The INTEGRAL-OMC Scientific Archive

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Abstract The Optical Monitoring Camera (OMC) on-board the INTEGRAL satellite has, as one of its scientific goals, the observation of a large number of variable sources previously selected. After almost 6 years of operations, OMC has monitored more than 100 000 sources of scientific interest. In this contribution we present the OMC Scientific Archive (http://sdc.laeff.inta.es/omc/) which has been developed to provide the astronomical community with a quick access to the light curves generated by this instrument. We describe the main characteristics of this archive, as well as important aspects for the users: object types, temporal sampling of light curves and photometric accuracy.

1 Introduction

The Optical Monitoring Camera (OMC) [3] observes the optical emission from the prime targets of the γ-ray instruments on-board the ESA mission INTEGRAL [4], with the support of the JEM-X monitor in the X-ray domain. In addition to the prime targets, OMC observes serendipitously a large amount of optically variable objects previously selected in the OMC Input Catalogue [1].

The OMC is based on a refractive optics with an aperture of 50 mm focused onto a large format CCD (1024×2048 pixels) working in frame transfer mode (1024×1024 pixels imaging area). With a field of view of $5^\circ \times 5^\circ$ is able to monitor sources down to magnitude $V \approx 17$. The operations of INTEGRAL-OMC provide a unique photometric capability to obtain light curves of variable stars presenting periods that can not be addressed properly from ground-based observatories.

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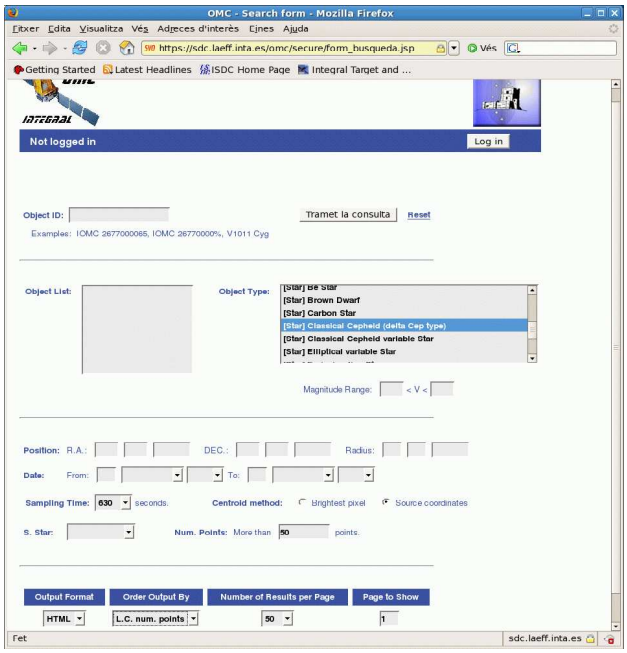

Fig. 1 Search capabilities available in the Archive Web Portal.

2 Archive Web Portal

In normal operations OMC monitors routinely around 100 sources in each field. Due to the observational strategy of INTEGRAL, most of the sky has been already observed several times. This allows the delivery, at the end of the mission, of a catalogue of thousands of variable sources with a well calibrated optical magnitude, covering all kind of periods and monitored over a long interval of time.

A scientific archive [2] was developed to provide the astronomical community with a quick access to the OMC light curves. This archive can be reached at http://sdc.laeff.inta.es/omc/. It contains the data generated by the OMC, updated regularly, and an access system capable of performing complex searches (Fig. 1). A remarkable point is the existence of visualization and analysis tools, available from the user's interface, aiming at optimizing the scientific return of the OMC data.

3 Observed Sources

The main scientific objective of OMC is to monitor the optical emission of the high energy sources observed by the γ-ray and X-ray instruments, even if the optical counterpart is unknown. However in this section we want to focus on the large

Table 1 OMC observed sources with known optical counterpart. Only those sources with more than 50 photometric points have been considered.

