

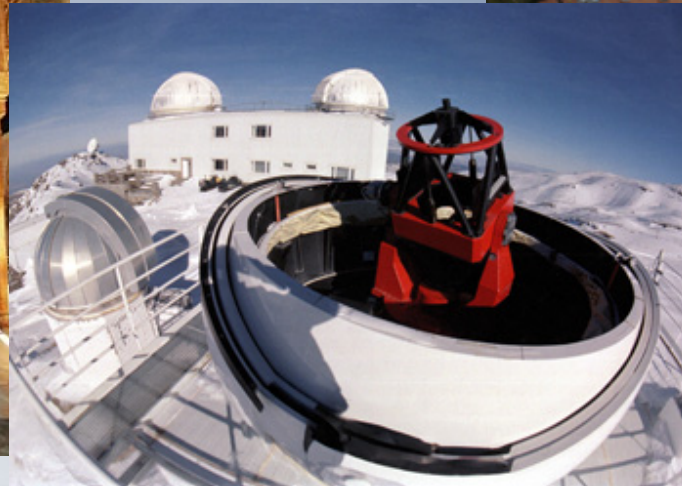


VO web-services-based astronomy workflows

Jose Enrique Ruiz
IAA - CSIC

Manchester 13th July 2011

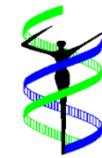




Curating and preserving collaborative digital experiments



1. Intelligent Software Components (ISOCO, Spain)
2. University of Manchester (UNIMAN, UK)
3. Universidad Politécnica de Madrid (UPM, Spain)
4. Poznan Supercomputing and Networking Centre (PSNC, Poland)
5. University of Oxford (OXF, UK)
6. Instituto Astrofísica Andalucía (IAA-CSIC, Spain)
7. Leiden University Medical Centre (LUMC, NL)

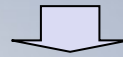


Who are you?

The AMIGA Group

Analysis of the interstellar Medium of Isolated Galaxies

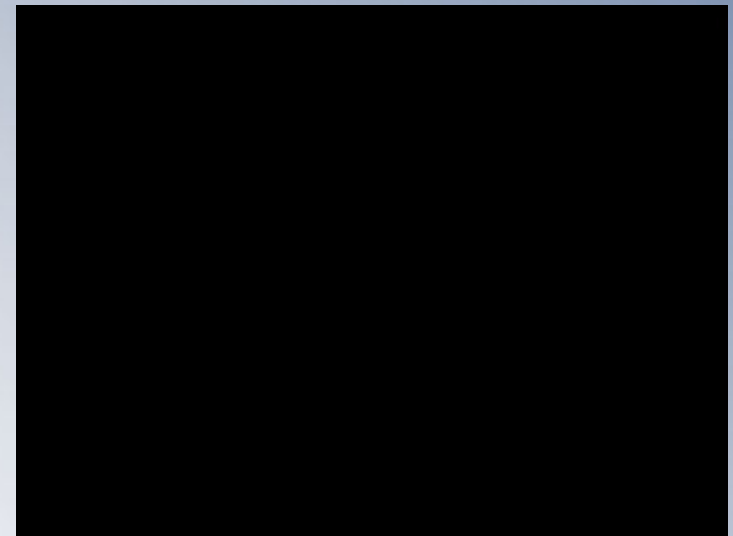
Statistical baseline of isolated galaxies to compare with the behaviour of galaxies in denser environments



Multi λ study of ~ 1000 galaxies

Instituto Astrofísica de Andalucía - CSIC
Univ. Granada, Obs. Marseille, Obs. Paris,
NAOJ, FCRAO, UNAM, Univ. Edinburgh,
IRAM, ESO, Kapteyn Astronomical Institute.

P.I. Lourdes Verdes-Montenegro
<http://amiga.iaa.es>



Who are you ?

VO Virtual Observatory

- International Virtual Observatory Alliance (IVOA)
 - Interoperability and Discovery
 - Publishing and Accessing Data
 - Service Oriented Architecture (SOA)
 - Integration of Software and Data
 - Distributed Resources
 - Panchromatic Astronomy
- Data Models
 - Web Services
 - Semantics



Who are you?

VO virtual Observatory



Who are you ?

The AMIGA VO Catalog The Data Provider

Instituto de Astrofísica de Andalucía | CSIC
Analysis of the Interstellar Medium of Isolated GALaxies

AMIGA

- Home
- The Project
- Science
 - Technical development
 - Team and collaborators
 - Results & Ongoing Work
- Publications
- Conferences
- Public Data
- VO Interface
- ASCII Files
- Links

Search

Dpt. Astronomía Extragaláctica
Instituto Astrofísica Andalucía
Camino Bajo de Huétor, 50
18008 Granada
Spain

VO Interface

[Query by name](#) [Query by parameters](#)

Search by name

submit reset

Object Name
 (Ex: CIG 4, UGC 00297,CIG 4%, etc..)


Or/and Input a File
 Examine... (Text file with a name per line)

AMIGA PUBLIC DATABASE SEARCH RESULTS

CIG 155

Alias names (**Simbad Name Resolver Service**)

CIG 155



Red image of CIG155, with a size of 05 x 05 arcmin, from DSS2

20	707	478	10.7	Sc (8)	
35	381	179	7.8	Sm (4), IB(s)m (7)	
27	856	750	10.6	SB(s)m pec? (3), Sd (4), SB(s)m pec: (7)	
95	1711	1643	21.9	S0	-2
2.383	10.01	2461	2398	32.0	Sb 3
1.249	9.28	2515	2451	32.7	Sbc 4
2.222	9.67	1556	1507	20.1	Scd 6
3.462	9.72	2821	2819	37.6	Sab 2
1.435	9.28	1089	1062	14.2	Sb 3
1.167	8.59	1099	1071	14.3	Sa 1

Basic Data

Coordinates

RA J2000	DEC J2000	RA B1950	DEC B1950
74.33875	78.1908	72.42666	78.1112

Velocity

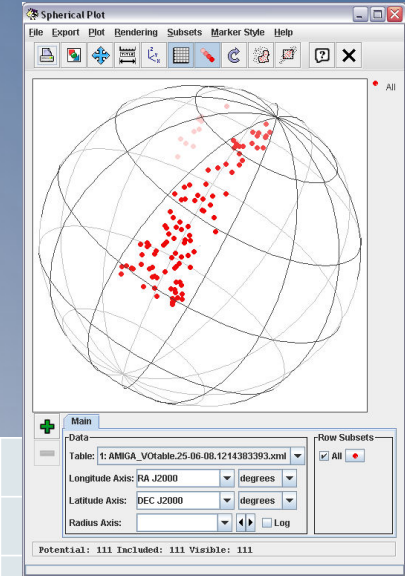
Vr	V3K	Distance
1556	1507	20.1

Morphology

Morph	Morph rc3	Conf morph	Bar	Int
Scd	6		Y	?

Multiwavelength Information

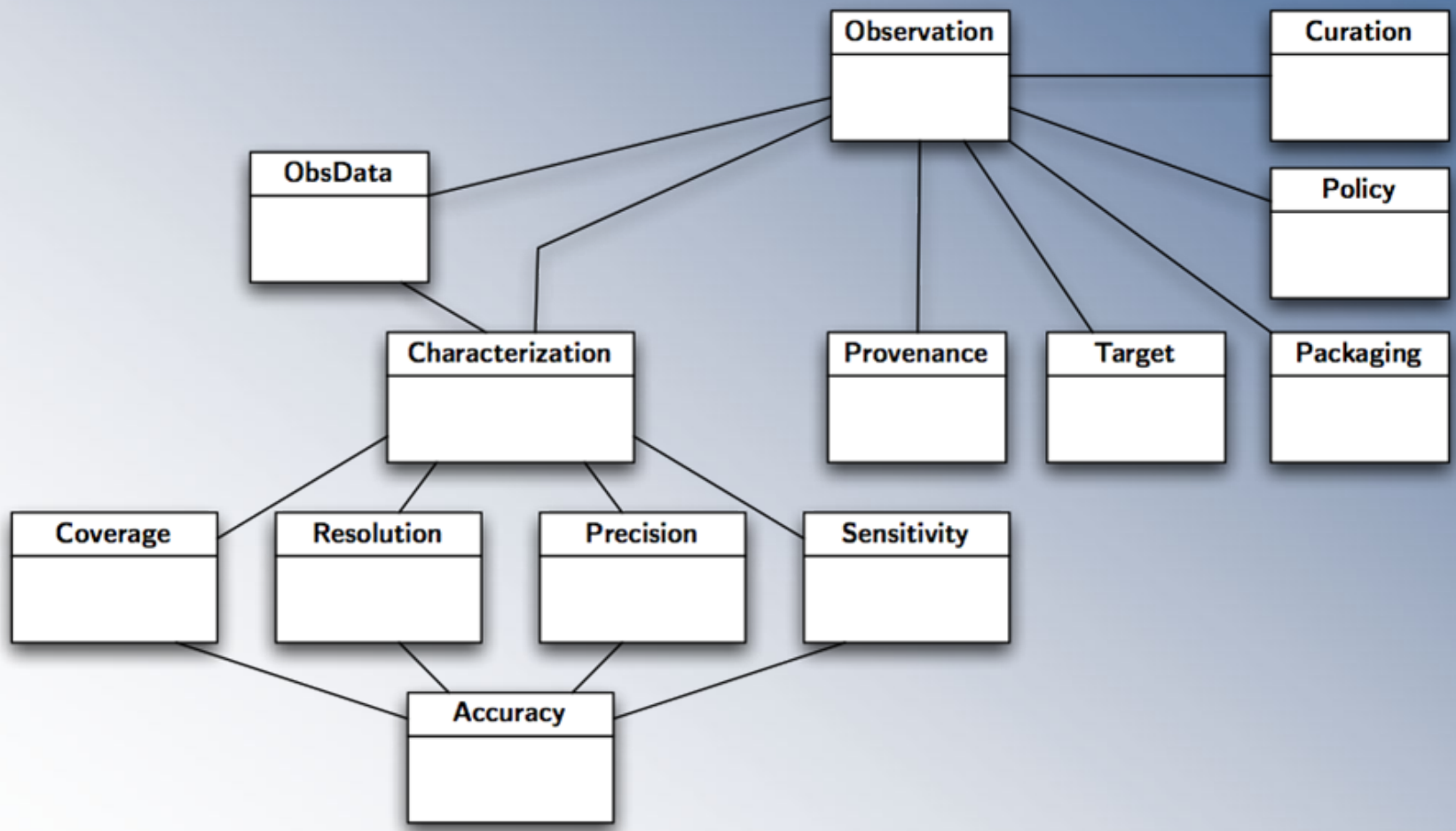
Optical



Who are you?

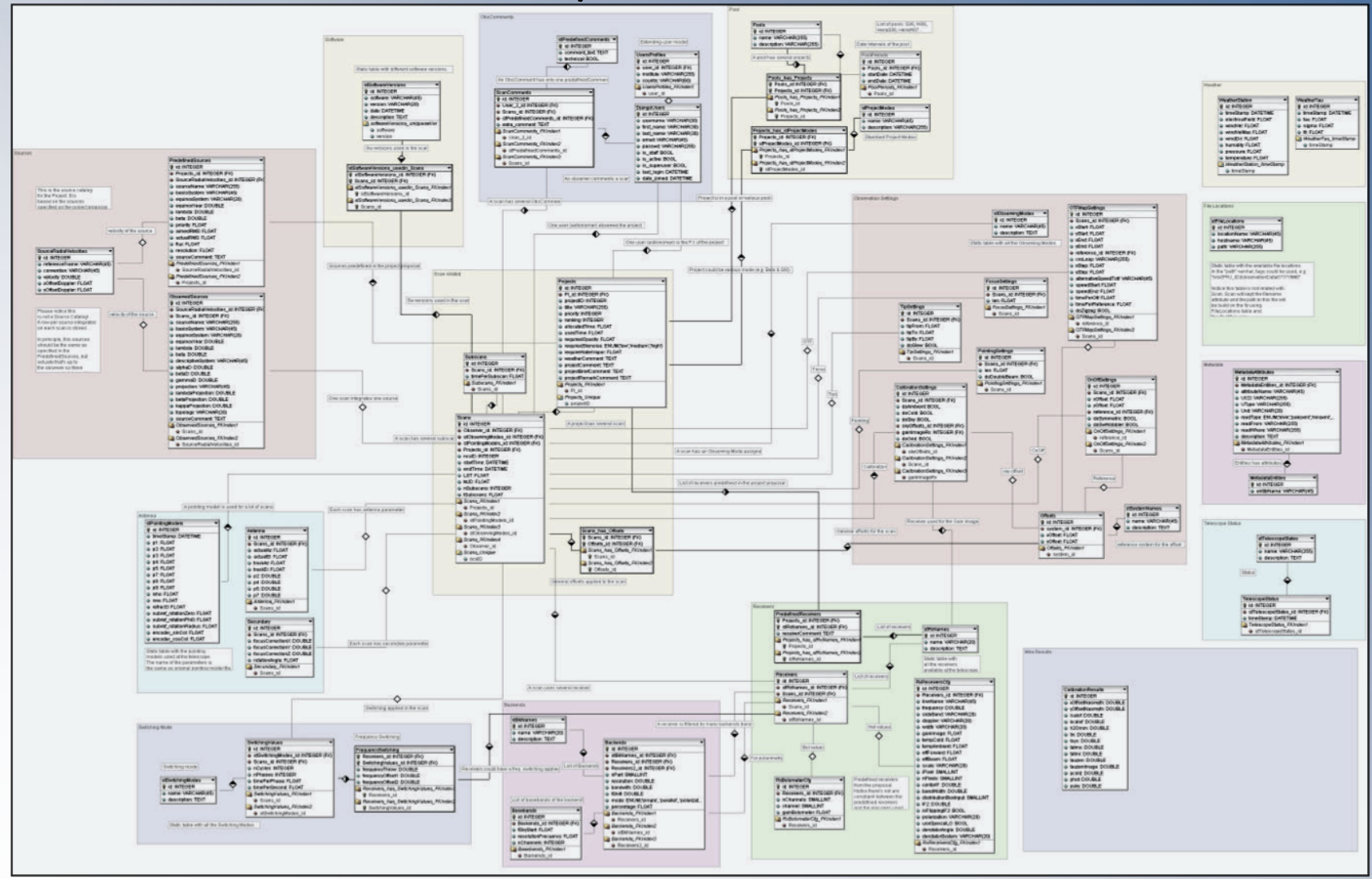
RADAMS

Radio Astronomy Data Model for Single-Dish telescopes



Who are you?

