

Montsec Astronomical Observatory (OAdM)

Link to the OAdM's website: [Montsec Astronomical Observatory – OAdM](#)



Science

The TJO-OAdM is a general-purpose facility and, as such, carries out a variety of observations related to various astronomical objects. Thanks to its flexible operation mode, the TJO allows the monitoring of sources for extended periods of time and also the possibility of a rapid reaction time.

- Exoplanet research (possibly follow-up of known transiting planets or targeted searches of individual objects)
- Eclipsing binaries (to understand stellar properties and structure)
- Pulsating variables (probing the stellar interior)
- Evolved variable stars (supergiants, post-He flash)
- Stellar activity (to understand the magnetic dynamo and to calibrate the time-decay of such activity)
- Variability of active galaxy nuclei (related to the stochastic accretion process)
- Solar System objects (follow-up of asteroids, near-Earth objects, comets)
- Supernovae (with the added value of obtaining early photometry)
- X-ray binaries (rotational variability and accretion phenomena)
- Novae (also with possible early data)
- Optical counterparts of Gamma Ray Bursts (GRBs)
- Any transient phenomena in general

Instrument

The Joan Oró Telescope is located at the Montsec Astronomical Observatory (TJO – OAdM). It is a mid-size multipurpose telescope working under completely unattended control. The telescope's features and size make this telescope quite singular and unique in comparison with the other robotic telescopes currently in operation.

The observatory houses a 0.8 m telescope, equipped with two instruments: MEIA (Medium-format Efficient Imager for Astronomy) and ARES (Astronomical mid-REsolution Spectrograph). MEIA and ARES are devoted to photometric and spectroscopic data collection, respectively.

Site

The OAdM is located at an altitude of 1570 m at the Montsec mountain range, 50 km South of the central Pyrenees and 50 km North of the city of Lleida (Catalonia, Spain).

Site testing campaigns were conducted during the years 1997-1999, with measurements of air stability, transparency and weather conditions, and seeing, which showed that the night sky of the Montsec mountain is suitable for high-quality astronomical observations.

Robotic Mode

There are numerous advantages in operating an astronomical observatory using robotic control instead of human attendance.

This mode of operation implies complex technology that is not commonly used in classical ground-based observatories, but rather in space observatories or several industrial applications. The end-to-end data flow and the housekeeping control are the two main control layers required for unattended operations. A suitable monitoring of the system health and environment are essential for a high level of dynamic responses to changing conditions. Several environment sensors are installed as part of the housekeeping control:

- Storm detector
 - Two weather stations
 - Rain detector
 - Cloud sensor
-

Other Instruments at OAdM

Several research facilities are installed at the OAdM site:

- The Fabra-ROA Telescope at the Montsec (TFRM) of the Real Academia de Ciencias y Artes de Barcelona and the Real Observatorio de la Armada.
 - An IEEC all-sky camera for meteor and bolide detection; as a mid-term objective, its images will be used to generate cloud maps that will allow the selection of clear areas in the sky.
 - A station for the measurement of airborne particles for air contamination monitoring of the Catalan Government (Dept.Medi Ambient).
 - A weather station of the Servei Meteorològic de Catalunya (SMC, Catalan Government), one of the existing nodes in Catalonia for weather reporting.
-

IEEC's Contribution

The construction of the TJO-OAdM telescope was specified in the mid-90's, when the project Montsec Sostenible was approved by the Catalan government to promote the Montsec area in Catalonia.

This project envisaged the construction of the Parc Astronòmic del Montsec, composed by a facility devoted to science outreach (the Centre d'Observació de l'Univers) and an observatory for astronomical research (the Observatori Astronòmic del Montsec, OAdM).

Several research institutes and universities have actively contributed with scientific and technical supervision and manpower to the development of the TJO-OAdM project: the Institut d'Estudis Espacials de Catalunya (IEEC), the University of Barcelona (UB), the Technical University of Catalonia (UPC), the Spanish Research Council (CSIC) and the Joan Oró Foundation (FJO).

The TJO telescope is owned by the Consorci del Montsec (CdM), a public institution founded by the Catalan Government (Generalitat de Catalunya). The Institut d'Estudis Espacials de Catalunya has been in charge of the telescope installation and is currently carrying out the management and scientific exploitation of the facility.