



SVOM Science User Support Services at Chinese Science Center

Xu-Hui Han^{1,2}, Li-Ping Xin^{1,2}, Jing Wang¹, Yu-Jie Xiao¹, Pin-Pin Zhang¹, Ruo-Song Zhang¹, Hong-Bo Cai¹, Hui-Jun Chen^{1,3},
Jin-Song Deng^{1,2}, Wen-Long Dong¹, Lei Huang¹, Lin Lan¹, Hua-Li Li¹, Guang-Wei Li^{1,2}, Xiao-Meng Lu¹, Yu-Lei Qiu¹,
Chao Wu^{1,2}, Wen-Jin Xie¹, Da-Wei Xu^{1,2}, Jing-Ran Xu¹, Yang Xu¹ , Zhu-Heng Yao¹ , Mo Zhang¹, Xue-Ying Zhao¹,
Wei-Kang Zheng⁴, Ya-Tong Zheng¹, Xiao-Xiao Zhou⁵, and Jian-Yan Wei¹

¹ National Astronomical Observatories, Chinese Academy of Sciences, Beijing 100101, China; hxx@nao.cas.cn

² School of Astronomy and Space Science, University of Chinese Academy of Sciences, Beijing 101408, China

³ Department of Computer Science and Technology, School of Computer and Information Technology Cangzhou Jiaotong College, Huanghua 061199, China

⁴ Department of Astronomy, University of California, Berkeley, CA 94720-3411, USA

⁵ College of Information Engineering, Fuzhou Polytechnic, Fuzhou 350108, China

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Abstract

The Chinese-French Space-based multi-band Variable Objects Monitor (SVOM) mission is dedicated to the study of gamma-ray bursts (GRBs) from the distant universe. A key component of the SVOM Chinese Ground Segment, the Science User Support Services (SUSS) provide comprehensive support for the mission's scientific operations. SUSS consists of two integral pillars: a suite of specialized software tools that automate key workflows, and a dedicated User Support Team that delivers expert-led, human services. These human-delivered services include operational coordination across telescope networks, direct technical assistance to astronomers, user training, and proactive problem-solving throughout the observation lifecycle. This paper focuses on the organization of SVOM scientific operations and the role of SUSS in facilitating these tasks. We provide a detailed description of the SUSS software architecture and its functionalities, encompassing the General Platform, the Burst Advocate support tools for GRB counterpart identification, the Target of Opportunity support tools, and the General Program support tools. The structure and services provided by the user support team at the Chinese Science Center are also elaborated. Furthermore, we evaluate the performance of SUSS during its first operational year, assessing its effectiveness in fulfilling user requirements. The evaluation offers valuable insights to guide future user support strategies and software enhancements, ultimately enabling better service for the SVOM scientific community.

Key words: gamma-rays: galaxies – telescopes – methods: observational

1. Introduction

The Space-based multi-band Variable Objects Monitor (SVOM) mission is a joint Chinese-French satellite project designed to detect, localize, and study gamma-ray bursts (GRBs) and other high-energy transient phenomena. Its primary scientific goals are to ensure a continuous supply of well-localized explosive transients for multi-wavelength follow-up studies and to provide the most comprehensive characterization of the detected events. To achieve these objectives, SVOM employs an innovative concept combining space-borne and ground-based instruments: the satellite carries four complementary instruments—including the wide-field hard X-ray telescope ECLAIRs for GRB detection and localization, and narrow-field telescopes for afterglow observations—while a dedicated ground segment, including the GWAC wide-field camera and robotic follow-up telescopes, enables rapid multi-wavelength observations from the prompt emission to the late afterglow phases.

The scientific operations of the SVOM mission are organized into three main programs, each with distinct observational requirements. The Core Program (CP) consists of observations triggered automatically by ECLAIRs alerts, focusing on GRBs and other high-energy transient sources. This program requires rapid validation and follow-up coordination, managed through dedicated burst advocate tools. The Target of Opportunity Program (ToO) enables ground-commanded observations with swift reaction times—ranging from minutes to hours—allowing the mission to respond to transients detected by other observatories. This time-critical process demands efficient proposal submission, review, and scheduling capabilities. Finally, the General Program (GP) covers all pre-planned observations conducted during quiescent periods, with targets defined annually by the scientific community, requiring comprehensive tools for proposal management, review, and long-term observation planning.

