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) observes the optical emission from the prime targets of the γ-ray instruments on-board the ESA mission INTEGRAL, 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.

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° × 5° 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.
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
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     |                       |                                |        |

counterpart is unknown. However in this section we want to focus on the large 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 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.

Acknowledgements The activities related to INTEGRAL-OMC are being funded since 1993 by the Spanish National Space Programme MEC/MICINN (ESP2005-07714-C03-03). This research has made use of the Spanish Virtual Observatory supported from the Spanish MEC through grants AyA2008-02156, AyA2005-04286.

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