RADAMS Implementation



Who are you?

VO Archives Developments

Robledo DSS-63

- Madrid Deep Space Communication Complex (MDSCC)
- 70m single dish in Robledo de Chavela (Madrid)
- 5% operational time for observations
- K band Spectra (18 - 26 GHz)
- H₂O Masers, methanol, NH₃,..



TAPAS - IRAM 30M

- Telescope **A**rchive for **P**ublic **A**ccess **S**ystem
- Bolometric observations, maps, spectra
- Rotational molecular transitions
- ~200 scientific projects / year, 1TB

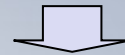
Radio **A**stronomy **D**ATA **M**odel for **S**ingle-dish telescopes

Who are you?

The AMIGA Group

Analysis of the interstellar Medium of Isolated Galaxies

Statistical baseline of isolated galaxies to compare with the behaviour of galaxies in denser environments

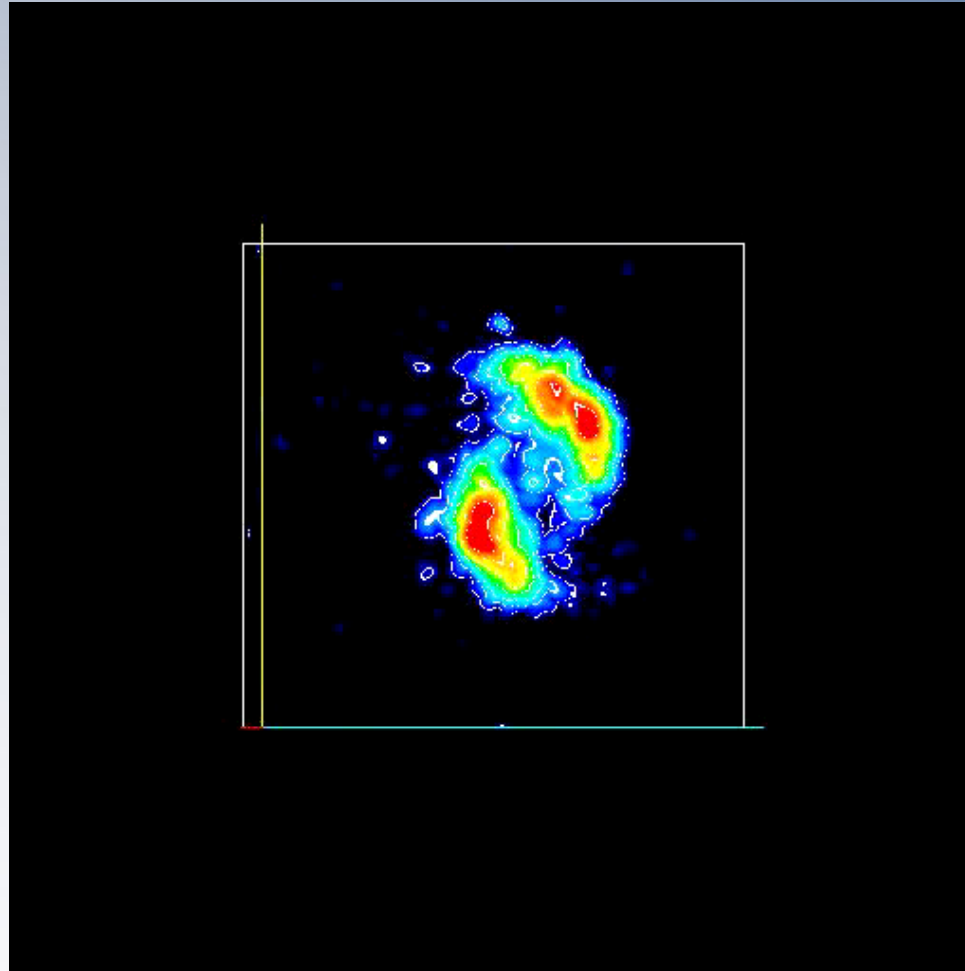


Multi λ study of ~ 1000 galaxies
+

Need of intensive and complex analysis of 3D data
2D spatial + 1 velocity

Who are you?

Velocity Datacubes

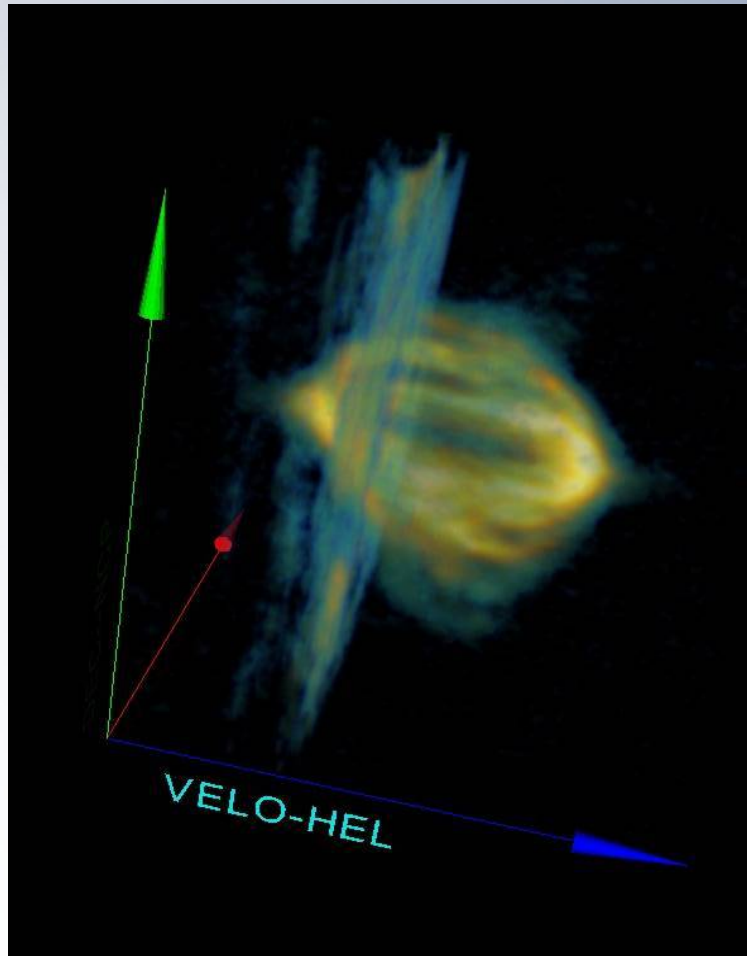


M. Krips - ESO 3D2008 Workshop - Garching

Who are you?

GIPSY

Groningen Image Processing SYstem



Connectivity

- VO Archives
- VO Software

Accessibility

- usability GUI
- VO Web Services

Kapteyn Astronomical Institute
IAA - CSIC

Who are you?

BODEGA Below 0 DEgrees GALaxies

P.I. : D. Espada

Legacy project of Submillimeter Array interferometer (SMA)

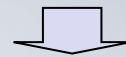
<http://bodega.iaa.es>

IAA-CSIC

CfA (Harvard-Smithsonian Center for Astrophysics)

ASIAA (Institute of Academia Sinica Astronomy and Astrophysics)

Molecular gas properties of a survey of nearby galaxies.



30 processed and reduced datacubes of galaxies

Who are you ?

The BODEGA 3D VO Catalog

The Data and *service* provider

BODEGA
Below zero degrees galaxies

About Team Publications

Basic data

Target

- Name: **NGC5247**
- Class: **Galaxy**

Coordinates

- RA J2000: **13:38:3.00** hh:mm:ss.ss
- DEC J2000: **-17.88** deg

Velocity

- V: **1319.98** Km/s
- Redshift: **0.00440299**

Extended data

Provenance

- Telescope: **SMA**
- Bandpass: **Millimeter bandwidth**
- Beam Major Axis: **0.000982176** deg
- Beam Minor Axis: **0.000892319** deg
- Beam Position Angle: **-66.64** deg

Spatial

- Aperture angular size (width x height): **0.025 x 0.025** deg
- Spatial bin size (width x height): **8.3e-05 x 8.3e-05** deg

Spectral

- Spectral coord value: **1319.98** Km/s
- Width of spectrum: **999986.33** Km/s
- Start in spectral coordinate: **579.99** Km/s
- Stop in spectral coordinate: **1579.98** Km/s

Flux

- Flux min : **0.0175** Jy/Beam
- Flux Support Extent (max): **0.7208** Jy/Beam
- Flux Support Extent (min): **0.0175** Jy/Beam

Images

12CO21

ch: [download data](#)

mom0: [download data](#)

mom1: [download data](#)

sp: [download data](#)

distrad: [download data](#)

Download Fits file

Right click and "Save Link As" to download

Number of points: 2250000
Size: 9011520 Kbs
[Open this with Aladdin Applet](#)

File Edit Image Catalog Overlay Tool View Interop Help Install

Location: ICRS

1339981.724

ngc5247_co21-09

Zoom: 2x

1.235° x 1.19°

Blink control: Change the current frame

Aladin VO Software

(c)1999-2009 Uds/CNRS - Centre de Données astronomiques de Strasbourg

0 sel / 0 src 17Mb

Virtual Data

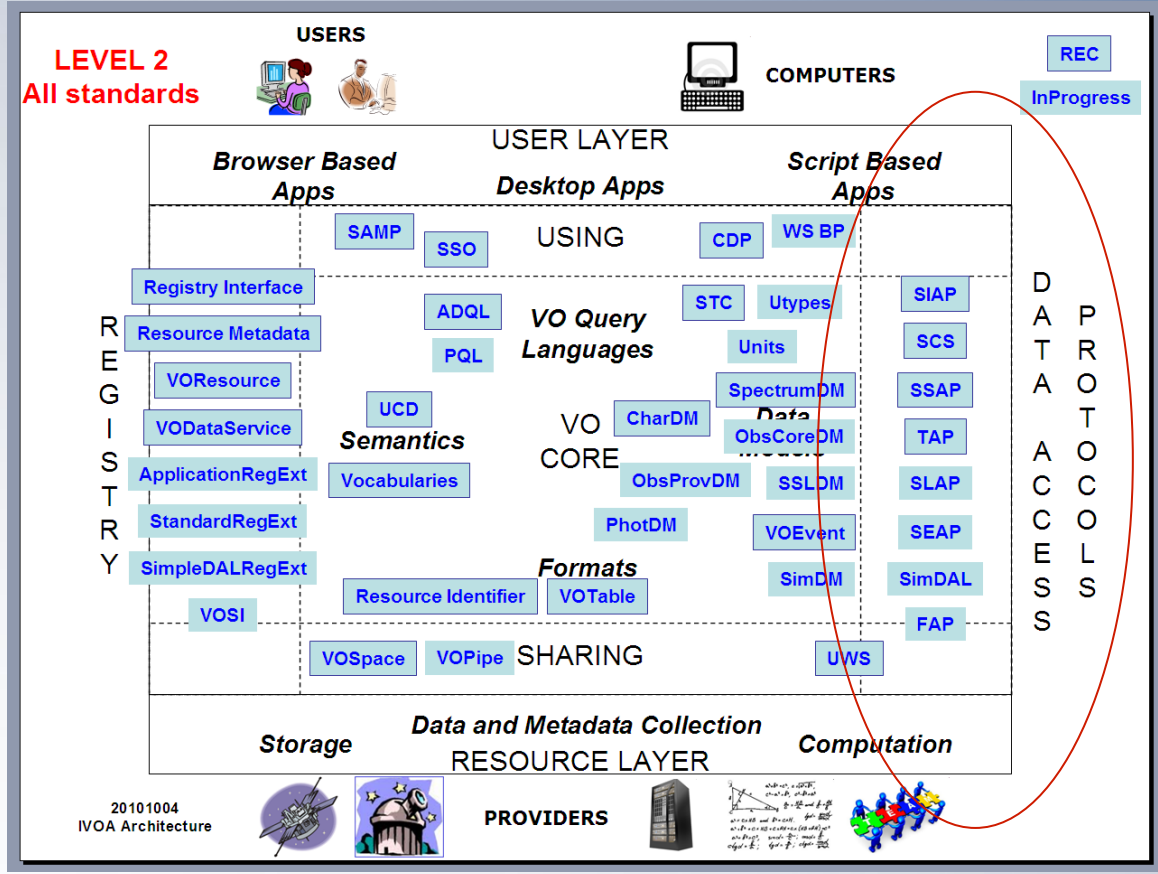
The Virtual Observatory

The Virtual Observatory

Infrastructure of *interoperable* data and services. *Standards* for:

- Providers to *share* data and services
- Developers to *discover* the services, *find* and *access* the data

Goal: astronomers to use this *infrastructure* in a seamless way



The Virtual Observatory

Standards for Web Services

- Most of the web services in Astronomy
- They are registered and curated
 - VO Registry
- WS for Humans
 - Data discovery and data access
 - Accessed with local software (Europe)
 - Integrated in web portals (USA)
- WS for Machines
 - Storage, transport, authentication, etc.