The SVOM Chinese Ground Segment undertakes several important functions for organizing and supporting these scientific operations (Liu et al. 2026). For the scientific

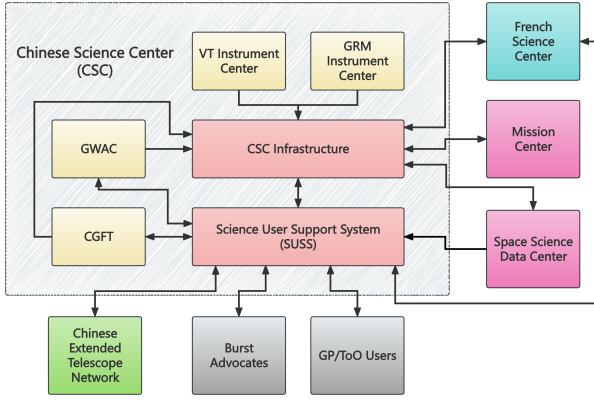


Figure 1. The CSC infrastructure and SUSS, integral components of the CSC.

management of the CP, ToO, and GP, the SVOM Chinese Science Center (CSC) has developed the Science User Support - Services (SUSS). The SUSS website ⁽⁶⁾ hosts three main scientific user support tools: CSC BA Tools (for CP), ToO Tools, and GP Tools.

The overall structure of the SVOM Chinese Ground Segment is shown in Figure 1. It demonstrates that the CSC infrastructure and SUSS are integral components of the CSC. The infrastructure handles the processing and transmission of information and scientific products, while SUSS supports most scientific activities within the CSC.

SUSS assists SVOM scientific users in completing tasks related to the organization of scientific activities in three main programs: CP, ToO, and GP (Cordier et al. 2026). These include BA duty management, GRB alert notifications, GRB follow-up observation proposals, submission of ToO and GP proposals, proposal review, generation and submission of observation requests and target lists, feedback on observation status, and querying and downloading observation data. Simultaneously, SUSS provides users with information on the status of SVOM satellite payloads, ground telescopes, and observations.

SUSS integrates the business logic, user management, real-time notification services, underlying databases, and front-end/back-end components of the three scientific support tools (CSC BA Tools, ToO Tools, and GP Tools) within a unified technical framework. It provides services to users via a web interface.

The rest of this paper is organized as follows. Section 2 describes the architecture of SUSS, including the General Platform and the three main support tools. Section 3 details the arrangement of the science operations for the CP, ToO, and GP. Section 4 presents the performance of SUSS in its first operation year. Finally, Section 5 concludes the paper.

⁶ <https://www.svom.cn>

2. Architecture of SUSS

The SUSS is architected as a unified system comprising four interrelated layers: the General Platform, which provides foundational services, and three specialized tool sets—CSC BA Tools, ToO Tools, and GP Tools—each tailored to the specific requirements of the SVOM scientific programs introduced in Section 1.

The General Platform serves as the common backbone, offering shared functionalities such as user authentication, content management, data product handling, real-time push notifications, and a centralized portal for information dissemination. These core services are leveraged by all three specialized tools, ensuring consistency and reducing redundant development.

The CSC BA Tools are dedicated to the CP, supporting Burst Advocates in rapid GRB validation, follow-up coordination, and shift management. These tools integrate with the General Platform to receive real-time alerts and access GRB data products.

The ToO Tools address the time-critical demands of the ToO, enabling swift proposal submission, review, and observation scheduling. They utilize the General Platform’s notification services to alert ToO scientists of new proposals and its data management capabilities to organize ToO observation products.

The GP Tools support the GP’s annual cycle of proposal submission, peer review, time allocation, and long-term observation planning. They rely on the General Platform for user management, proposal archiving, and catalog generation.

