



First results from the COLIBRÍ telescope and perspectives at OHP with Mistral@T193, ELIXIR, and Providence

S. BASA (UAR Pytheas/OHP/LAM and COLIBRI PI)



Very promising perspectives

France is currently investing in several optical facilities dedicated to time-domain astronomy, for SVOM of course , but not only:

- COLIBRI, the France-Mexican robotic telescope
- Several facilities at Observatoire de Haute-Provence:
 - Mistral presently at T193.
 - ELIXIR, a new wide field survey.
 - PROVIDENCE, a second generation telescope.

The community must fully capitalize on these facilities, which offer a unique opportunity to establish a leading position in time-domain astronomy.



COLIBRI (FM-GFT/SVOM), a new robotic telescope

A robotic telescope motivated by SVOM and fully dedicated to the transient sky:

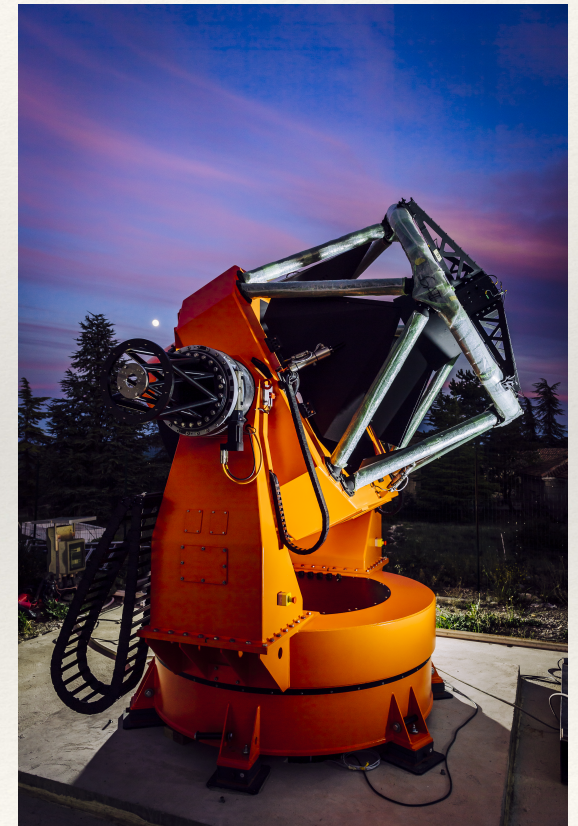
- From GRBs to TDEs, FRBs, FBOTs, GWs and neutrinos, etc.

Stack holders:

- France: Aix-Marseille University, CNRS and CNES.
- Mexico: UNAM and SECIHTI.

Main specifications:

- Delay between alert reception and start of an observation: <20sec.
- Primary mirror diameter: 1.3 m.
- Image quality: seeing limited (median at OAN: 0.8 arcsec).
- Three simultaneous bands: from Pan-STARRS g to H bands.

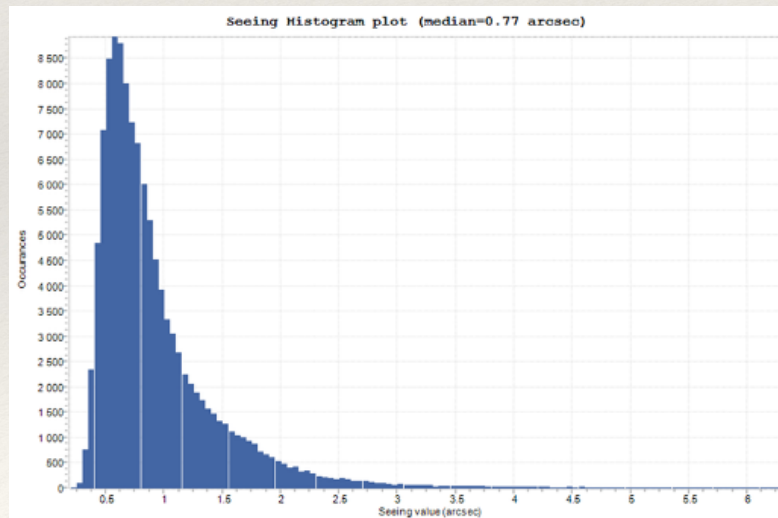




Infrastructure at OAN, Mexico

Really excellent astronomical performances of the site confirmed:

- Median seeing = about 0.8 arcs.
- About 80% of clear skies.





