

RAPAS 2026, PRO-AM NETWORK FOR SCIENTIFIC ALERTS

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1 Introduction

RAPAS (Réseau Amateur Professionnel pour les Alertes Scientifiques / Pro-Am network for scientific alerts) is a French Pro-Am collaboration dedicated to astronomical scientific alerts which started in 2022. The purpose, at the beginning, was to create a network of amateurs able to answer to photometric alerts provided by the Gaia mission. Beyond, three kinds of alerts are now feeding the network from :

- optical alerts of Galactic and extra-galactic transients provided by optical surveys (CRTS, ZTF, ATLAS, GOTO, Rubin,...) through Astro-COLIBRI system.
- alerts from Multi-Messengers astrophysical awareness sensors (Gravitational Wave, Gamma and X ray satellites, Neutrinos, Cosmic Rays, Radio, ...) through Astro-COLIBRI.
- Solar System Objects alerts

The RAPAS collaboration was presented and updated during the previous Gemini Workshops at the Journées de la SF2A since 2022. You could refer to the previous proceeding (see for example Midavaine et al. (2025c)) to get a full presentation of the program. We are updating and developing here the latest progress, productions and perspectives on the project.

2 The RAPAS Gaia like filters

One of the idea we implemented at the very beginning of RAPAS collaboration, was to provide amateur telescopes with the same set of 3 optical filters meeting the G, Gbp and Grp photometric bands of the Gaia mission (cf. Fig. 1 left). It allows to use the Gaia photometric system and catalogs to provide harmonized magnitudes and color index measurements. Thanks to the enlarged spectral bandwidth of these Gaia bands, it provides an enhanced sensitivity to amateur telescopes with improved SNR and higher upper limit magnitudes in the range of Gaia catalog (G 20.7) and beyond. The two first batches of manufactured filters was made in using multi-layer coating library of the subcontractor we selected. Pierre Barroy (Barroy 2026) with two Master II internships designed, between 2024- 2026, optimized multilayer coatings to enhance the optical transmission and rejection of the Gbp and Grp filters (cf. Fig. 1 right). It is the V2 definition of RAPAS filters, we are on the way to manufacture in a third batch.

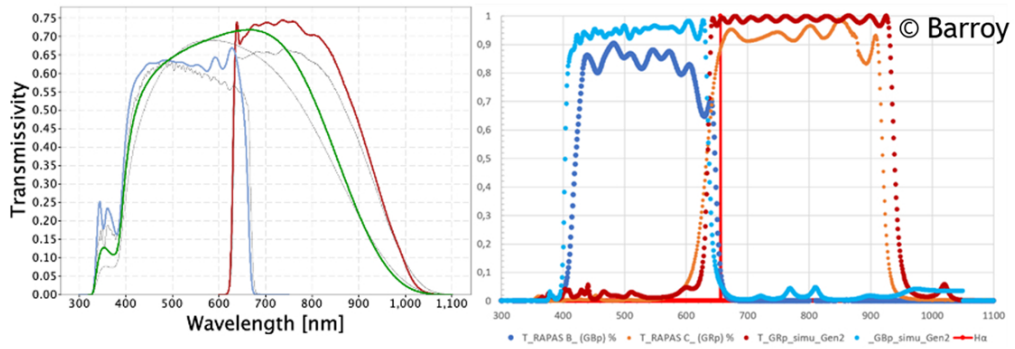


Fig. 1. left : Gaia G, Gbp and Grp bands defined by the quantum efficiency of three families of CCD and two refracting prisms. Right : RAPAS filters V1 dark blue and orange, V2 light blue and red meeting the Gbp and Grp Gaia bands, the G band is provided by the CCD or the APS CMOS quantum efficiency and a parfocal AR window.

We are preparing the call for funding of preorders, crowd fundings and sponsorships to be able to provide these filters on an European wide or even worldwide scale in 2027. Beyond the astrophysical transient field, these Gaia like filters meet several applications in astronomy. Gaia is going to release on the 2nd of December 2026 DR4 5 years long depth catalog with the identification of 1.5 billion stable stars. In addition, it will provide a catalog of light curves of asteroids, variable stars and Gaia alerts, most of them are still to be characterized and classified. With such a Gaia like filters we may extend and oversampled the Gaia light curves data base in an unified photometric frame. Several robotic array of telescopes or space probe payload (SVOM, TESS, Kepler) are moving to two wide spectral bands (ATLAS, GOTO, ARGUS,...) to enhance the depth of theses

surveys. In addition, Nicolas Biver noticed the Gbp band integrate most of the ionic lines from comet coma while the Grp rejected them in providing only the dust diffusion signature. This could allow the detection of cometary activities.

3 Spectro SED

In 2023 we designed and purchased two low dispersion and high sensitivity spectrographs : Alpy 200 and Star'Ex VLR. The purpose is to allow the acquisition and the monitoring of Spectral Energy Distribution (SED) of localized alerts to support their respective classification. Some of the French spectro amateur community is joining RAPAS in providing on some alerts their spectral signatures to support the alert classification. The joint photometric acquisition with Gaia G magnitude and Gbp-Grp color index will allow to provide calibrated radiometric spectra.