Together, this layered architecture ensures that each scientific program benefits from both specialized functionalities and a robust, shared infrastructure, facilitating efficient and coordinated science operations across the SVOM mission.

The basic structure of SUSS is shown in Figure 2. This section elaborates on the functionalities of its various support tools.

2.1. General Platform

The SUSS General Platform provides common functions for the CSC BA Tools, ToO Tools, and GP Tools, including:

2.1.1. SUSS Portal

The SUSS Portal provides users with SVOM-related news, GP proposal call announcements, user guides, various documents, and different SVOM project links. It is an important channel for scientific users to obtain information related to SVOM and its scientific activities. Articles are publicly displayed on the SUSS Portal according to their categories.

2.1.2. SVOM Observation Status Display

SUSS provides users with the basic status of SVOM scientific operations, enabling them to quickly understand SVOM’s historical and current status. This assists users in making rapid decisions regarding GRB identification and ToO observation proposals.

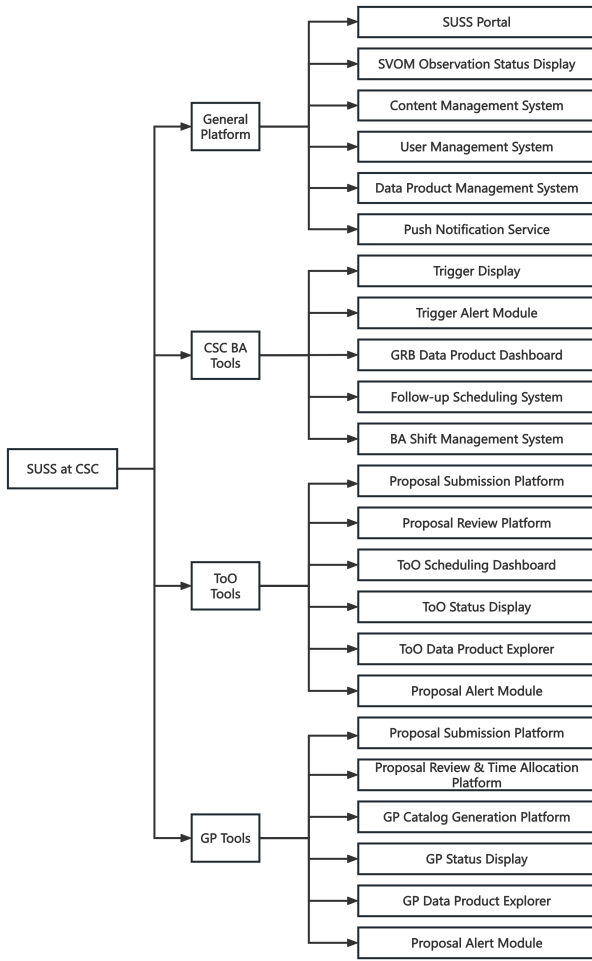


Figure 2. The architecture of SUSS, which includes the General Platform, CSC BA Tools, ToO Tools, and GP Tools, is designed to integrate the distinct functions of each component.

SUSS provides a dynamic celestial sphere map (Figure 3) displaying the alert positions and error regions of events detected by SVOM and other astronomical satellites (Swift, Gehrels et al. 2004; Fermi, Atwood et al. 2009; Einstein Probe (EP), Yuan et al. 2022, etc.) at different times. The map also shows the monitored sky areas of SVOM/ECLAIRs and Ground-based Wide Angle Camera (GWAC; Han et al. 2021; Xin et al. 2026). Users can quickly assess potential associations between events detected by different satellites and the monitored sky areas of SVOM/ECLAIRs and GWAC.

SUSS provides dynamic charts displaying the ToO and GP observation plans and completion status at different times, which is demonstrated in Figure 4. Users can check ToO/GP observation targets, planned observation times, and completion status, enabling quick decisions on the necessity of ToO observation proposals and available observation time windows.

