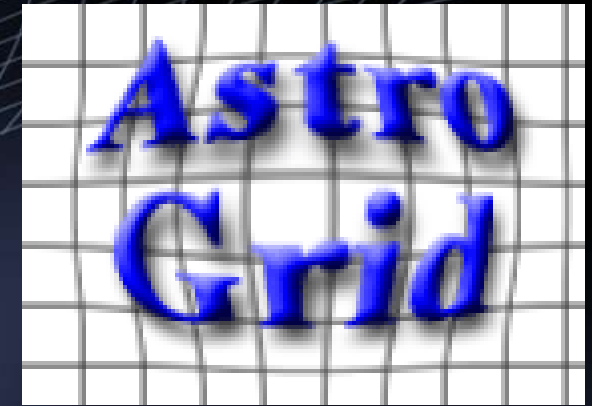


Deploying the AstroGrid: Science Use Ready

Nicholas Walton
IoA, Cambridge

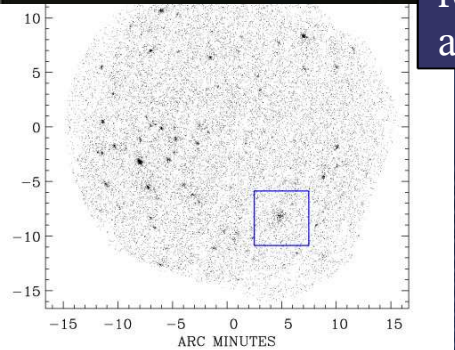
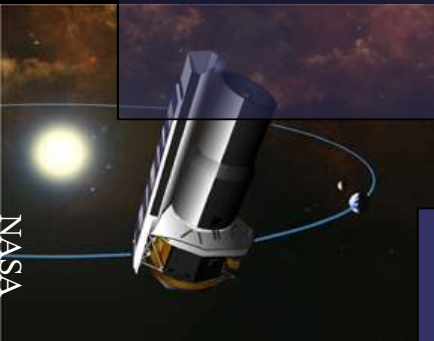
Paul Harrison & Anita Richards
JBO, Manchester

Martin Hill
IfA, Edinburgh



Recap: New & Improved Science: Cosmology

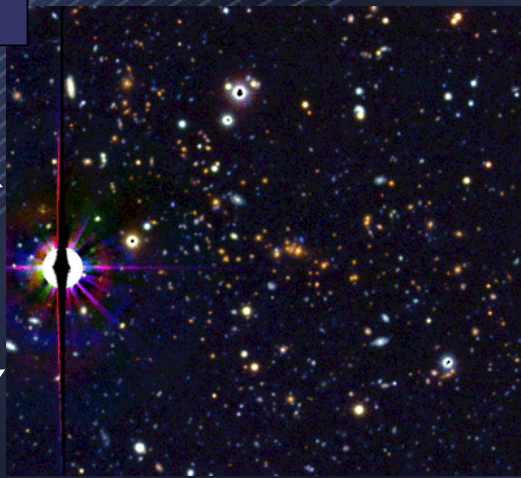
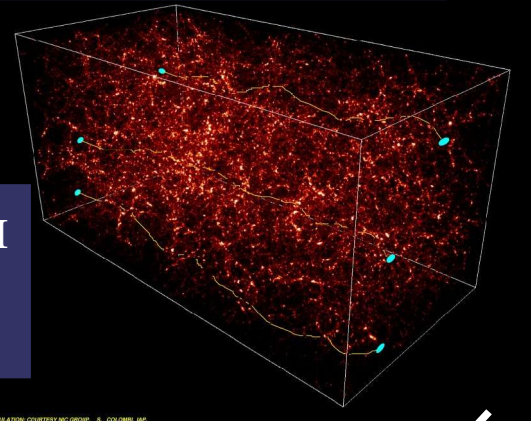
DEFLECTION OF LIGHT RAYS CROSSING THE UNIVERSE, EMITTED BY DISTANT GALAXIES



Multiple large image sources: registration & association

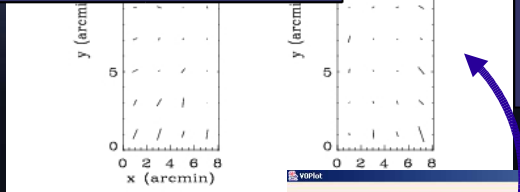
Automatic cluster finding techniques

Multi-TB Λ CDM models, e.g. Millennium Sim



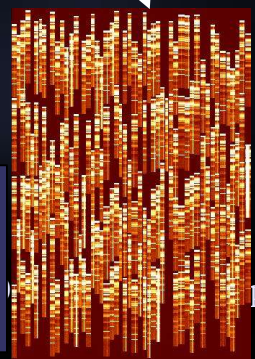
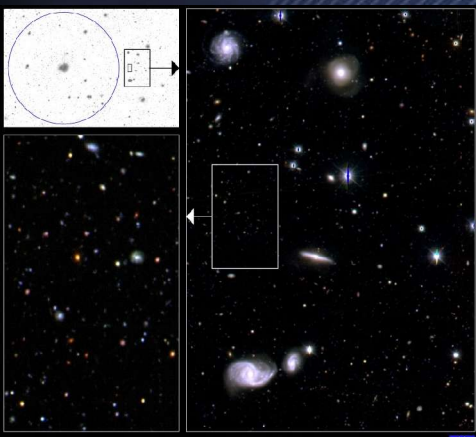
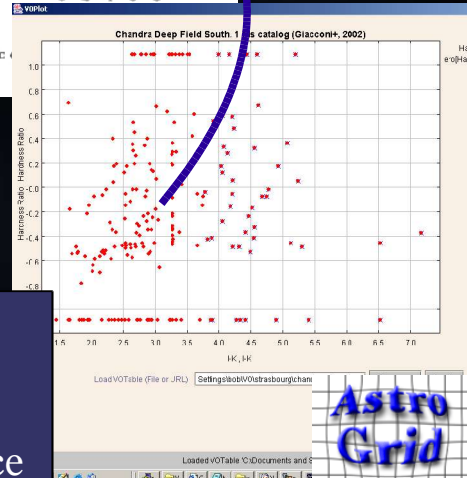
X-ray cluster: Chandra X-ray (Mullis) overlaid on a deep BRI image (Clowe & Luppino).

