

# FIRST LIGHT FOR AVO

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The Astrophysical Virtual Observatory (AVO) prototype was presented at a press conference and science workshop at the Jodrell Bank radio observatory near Manchester, UK, on January 20 - 21, 2003. At this 'First Light' event the results from the first year of this three year phase A study by the six European partner organisations were presented.

## RATIONALE

The AVO demonstration addressed some key problems of modern astronomy. These include the challenge of browsing huge sets of observations in multiple waveband regimes, where the data are distributed between several data centres. Furthermore the problem of triggering demanding remote computation on grid nodes in a way that avoids the network bottleneck was considered. The final problem was the analysis, collection and structuring of results and their visualisation.

## AVO PROTOTYPE

The AVO prototype is a set of tools consisting of three software components:

1. The Aladin type of interface for metadata discovery and visualisation
2. The Astronomy Catalogue Extractor (ACE)
3. The Spectral Energy Distribution (SED) utility

The software components were developed at CDS in Strasbourg, by the Astrogrid Consortium and by ESO respectively. The three modules exchange information in VOTable format – a dialect of XML for Astronomy – and use Unified Content Descriptors (UCDs). UCDs are metadata, ie, keywords, with a defined meaning across applications and data centres. From a VO point of view UCD tagged data wrapped in VOTable format are a major innovation. Visit [www.euro-vo.org/intranet/](http://www.euro-vo.org/intranet/) for the details.



Fig 1: Special homemade cake to honour the AVO first light event.

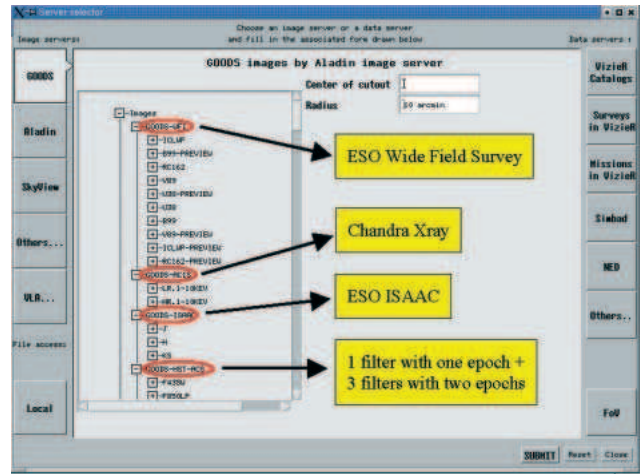


Fig 2: Hierarchical view of GOODS data in the new metadata browser.

## DATA

For demonstration purposes a very rich, well calibrated dataset covering many wavebands was selected from the Great Observatories Origins Deep Survey (GOODS).

Organization	Observ./Instr.	Bands
MPG/ESO	2.2m/WFI	U, B, V, R, I
ESO	VLT/ISAAC	J, H, K
NASA/ESA	HST/ACS	B, V, i, z
NASA	Chandra/ACIS	0.1 - 10 KeV
NRAO	VLA	1.4 & 8.5 GHz
UMAN/JBO	MERLIN	1.4 GHz

Tab 1: Spectral coverage including optical, infrared, X-ray and radio regime.

The ESO Imaging Survey (EIS) provided several single band as well as two cross matched colour object catalogues with 5 and 7 bands. The colour catalogues are used to generate plots of the spectral energy distribution of user selected objects. Further object catalogues from Chandra, ISO, VLA etc. help in detecting peculiar objects. Above these the Astronomy Catalogue Extractor (ACE) builds source catalogues on the fly. ACE is a web service based on the SExtractor tool. The extraction process

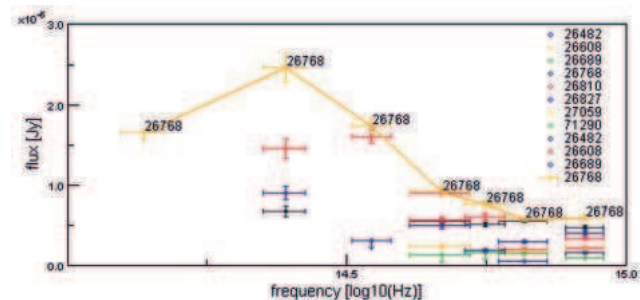


Fig 3: Spectral energy distribution of some objects in UBVRIJK bands.