SUSS provides dynamic charts and lists showing the geographical locations of different ground telescopes, day/night periods, telescope availability, and weather conditions at the telescope sites, which are shown in Figure 5. Users can check target visibility and quickly select ground telescopes for GRB follow-up observations.

2.1.3. Content Management System

The Content Management System provides a backend web interface for administrators to create, edit, publish, sort, and retract the articles displayed on the portal.

2.1.4. User Management System

SUSS allows users to access all tools with a single account. The three support tools (CSC BA Tools, ToO Tools, and GP Tools) have different user types with varying permissions, including roles such as system administrator, PI, BA manager, BA, ToO scientist, GP manager, ToO/GP proposers, and GP Time Allocation Committee (TAC) members.

Many SVOM scientific users have permissions to use multiple support tools. Therefore, SUSS provides a unified user management platform for system administrators and the administrators of each support tool to manage user identities, permissions, and accessible functional modules.

2.1.5. Data Product Management System

The Data Product Management System provides GRB and corresponding ToO/GP observation data products for SVOM scientific users, such as BAs and ToO/GP proposers. The system collects scientific data products from both SVOM space-based instruments and ground-based telescopes, while establishing correlations between data sources, observation tasks, and observation proposers to ensure precise data distribution (see Figure 6).

2.1.6. Push Notification Service

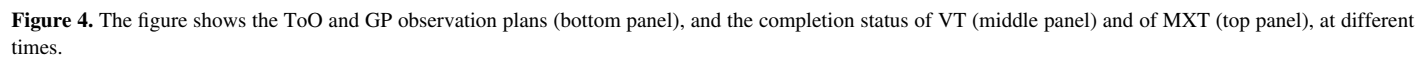
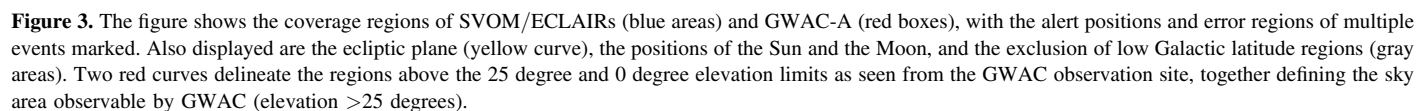
The Push Notification Service offers underlying support for various instant messaging platforms (including Short Message Service (SMS), MATTERMOST ⁽⁷⁾, ENTERPRISE WECHAT ⁽⁸⁾, DINGTALK ⁽⁹⁾, FEISHU ⁽¹⁰⁾, etc.), tailored to the usage habits and environments of SVOM's international user base. Each support tool within SUSS can leverage this service to deliver critical real-time notifications, enabling users to promptly receive GRB alerts, follow-up observation requests, ToO/GP proposal status updates, and other key operational information.