Generate Shear Maps c.f. CDM models > DM distribution with redshift



Remove stars correlate gal with z

Figure 7. Example of astrometric ... the Wide Field Camera on WHT.

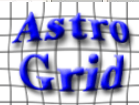


Source ID from multiplexed spectral data

Colour-Colour relationships classification in multi-phase space



CLASS XIV: CalTech



AstroGrid (VO) Key Goals

Enable Science by:

- Improving the quality, ease, speed and cost effectiveness of on-line astronomy
- Making comparison and integration of data from diverse sources seamless and transparent
- Removing data analysis barriers to multiwavelength analysis
- Enabling access and manipulation of large data sets

Scoping the VOs

- All major projects – science input
 - AstroGrid: Science Advisory Group
 - AVO: Science Working Group
 - NVO: Science Advisory committee
- Projects define key science goals
 - Annual demos
 - Show early features and use matched to a specific science topic
 - Encourage early use
 - Capability increases year on year
 - Build towards full working systems
- AstroGrid: deployment of successive 'iteration' releases

AstroGrid 'Ten' Key Science Drivers



[AgWiki](#) . [Astrogrid](#) . **ScienceProblems**

AgWiki webs:

[Astrogrid](#) | [IVOA](#) | [AG-II](#) | [SSVO](#) | [e-Science](#) | [VO](#) | [Grid](#) | [Support](#) | [Main](#) | [TWiki](#) | [Know](#) | [Test](#)

Astrogrid . { [DocStore](#) | [Glossary](#) | [WPs](#) | [Home](#) | [Changes](#) | [Index](#) | [Search](#) | Go | [Portal](#) | [News](#) | [Forum](#) }

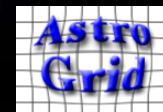
AstroGrid Science Problems - 'The AstroGrid Ten'

This lists the science problems, abstracted from the more general [ScienceProblemL](#)ist held in the [VO](#) area, which [AstroGrid](#) aims to provide capabilities to meet in its initial three year project plan (9/2001 - 8/2004).

Case#	Case Name	Focus of Science Iteration #	Comments
1	BrownDwarfSelection	2	imaging
2	DeepFieldSurveys	2, 4	imaging, radio, multi-lambda
3	GalaxyClustering	2, 8	imaging, algorithms
4	HiZQuasars	2, 4	imaging, spectral
5	LowSurfaceBrightnessGalaxyDiscovery	6, 8	images, alogorithms
6	MagneticStormOnset	6, 8	STP
7	SolarCoronalWaves	6, 8	solar
8	SolarStellarFlareComparison	6, 8	astro, solar
9	STPSolarEventCoincidence	6, 8	solar, STP
10	SupernovaGalaxyEnvironment	4, 8	imaging, spectral

These science cases demand a well [scoped range of functionality](#).

-- [NicholasWalton](#) - 07 June 2002



Deployment Strategy

- **Goal:** provide rapid operational feedback to ongoing development process
- AstroGrid has an iterative release cycle (ref: previous talk)
- Each release is deployed during the following 'iteration'
- Deployment
 - Release s/w components installed on the AstroGrid Testbed
 - Associated release documentation and walk throughs
 - Dedicated feedback reporting system
 - In use with 'beta-testers'
- Integration of AstroGrid testbed with AVO activities

Integration System: Maven

Astrogrid Integration Test Results - Tue Oct 19 13:26:59 BST 2004 - Mozilla

File Edit View Go Bookmarks Tools Window Help

http://www.astrogrid.org/maven/docs/SNAPSHOT/integrationTests/junit-full/index.html

Home Bookmarks OfS MyNews my Travel Ag VO MyAthens CDS NED Goo B-Txt ADS a-ph Weer DB Trip VNU time

IP3 Networks Home Page Institute of Astronomy An Error Occurred TWiki Astrogrid VoReso... Astrogrid Integration Test...

Unit Test Results

Designed for use with [JUnit](#) and [Ant](#).

Summary

Tests	Failures	Errors	Success rate	Time
653	41	36	88.21%	7184.746

Note: *failures* are anticipated and checked for with assertions while *errors* are unanticipated.

Baselines

Baseline	Tests	Failures + Errors	Success rate
itn06_towardclose13Oct2004	640	80	87.50%
Pre-add extdep	553	33	94.03%
2004_09_21_nww	551	43	92.20%
RemovedPortal	530	89	83.21%
2004_09_17	548	124	77.37%
2004_09_17_nww	563	104	81.53%
2004_09_07	512	65	87.30%
Pre Case3 SIAP merge	375	41	89.07%
Pre Case3 workflow objects merge	386	46	88.08%
19 Aug 2004	368	34	90.76%
18 Aug 2004	431	48	88.86%
Case 3	300	20	93.33%

Packages

Key: improvement on baseline, regression and improvement from baseline, regression from baseline

Name	Tests	Errors	Failures	Change
org.astrogrid.applications.integration	25	0	0	2004_09_17 2004_09_17_nww 2004_09_07 18 Aug 2004

Home

Packages

- [org.astrogrid.applications](#)
- [org.astrogrid.applications](#)
- [org.astrogrid.applications](#)
- [org.astrogrid.applications](#)
- [org.astrogrid.applications](#)
- [org.astrogrid.applications](#)

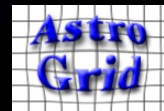
Classes

- [AladinImageTest](#)
- [CECClientTest](#)
- [CommandLineDirectExecu](#)
- [CommandLineFileIndirect](#)
- [CommandLineServerInsta](#)
- [CommandLineVOSpaceIn](#)
- [CommunityAccountResolv](#)
- [CommunityMemoryTest](#)
- [CompositeFitsVotablePar](#)
- [CompositeFitsVotablePar](#)
- [CompositeWorkflowEndT](#)
- [CrossMatcherMultiIndirec](#)
- [DataCenterDirectExecuti](#)
- [DataCenterFileIndirectEx](#)
- [DataCenterServerInstall](#)
- [DataCenterVOSpaceIndir](#)
- [DeployedManagerTest](#)
- [DeployedServicesTest](#)
- [DeprecatedSesameDeleg](#)
- [DirectExecutionTest](#)
- [DynamicWorkflowTest](#)
- [EgsoDelegateTest](#)
- [EgsoQuerierTest](#)
- [ExampleVOTableParsingV](#)
- [FailureTest](#)

