

News from the ESO Science Archive Facility

Nausicaa Delmotte (ESO) on behalf of the Data Management and Operations division

The latest developments of the ESO archive are presented. Information is provided to the astronomical community on new data releases, services and policies.

The end of 2007 brought several changes in the way to access the ESO archive. The Data Management and Operations division continues to look into improvements to enhance the scientific value and access to the large data volumes of the Archive, with the aim of increasing the legacy and scientific productivity of ESO data.

To better integrate the archive web with the main ESO web and to ease its maintenance, a content management system has been set up by the Virtual Observatory Systems (VOS) department so that any new archive web page now gets served with the look and feel of the ESO Web (see Warmels and Zech 2007). Already existing archive web pages are being progressively migrated to this new system. A significant fraction of this work was done as part of the in-kind contribution provided by Spain.

Apart from the traditional web interface, a subset of the ESO archival data can now be accessed through VirGO, the next-generation visual browser for the ESO archive, developed by the VOS department. Currently VirGO can be used to access all data products and an increasing fraction of raw data. We expect the ingestion of imaging data to be completed in 2008, followed by the spectroscopic data sets. VirGO is a plug-in for the popular open-source software Stellarium, adding capabilities for browsing professional astronomical data. Its main feature is to perform real-time access and graphical display of a large number of observations by showing instrumental footprints and image previews, and to allow their selection and filtering for subsequent download from the ESO Science Archive Facility (SAF) web interface. All data interfaces are based on VO standards which allow access to images and spectra from ex-

ternal data centres, as well as inter-application exchange and compatibility. For download and more information, see <http://archive.eso.org/cms/virgo>.

The ESO archive is now also integrated into a unique gateway, known as ESO's User Portal, a single sign-on infrastructure providing a central access point to the various scientific services offered, via the web, to the ESO user community (see Tacconi-Garman 2007). At the end of the proprietary period, ESO data become accessible worldwide. Although a user does not need to register with the ESO User Portal in order to browse the contents of the archive, it is required to be signed in to request data.

New data releases

Several major scientific data releases have also taken place through the ESO archive over the last months and are summarised here.

Processed data for the bulk of UVES echelle data acquired since the beginning of its operations in the year 2000 are now available online from the ESO archive. The one-dimensional extracted spectra, together with processing logs and ancillary files, can be accessed through a dedicated query form at <http://archive.eso.org/wdb/wdb/adp/ssa/form>. More than 50 000 raw frames of point-like sources were processed at ESO by the Data Flow Operations department with the latest version of the instrument pipeline (v3.2). Only quality-controlled master calibration frames were used for the processing and all science products have undergone a certification procedure. This approach results in a large data set processed in a homogeneous, controlled and well-understood way. Those UVES products were ingested into the ESO archive, in a VO-compliant manner by capturing all relevant meta-data, using a tool developed by the VOS department. The meta-data are available for searching and the data themselves can be accessed with VO-compliant applications through the Simple Spectral Access Protocol (SSAP). In addition, archive users can search the UVES processed data by target name, object class, redshift or radial velocity as provided by SIMBAD/NED.

The archive query form also gives access to several other Advanced Data Products (ADPs): HARPS, zCOSMOS, and GOODS/FORS2. Public HARPS reprocessed data have been produced and released by the ADP group within the VOS department, using the latest version (v3.0) of the automatic HARPS pipeline developed by the Observatoire Astronomique de l'Université de Genève. Currently these data cover the first four years of operation (2003–2006). Other data will follow as soon as possible. ADPs from the first release (DR1) of zCOSMOS (ESO Large Programme 175.A-0839, PI Lilly) were made public on 30 October 2007. They include 1264 one- and two-dimensional VIMOS spectra. This is the first data release of an external ESO large programme. Finally, the GOODS/FORS2 final data release v3.0 took place on 31 October 2007 and contains 1715 one-dimensional spectra of 1225 unique targets, providing in total 1165 redshift measurements. Associated spectral previews and colour image cut-outs (5" × 5") are also available for each target. This release was a collaborative effort of the ADP group in VOS with the GOODS team and the ST-ECF. Also the ADPs from the imaging project 'Monitor' (ESO Large Programme 175.C-0685, PI Aigrain) were released on 21 January 2008 (see Aigrain et al. 2007).

