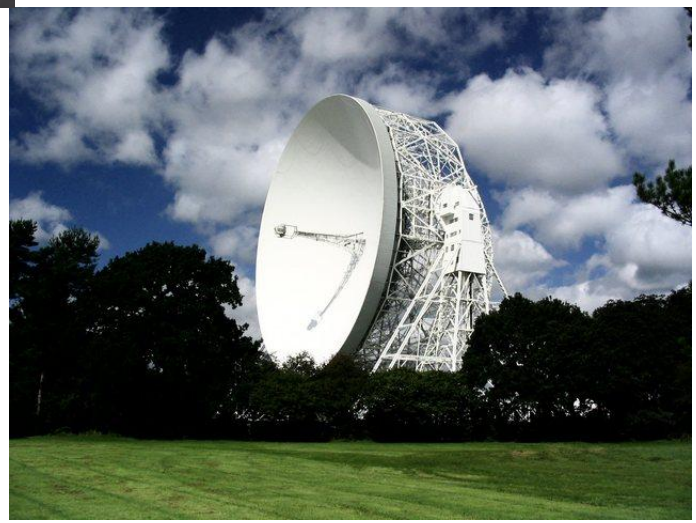
# How a Pan-Tropical Forest Observatory Will Work




## The Third Lens:
## Virtual Superimposition

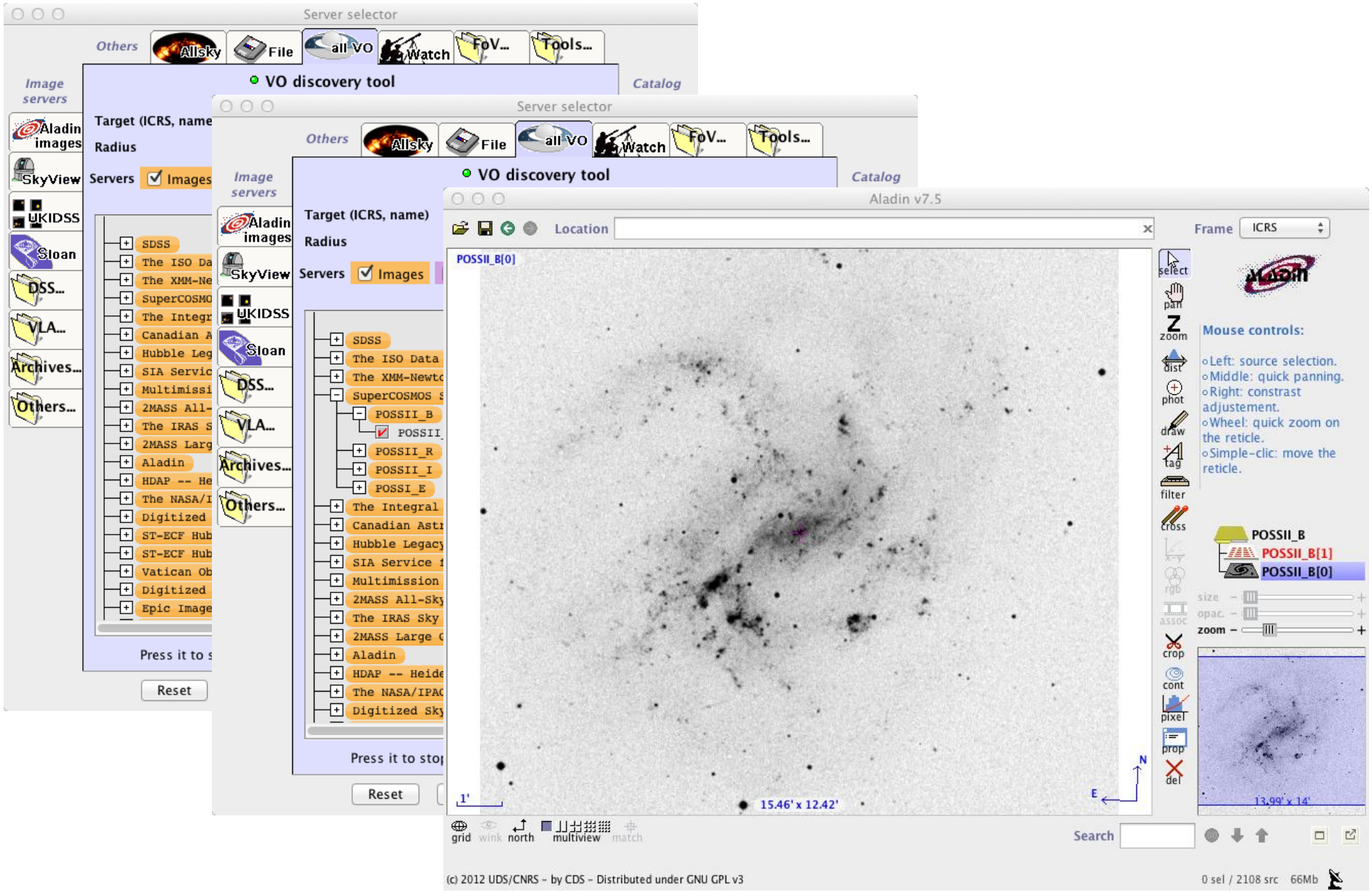
- **Web**
  - All docs in the world inside your PC
- **Virtual Observatory**
  - All databases in the world inside your PC