Type	Subtype	Number	Type	Subtype	Number
Variable stars					
Irregular		242	Rotational		566
	Orion	118		Pulsar	512
	With rapid variations	52		a2 Canum Venaticorum	23
	Without subtype	72		RS Canum Venaticorum	17
Eruptive		298		Others or without subtype	14
	Flare star	72	Pulsating		4960
	R Coronae Borealis	11		Mira	1758
	T Tauri	202		RR Lyrae	1268
	Others or without subtype	13		Cepheid	104
Rotational		566		Classical Cepheid (δ Cephei)	265
	Pulsar	512		Semi-regular	792
	a2 Canum Venaticorum	23		Others or without subtype	773
Symbiotic		18	Others/No type		4294
Composite objects					
Cataclysmic star		352	Eclipsing binary		1900
	Nova	193		Algol	1207
	Dwarf Nova	109		β Lyrae	221
	Others or without subtype	50		W Ursae Majoris	153
X-ray binary		249		Without subtype	319
	High Mass (HMXB)	74			
	Low Mass (LMXB)	162			
	Without subtype	13			
Galaxies					
AGN		923	Radio galaxy		196
	Seyfert	198	Emission-line galaxy		146
	Blazar	40	Possible Quasar		484
	Quasar	628	Others/No type		159
	Others or without subtype	57			

amount of optically variable objects which are observed serendipitously. In Table 1 we show a summary of these serendipitous sources available from our Web Portal after almost 6 years of operations.

The photometric accuracy we can achieve in V magnitude with OMC for a typical effective exposure of 300 s ranges from 0.005 for $V = 10$ to 0.04 for $V = 14$. By using a longer effective exposure of 900 s we reach accuracies of 0.026 for $V = 14$ and 0.17 for $V = 16$. These values are calculated in staring mode for isolated sources with a good measurement of the sky background. In dithering mode (the most usual in INTEGRAL operations), these values are increased by 0.015 mag, which corresponds to the accuracy of the flatfield correction.

In Fig. 2 we present as an example different types of light curves extracted from our archive. Note the different ranges in the time axes. For the irregular variable

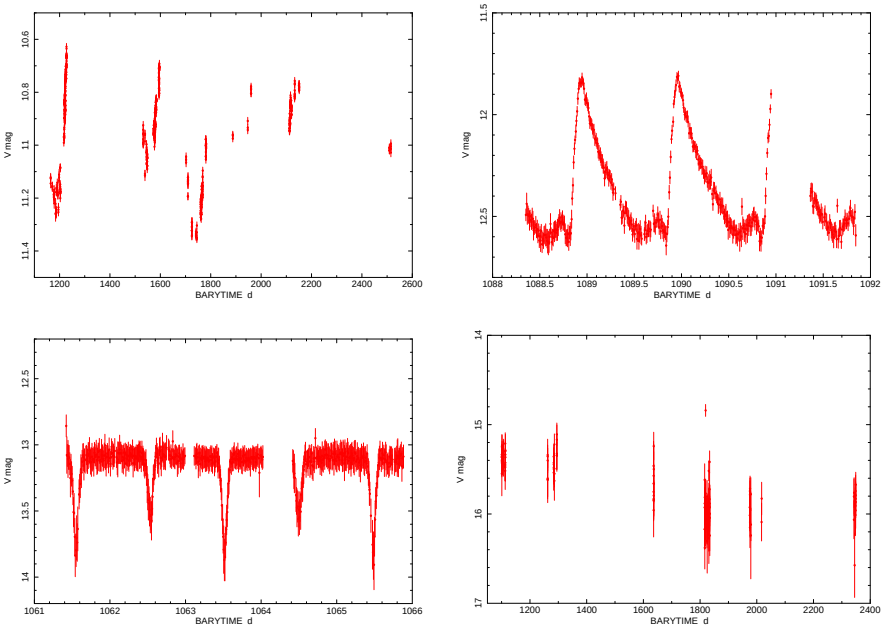

Fig. 2 OMC light curves. Top: from left to right, V347 Aql (irregular type) and FY Aqr (pulsating, probably RRab). Bottom: from left to right, V809 Cyg (eclipsing binary of Algol type) and QSO B1217+0220 (Seyfert 1 galaxy). The origin of the time axis (BARYTIME) is January 1st, 2000.

V347 Aql, the covered range is almost 4 years. In the other extreme, we can see the pulsating star FY Aqr for which the total elapsed time covered in the curve is only 4 days.

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