The Virtual Observatory

The VO Registry

- If you are not registered, you are not in the VO
- Web forms to register services
- Three VO Registries
 - Euro-VO
 - National Virtual Observatory (USA)
 - AstroGrid (UK)
- Harvesting among registries
- A VO Registry register resources
 - Organizations
 - Authorities
 - Data collections
 - Services

The Virtual Observatory

WS for Humans

- Most WS provide “just” Data Discovery and Access
- Associated to a very specific Archive
- Designed to discover
 - VO Services
 - Catalogs
 - Images
 - Spectra
- Parameters-based -> Standards
- Responses are always VOTables
 - Characterization of data
 - Actual data values
 - List of services
 - Spreadsheets for catalogues
 - Links to binaries for images and spectra

The Virtual Observatory

WS for Humans

- Sesame name resolver is one of the most used
 - Resolves objects names into coordinates
 - Provided by Centre de Données de Strasbourg (CDS)
- Data Discovery and Access (RESTful)
 - ConeSearch
 - Simple Image Access
 - Simple Spectra Access
 - Parameters: RA, DEC, SIZE
 - Table Access Protocol (TAP), OpenSkyQuery, SkyNodes
 - Astronomical Data Query Language (ADQL) requests
- Sparse complex services (SOAP)
 - Mosaicing of images, footprint of regions, spectral building and fitting, principal components analysis in spectra..
 - Common Execution Architecture (AstroGrid) - not took off

The Virtual Observatory

WS for Machines

- Implementation in progress
 - More standards than implemented services
- Universal Worker Service (Grid oriented)
 - asynchronous
 - stateful
 - job oriented services
- VOSpace
 - distributed storage
 - will be provided for Big Data archives
- Single Sign-On and Credential Delegation
- Registry Interfaces: services acting on the Registry

The Virtual Observatory

VOSI

- VO Services Support Interface (REST binding)
- In progress of implementation
- Provides interoperability among services
- Common Contract for all VO services
- Self-descriptive services
 - operations and data
 - /capabilities /tables
 - state of the service
 - /availability /upSince /downAt /backAt /note
- XML/VOTable VOSI files
- VOSI files stored in service provider server
- Files are scanned by VO Registries
- Provide also state of the service

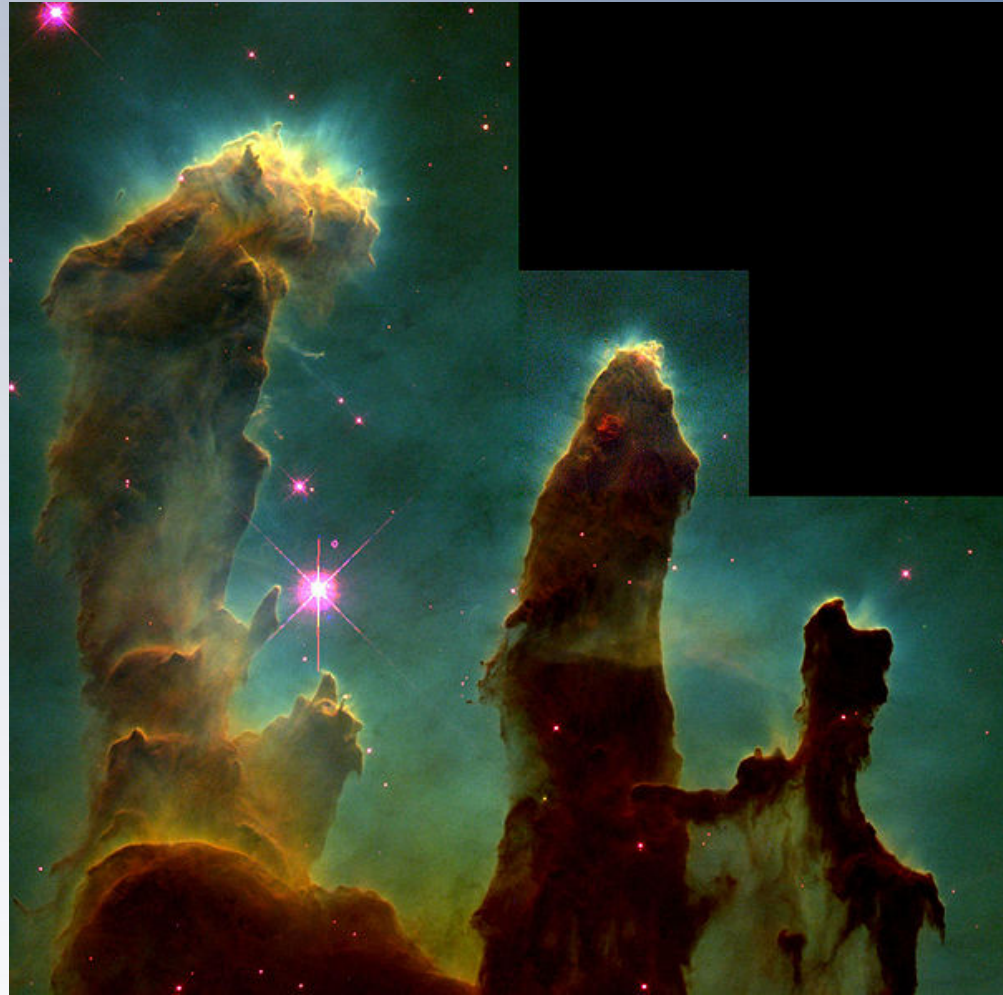
VOTables

XML Format

- Characterization of Data
 - Semantics
 - UCDS (Universal Content Descriptors)
 - Data Models
 - UTypes
- Actual Data
 - Tabular data
 - Links to binary data

The Virtual Observatory

Ontologies, SKOS vocabularies



M16



















The Virtual Observatory

Ontologies, SKOS vocabularies

La Web [Imágenes](#) [Vídeos](#) [Maps](#) [Noticias](#) [Libros](#) [Gmail](#) [Más](#) [Configuración de búsqueda](#) | [Acceder](#)

Google [Búsqueda avanzada](#)
 SafeSearch: [Moderado](#) ▼

La Web [Imágenes](#) [Mostrar opciones...](#) Resultados 1 - 18 de aproximadamente 1.020.000 (0,03 segundos)

 M16 400 x 300 - 35 KB - jpg empresas.ceuta.es Buscar imágenes similares	 AR15 M16 Military 748 x 321 - 36 KB - jpg investmentgradefirearm... Buscar imágenes similares	 M16 650 x 593 - 61 KB - jpg taringa.net Buscar imágenes similares	 M16 398 x 320 - 38 KB - jpg library.thinkquest.org Buscar imágenes similares	 ametralladoras 500 x 375 - 100 KB - jpg portalpirata.com Buscar imágenes similares	 There are two M16 697 x 337 - 61 KB - jpg defensereview.com Buscar imágenes similares
 LO QUE HAY ES M16 700 x 499 - 131 KB - jpg desahogate.net Buscar imágenes similares	 Opposing Force - 863 x 281 - 27 KB - gif imperiumgames.com.ar Buscar imágenes similares	 Police secured an 300 x 274 - 21 KB - jpg 7cgen.com Buscar imágenes similares	 Click here to visit the 628 x 277 - 27 KB - jpg defensereview.com Buscar imágenes similares	 The M16 Assault 432 x 334 - 52 KB - jpg nrm.ru Buscar imágenes similares	 m16 « The Place 1024 x 768 - 245 KB - jpg aplacetoreturn... Buscar imágenes similares
 Tags: vietnam, cu chi, 454 x 340 - 36 KB - jpg journals.worldnomads.com Buscar imágenes similares	 M16 Assault Rifle 1080 x 315 - 144 KB - jpg taringa.net Buscar imágenes similares	 fusil-2r-m16 648 x 407 - 21 KB - jpg odiseaspolitecnicas...	 the M16 825 x 475 - 34 KB - jpg fastrail.com Buscar imágenes similares	 AK-47 vs M16 300 x 274 - 24 KB - jpg taringa.net	 TM M4A1 or TM M16 500 x 375 - 40 KB - jpg airsoftcanada.com Buscar imágenes similares

Goooooooooooooogle▶
1 2 3 4 5 6 7 8 9 10 [Siguiente](#)

[Página principal de Google Imágenes](#) - [Notificar imágenes ofensivas](#) - [Ayuda](#)

[Página principal de Google](#) - [Programas de publicidad](#) - [Soluciones Empresariales](#) - [Privacidad](#) - [Todo acerca de Google](#)

VODesktop



VO Explorer - List of SIAs

Contents of List of SIAs - 251 resources

Filter result: [input]

Table Column UCD: [dropdown] Image Service Type: [dropdown] Publisher: [dropdown]

Flag...	Title	Capability	Valida...	Date
	Combined database of sunspot magnetic fields		①	2003-03-17
	Combined General Catalogue of Variable Stars (Kholopov+ 1998)		①	2005-01-01
	Combined General Catalogue of Variable Stars (Samus+ 2004)		①	2008-11-12
	Composite spectra of early-type galaxies (Bernardi+, 2006)		①	2008-01-30
	Cygnus OB2 Association Chandra X-Ray Point Source Catalog 2			2009-10-22
	ESO Image Service			2009-05-04
	ESO Science Archive Image Service			2008-04-11
	EWs of 31 giant stars of 10 open clusters (Smiljanic+, 2009)		①	2009-08-24
	Epic Image SIAP of the SSC Interface for the 2XMM1 Catalogue			2009-02-15
	Faint Markarian galaxies of SBS. III. (Stepanian+, 2002)		①	2006-12-16
	GALEX Atlas of Nearby Galaxies		②	2006-09-12
	Galactic PNe statistical distance scale (Zhang 1995)		①	1997-12-09
	Galactic emission at decimeter wavelengths (Platania+, 2003)		①	2003-12-29

Information | Table Metadata

ESO Science Archive Image Service

Short Name: ESO SAF SIAP IVOA-ID: ivo://archive.eso.org/siap
 Resource Type: CatalogService Created: 2007-09-20 Updated: 2008-04-11

Content Type: archive Subject: stars, galaxies Level: research
 This service provides access to science ready images and preview graphics from the Science Archive Facility of the European Southern Observatory. Note that raw files are accessible to registered users only and therefore are not available through the SIA v1 protocol. As a special feature, and provided that WCS information is sufficient, this service returns instrumental footprint overlays <http://www.ivoa.net/Documents/latest/Footprint.html> which are supported by certain archive browsers such as VirGO.
[Further information...](#)

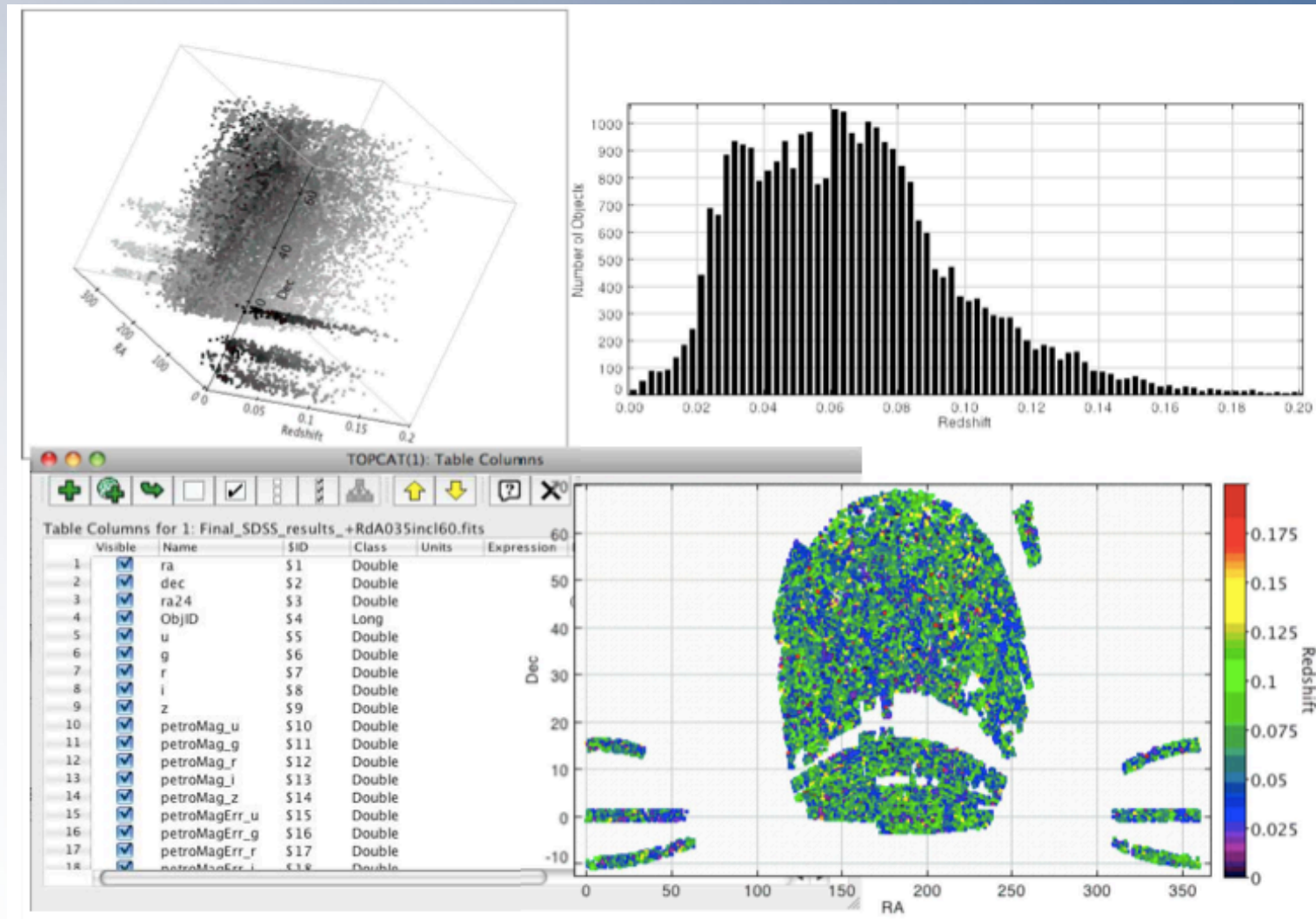
Relationships: service-for [European Southern Observatory - Science Archive Facility](#)

Waveband Coverage: infrared, optical, uv
 Spatial Coverage: All-Sky

Show Coverage

Annotate: Flag Highlight [dropdown] Alternative title [input] Notes [input] Tags [input]

TopCat



Aladin Sky Atlas



Aladin v6.0

Location: 5:43.95 +21:40:58.1 | ICRS | Pixel: unknown | full

The interface displays four panels of astronomical images:

- Top Left:** POSSILF-DSS2.575, 21.3' x 17.4'
- Top Right:** POSSIIN-DSS2.143, 10.65' x 8.701'
- Bottom Left:** POSSILF-DSS2.831, 5.326' x 4.352'
- Bottom Right:** POSSILF-DSS2.061, 10.65' x 8.702'

Right sidebar (NGC4826):

- select, pan, zoom, dist, draw, tag, text, filter, cross, rub, assoc, cont, molss, pixel, prop, del
- Layers: NEP, Simbad, FORS2, WFPC2, HST, POSSILF-DSS2.061, POSSILF-DSS2.575, POSSIIN-DSS2.143, POSSILF-DSS2.831
- Zoom: 1/4x

