

AstroCat/CVcat: A catalogue on Cataclysmic Variables based on a new framework for online interactive astronomical databases

Fabian Euchner, Alexander Pollmer, Klaus Beuermann

Universitäts-Sternwarte, Geismarlandstr. 11, D-37083 Göttingen, Germany

Boris T. Gänsicke

Department of Physics, University of Warwick, Coventry CV4 7AL, UK

Jens Kube

Stiftung Alfred-Wegener-Institut für Polar- und Meeresforschung in der Helmholtz-Gemeinschaft, Koldewey-Station, N-9173 Ny-Ålesund, Norway

Abstract. We report on the progress of the development of CVcat, an interactive catalogue on Cataclysmic Variables, which is the first application based on AstroCat, a general framework for the installation and maintenance of web-based interactive astronomical databases. Registered users can contribute directly to the catalogue content by adding new objects, object properties, literature references, and annotations. The scientific quality control of the catalogue is carried out by a distributed editorial team. Searches in CVcat can be performed by object name, classification, certain properties or property ranges, and coordinates. Search results can be retrieved in several output formats, including XML. Old database states can be restored in order to ensure the citability of the catalogue. Furthermore, CVcat is designed to serve as a repository for reduced data from publications. Future prospects include the integration of AstroCat-based catalogues in the international network of Virtual Observatories.

1. AstroCat – a new concept for astronomical catalogues

1.1. Motivation

Traditionally, in astronomy the availability of online digital information is excellent with respect to scientific publications (NASA's *Astrophysics Data System*, *arXiv.org* preprint server) and raw observational data. With the development of the *AstroCat* software we intend to fill the gap between these two categories by enabling astronomers to set up *interactive* astronomical catalogues for reduced and inferred data (Fig. 1).

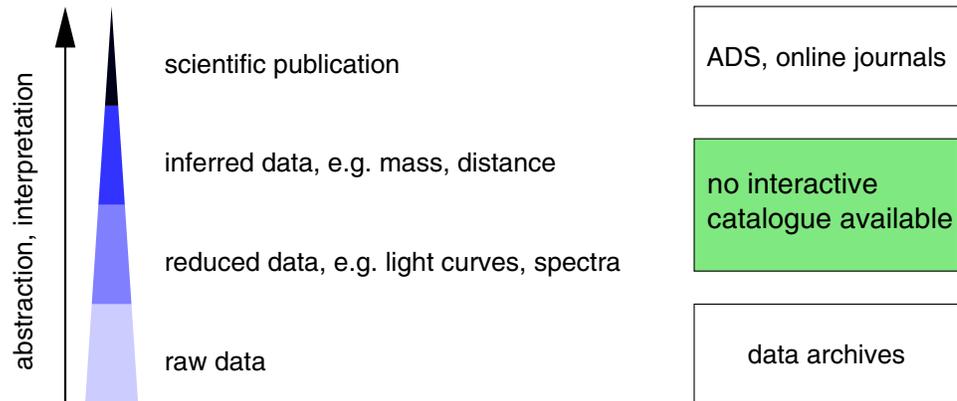


Figure 1. Level of abstraction and digital availability of astronomical information.

1.2. Objectives

AstroCat is a software framework for the implementation of a new type of web-based interactive astronomical catalogues. *AstroCat*-based catalogues are intended to hold information on the physical properties of astronomical objects of a specific class. We provide the possibility to account for fine-grained hierarchical sub-classifications of the selected objects. The information contained in the catalogue should be gathered from trustworthy publications, preferably from refereed papers. The scientific quality control is performed by users who assumed editorial duties. If available, a hyperlink to an electronic version of the referenced publication should be given for each catalogue entry (e.g. via the ADS, the astro-ph preprint server, or online journals like the *Information Bulletin on Variable Stars*). We will also provide the possibility for authors to share reduced data (spectra, light curves, images, etc.) from their publications with the community of users.

Our new concept of astronomical catalogues and the differences to existing catalogues are best characterized by the terms *interactivity*, *up-to-dateness* and *accessibility*:

Interactivity: All registered users may contribute to the database content by adding new data. The reliability of the data is ensured by an editorial team which is allowed to modify catalogue entries. We achieve a high level of objectiveness by allowing for several entries per property. We also allow for detailed annotations on the catalogue entries.

Up-to-dateness: Most ‘classical’ catalogues are updated only in irregular and/or lengthy intervals. In *AstroCat*-based catalogues all changes to the database are made instantly visible to the users. To ensure the citability of the catalogue, we provide a mechanism for restoring previous states of the catalogue content.

Accessibility: The web-based character allows for simple but powerful searching on the database via a web browser. The query results can be formatted in various user-definable styles. We also provide the possibility to retrieve the query

results in XML format in order to supply the user with semantically enriched data.

Additional information on the *AstroCat/CVcat* project can be found at our web page¹. At this location, we provide an online discussion forum² where comments on the project can be placed.