AstroGrid Beta Testing

Early involvement of the end user community

- Beta testing programme to test product releases
 - Programme includes access to AVO tools
- Beta tester pool composes:
 - Science Advisory Group
 - eScience astronomy students
 - Interested astronomers
- Beta tester programme providing feedback
 - Usability > input to GUI design
 - Functionality > informs access to data and tools
 - Reliability > uptime, speed of response, bugs
- Beta testers welcome:
<http://wiki.astrogrid.org/bin/view/Astrogrid/BetaTesting>

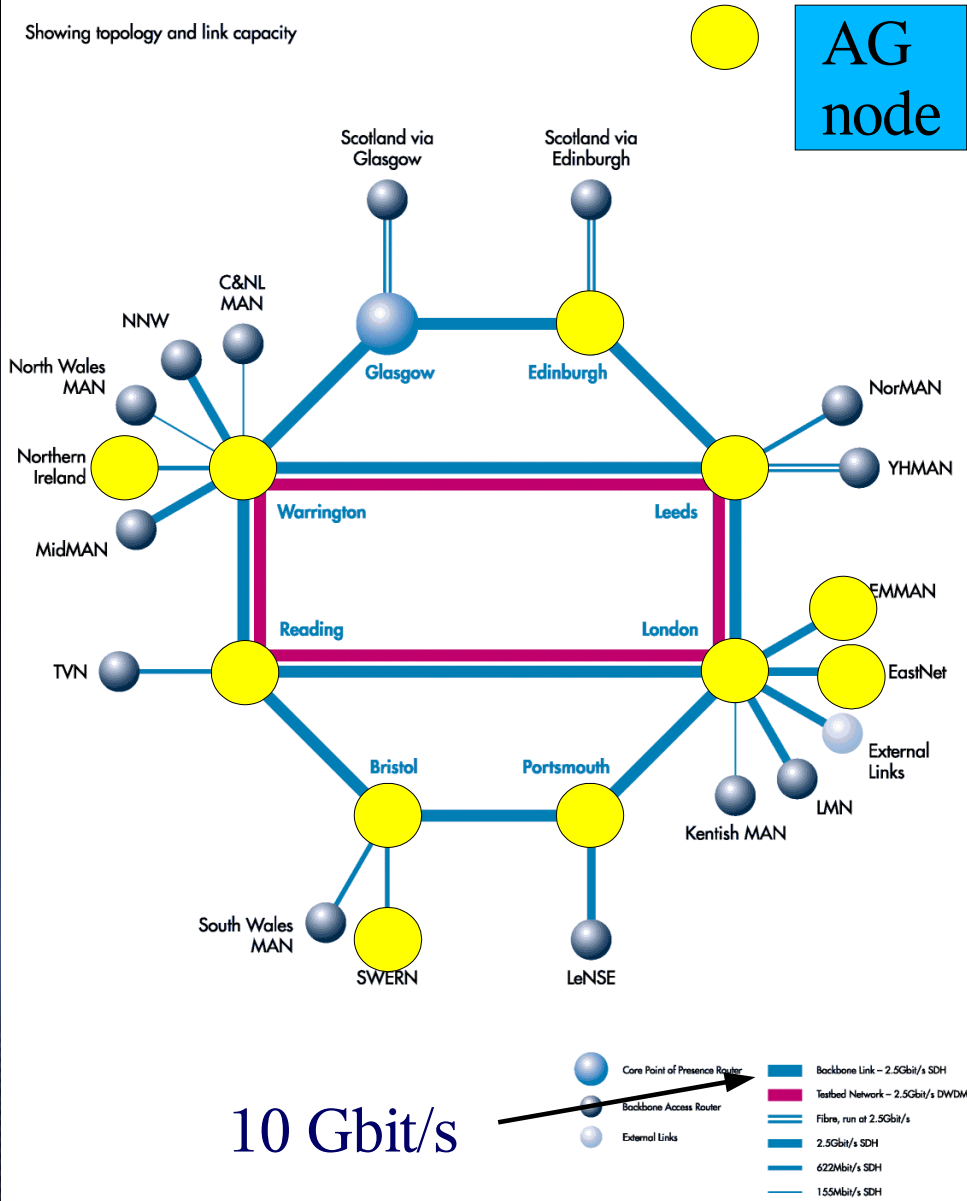


The AstroGrid Testbed

- Releases deployed on a functional 'Testbed'
 - Early release on simple resources
 - Increasing complexity of testbed with each release
 - Build to link full range of institutional resources
- Iteration Six Testbed consists of:
 - Publishing Registry (Harvesting NVO registry & CDS): Leicester
 - MySpace servers: Leicester
 - Applications servers: Manchester. MSSL
 - Datacenters: Cambridge, Edinburgh, MSSL