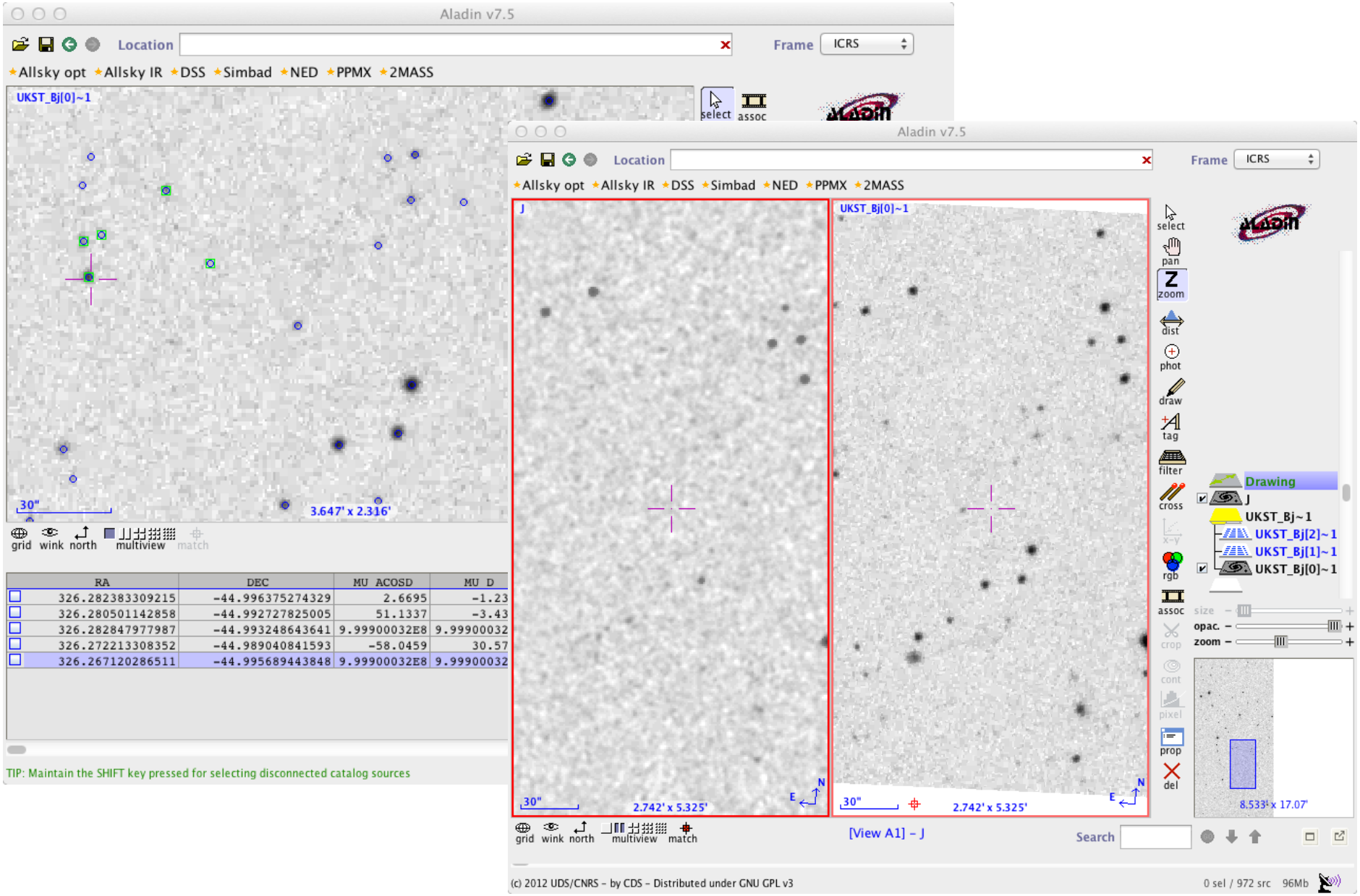
# VO in action

## searching the VO for image data



# VO in action

## Grab, Overlay and Compare Images

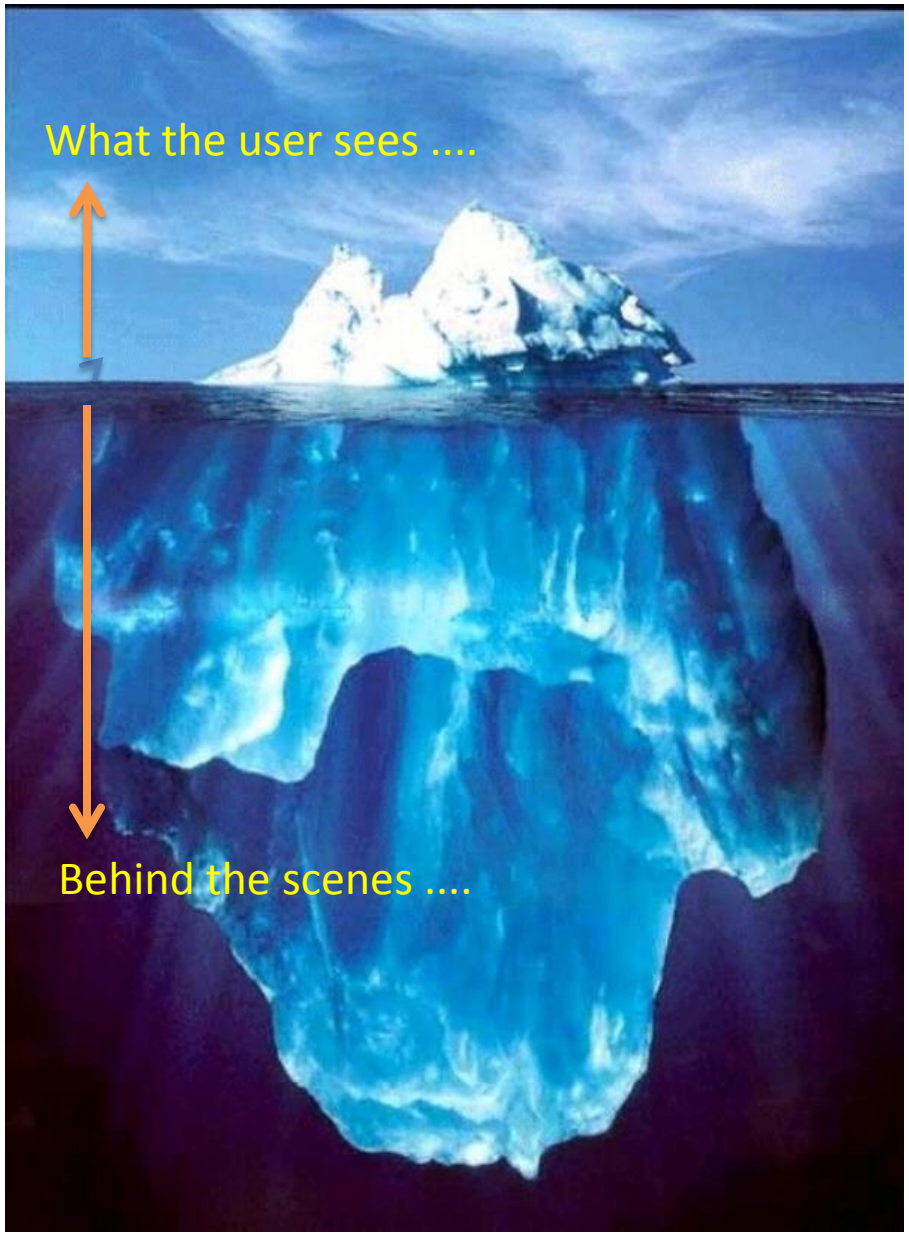


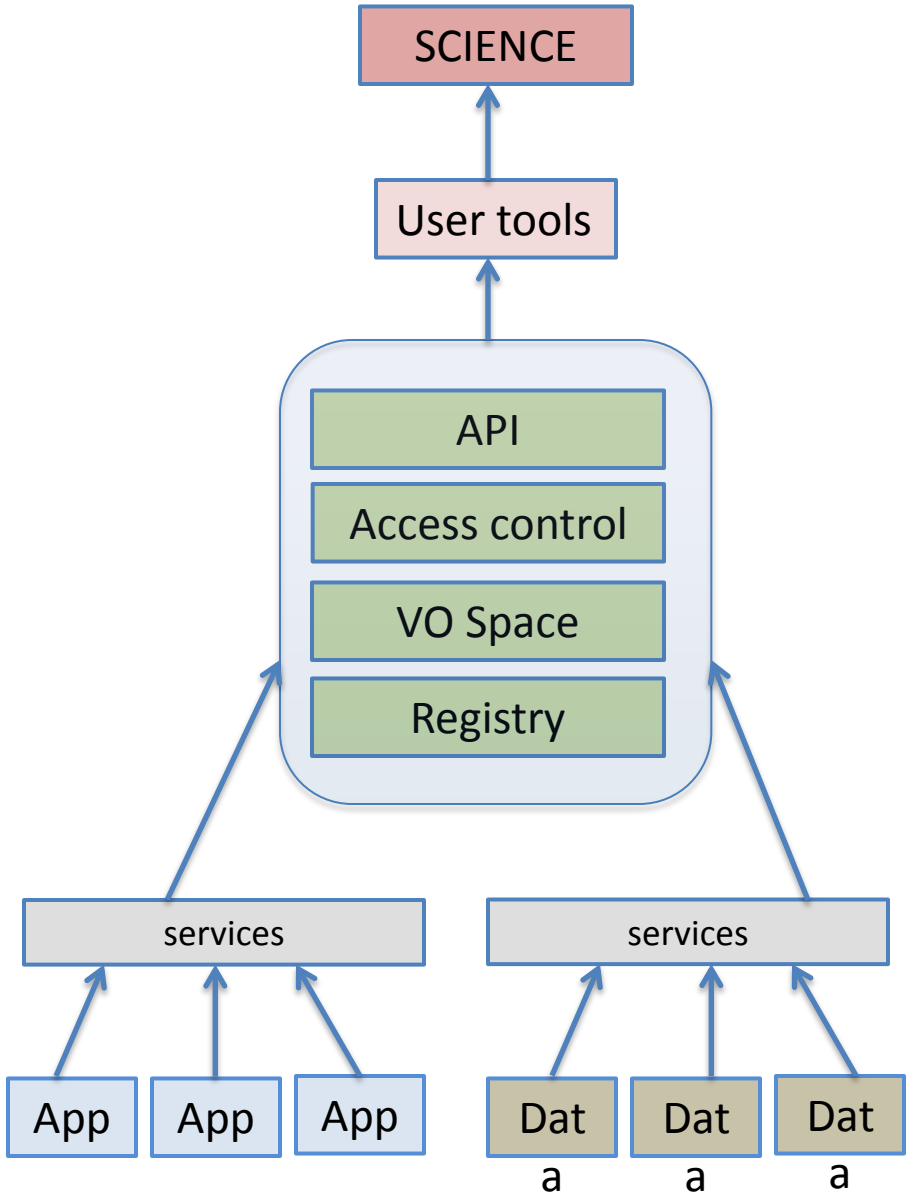
# Parts of a VO

- All databases listed in Registries, or ‘Yellow Pages’
- Databases selected via their Metadata
- Data grabbed from selected database using Grabbing Services
- Data analysed using Manipulation Tools

- Depends on:
  - Agreed standards
  - Services and applications which understand VO rules
  - Middleware which glues everything together

# The iceberg


What the user sees ....
Behind the scenes ....


SCIENCE
User tools
API
Access control
VO Space
Registry
services
services
App
App
App
Dat
a
Dat
a
Dat