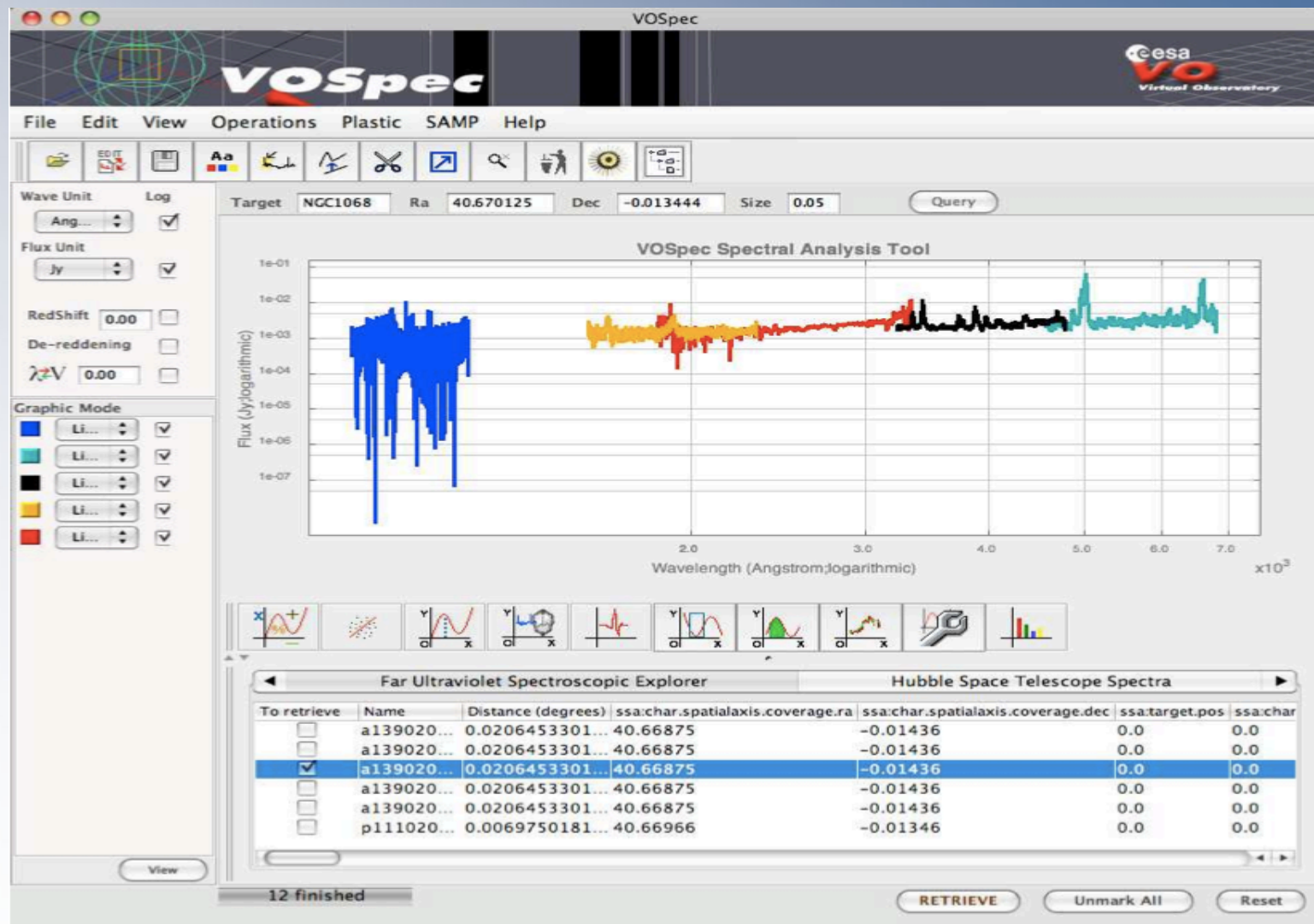
simbad - MAIN_ID - Main identifier for an object

MAIN ID	OTYPE	RA	DEC	COO ...	COO ...	C...	PMRA	PMDEC	B	V
[] ITH941 NGC 4826 7	Radio	12 56 43.95	+21 40 58.1	1250	1250	45				
[] ITH941 NGC 4826 9	Radio	12 56 44.64	+21 41 02.1	1250	1250	82				
[] ILLJ20001 NGC 4826 X1	X	12 56 44.00	+21 40 59.0							
[] GB6 B1254+2157	Radio	12 56 44.50	+21 40 59.0	11000	11000	90				
[] M 64	Sevf...	12 56 43.88	+21 41 00.1	10800	10800	90			9.36	8.52

5 sel / 638 src 27Mb

(c)1999-2009 UdS/CNRS - Centre de Donnees astronomiques de Strasbourg

VOSpec



SAMP/WEB SAMP

cds.aladin.Aladin TOPCAT(2): Table Columns

TOPCAT(2): Table Browser

Table Browser for 2: GSC2.3

	_RAJ2000	_DEJ2000	_r	GSC2.3	GSC1	HTM6	RAJ2000	DEJ2000	e_RAdeg	e_DEdeg
1	274,69173	-13,82301	0,6141	S9KJ000845	5689-00251	S3001303	274,69173	-13,82301	0,09	0,11
2	274,71117	-13,80354	1,0216	S9KJ000836	5689-00433	S3001303	274,71117	-13,80354	0,06	0,07
3	274,6843	-13,82465	1,0323	S9KJ002476		S3001303	274,6843	-13,82465	0,34	0,34
4	274,68194	-13,82432	1,1478	S9KJ002482		S3001303	274,68194	-13,82432	0,34	0,34
5	274,68271	-13,80687	1,1664	S9KJ002615		S3001303	274,68271	-13,80687	0,34	0,34
6	274,6875	-13,8326	1,202	S9KJ043188		S3001303	274,6875	-13,8326	0,36	0,37
7	274,68326	-13,83	1,2616	S9KJ002436		S3001303	274,68326	-13,83	0,34	0,34
8	274,68053	-13,80599	1,3028	S9KJ002628		S3001303	274,68053	-13,80599	0,34	0,34
9	274,67742	-13,82043	1,3346	S9KJ025706		S3001303	274,67742	-13,82043	0,47	0,46
10	274,71947	-13,8285	1,3382	S9KJ000847	5689-00439	S3001303	274,71947	-13,8285	0,01	0,02
11	274,67701	-13,81743	1,3405	S9KJ002535		S3001303	274,67701	-13,81743	0,34	0,34
12	274,67824	-13,80904	1,3477	S9KJ002596		S3001303	274,67824	-13,80904	0,34	0,34
13	274,67964	-13,82752	1,353	S9KJ025652		S3001303	274,67964	-13,82752	0,47	0,46
14	274,68081	-13,83101	1,4111	S9KJ002425		S3001303	274,68081	-13,83101	0,34	0,34
15	274,67633	-13,82403	1,4478	S9KJ025679		S3001303	274,67633	-13,82402	0,47	0,46
16	274,67569	-13,82254	1,4598	S9KJ025691		S3001303	274,67569	-13,82254	0,47	0,46
17	274,67918	-13,83059	1,4729	S9KJ002428		S3001303	274,67918	-13,83059	0,34	0,34
18	274,67501	-13,82088	1,4778	S9KJ002510		S3001303	274,67501	-13,82088	0,34	0,34
19	274,68184	-13,83395	1,4815	S9KJ002397		S3001303	274,68184	-13,83395	0,34	0,34
20	274,68068	-13,83286	1,4871	S9KJ002407		S3001303	274,68068	-13,83286	0,34	0,34
21	274,67503	-13,80867	1,5319	S9KJ002601		S3001303	274,67503	-13,80867	0,34	0,34
22	274,68223	-13,83576	1,5443	S9KJ002386		S3001303	274,68223	-13,83576	0,34	0,34
23	274,67395	-13,82286	1,5628	S9KJ025688		S3001303	274,67395	-13,82286	0,47	0,46

34 e \$34 Float ? Eccentricity of fitting ellipse

35 aPA \$35 Float deg ? Position angle (N->E) of fitting ellipse

4 planes, 1 view, 9Mb

A Cloud of Services

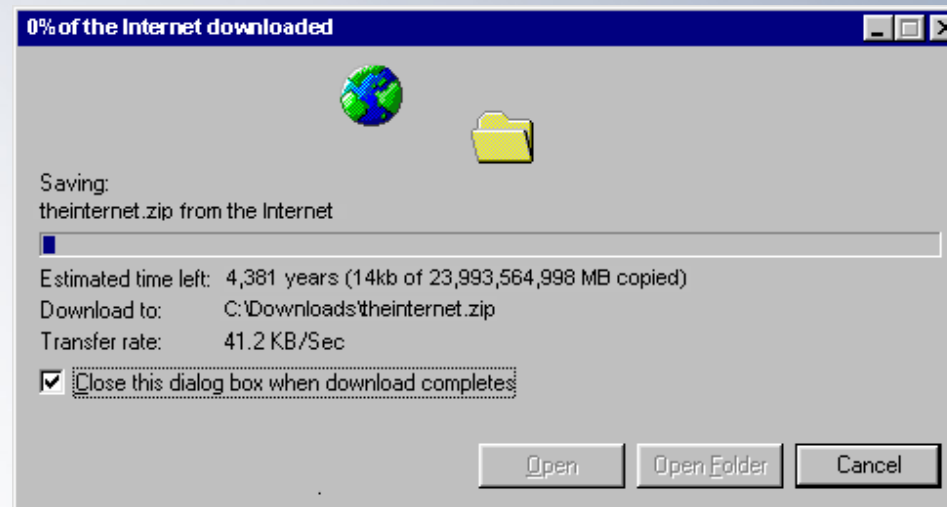
The next generation of archives

Much wider FoV and spectral coverage

- Large volumes for an observed datacube
- Subproducts are **virtual Data** generated on-the-fly

Automated surveys

- Huge amounts of tabular data
- Services for **Knowledge Discovery in Databases**



A Cloud of Services

Cube sizes

	Low Res		High Res		Extreme Res	
Number	4 Bytes	4B	4 Bytes	4B	4 Bytes	4B
Resolution	2,048 x 2,048	16MB	8,192 x 8,192	268MB	12,288 x 12,288	603MB
Channels	16,384	0.27TB	16,384	4.39TB	16,384	9.8TB
Stokes & Weighting	1	0.27TB	1	4.39TB	4 + 1	49.5TB

ASKAP Cubes

Prof. Kevin Vinsen

A Cloud of Services

The overall picture

Distributed, scalable and flexible infrastructure

- **Grid** + **Cloud** may solve storage and processing
- Bandwidth is the issue

Big Data Science performance is highly dependent upon I/O data rates (local and transfer)

The data is the infrastructure

- Interconnected and interoperable archives
- Distributed, multi-wavelength and multi-facilities

Archives speaking **Web Services**

ALMA, LSST, ASKAP, MeerKAT, LOFAR, Apertif,...

A Cloud of Services

The overall picture

We are moving into a world where

- computing and storage are cheap
- data movement is death

Archives should evolve from data providers into *virtual data* and *services providers*, where web services may help to solve bandwidth issues.

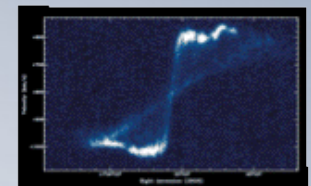
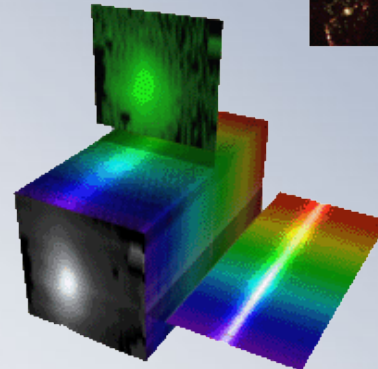
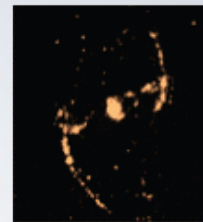
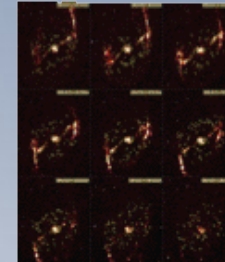
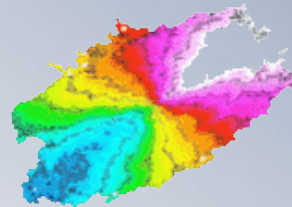
Web Services

- Smaller virtual data subproducts
- Distributed, multi-archive, multi-wavelength astronomy
- Workflows as a disruptive working methodology

A Cloud of Services

3D Data Services

- Cutout
- Resample
- Spectrum extraction
- 2D slice extraction
- Dimensional reduction
- Filtering/Flagging
- 2D Moments
- Complex transformations



Scientific Use Cases

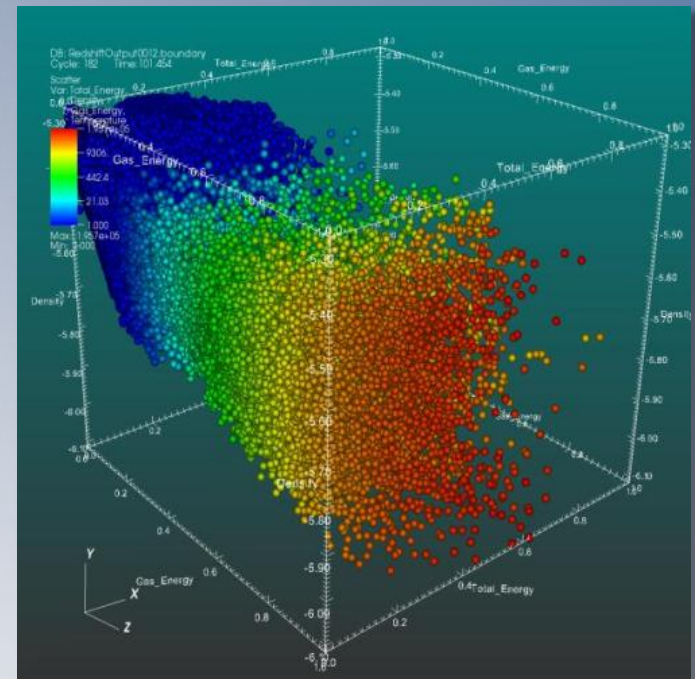
Exploration services

KDD - Knowledge Discovery in Databases

Understand what information is contained within the data in order to know how we can efficiently extract it

- Anomaly detection
- Cross-matching data
- Dimensionality reduction

Extraction of scientifically relevant information from a multidimensional parameter space.