The JANET Backbone

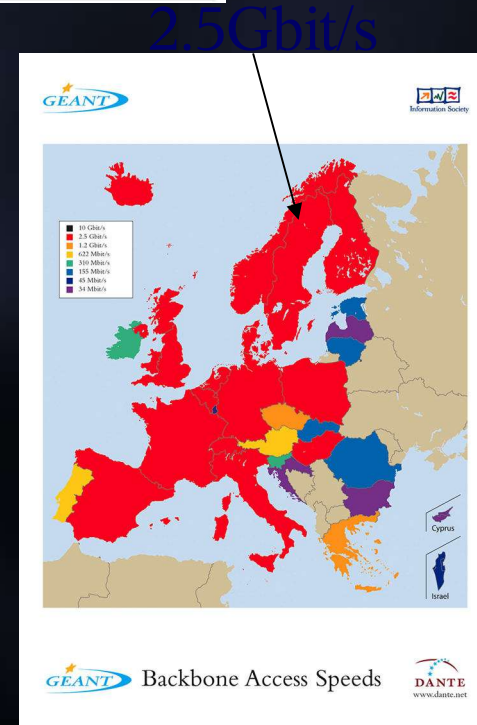
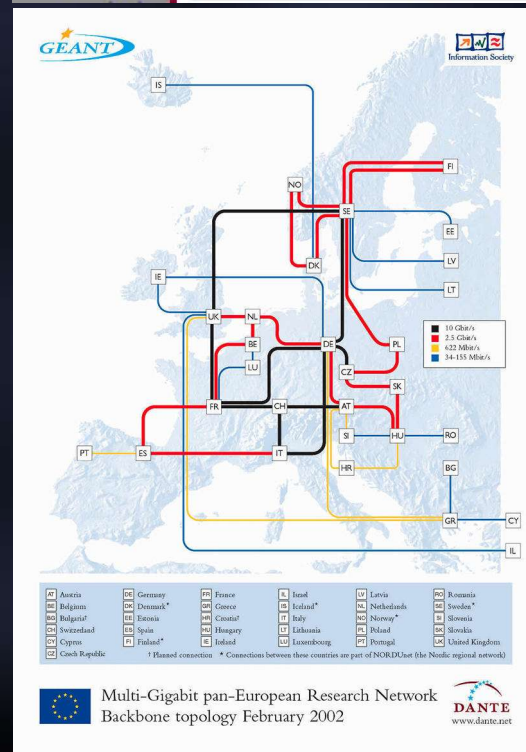
Showing topology and link capacity



AstroGrid nodes: connected to fast backbone

>1 Gbit/sec

The screenshot shows the BBC News website from March 6, 2003. The article is titled 'Net speed record smashed' and reports on a data transmission record across the Atlantic. The article text includes: 'A quantity of data equivalent to a DVD-quality movie is transmitted across the Atlantic in less than 30 seconds.' and 'Grid plan for high speed net' and 'Scientists develop net jambuster'. The website header includes 'BBC NEWS UK EDITION' and navigation links for 'CATEGORIES TV RADIO COMMU'.



Iteration 05 Deployment Release

- Conforms to IVOA standards
- Single sign in
- User MySpace
 - secure
- Query building
 - Standard queries
- Build up workflow
 - reusability

The screenshot shows the AstroGrid Portal interface in a Mozilla browser window. The page title is "AstroGrid Portal - Mozilla" and the URL is "http://astrogrid.jb.man.ac.uk:8080/astrogrid-portal/main/mount/workflow/agjobman". The page features a navigation bar with links for "AstroGrid", "Login", "Community", "Workflow", "MySpace", "DataCenter", and "Registry". The main content area is titled "Workflow" and contains several forms and tables.

Workflow Form:

Name: ivom: agsl:

Description: ivom: agsl:

Sequence:

Step:

Input Table:

Name	Type	Value	
Query	ADQL	ivo://org.astrogrid.itn05/frog#frog/quer	<input type="button" value="submit"/>
Format	string	VOTABLE	<input type="button" value="submit"/>

Output Table:

Name	Type	Value	
Target	IVORN	ivo://org.astrogrid.itn05/frog#frog/nav/	<input type="button" value="submit"/>

Step and Tool Tables:

Step		Tool	
Name:	<input type="text" value="step 1"/> <input type="button" value="add-step-name"/>	Name:	<input type="text" value="org.astrogrid.itn05/INTWF"/> <input type="button" value="insert-tool-into-step"/>
Join:	<input type="text" value="any"/> <input type="radio"/> any <input type="radio"/> true <input type="radio"/> false <input type="button" value="edit-join-condition"/>		-- Select tool -- <input type="button" value="unavailable"/>
Description:	<input type="text" value="data query"/> <input type="button" value="add-step-description"/>	Description:	

Iteration 05 Deployment Release

complex workflows

The screenshot shows a Mozilla browser window titled "Astrogrid Portal - Mozilla". The address bar contains the URL: `http://astrogrid.jb.man.ac.uk:8080/astrogrid-portal/main/mount/workflow/agjobmanager-job-status.htm`. The browser's bookmark bar includes "Home", "Bookmarks", "astrogrid", "security", "doc", "xml", "Red Hat Network", "RT TV", "tomcat", "Apache-Axis", "voresource", and "Interop".

The main content area features a header with the "AstroGrid" logo and "PPARC" branding. Below the header is a navigation menu with links for "AstroGrid", "Login", "Community", "Workflow", "MySpace", "DataCenter", and "Registry".

The "Workflow" section displays the following information:

Name:	AVODEMO-sect23s	Workflow submitted:	Wed Jun 23 17:33:48 BST 2004
Description:	Workflow involving multi-band sextractor run followe	Overall status:	COMPLETED

Below the table, a "Sequence:" section lists the workflow steps:

- Step : Name: **sextractor - b**, Status: **COMPLETED** ([more](#))
- Step : Name: **sextractor - v**, Status: **COMPLETED** ([more](#))
- Step : Name: **sextractor - i**, Status: **COMPLETED** ([more](#))
- Step : Name: **sextractor - z**, Status: **COMPLETED** ([more](#))
- Step : Name: **dft**, Status: **COMPLETED** ([more](#))
- Step : Name: **hyperz**, Status: **COMPLETED** ([more](#))