Instrumentation specifications

Three simultaneous arms:

- Wide field of view: 26 arcmin.
- Visible domain: B to Pan-STARRS z bands.
- Infrared domain: up-to H band.

	DDRAGO	CAGIRE
Sensor	e2v	Lynred
Wavelength coverage	400-1000 nm	1000-1800 nm
Number of pixels	4096x4096	2048x2048
Pixel size	15 μm	15 μm
Well capacity	350000 e^-	>80000 e^-
Readout noise	8 e^-	<40 e^-
Operating temperature	163 K	100 K
Dark current	<0.001 $e^-/\text{pix}/\text{s}$	<1.0 $e^-/\text{pix}/\text{s}$
Pixel scale	0.38 arcsec/pix	0.63 arcsec/pix
Field of View	26 arcmin	21.7 arcmin



Status of the development

There's still work to be done to ensure that all the improvements are made.

But:

- The telescope is working well, even if we still want to improve the image quality.
- DDRAGO (visible cameras) is in operation.
- CAGIRE (NIR camera) is scheduled to be installed in Fall 2026.
- We are developing a polarimeter, TEQUILA (first observations started).



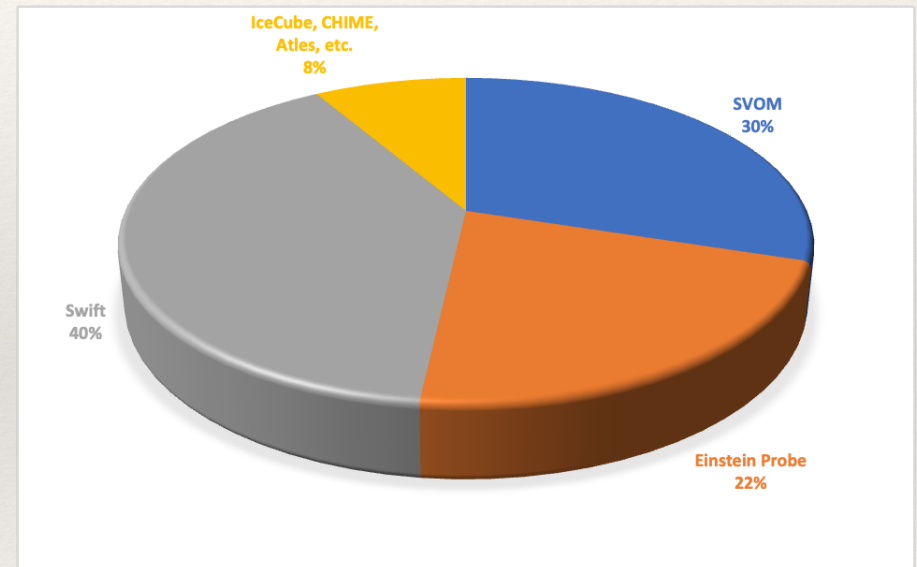
Alerts statistics

Start of the scientific exploitation: 1st of January 2025:

- More than 282 GCNs as of June 21th, 2026.
- Presently the most active telescope in this scientific domain.

The consortium is making a strong effort to share the results as quickly as possible:

- ➔ *Delay between GCN publication and end of the observations: < 20 min in average.*





Efficiency on the SVOM alerts

After more than one year of operations:

- About 77% of the SVOM alerts observable by COLIBRI have been followed up (i.e., excluding alerts in the Southern Hemisphere, which mainly impacts the summer period).
- About 65–71% of the real GRBs observable by COLIBRI are detected (i.e., excluding false alerts).