2. CVcat – the online catalogue on Cataclysmic Variables

CVcat, a first version of an online catalogue on Cataclysmic Variables (CVs), was developed by the CV group in Göttingen and presented to the public in August 2001 due to the increasing need in the community of CV researchers for an authoritative, up-to-date, online database of the relevant objects (Kube et al. 2003). In this catalogue some of the concepts of *AstroCat* are already realized. It comprises data from ‘classical’ catalogues on CVs (mainly Ritter & Kolb 2003) as well as additional information compiled manually from numerous publications.

Since the acceptance of *CVcat* in the CV community is good, we decided to re-implement the catalogue with additional features providing more flexibility and convenience to the users. For that purpose, we started to develop the *AstroCat* framework which is not only designed for the re-implementation of *CVcat*, but can also be used for the installation of catalogues covering different astronomical fields.

Up to now, *CVcat* is used by ~150 registered users and can be accessed at <http://www.cvcat.org>. The upgrade to the *AstroCat*-based version is planned for January 2004. A non-interactive demonstration of the new version can already be found at <http://astrocat.uni-goettingen.de/cvcat-demo/>.

3. Target Group

AstroCat is especially suited to set up databases used by relatively small research communities (several hundred users). Since all catalogue entries should be approved by editors, we estimate the maximum number of objects that can be handled properly to be several thousands. The possibility to comment on catalogue entries is particularly useful if extensive calculations and/or non-standard methods are required to derive the respective object properties.

4. Technical Realization

The catalogue data is held in a PostgreSQL database management system. The communication between the database and the webserver (Apache) is controlled by PHP scripts. Queries to and results from the database are handled internally in an XML dialect, *AstroCatML*³, for which an XML Schema can be found on

¹<http://astrocat.uni-goettingen.de>

²<http://astrocat.uni-goettingen.de/#discussion>

³<http://astrocat.uni-goettingen.de/#astrocatml>

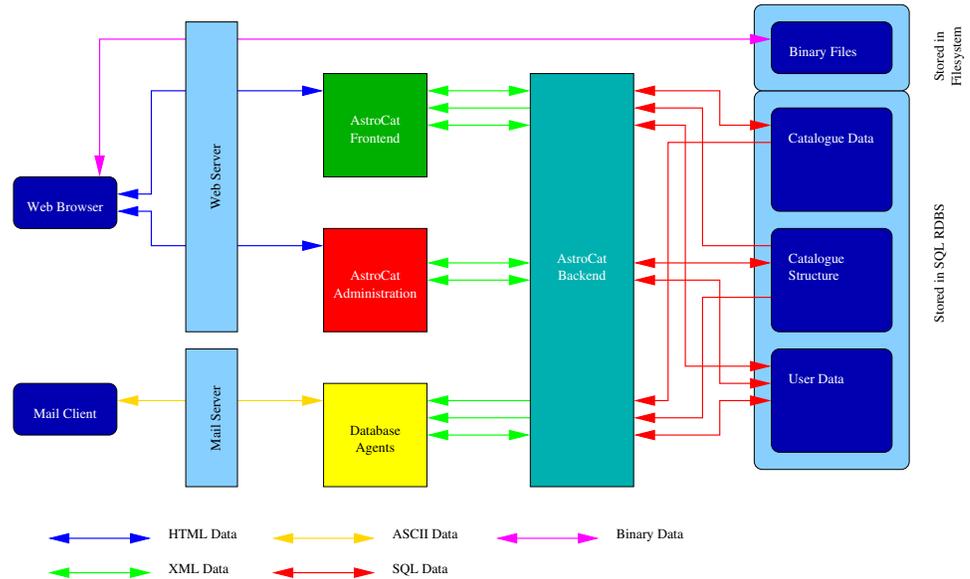


Figure 2. Software components and data flow in AstroCat.

our web page. A schematic view of the data flow in *AstroCat* can be found in Fig. 2.

5. Outlook

After the completion of *CVcat* we plan to transfer the new concept to a different field of astronomical research by installing a catalogue on extrasolar planets (*EPcat*) based on the *AstroCat* software. Furthermore, we will provide a registry where the metadata of all *AstroCat*-based catalogues can be stored, in order to establish interoperability mechanisms between catalogues, e.g. simultaneous searches. It is also intended to integrate the information provided by the catalogues based on *AstroCat* in the global network of Virtual Observatories.

6. Partners

AstroCat/CVcat is funded by the *Deutsche Forschungsgemeinschaft* (project number LIS 4 - 554 95 (1) SUB Göttingen). The project is realized in collaboration with the Niedersächsische Staats- und Universitätsbibliothek (SUB), Göttingen, in the framework of *Virtuelle Fachbibliothek Astronomie*. *CVcat* will be hosted at the SUB after completion.

References

- Kube, J., Gänsicke, B. T., Euchner, F. & Hoffmann, B. 2003, *A&A*, 404, 1159
 Ritter, H. & Kolb. U. 2003, *A&A*, 404, 301