visit software

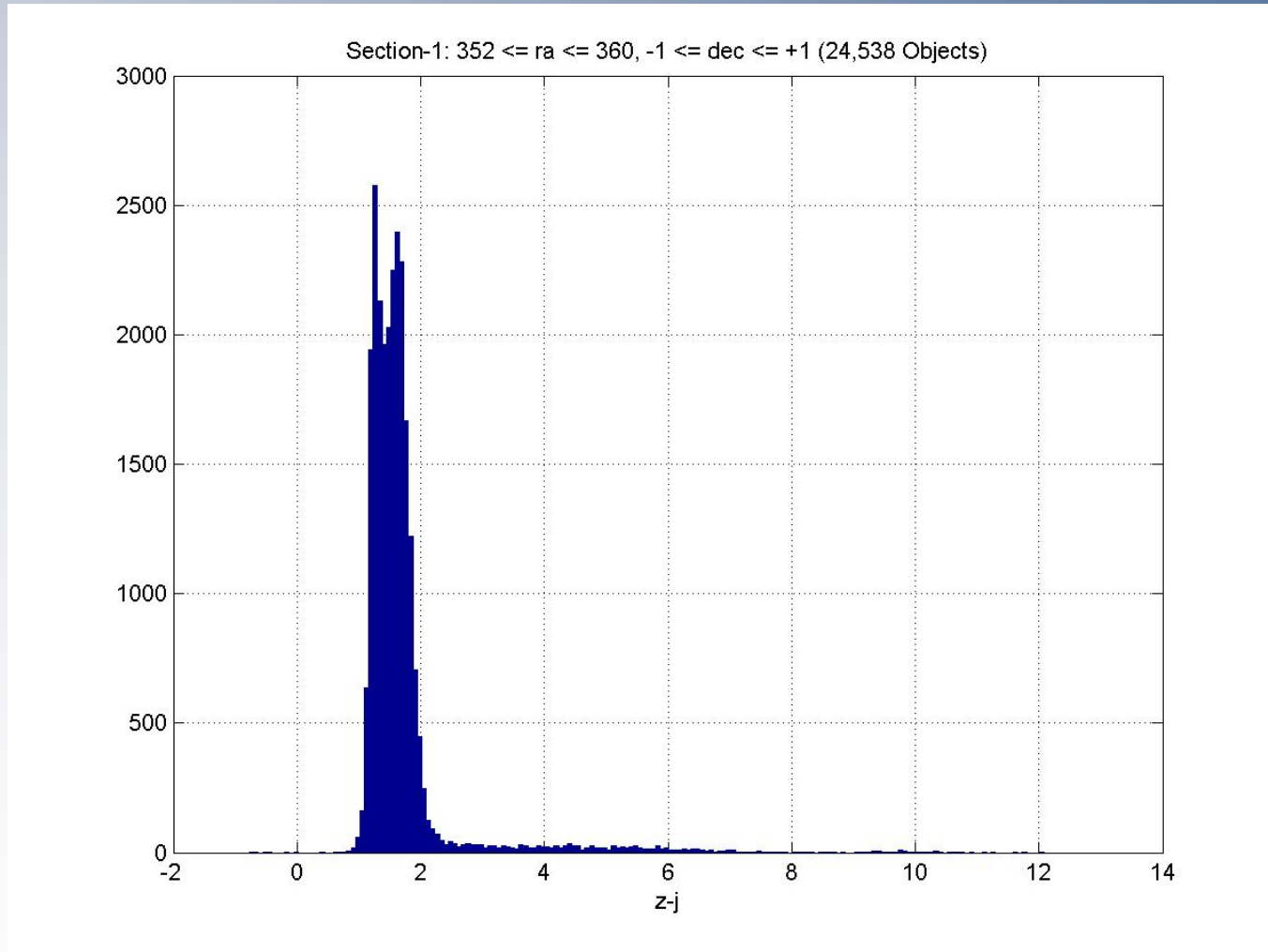
Scientific Use Cases

Data Mining

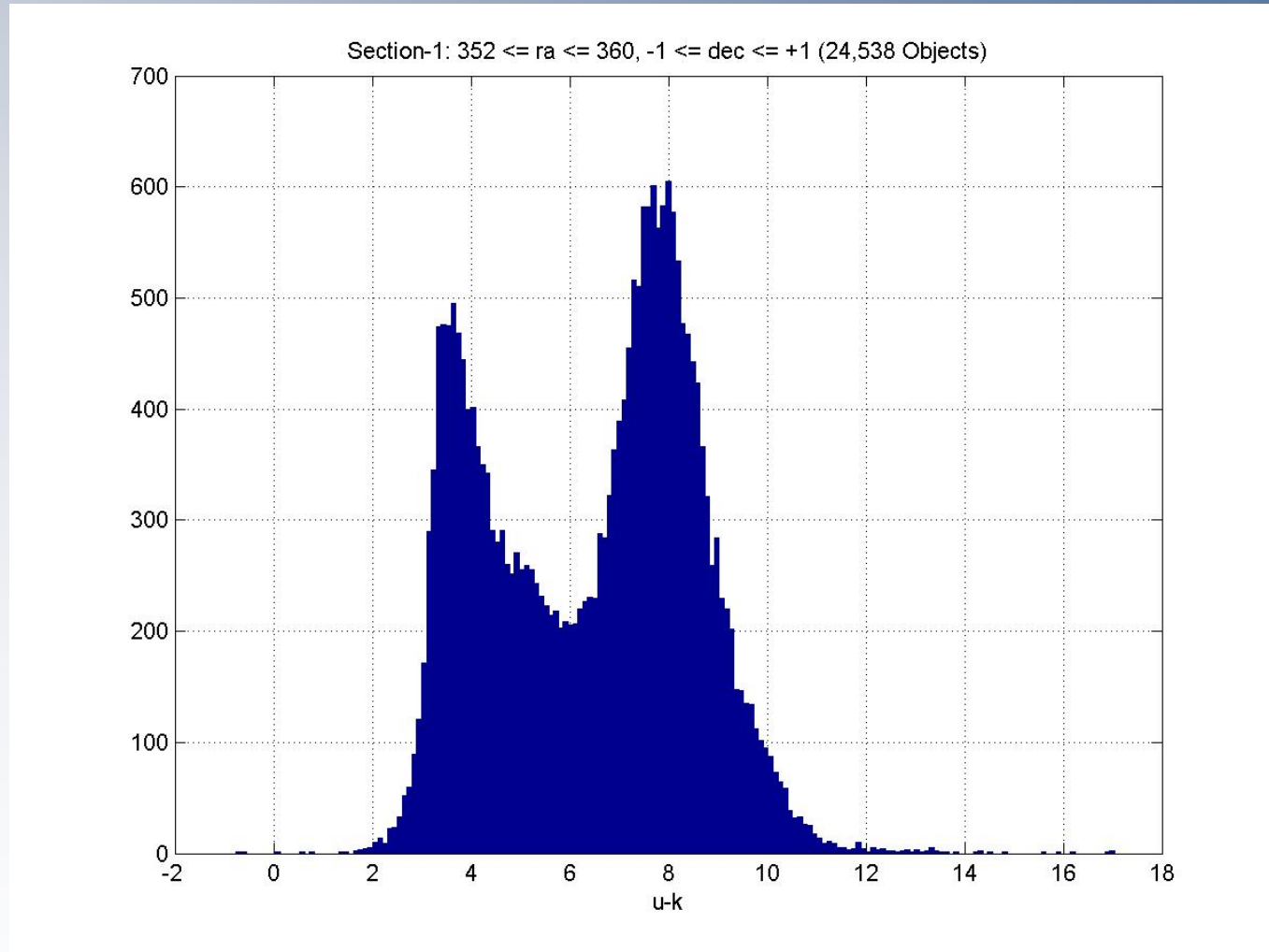
Some key astronomy problems that can be addressed with data mining techniques:

- Cross-Match objects from different catalogues
- The distance problem (e.g., Photometric Redshift estimators)
- Star-Galaxy Separation
- Cosmic-Ray Detection in images
- Supernova Detection and Classification
- Morphological Classification (galaxies, AGN, gravitat. lenses, ...)
- Class and Subclass Discovery (brown dwarfs stars, ...)
- Dimension Reduction = Correlation Discovery
- Learning Rules for improved classifiers
- Classification of massive data streams
- Real-time Classification of Astronomical Events
- Clustering of massive data collections
- Novelty, Anomaly, Outlier Detection in massive databases