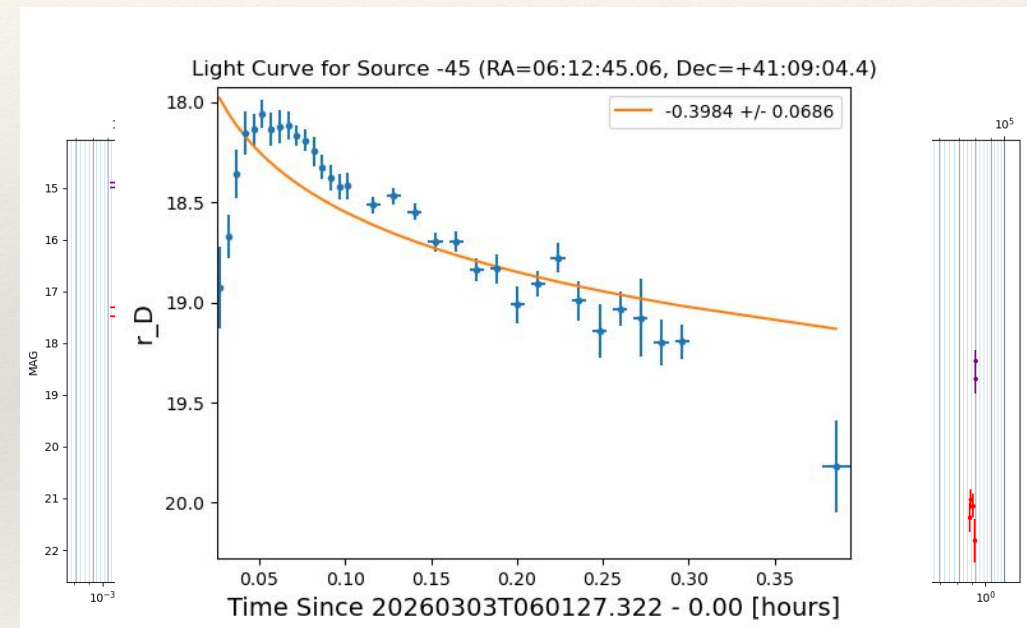


On the importance of the time sampling

Detections:

- When an optical counterpart is detected, the follow-up per alert typically lasts ~ 9.4 hours (up-to >100 h for some cases as rebrightening or SN), spread over several days.

This extended monitoring is essential for good sampling and high sensitivity of the afterglow evolution, but not only...



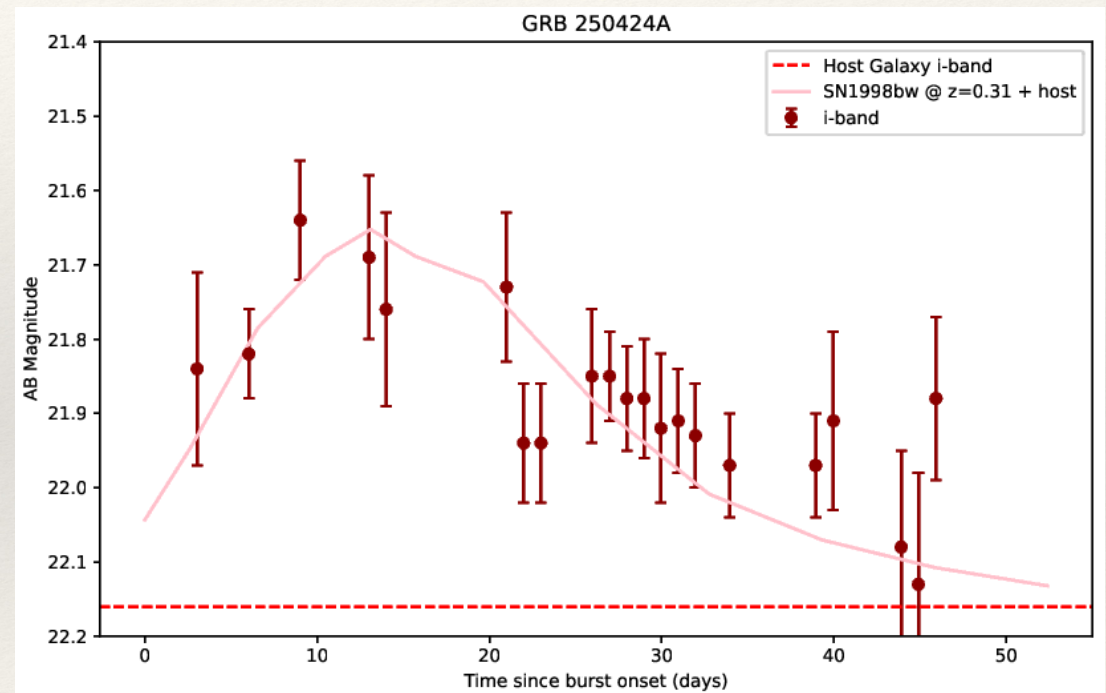
Automatic LC from GRB 260303A (SVOM)