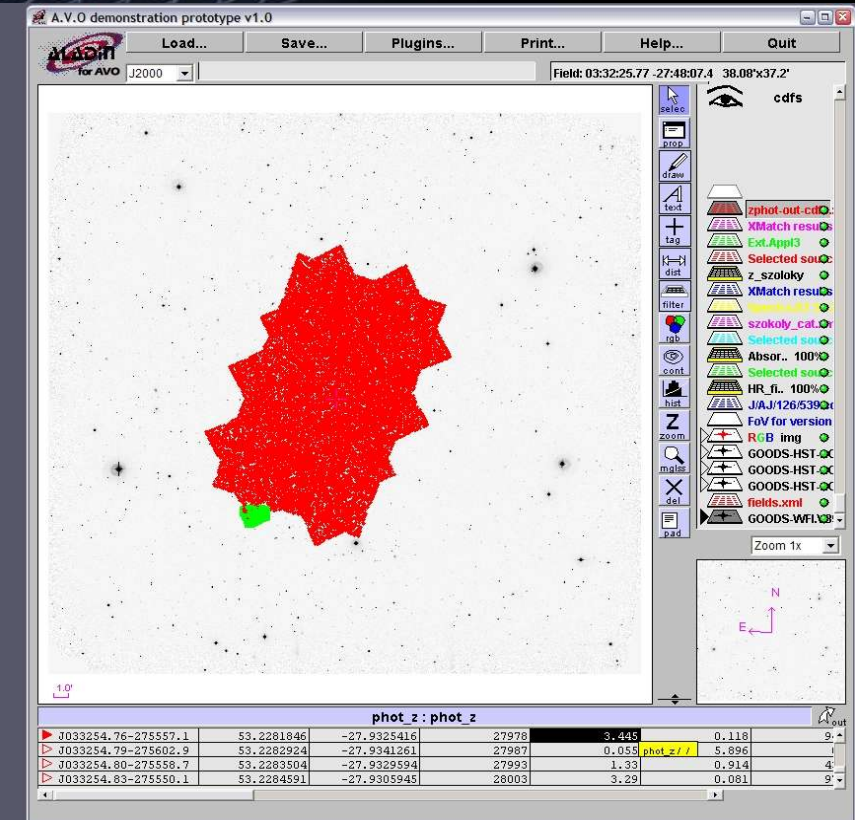
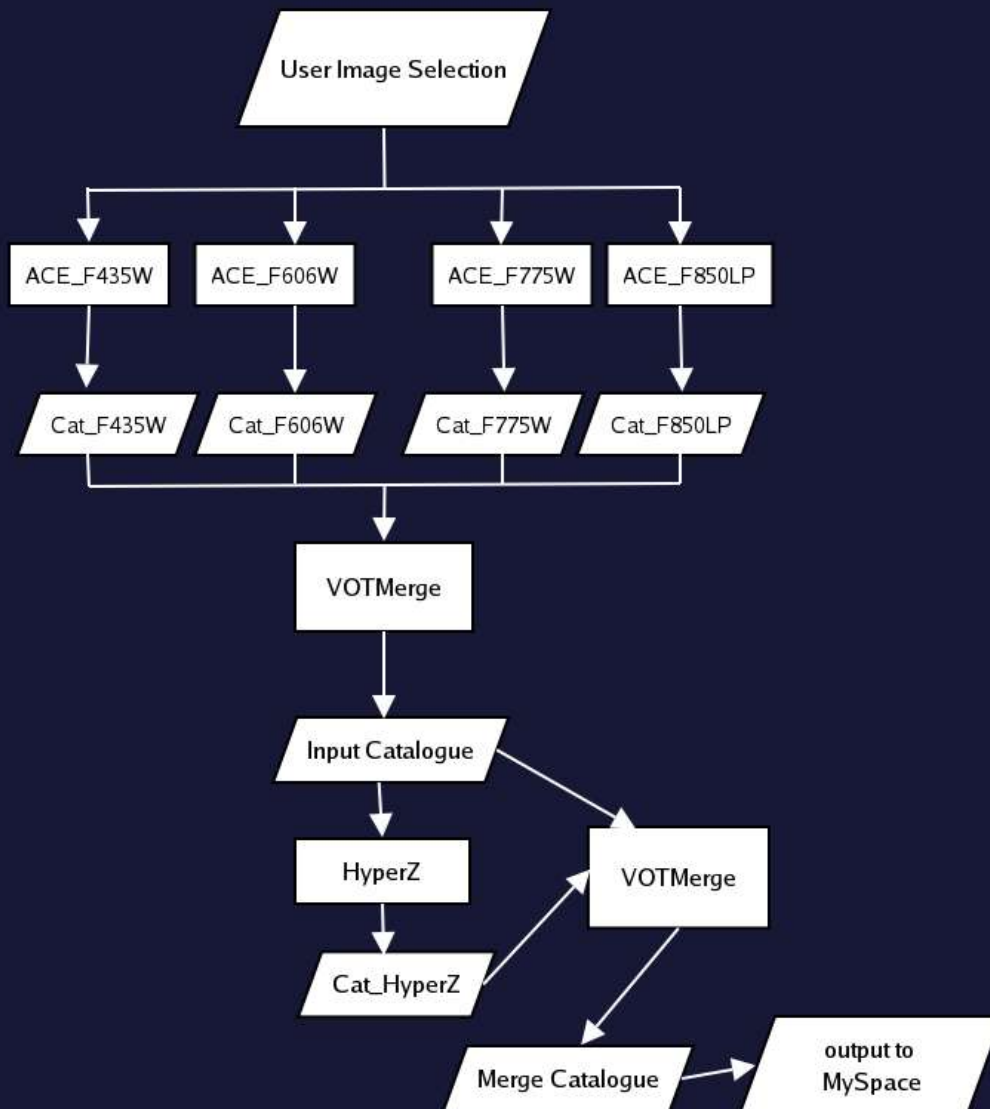
A detailed view for the "hyperz" step is shown in a blue box:

Step: hyperz
Status: COMPLETED
Desc: null
Start: Wed Jun 23 17:40:56 BST 2004
Finish: Wed Jun 23 17:43:04 BST 2004
Join: any
Message: The application has completed with exit status=0

The footer of the page includes the "IVOA" logo and the text "© AstroGrid 2004". The browser's status bar shows "javascriptvoid(0);".