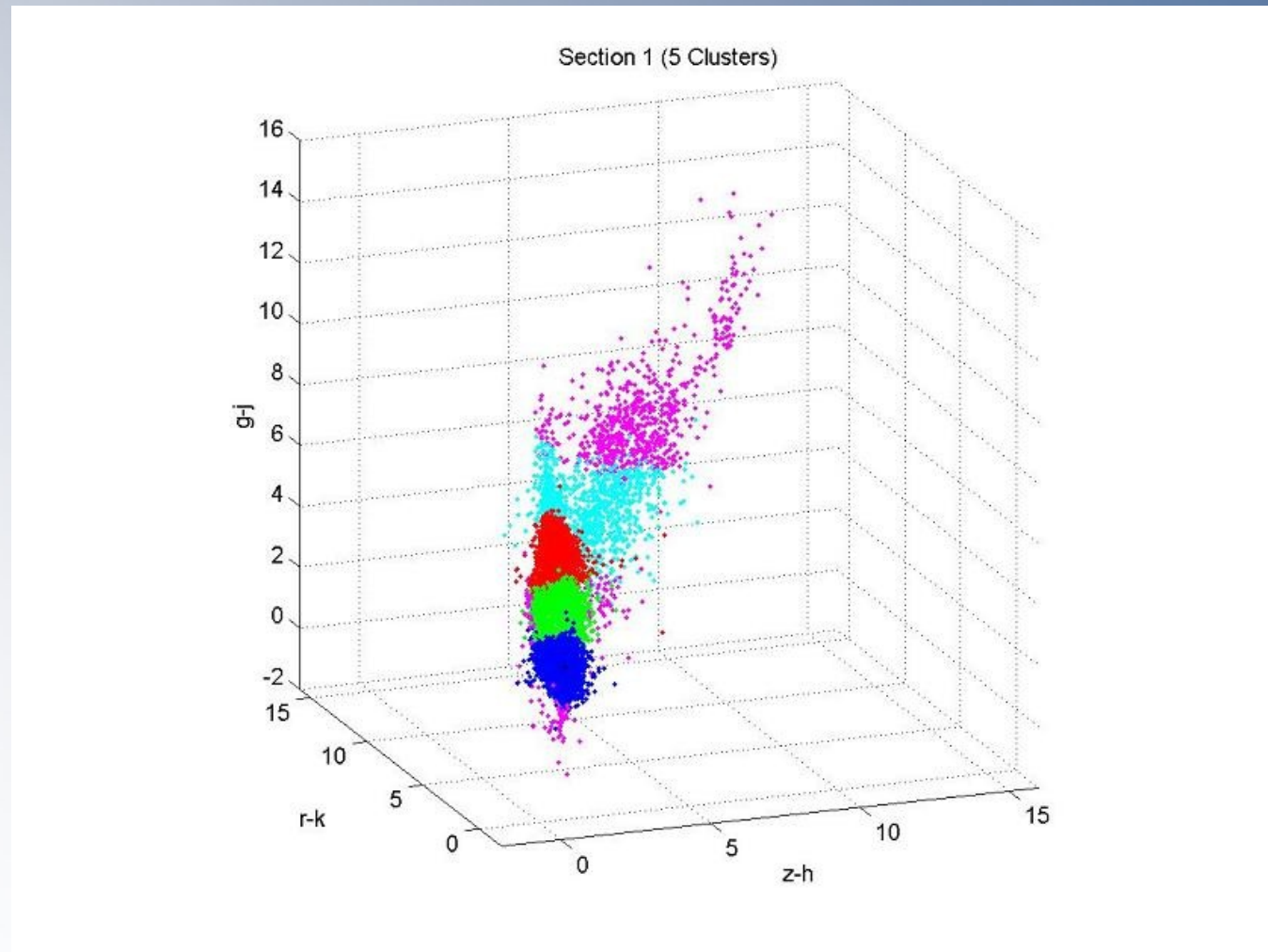
Clustering



Clustering

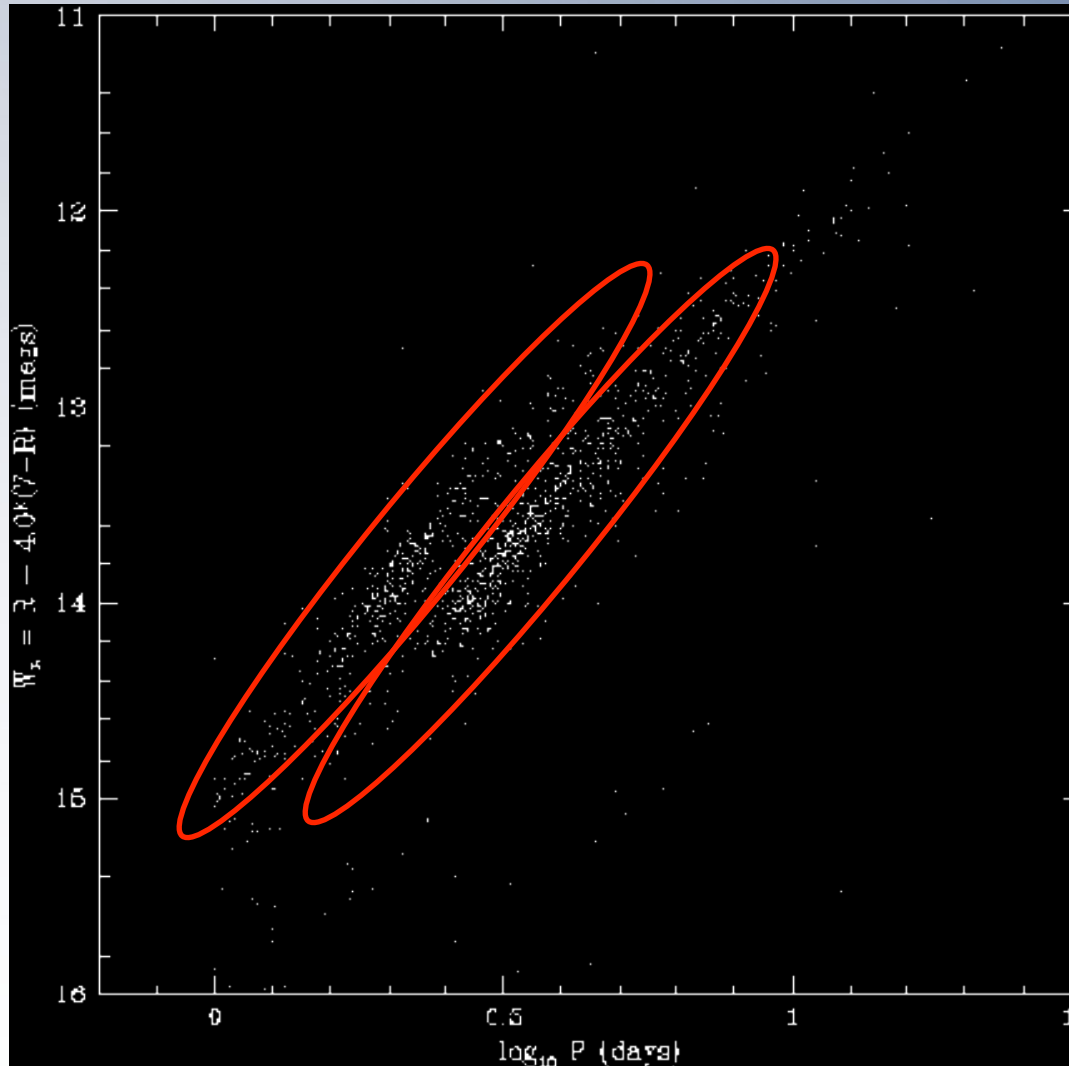


Multidimensional Clustering



Scientific Use Cases

Clustering

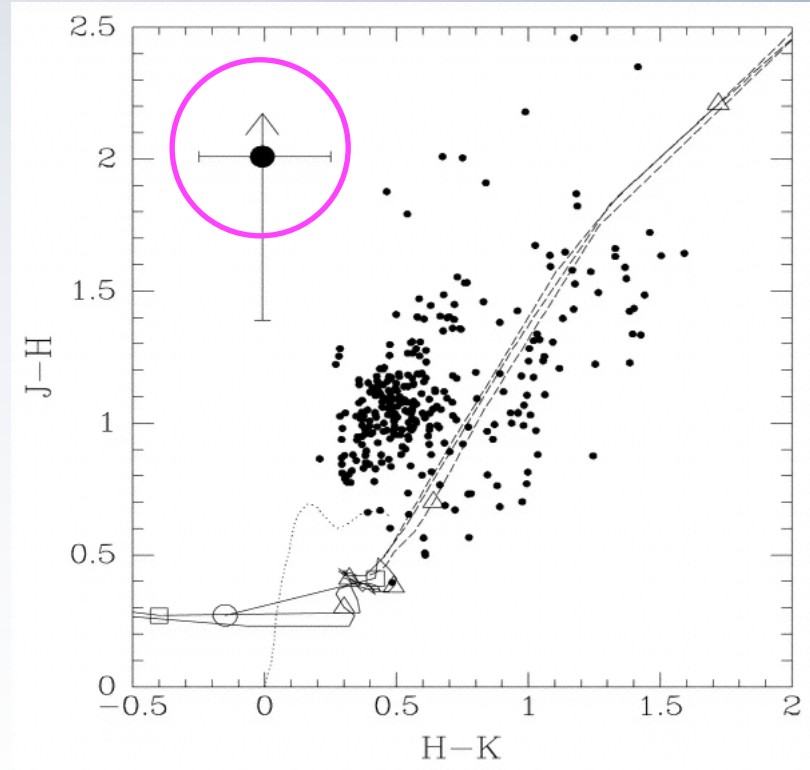


Cepheid variables
Cosmic yardsticks

- One Correlation
- Two Classes!

Scientific Use Cases

Outlier detection



2MASSW J1217-03

A methane (T-type) dwarf in the constellation Virgo

The near-infrared view

2MASS Composite JHK_s Atlas Image

The optical view

Palomar Digitized Sky Survey

A.J. Burgasser (Caltech), J.D. Kirkpatrick (IPAC/Caltech), M.E. Brown (Caltech), I.N. Reid (U. Penn), J.E. Gizis (U. Mass), C.C. Dahn & D.G. Monet (USNO, Flagstaff), C.A. Beichman (JPL), J.Liebert (Arizona), R.M. Cutri (IPAC/Caltech), M.E. Skrutskie (U. Mass)

The 2MASS Project is a collaboration between the University of Massachusetts and IPAC

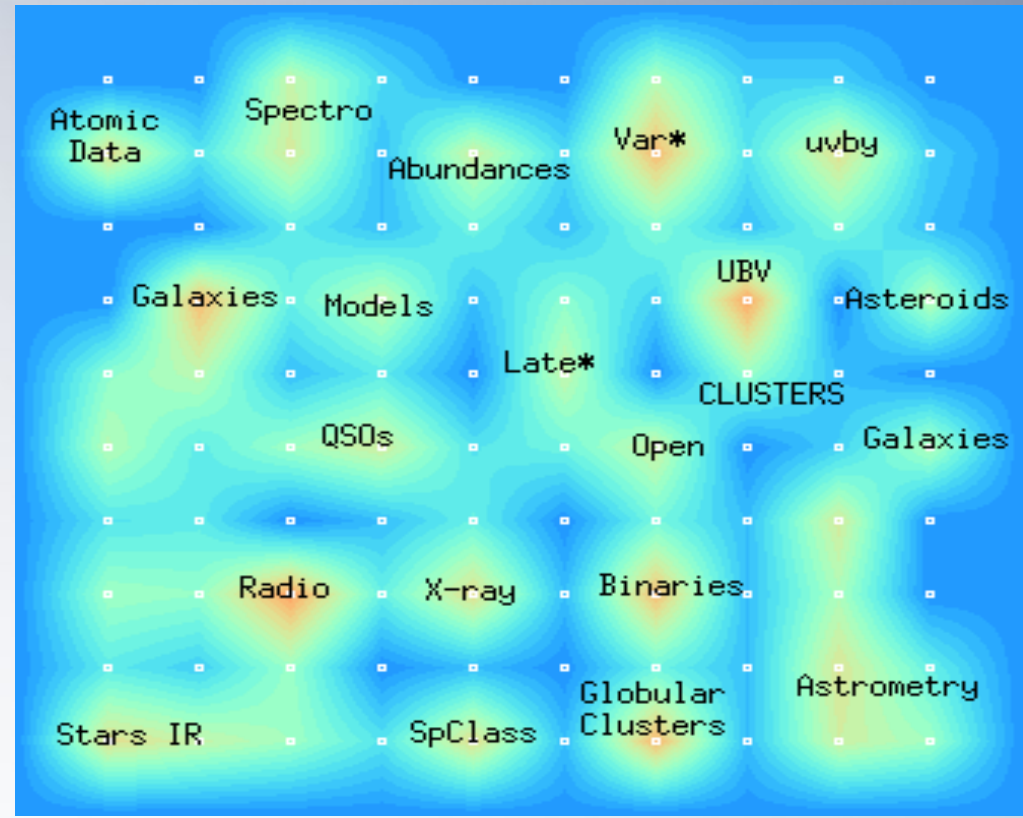
Scientific Use Cases

Self Organizing Map

Organizing information in complex data collections

Find hidden relationships and patterns

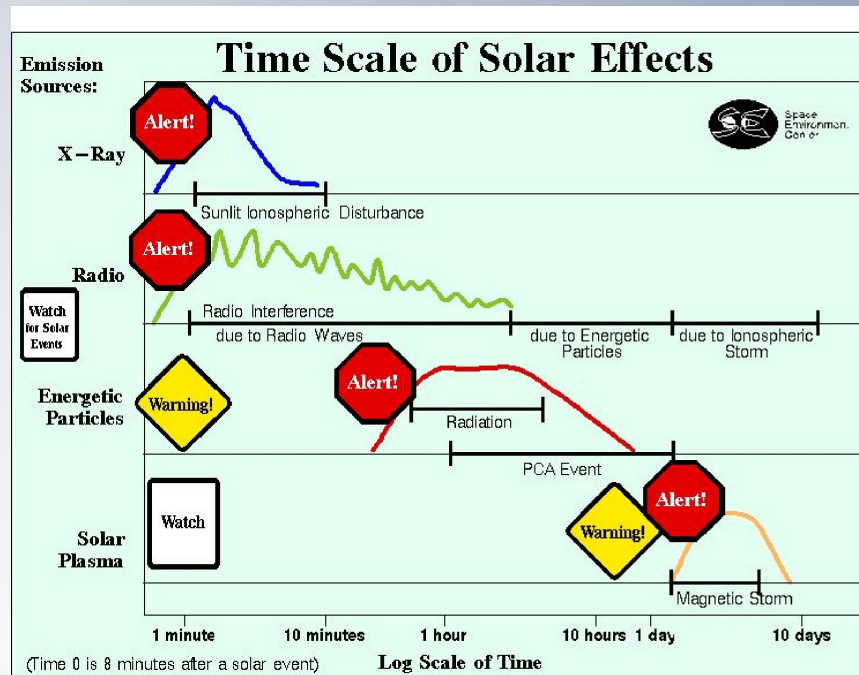
Based on links among keywords and metadata



The time domain

- VO Sky Event reporting metadata
- What, Where, Who, How ?
- Stars flares ,GRBs, solar, atmospheric particle bursts,..

The Helio-VO Project



AMIGA



The VO-Experiment

- Data Mining Oriented
- VO Services
 - Discovery
 - Access
 - Waiting for analysis services
- Local software (also some web portals)
 - Crossmatching
 - Inspection
 - Visualization
- web services associated to archives of big facilities
 - Hinders cross-boundary science

Scientific Use Cases

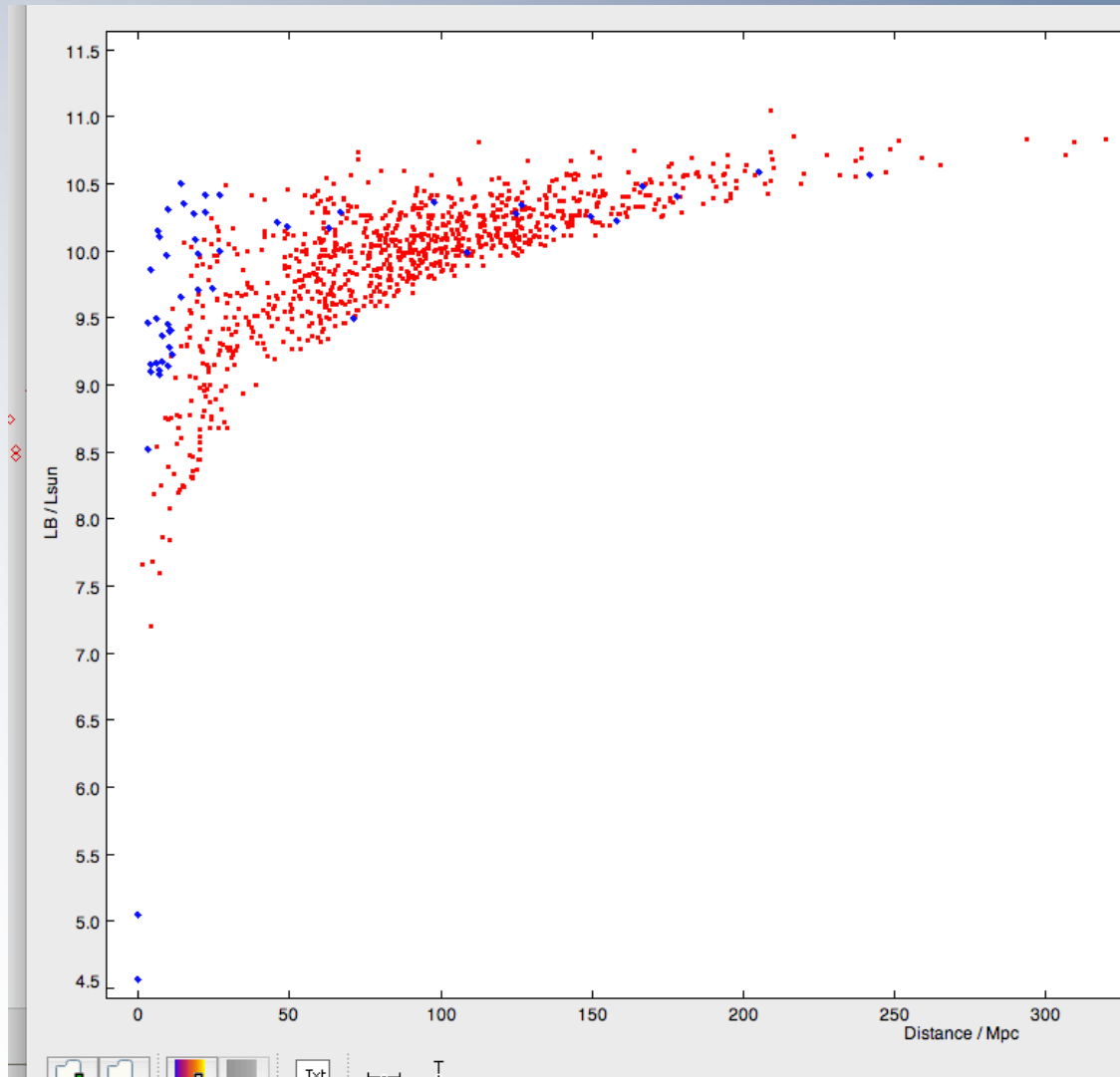
XMM Observations of the AMIGA Sample

TopCat Hands-On

Let's do some science!