The ESO archive now provides on-line access to WFI data previews through the main-archive query form, as they are produced by the ADP group in the VOS department. Previews of data from 2002 to March 2006 are already available. Previews come in JPG and H-compress FITS format. They are obtained by processing raw WFI frames (already in the public domain) with ESO-MVM in an automated fashion. An approximate bias subtraction and flat fielding is applied to the raw frames using master calibrations obtained once a month. A rough de-fringing for the *I*- and *z*-band exposures is applied by building fringing maps from science frames taken over several nights, as intra-night, widely dithered, science frames are not available for most of these observations. As a result, the fringing correction is often not satisfactory. The resulting images are then rebinned by a factor of 10 and compressed using a loss-less algorithm. Notably, the FITS ver-

sion of these previews contains recalibrated positional (WCS) information with an accuracy $\lesssim 1$ arcsec.

In addition to the main ESO archive query form, the archive also offers its users the possibility to query by instrument-specific parameters, via the so-called instrument-specific query forms. The latest one released was the CRIRES query form

in October 2007. The APEX query form has been updated to be able to retrieve observing logs and CLASS files for the APEX-2A/FLASH data. Finally HAWK-I science verification data packages have been released.

For the latest information about the ESO archive, or to subscribe to the archive RSS feed, please see <http://archive.eso.org/>.

For any questions or comments on the ESO archive, please contact us at archive@eso.org.

References

Aigrain S. et al. 2007, *The Messenger* 130, 36
 Tacconi-Garman L. E. 2007, *The Messenger* 130, 54
 Warmels R. and Zech G. 2007, *The Messenger* 128, 73

ALMA Science: the ESO-Garching Astronomers View

Leonardo Testi (ESO)

At the Garching Science Day 2007, proposals for observations with ALMA were presented. A comparison is presented with the ALMA Design Reference Science Plan. The comparison shows that ALMA can be exploited by the wider community for a variety of different science projects, many of which are beyond the expectations of the current community of millimetre astronomers.

ALMA has been designed and is being built to allow the astronomical community to achieve transformational science. To reach this ambitious goal, all ALMA components are scrutinised to ensure that they meet stringent scientific requirements. Together with the top-level science goals, the ALMA Design Reference Science Plan (DRSP)¹ has been created (see Hogerheijde 2006). The DRSP is a collection of science programmes that are used as reference for the scientific capabilities of the instrument. The DRSP has gone through a major revision (version 2.0) during 2007, in order to update its scientific content and to take into account the new ALMA capabilities made acces-

sible through the East Asian contribution. Even though the DRSP contains a number of projects prepared by non-millimetre specialists, the bulk of it has been prepared by the millimetre community.

For the annual Science Day, held on 6 December 2007, the ESO Garching astronomers were invited to prepare potential programmes to be carried out with ALMA. Most of the science staff of ESO-Garching has profound experience in optical/infrared astronomy, therefore the Science Day was then a unique opportunity to receive input from a community base quite different from that of the DRSP, and possibly more similar to the future ALMA users.

The 147 programmes in the DRSP 2.0 and the 43 Science Day presentations were analysed in a homogeneous way to compare the distribution of programmes and the total requested time in the four ESO-OPC categories, with the addition of a new category for observations of the Sun, which will be possible with ALMA. The requests for observing time in each of the ALMA frequency bands were also compared.

The results of this analysis are shown as ring charts in Figure 1. In the DRSP, almost 60 % of the programmes are in four large scientific areas that are contained in the OPC-C category: Interstellar Me-

dium, Star Formation, Circumstellar Matter and Solar System. Most of the remaining programmes target Galaxies (B) or Cosmology (A) with a minor fraction in Stellar Evolution (D) and Solar Physics (S).

The distribution of requested time reveals that the relatively few Cosmology programmes actually require a large investment of telescope time, while only a small fraction of time is needed to complete the Stellar Evolution and Solar Physics part of the programmes (less than 5 %).

The Science Day programmes offer a significantly different view, in that there is a much lower fraction of programmes in the C category and higher fractions in the other areas, especially the Stellar Evolution (D) and Solar Physics (S). This is also reflected in the fraction of requested time, where these latter two categories combined approach 10 % of the total time needed.

The analysis of the time requested in each of the ALMA receiver bands shows that the request for the highest frequency bands, B8 and B9, is similar (around 15 %). The lowest frequencies (B3 and B4) add up to about 25 % in the DRSP, but to almost 37 % in the Science Day programmes. The intermediate frequencies (B5, B6 and B7 – see Haupt and Rykaczewski 2007) are confirmed to be the workhorse of ALMA with 60 % in

¹ See <http://www.strw.leidenuniv.nl/~alma/drsp.shtml>.