

COROT and OMC archives

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Abstract

COROT (CONvection, ROTation and TRANSITS) is a satellite launched in December 2006 with two principal objectives: the study of stellar interiors using asteroseismology techniques, and the discovery of extrasolar planets using the transit method. The Data Archive Unit of the *Centro de Astrobiología* (CAB) is one of the data centers from where it is possible to access COROT public data (<http://sdc.cab.inta-csic.es/corotfa>). In this paper the main functions of the COROT public archive at CAB are described. The archive has been developed in the framework of the Spanish Virtual Observatory following the standards defined by the International Virtual Observatories Alliance (IVOA, <http://www.ivoa.net>). At present it contains over ninety thousand light curves with an unprecedented photometric accuracy and time resolution. Also, the OMC (Optical Monitoring Camera, an instrument onboard the INTEGRAL satellite) archive (<http://sdc.cab.inta-csic.es/omc>) is in operation since 2003 and contains more than sixty thousand light curves of high photometric quality. We describe here the main functionalities of both systems.

1 Introduction

Nowadays, there is a great knowledge of variable phenomena in the time but the information sampling in that domain is too incomplete. This situation is changing thanks to the launch of space missions that operate in the time, namely:

- COROT: (launched in 2006): more than 90 000 stars.
- KEPLER: (launched in 2009): more than 100 000 stars.
- GAIA: (to be launched in 2012): 1000 millions stars.
- Pan-STARRS (in operation since 2010).



Figure 1: Input web page of the COROT public archive.

- LSST (in the coming years)

The analysis of the results obtained with these projects is making possible to discover previously unknown variable phenomena in the time, and a better comprehension of the already known.

The Data Archive Unit of the *Centro de Astrobiología* is responsible of the development of several astronomical archives in the framework of the Spanish Virtual Observatory¹, a mandatory initiative if the interoperability among astronomical archives and services wants to be guaranteed. In the next sections we describe the main characteristics of two of these archives: COROT and OMC.

2 The COROT public archive

The COROT public archive at CAB is in operation since February 2009. To ensure data integrity among the different public archives (CDS and NStED in addition to CAB), only the metadata are delivered whereas the data are centralized at the Space Astrophysics Institute in Paris (IAS). This approach is often inefficient, causing delays in the data transfer. For that reason, a new method of synchronization is going to be implemented which will make it possible to have exact copy of the data in each data center.

2.1 Input web page

The input web page to the system (Fig. 1) has several sections:

¹<http://svo.cab.inta-csic.es>

2.1.1 News

In this section a summary of the new data added to the archive is shown. The information comprehends the number of light curves in each run and the release date.

2.1.2 System overview

A brief introduction of the mission is provided, as well as an explanation of the system functionalities.

2.1.3 Helpdesk

A contact point with the COROT Archive team.

2.1.4 Usage statistics

This is a private section of the archive where information about the number of the queries requested via web or via the VO access protocols can be found. It is very relevant to emphasize that most of the queries made to the archive are made through the VO interface. The number of downloads and users that have accessed the COROT Archive can also be monitored.

2.1.5 Outreach

In this section, the users may find some valuable information about the exoplanets found by the transits method, view the corresponding folded light curve, the image of the sky region where the exoplanet was detected, the basic parameters related to it and to the star around which it orbits, and download an ASCII file with the light curve data.

2.2 Archive search form

The CoRoT public archive at CAB is accessed by means of a web-based fill-in form that permits queries by different criteria (Fig. 2):

1. Observation run.
2. Light curve type: asteroseismology or exoplanet monochromatic/chromatic.
3. COROT ID list.
4. Object name list.
5. Coordinate list and search radius.
6. Observing date range.
7. Magnitude (V) range.

Figure 2: COROT public archive: search form.

8. Color ($B - V$) range.
9. Spectral types.
10. Luminosity classes.
11. Variability classes, obtained from the light curve using supervised classification methods.

Searches are case-independent, and wildcards (“%”) are permitted for the CoRoT ID field. The system furthermore incorporates a built-in name resolver allowing queries by any of the names provided by the SIMBAD database. The output fields may be ordered by coordinates, COROT identifier or probability of the variability class. The output format is in HTML with a pre-defined number of results shown per page.

2.3 Results

The results of the query are shown in a new page where two tables are given: asteroseismology data and exoplanet data. In these tables general information about the light curves is presented. In particular, the three most likely variability classes are presented.