Scientific Use Cases

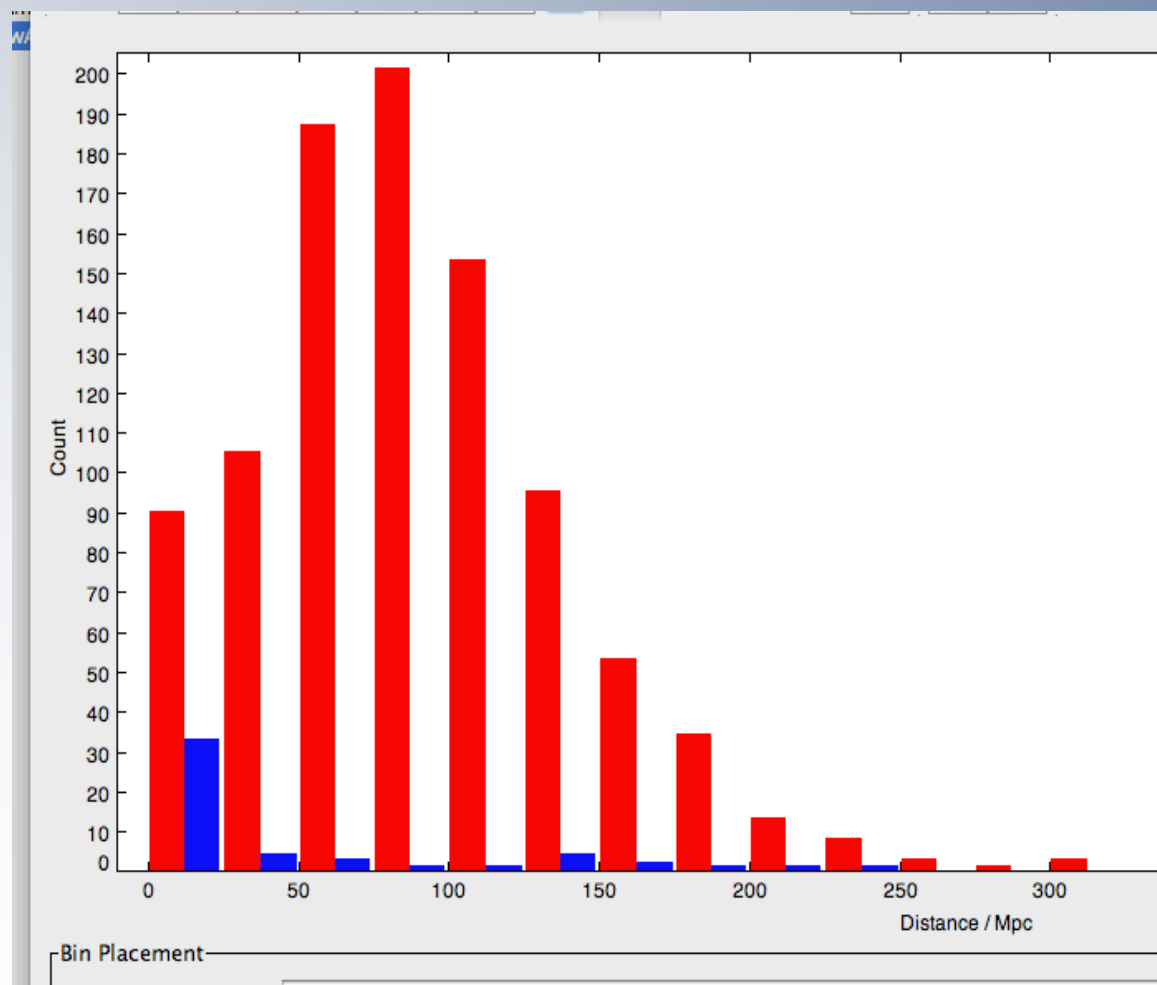
XMM Observations of the AMIGA Sample



Slightly brighter

Scientific Use Cases

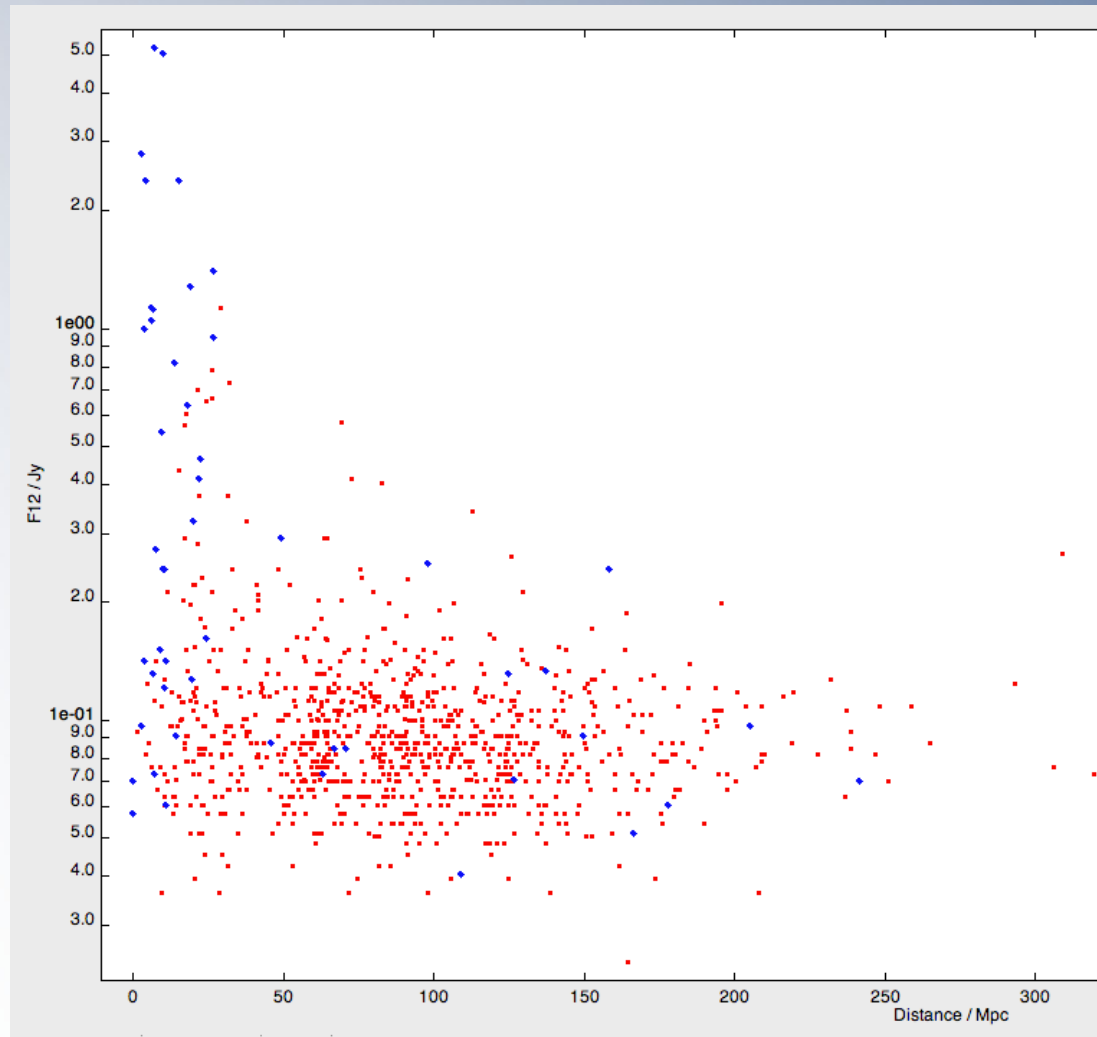
XMM Observations of the AMIGA Sample



Slightly brighter
Closer

Scientific Use Cases

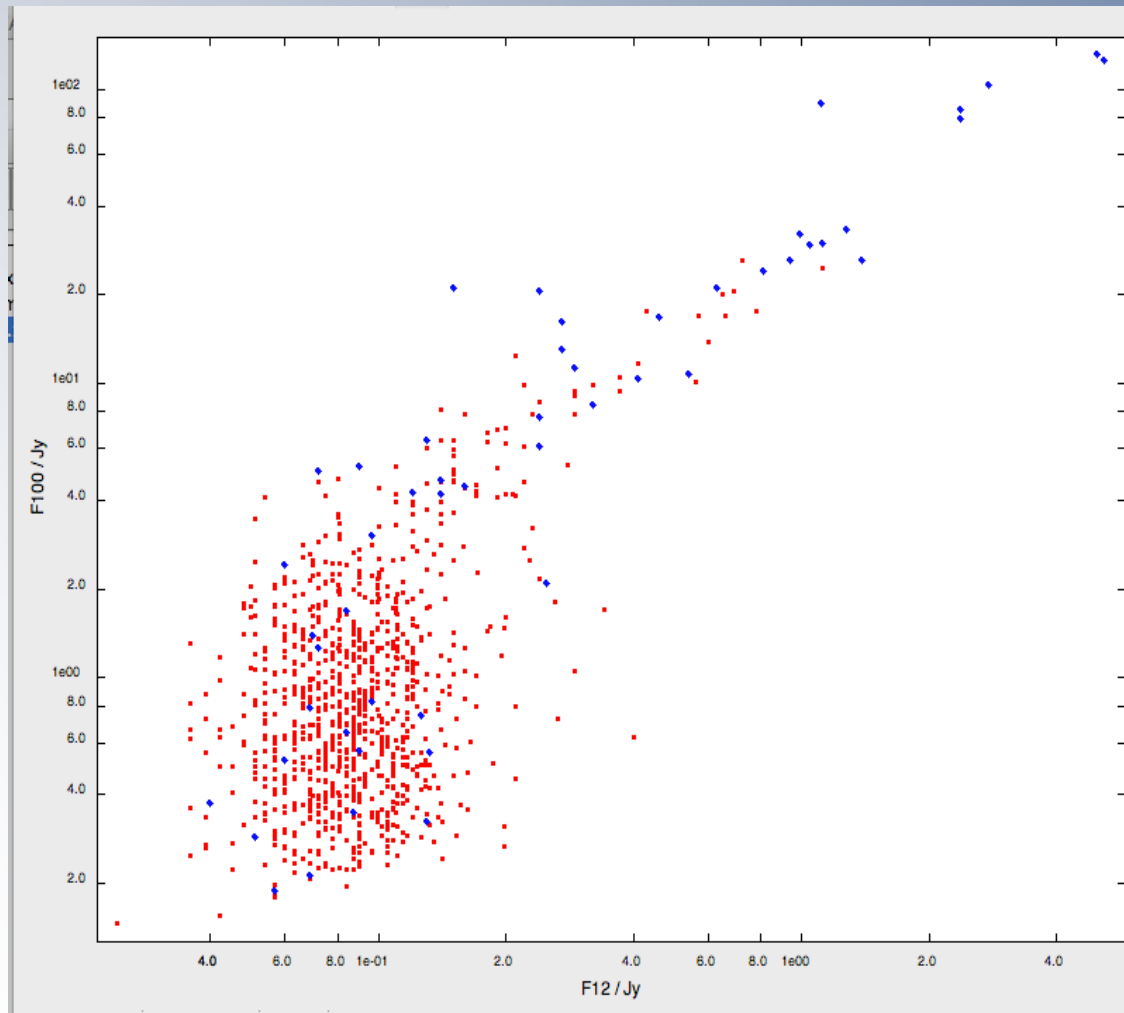
XMM Observations of the AMIGA Sample



Slightly brighter
Closer
Brighter in FIR

Scientific Use Cases

XMM Observations of the AMIGA Sample



Slightly brighter
Closer
Brighter in FIR
Excess in longer λ

Why workflows ?

Web-services-based vs. Pipelines

- Expose the scientific methodology
- Keep the provenance
- Pack the experiment
- Enable
 - repeatable results
 - reproducibility
 - reuse, repurpose
 - cross-boundary science
 - preservation

formative

collaborative

Workflows Preservation

All components related to the research lifecycle should be available.

Preserved and easily retrievables

- Proposals
- Data
- Processes
- Workflows
- Publications

RESEARCH OBJECT



Open questions for Web Services in the Virtual Observatory

- Curation and preservation (identifiers)
- Discovery (semantics) of web services
- Characterization: input, outputs, functionality, etc.
- Copies (authenticity) or similar used as alternates
- Permissions (authentication), licenses, platform, costs,...
- Metrics for quality: popularity, use stats, logs uptime, etc.
- Versioning and authoring (referenced and acknowledged)

In a cloud of services and data, *web services should benefit of the same privileges acquired by Data.*

IVOA Note on Workflows

Announcement about Workflow future plans

IVOA | X

Wf4ever | X



★ Andre Schaaff para interop

[mostrar detalles](#) 1 jul (hace 12 días) [Responder a todos](#) ▼

Dear all,

As you know we will soon be facing a new generation of facilities and archives dealing with huge amounts of data (ALMA, LSST, panSTARRS, LOFAR, SKA pathfinders,...) where scientific Workflows will play an important role in the working methodology of astronomers. A detailed analysis about the state of the art of workflows in the frame of the VO involves languages, design tools, execution engines, use cases, etc. A major topic is also the preservation of the workflows and the capability to replay a workflow several years after its design and implementation. Several talks concerning these issues have been presented during the past IVOA Interop meetings (see references below).

In order to undertake this task within our community we think that as a first step a Note should be written. Participation is welcome, in particular, we would like to collect experiences (including use cases, tools, etc.), references, remarks, etc. We plan the Note to be published around September and discussed at the Pune Interop meeting. We should then decide on starting a working draft describing those aspects and possibly in a new Interest Group on Workflows.

Best regards,

André Schaaff and Jose Enrique Ruiz

MyExperiment

The screenshot shows the MyExperiment website interface. At the top, there is a navigation bar with the MyExperiment logo and links for About, Mailing List, Publications, Log in, Register, Give us Feedback, and Invite. Below this is a secondary navigation bar with Home, Users, Groups, Workflows, Files, and Packs. A search bar contains the word 'astronomy' and a 'Search' button. A message box states: 'Didn't find what you need? Click here to search external workflow repositories.' Below this, the 'Search Results' section shows '6 Workflows found for "astronomy"'. A note indicates that some items may not be visible due to viewing permissions. The results list four workflows:

- Astronomic Observation conditionals example (v1)** by Jiten Bhagat (Trident). Created: 13/10/08 @ 13:23:08 | Last updated: 13/10/08 @ 13:27:48. License: Creative Commons Attribution-Share Alike 3.0 Unported License. Rating: 0.0 / 5 (0 ratings) | Versions: 1 | Reviews: 0 | Comments: 0 | Citations: 0. Viewed: 87 times | Downloaded: 41 times. This workflow contains conditional processing. Trident does not have a good visualization for these yet, but it is good to see how conditionals work.
- AMIGA ConeSearch (v3)** by Pique (Taverna 2). Created: 11/07/11 @ 22:08:06 | Last updated: 11/07/11 @ 23:34:14. License: Creative Commons Attribution-No Derivative Works 3.0 Unported License. Rating: 0.0 / 5 (0 ratings) | Versions: 3 | Reviews: 0 | Comments: 0 | Citations: 0. Viewed: 0 times | Downloaded: 0 times. Tags: astronomy | virtual observatory | votable. This workflow provides a VOTable response from the AMIGA ConeSearch service and extract values from VOTable columns.
- MultiQuery XMM Catalog (v1)** by Pique (Taverna 2). Created: 12/07/11 @ 17:27:05. License: Creative Commons Attribution-No Derivative Works 3.0 Unported License. Rating: 0.0 / 5 (0 ratings) | Versions: 1 | Reviews: 0 | Comments: 0 | Citations: 0. Viewed: 1 time | Downloaded: 0 times. Tags: astronomy | virtual observatory | votable. This workflow takes as input a VOTable with coordinates of sources and processes a multiquery of the XMM Catalog through the ConeSearch VO Service.
- AMIGA ConeSearch from a file of targets/positions (v1)** by Pique (Taverna 2). Created: 12/07/11 @ 17:34:33 | Last updated: 12/07/11 @ 17:36:38. License: Creative Commons Attribution-No Derivative Works 3.0 Unported License. Rating: 0.0 / 5 (0 ratings) | Versions: 1 | Reviews: 0 | Comments: 0 | Citations: 0. Viewed: 1 time | Downloaded: 0 times. Tags: astronomy | virtual observatory | votable. This workflow takes an ASCII file of position of targets, provides a VOTable response from the AMIGA ConeSearch service and extract values from VOTable columns.