4 The RAPAS answer to alerts

Thanks to a partnership with Astro-COLIBRI (Schussler et al. 2024), the team developed an alert selection process dedicated to RAPAS. Then in 2024 the network, through a training phase, started to answer to alerts with a first process to collect the data from observers on RAPAS spreadsheets (Fig. 2). Then Astro-COLIBRI copy and is displaying the collected data in the respective alert article on a light curve. The data could be delivered on demand. Since 2024 we started to release Telegrams, GCN and TNS to the community summarized in Table 1.

Object	Reference & URL (if available)
	Midavaine et al. (2024)
GRB 240809A	https://gcn.nasa.gov/circulars/37159?view=index&view=index
	Midavaine & Rapas Network (2024a)
GRB 241113B	https://gcn.nasa.gov/circulars/38431?view=index&view=index
	Midavaine & Rapas Network (2024b)
GRB 241128A	https://gcn.nasa.gov/circulars/38438?view=index&view=index
	Dennefeld et al. (2025a)
GRB 250327B	https://gcn.nasa.gov/circulars/39905?view=index&view=index
	Dennefeld et al. (2025b)
AT 2025usz	https://www.astronomerstelegam.org/?read=17355
	Midavaine et al. (2025b)
GRB 251017A	https://gcn.nasa.gov/circulars/42370?view=index&view=index
	Midavaine et al. (2025a)
SN 2025coe	https://www.wis-tns.org/astronotes/astronote/2025-200
	Midavaine et al. (2026a)
SN 2026fvx	https://www.wis-tns.org/astronotes/astronote/2026-104
	Midavaine et al. (2026b)
SN 2026kie	https://www.wis-tns.org/astronotes/astronote/2026-131
	Lechapelain & Midavaine (2026)
EP-WXT trigger 0170924151	https://gcn.nasa.gov/circulars/45133
SN 2026sqf	https://www.wis-tns.org/astronotes/astronote/2026-230
GRB 260727A / SVOM sb26072702	Lechapelain et al. (2026)
	Buil & Dennefeld (2026)
AT 2026clk	https://www.astronomerstelegam.org/?read=17805

Table 1. List of released Telegrams, GCN and TNS by the RAPAS network.

In addition to these astrophysical alerts, several participants contribute to the observations of suspected near-Earth objects (NEOs) published on the MPC's "NEO Confirmation page", as well as to the detection of suspected moons orbiting Gaia asteroids.

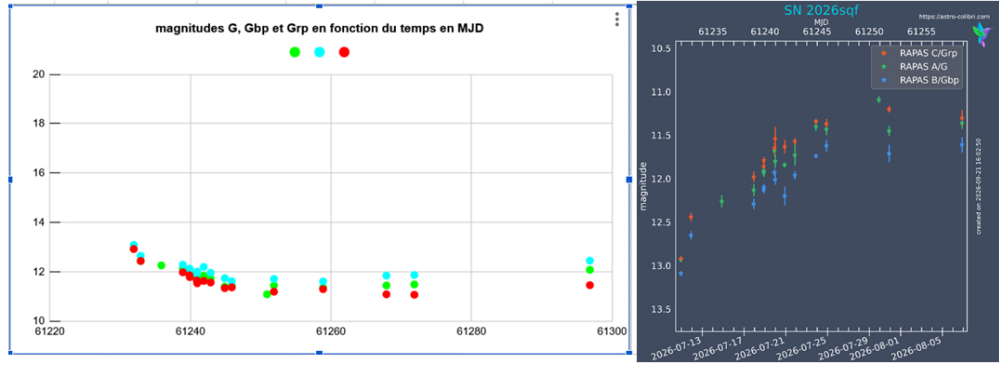


Fig. 2. Left : the light curve built in the RAPAS spreadsheet. Right: the RAPAS light curve displayed in AstroCOLIBRI.

5 RPP and STDWeb pipelines embedded in the RAPAS PADC archive facility

In 2025 and 2026 two processing pipelines have been implemented by P.-F. Rocci (RAPAS Processing Pipeline) and P.Y. Lechapelain (STDWeb from the S. Karpov’s STDPipe) to improve and unified the magnitude extraction process. In 2026, thanks to the support of Paris Astronomical Data Center (PADC) a RAPAS framework is on the way to embed the two pipelines and FITS up loaded process to allow then real-time access to the light curves or the FITS files, or latter on to allow data mining from the astronomical communities.

6 Conclusions

In 2026 we shared abroad the RAPAS acquired experience to support similar amateur networks in other countries. Therefore in 2027 we intend to propose the Gaia like set of filters to the amateur and even the professional communities. Even beyond, this project could be developed at an international scale with the IAU support.

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