Itn05: use in AVO Demo: Jan 2004

discovering distant quasars from multi- λ data



Iteration 06 Deployment Release

- More complex IVOA standard implementation
 - SIAP interface
- Query builder: interface
- Workflow: programmable
- Registry: harvesting
- Applications: varied
- Data: image and tabular

The screenshot shows the AstroGrid Portal interface. At the top, there is a navigation menu with links for AstroGrid, Help, Login, Community, Workflow, MySpace, DataCenter, and Registry. Below the menu, there is a welcome message: "Welcome to Astrogrid! This is your MyAstroGrid page". The main content area is divided into two sections: "Conventions" and "Shortcut Alley".

The "Data Query Builder (in (s)ADQL)" section is highlighted. It contains a text input area with the following query:


```
select * from sgas_event where longitude > 120 and latitude < 60
```

 To the right of the query input is a vertical scale with values 5, 10, 20, 30, 40, and 50. Below the query input are buttons for "Load", "Save", and "Browse MySpace".

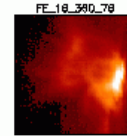
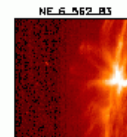
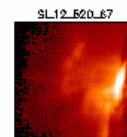
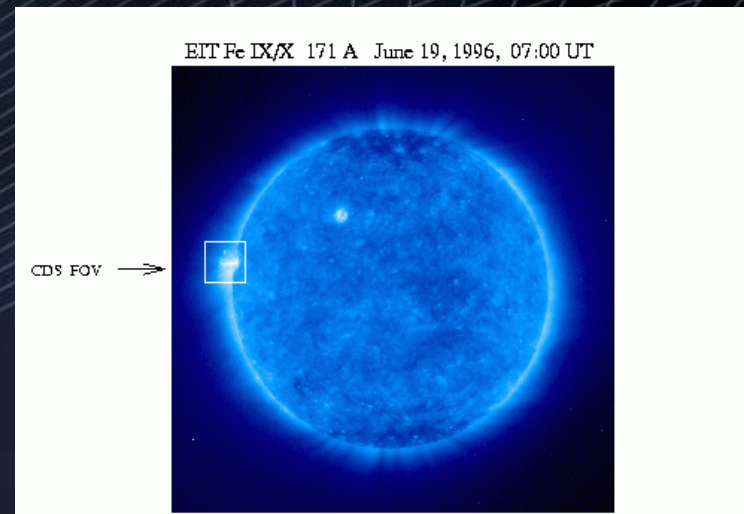
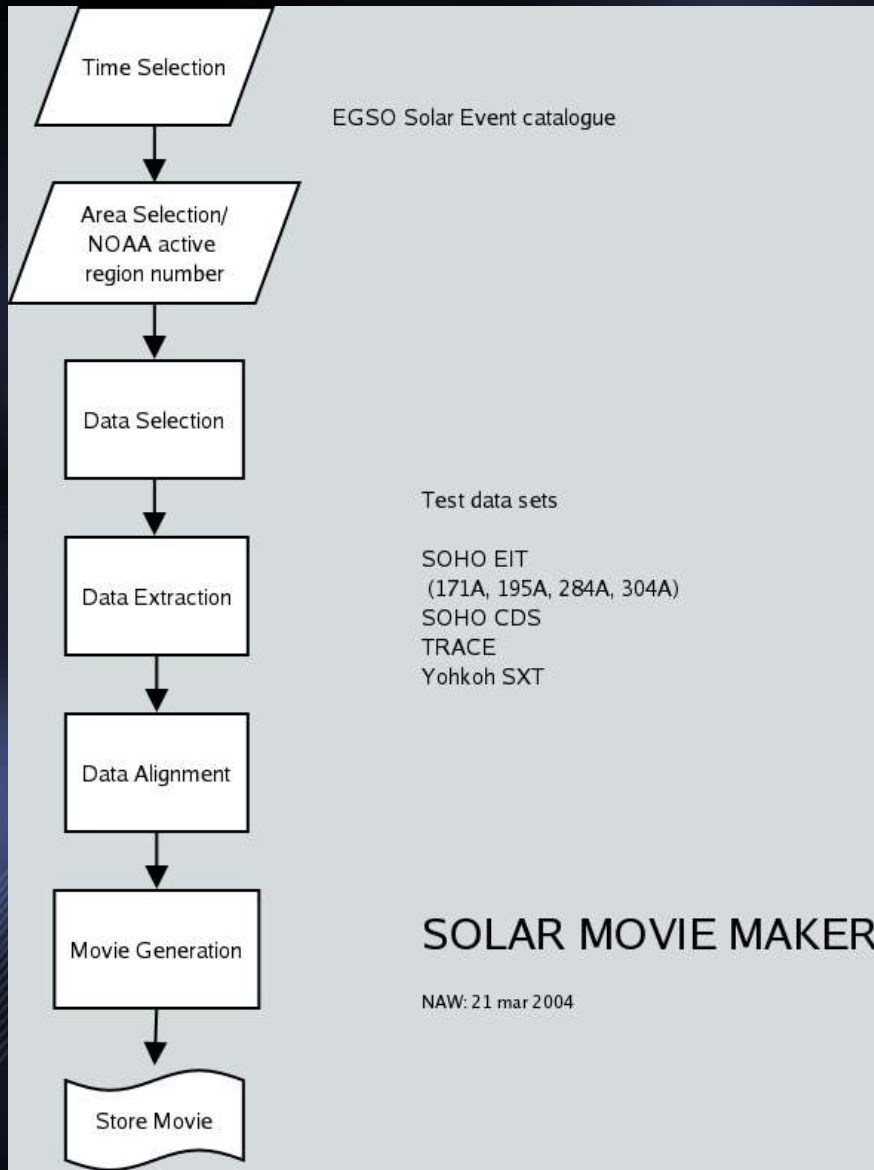
Below the query builder is a table of mathematical functions and operators:

from ...	top ...	(...	/ ...	> ...	sin ...	asin ...	abs ...
as ...	table ...	) ...	= ...	>= ...	cos ...	acos ...	ceil ...
where ...	name ...	+ ...	<> ...	and ...	tan ...	atan ...	floor ...
select ...	alias ...	- ...	< ...	or ...	cot ...	atan2 ...	exp ...
region ...	circle ...	* ...	<= ...	not ...	log ...	log10 ...	pow ...
sqrt ...	x^2 ...	min ...	avg ...	max ...	sum ...	sigma ...	...