a

# Prototype ASTROTROP Software

| | Astrogrid | ASTROTROP |
|---|---|---|
| Data models | Obscore | Worldfile GIS metadata |
| Standards bodies (Existing) | IVOA | Open Geospatial Consortium |
| Registries | Registry | CKAN – Comprehensive Knowledge Archive Network Or GEONODES |
| Data Grabbing Services | SIAP | Geoserver |
| Data Manipulation Tools | Aladin | QGIS |

# Applications

- **Virtual World Forest Observatory** in which:
  - Users all over the world access multiple attribute data **and** multi-sensor data (e.g. Landsat, LIDAR etc.)
  - BUT data stay in their host databases
  - Local people can validate maps

- **Combine Spatially Decentralized Databases**
  - National forest inventories by provinces in large countries
  - Citizen observatories in hundreds of towns etc.

- **Combine Multiple Databases in Large Groups**
  - International research projects
  - Research councils
  - Mapping organizations

# Next Steps

- Demonstrate prototype virtual observatory at February Conference
- Agree on initial standards at Conference
  - Metadata
  - Table formats
- Establish Working Group to agree on further standards over time

# IVOA Standards Working Groups

| Working Group | Standards for |
|---|---|
| Applications | Rules for data manipulation tools |
| Data Model | Metadata list format |
| Data Access Layer | Table Access Protocol, Search, Grab |
| Registries | Formats for registry listings |
| Grid and Web Services | Using VO Space |
| Semantics | Terms and ontologies |