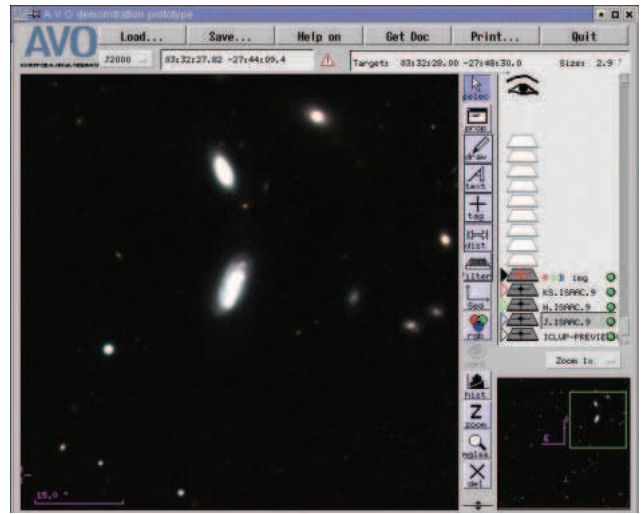
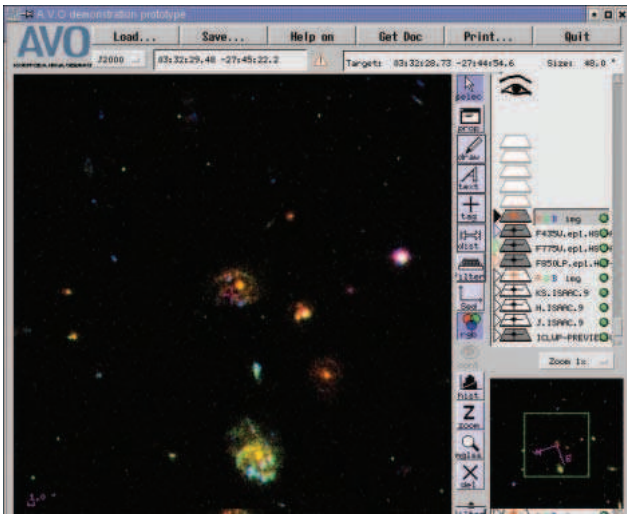


Fig 4: Analysis of the high redshift environment in 3 ACS (left) and 3 ISAAC (right) filter bands.

is configurable and the results in VOTable format can be re-imported and visualized for further analysis.

### SCIENTIFIC SCENARIOS

During the First Light event scientists presented three scenarios highlighting the potential of the AVO prototype:

1. high redshift environment
2. identification of supernova candidates
3. radio observations of Hubble Deep Field North and the associated flanking fields

All three scenarios made heavy use of the new capabilities for manipulating and analysing a hierarchical data structure comprised of image and catalogue layers together with a highly configurable filter mechanism.

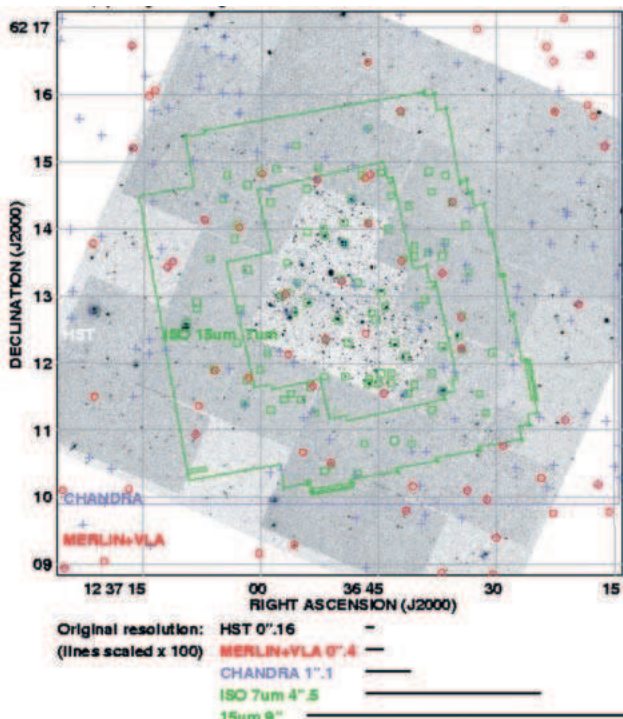


Fig 5: Fusion of HST, Chandra, Merlin and VLA data around Hubble Deep Field North

### CONCLUSION

The AVO First Light event attracted a large number of journalists and scientists as well as representatives of the funding bodies: the European Commission and the UK Particle Physics and Astronomy Research Council (PPARC). The presentations were very well received and subsequently a number of press articles appeared. In a two-month evaluation period starting in February 2003 the AVO science working group will work out recommendations for the future. It is now a matter of defining the scope and relevant standards of a VO and ensuring that it will be attractive for data providers and scientists alike. The next science demonstration is planned for January 2004 and a third round will be in 2005. By then we will be ready for phase B – an operational Euro-VO for all observatories and astronomy data centres in Europe.



### Credits

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