The system also implements visualization and download capabilities. An interactive plot of the light curve as well as a visualization of the associated FITS header is generated

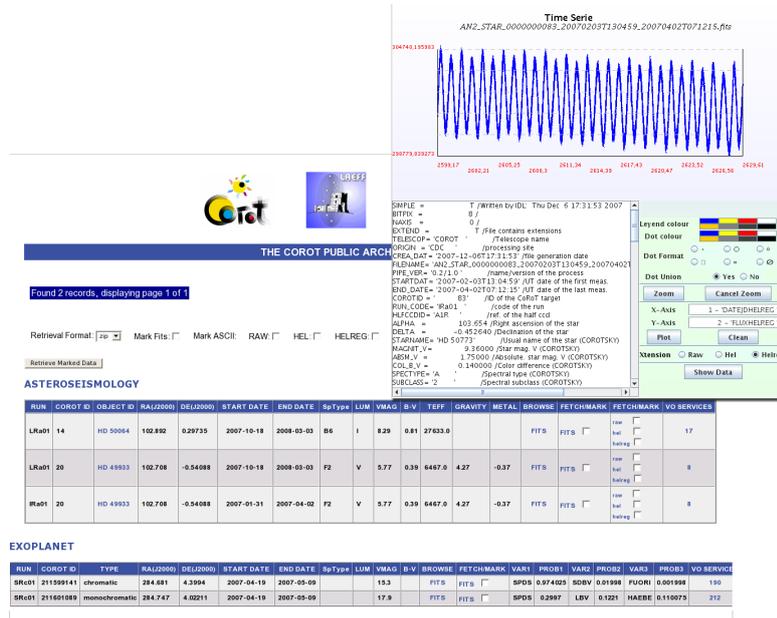


Figure 3: COROT public archive: visualization of data and metadata.

by clicking on the corresponding link (Fig. 3). Zoom views can be generated by dragging the mouse over the light curve and clicking on the “Zoom” button. The data can also be visualized in tabular form by clicking the “Show Data” button. Data in FITS format can be retrieved in groups. For multiple-file retrieval it is possible to include or exclude individual datasets. Multiple-file download generates a file in ZIP format. For asteroseismology data, the system also offers the possibility of downloading each of the FITS binary table extensions (Raw, Hel and Helreg) in ASCII format.

Finally, the system provides access to all the resources available in VO services (spectra, images and catalogues) for a given object. There are more than forty VO archives containing spectra, more than one hundred seventy containing images and thousands of catalogues (including Vizier). At present, this capability is available only for the IRa01 and SRc01 runs.

3 The OMC archive

The Optical Monitoring Camera (OMC) observes the optical emission from the prime targets of the gamma-ray instruments on-board the ESA mission INTEGRAL (launched on Oct. 17, 2002). OMC has also the capability to monitor serendipitously a large number of optically variable sources within its field of view. After eight years in operation, OMC has observed more than a hundred thousand objects of scientific interest.

Figure 4: OMC archive: search form.

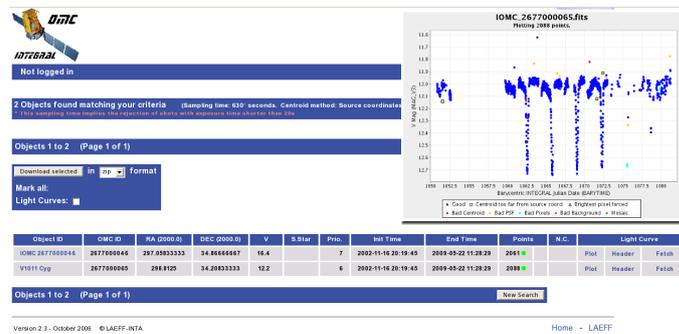


Figure 5: OMC archive: visualization of data and metadata.

3.1 Input web page

The main web page of the OMC is similar to the COROT one, with sections “News”, “System Overview” and “Help Desk”. There is also the possibility to log in the system, because the archive contains some private data, only accessible by a restricted group of users.

3.2 Search form and results

The input form shows several query parameters. The users can perform a query by (Fig. 4):

1. Object parameters: name or list of names, object type, coordinates.
2. Light curve parameters: range of dates, sampling time, centroid method, minimum number of points.

The results are shown in a table where general information of the light curve is presented and the user has the possibility to browse or download the light curves of interest (Fig. 5).