An interesting example, GRB 250424A

Supernova detected firstly by COLIBRI (even if it was very challenging due to the elevation!):

- Long burst detected by SWIFT.
- $z=0.310$
- Detection confirmed by JWST.
- Publication underway (A. De Ugarte Postigo).





Public list of followed alerts

Even if the development is not yet achieved, there is already a very sustained scientific activity:

- <https://www.colibri-obs.org/public-list-of-followed-alerts/>

COLIBRI

About Public Science The Observatory Internal Pages

COLIBRI

PUBLIC LIST OF FOLLOWED ALERTS

For any information regarding these alerts, please contact: [stephane.basa AT lam.fr](mailto:stephane.basa@lam.fr)

Last modified: Sat, 14 Mar 2026 23:00:02 GMT Number of alerts: 304

Alert Name ↑	Filters Used	Number of Images	Last Observation Date ↓
EP260312.330	r,z	40	2026-03-12 08:37:58 UTC
AT2026cex	g,r,i,z,y	3170	2026-03-12 06:07:30 UTC
AT2026dbl	g,r,i,z	1632	2026-03-11 08:21:17 UTC
GRB260223a	g,r,i,z,y	1052	2026-03-11 05:05:06 UTC
GRB260307b	i,z	247	2026-03-08 08:57:02 UTC

Mistral at OHP

Spectro-imager based on SPRAT concept (Liverpool 2m) :

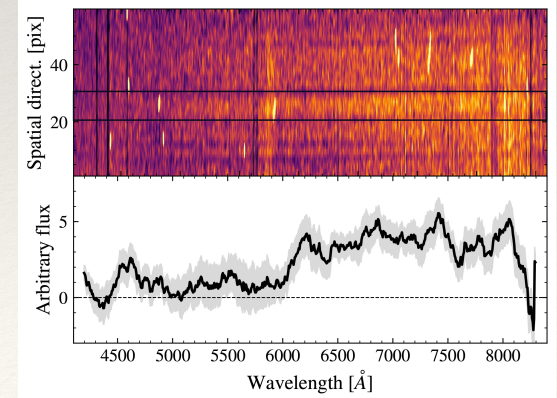
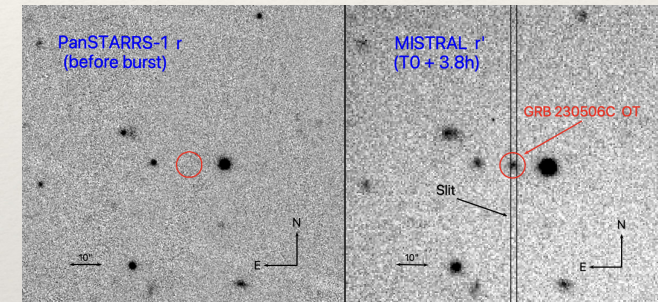
- Largely driven by the time-domain astronomy.
- Major upgrade completed this Spring: variable slit system and new optics providing continuous coverage from the blue to the red.

In the process of ensuring a real place in this race:

- Presently the most active 2m class telescope in the GRB follow-up.
- ToO policy significantly relaxed by the T193 Scientific Council.

GRB 230506C

- Observed ~4h after the alert
- Magnitude: ~20.9 in the r-band.
- Redshift: $3.7 \leq z \leq 4$



ELIXIR at OHP

A new robotic telescope with a very large field of view specially designed to study the transient Universe.