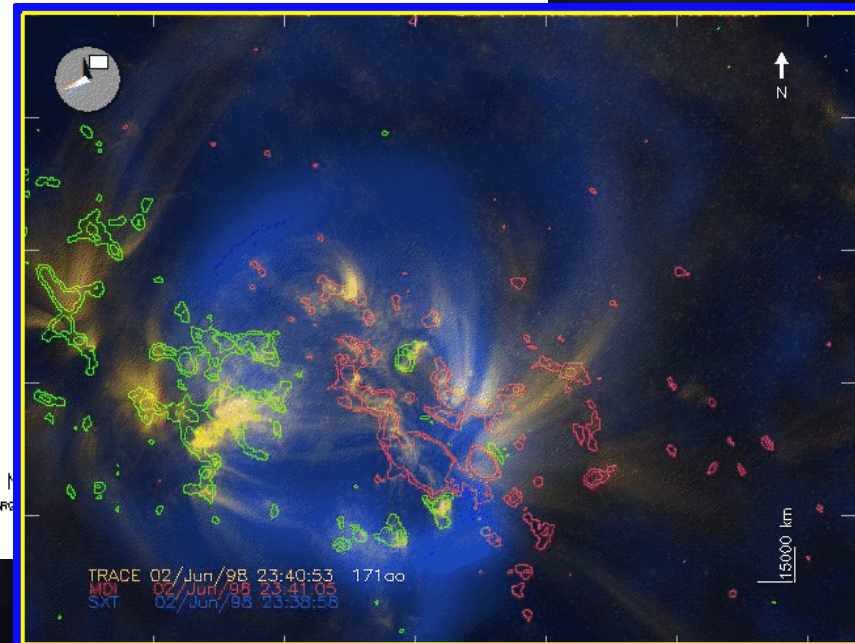
Iteration 06: Solar/STP

- Automatic overlaying of series of image data
 - using TRACE and SOHO/CDS as examples
- Supports Solar Coronal Waves case
- Workflow involves time selection of data
 - Solar coordinates
 - New data sets > RAL, MSSL
- Some manipulation of data required (via solarsoft)
- Target localisation
 - EGSO product – Solar Event catalogue [ref: P1.3.12]

Movie Maker Workflow



CDS M
LARG



TRACE 171A: yellow, YOHKOH/SXT: blue, SOHO/MDI: green/red

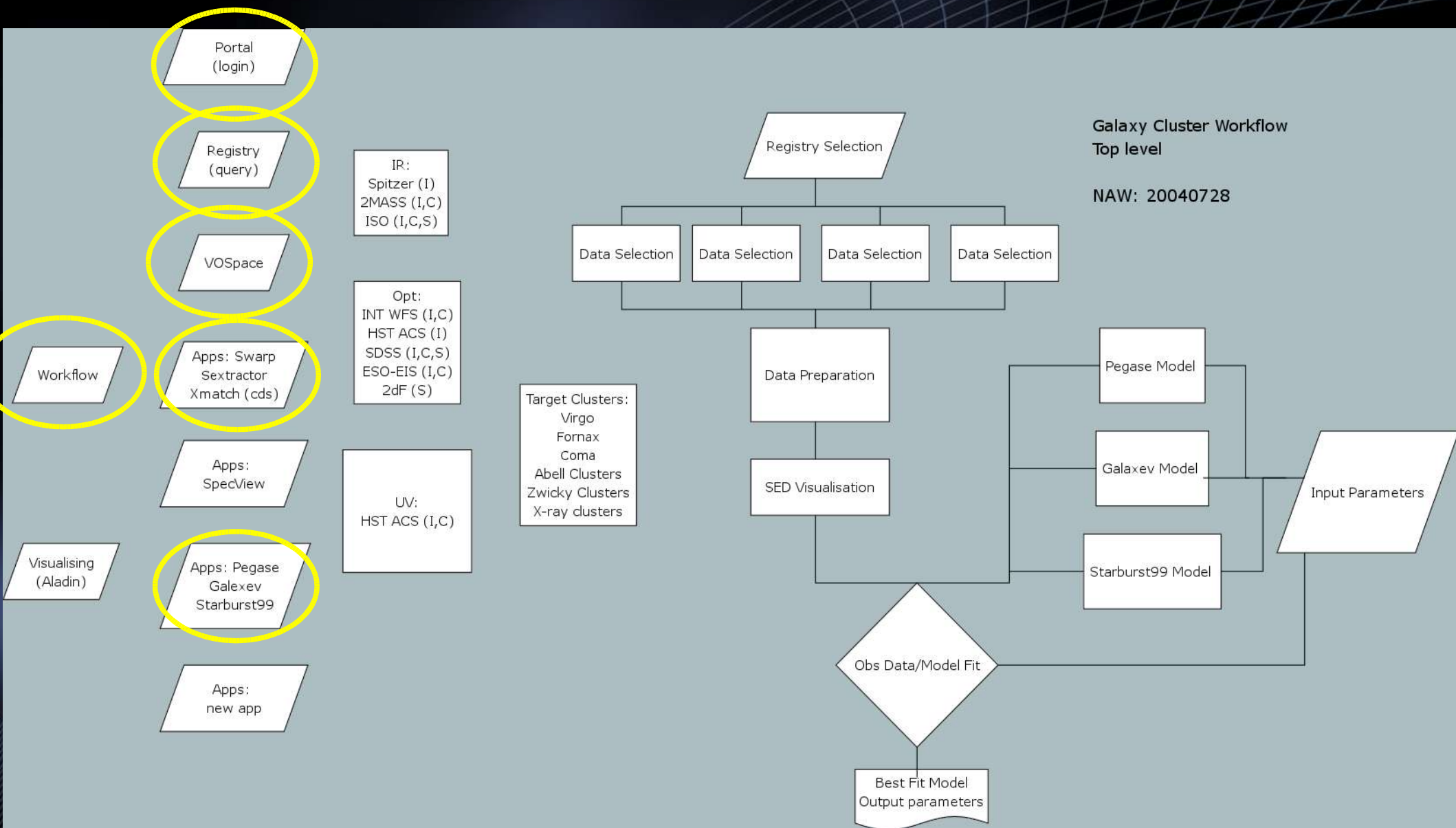
Interface to EGSO service

The image shows a screenshot of the EGSO Solar Event Catalogue web interface. The interface is divided into several sections:

- Top Left:** "EGSO Solar Event Catalogue" header with a search form. The search form includes "Preset search" with two dropdown menus for "Catalogue #1" and "Catalogue #2" (both set to "NOAA SGAS Energetic Events"), a checkbox for "Search also in catalogue #2", and date pickers for "Starting date" (2004 February 30 00:00:00) and "Ending date" (2004 March 30 23:59:59). There is also a field for "NOAA Active region number" and "Search" and "Reset" buttons.
- Top Right:** "European Grid of Solar Observations" header with a navigation menu. The menu includes "Site Navigation" (Home, Overview, Status, Organisation & Contacts, Workpackages), "Physics Communities" (click to find out more), "Grid Community" (click to find out more), "Public & Students" (click to find out more), and "EGSO News" (March 2004: The EGSO Solar Event Catalogue (SEC) is now available for experimentation here).
- Bottom Left:** "Free SQL query" section with a text input field containing a SQL query: `SELECT * FROM sgas_event WHERE nar>`. Below the input field are "Search" and "Reset" buttons and a link to "Examples of how to use SQL on the EGSO".
- Bottom Right:** "Catalogue description" section. It provides information about the VOTable (XML) result file (`sec1_20040330_210407.xml`) and the TXT result file (`sec1_20040330_210407.txt`). It also displays the SQL query: `SELECT * FROM sgas_event WHERE nar>9500 AND nar<9600`.
- Table:** A table showing solar event data for two events. The table has columns: `sgs_id`, `time_start`, `time_peak`, `time_end`, `nar`, `latitude`, `longitude`, `xray_class`, `optical_class`, `radio_245mhz`, `radio_10cm`, and `radio_sweep_ijr`.

sgs_id	time_start	time_peak	time_end	nar	latitude	longitude	xray_class	optical_class	radio_245mhz	radio_10cm	radio_sweep_ijr
415469	2001-06-13 04:22:00	2001-06-13 04:33:00	2001-06-13 04:44:00	9502	-25	-74	M2.0	1f	110	85	
415472	2001-06-13 11:22:00	2001-06-13 11:42:00	2001-06-13 11:51:00	9502	-29	-66	M7.8	1n	490	120	

AstroGrid Itn06: use in AVO Demo 2005



AstroGrid: Helper Applications

- Range of externally provided applications: tools to analyse and visualise end and intermediate data products
 - VOPlot: handles VOTable data
 - VOPlot3D: handles VOTable data – 3D visualisation
 - Topcat: tabular data and manipulation
 - VOSpec: spectral plotting and analysis package
 - Specview: spectral plotting and analysis package
 - Aladin: data visualisation and catalogue access
 - MySpace browser capability (read-only)
- See <http://wiki.astrogrid.org/bin/view/Astrogrid/VoResources>

Current Lessons Learned

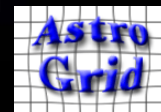
- **Functionality:** not necessarily end to end
 - Limitations in operational science use
- **Reliability:** bug support limited
 - Limited time till release of next iteration
- **Involvement:** limited but increasing
 - Early releases complex with limited science functionality
- **Standards:** system built to comply
 - BUT: standards not always agreed and in place

Rapid deployment > lessons learned > feedback to
development process > better end product

The Next Steps: Participant in VO Science Demos 2005

- AstroGrid: Consortium meeting: mid Dec 2004
 - Brown dwarf discovery
 - Solar coronal mass ejections
- NVO @ AAS, San Diego: Session: Weds 12 Jan 2005
 - Swift alerts
- Euro-VO: ESAC, Madrid: 25-26 Jan 2005
 - Star formation histories
 - AGB to PN transitions
- A Widening range of capabilities, data, applications
 - Increasing scientific usefulness

GOAL: end 2005 – science papers enabled by VOs



AstroGrid Version 1 Release: Jan 2005

Prototype Virtual Observatory for the UK

The screenshot shows the AstroGrid user interface. At the top, there is a navigation bar with buttons for Home, Task, MySpace, Profile, Admin, Logout, and Help. The user is logged in as 'Kona Andrews' and is on their 'Home Page'. The main content area is divided into two columns. The left column contains a 'Help' section with a question mark icon and text explaining the hint button, a green bar icon, a glossary, and FAQ & Cookbook links. Below this is an 'Examples' section with four links: 'Example cone search', 'Example catalogue search', 'Example data extraction', and 'Example workflow construction', each with a right-pointing arrow icon. The right column contains a 'Recent jobs' section with a table listing job details.

Name	Time submitted	Status	[more] Job ID
ADASS paper plots	2004-09-13 10:13am	Completed	.....55667315
Brown dwarfs	2004-09-13 10:13am	Running	.....1791494912
XMATCH with USNOB	2004-09-13 10:13am	Error	.....1229106770
XMATCH with WF-CAM	2004-09-13 10:13am	Running	.....048010803
Job for Brian	2004-09-13 10:13am	Completed	.....32143444
Big X-ray job	2004-09-13 10:13am	Running	.....23360710

Below the table is a link: [Go to Job Monitor](#) with a right-pointing arrow icon.

<http://www.astrogrid.org/release>

AstroGrid Posters at ADASS

- [P1.1.7] MySpace: distributed data storage for the VO
- [P1.3.9] Portal and Workflow
- [P1.3.2] AstroGrid and the Registry: Enabling Resource Discovery
- [P1.3.11] Access Control in AstroGrid software
- [P1.3.4] The AstroGrid Common Execution Architecture
- [P1.3.6] The Publisher's AstroGrid Library



<http://www.astrogrid.org>

<http://wiki.astrogrid.org>

<http://www.astrogrid.org/release>

<http://www.ivoa.net>

<http://www.euro-vo.org>