On the right side of the page, there is a 'New/Upload' section with a 'Workflow' dropdown and a 'GO' button. Below it is a 'Log in / Register' section with fields for Username or Email, Password, and Remember me. There is also a 'Use OpenID' section with a field for an OpenID and a 'Log in' button. At the bottom of this section, there are links for 'Need an account? Click here to register' and 'Forgot Password?'. A 'Popular Tags' section lists 25 tags, including benchmarks, bio2rdf, bioinformatics, BLAST, cheminformatics, data integration, ebi, example, gene, graph, impact, kegg, Kegg, Pathways, localworker, mygrid, ondex, pathway, pathways, phenotype, protein, pubmed, sequence, taverna, text mining, and workflow.

Astronomy

- No VO services-based wfs
- Helio Project wfs
- VOTables parsing
- Internal services

Amiga

- Querying catalogue

Working with the v2.3



The splash screen features a background of interlocking gears in various sizes and colors (orange, blue, black) against a dark blue, starry sky. A prominent orange gear with smaller blue and black gears inside is on the left. The text 'Taverna Version 2.3' is centered in white. Below it is the website 'www.taverna.org.uk'. At the bottom, there is a paragraph of support information and a status bar that says 'Starting application...'. A pink button with a warning icon and the text 'Nightly Build' is in the top right corner.

Nightly Build

Taverna

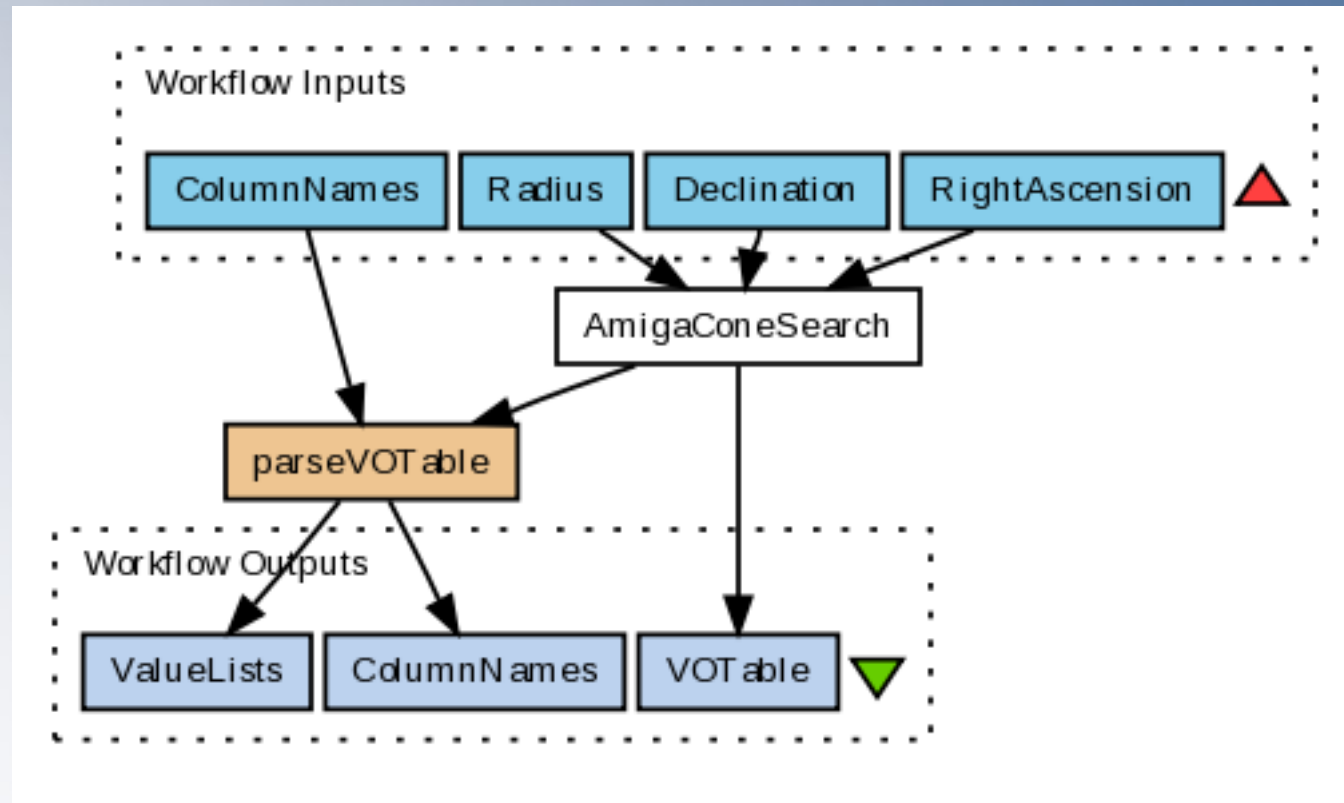
Version 2.3

www.taverna.org.uk

Taverna is supported by the UK e-Science programme, the Engineering and Physical Sciences Research Council (EPSRC), the myGrid consortium, OMII UK, the University of Manchester and the European Bioinformatics Institute (EBI), and includes contributions from Moby, Soaplab, BioMart, myExperiment and the University of Twente.

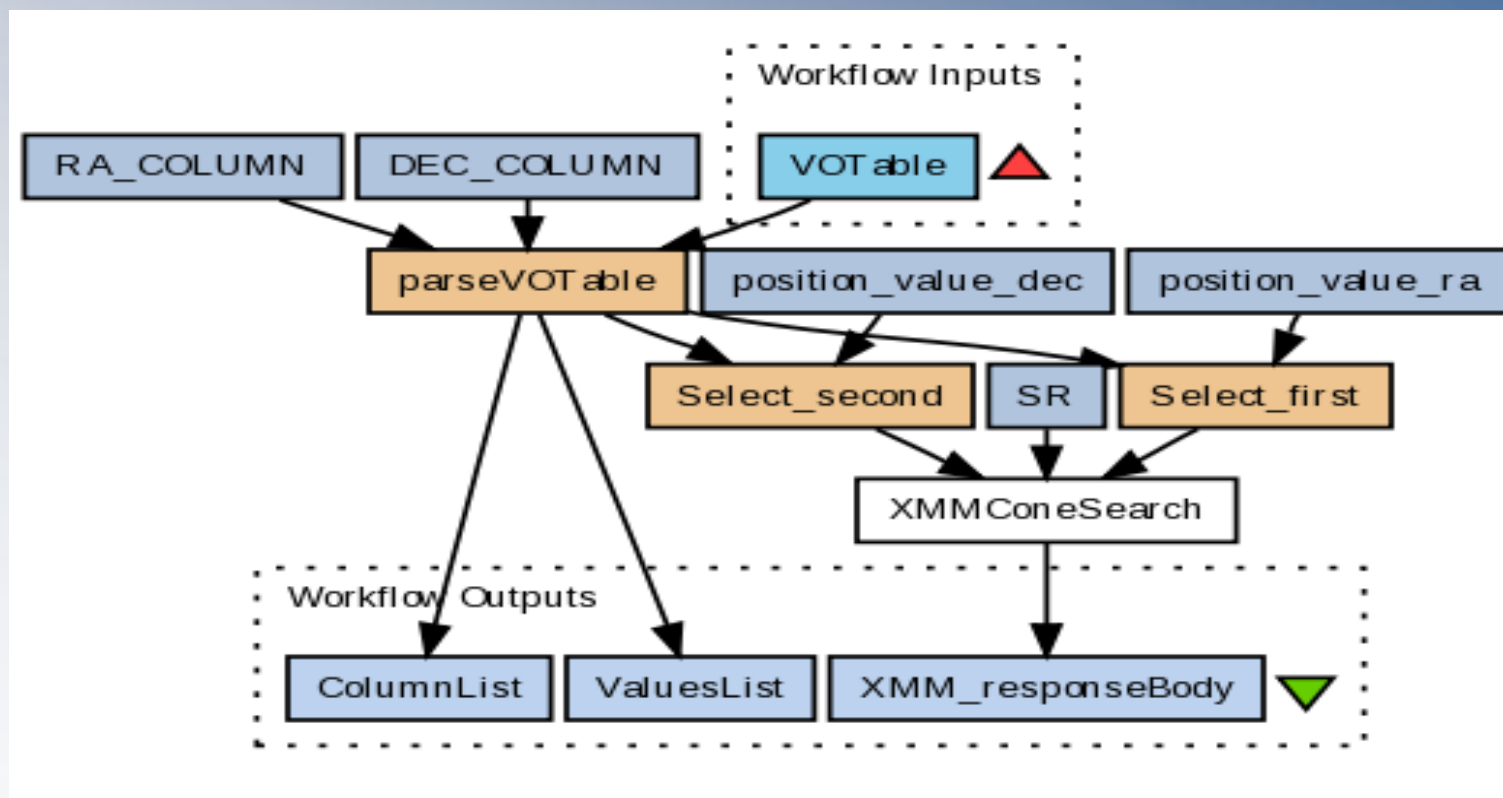
Starting application...

Simple AMIGA ConeSearch



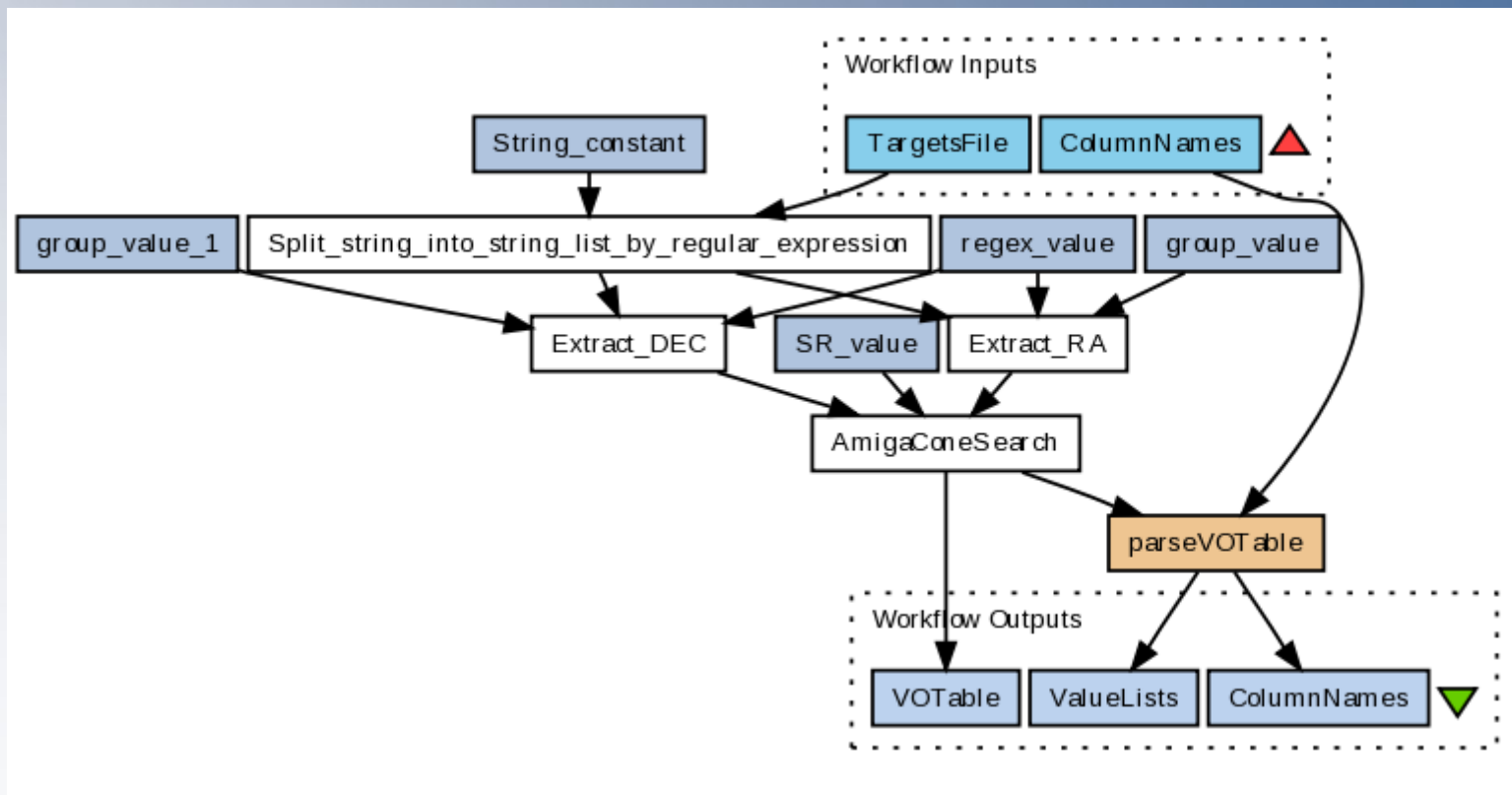
- Xpath plugin not a useful for extracting info from VOTable
- Helio-VO beanshell used instead (Thanks !)
- Visualization of results.. (VOTables)

XMM Multi-ConeSearch



- Lot of previous VOTable parsing ..
- The response is 1051 VOTables !
- VOTable merging tool needed

AMIGA Multi-ConeSearch



- Lot of beanshells for VOTable and CSV parsing ..
- Beanshells development needed for splitting lists into values
- STILTS Library needed for VOTable crossmatching

The VO-experiment

- Discover Services
- Multi-query
- Crossmatching
- Inspection
- Visualization and Comparison

Proposed shortcuts for Taverna

- VORegistry Access Perspective
- STILTS VOTable Library
- SAMP (Connectivity with VO Software)
- Python based beanshells
- Simple standard astronomy functions

Thanks !

Wf4Ever @ Manchester

- Carole Goble
- Sean Bechhofer
- Jiten Baghat
- Stian Soiland-Reyes
- Kalid Belhajjame

Helio-VO

- John Brooke
- Donal Felows
- Anja Leblanc

And all the MyGrid Team !

Thanks !



Thanks !



Thanks !