- Search for the optical counterparts of the GRBs
- Identification of the astrophysical objects at the origin of the gravitational waves detected by the LIGO, VIRGO and KAGRA detectors.
- Identification of the sources producing the high energy cosmic neutrinos detected by KM3Net and IceCube.
- Constant monitoring of the sky in order to identify
- Etc.

Developments supported by LAM, LTE and OHP (main fundings institutes: DIM-ACAV, Paris Observatory, Région Sud).

Technical concept

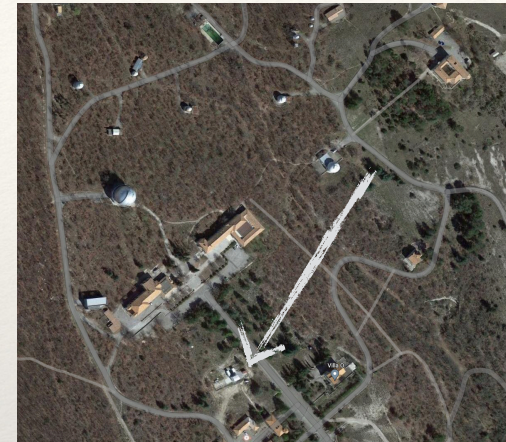
Technical concept:

- 3 independent telescopes with a 0.6 m diameter:
- FoV of each telescope=3x2 degrees² (with a pixel of 0.86 arcsec).
- 4 bands accessibles: Luminance and 3 others still to be defined.

Possible to combine a very large field of view with an attractive sensitivity:

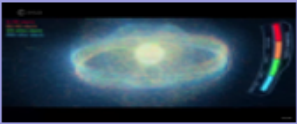


- *In Survey mode*: possible to cover 18 degrees² with the sensitivity of a 0,6m telescope.
- *In Alert mode*: possible to combine them and reach the sensitivity of a 1.0m telescope having a FoV of 6 degrees².

First observations: early 2027.





PROVIDENCE science cases

<p>SDA (V)LEO high resolution (4D)</p>  <p>Survey of GEO close environment</p>  <p>Orbitography & débris</p> 	<p>ASTRO Transients</p>  <p>Solar system, Asteroids, Near-earth objects, planets ...</p> 	<p>LASER Ranging & active illumination</p>  <p>QKD & deep space com</p> 	<p>ATMOS Caractérisation de la turbulence atmosphérique, transmission, structures (trainées de condensation, nuages ...)</p> 
<p>INSTRUMENTATION Validation of components and concepts for high spatial and spectral resolution imaging</p>  			

More information on PROVIDENCE : www.onera.fr/en/providence or contact thierry.fusco@onera.fr / nicolas.vedrenne@onera.fr



PROVIDENCE in a nutshell

An Optical Research Platform, optimized for high angular resolution and dedicated to Space Domain Awareness, Astronomy, Laser and environmental applications:

- 2.5m Adaptive Telescope (Alt-Az) with adaptive secondary (resolution : $41\text{mas}@0.5\mu\text{m} = 10\text{cm}@500\text{km} / 7.5\text{m}@36000\text{km}$)
 - 10 to 30 arcmin FoV (including a 2 arcmin diffraction limited FoV).
 - Up to $5^\circ/\text{s}$ tracking capability (for LEO sat observation)
 - From 380 (goal: 360) to 2300 nm bandwidth.
- Nasmyth and Coudé Focus available.
- Compatible with LGS operation (Rayleigh and Sodium).

- 2 first light instruments:
 - INTERSTELLAR : AO-assisted short-exposure multi- λ HR-imager (from 450 to 1700 nm)
 - MISTRAL.



PROVIDENCE at OHP

Key dates:

Site selection: Nov 2024.

Pre-studies (telescope & bulding): Apr–dec 2025.

Telescope procurement (final contractualisation): June 2026.

Start of work (removal of existing telescope): Oct 2026

Modification & adaptation of the building: January 2027.

First light: early 2029 (for Apophis of course).

ONERA Telescope, but 30% of GTO for CNRS (contact marc.ferrari@osu-pythéas.fr).