⁷ <https://mattermost.com>

⁸ <https://work.weixin.qq.com>

⁹ <https://www.dingtalk.com>

¹⁰ <https://www.feishu.cn>



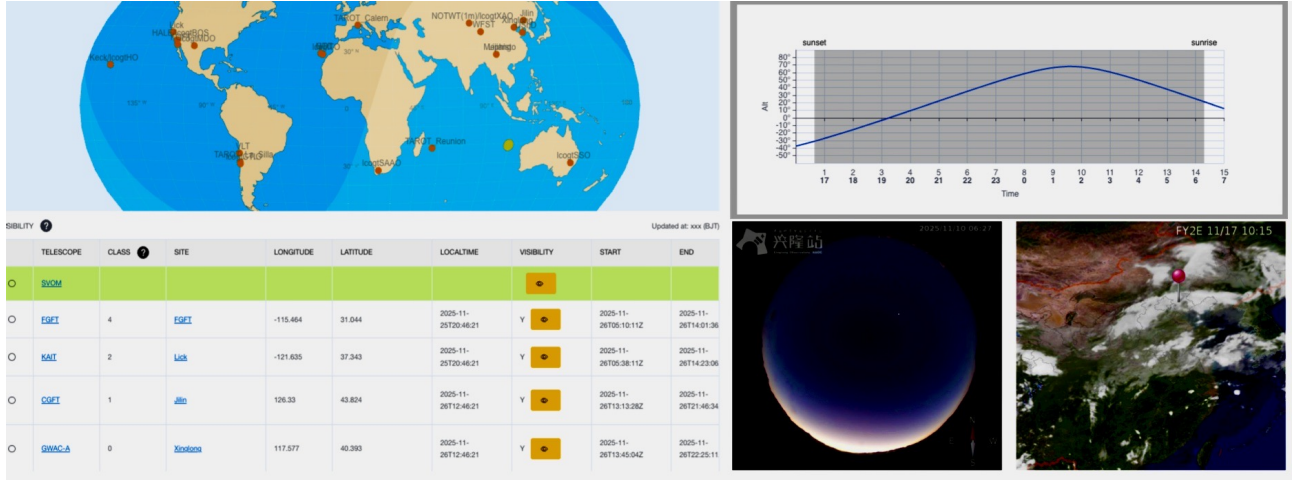


Figure 5. The figure presents an overview of the SVOM ground-based follow-up telescope system. The top-left panel shows the geographical distribution of the telescopes and their day/night periods; the bottom-left indicates their real-time availability status (green); the top-right displays the visibility of a target, expressed as its altitude; and the bottom-right provides local weather conditions and cloud coverage for each observatory.

ID	INSTRUMENT	OBS_TYPE	OBS_ID_NUMBER	SOURCE_NAME	TRIGGER_NAME	SVOM_DB_OBJECT_ID	DATA_TYPE	OBSERVER	DATA ARRIVING TIME ↓	SHOW ALL DATA
☐	530	ECL	GP-PPT	6612		B1_1328	SDP		2025-11-23T21:31:57Z	👁
☐	529	MXT	ToO-NOM-AT	6637	B1_pointing-1123	ToO_8108	SDP		2025-11-23T18:14:32Z	👁
☐	528	ECL	ToO-NOM-AT	6637	B1_pointing-1123	ToO_8108	SDP		2025-11-23T18:14:29Z	👁
☐	527	MXT	ToO-NOM-GRB	6640	sb25112204	ToO_8111	SDP		2025-11-23T15:04:42Z	👁
☐	526	ECL	ToO-NOM-GRB	6640	sb25112204	ToO_8111	SDP		2025-11-23T15:00:49Z	👁
☐	525	MXT	ToO-NOM-AT	6639		ToO_8110	SDP		2025-11-23T12:34:43Z	👁
☐	524	MXT	GP-PPT	6610		B1_1327	SDP		2025-11-23T12:22:52Z	👁
☐	523	ECL	GP-PPT	6610		B1_1327	SDP		2025-11-23T12:13:33Z	👁
☐	522	ECL	ToO-NOM-AT	6639		ToO_8110	SDP		2025-11-23T11:59:34Z	👁
☐	521	MXT	ToO-NOM-GRB	6636	sb25112204	ToO_8107	SDP		2025-11-23T06:04:24Z	👁

Figure 6. A centralized interface in the Data Product Management System is provided for accessing scientific data products, which are systematically associated with their corresponding data sources, observation tasks, and observation proposers.

2.2. CSC BA Tools

2.2.1. Trigger Alert Module

The Trigger Alert Module automatically delivers GRB notices to designated messaging platforms via the Push Notification Service. Through the tool's interface, BAs can select their preferred platform and subscribe to notices based on type.

2.2.2. Trigger Display

The CSC BA tools provide pages displaying GRB information, including the triggering satellite and instrument, event type, trigger time, position, error region, and signal-to-noise ratio. The tools also provide interfaces for users to record other relevant information about the GRB event, such as GRB

type, redshift, extinction, and potential host galaxy. The interface is optimized for mobile devices, allowing BAs to efficiently monitor GRB alerts directly on their smartphones.

2.2.3. GRB Data Product Dashboard

The CSC BA tools organize scientific data products from space-based instruments and ground telescope detections of GRB events. BAs can view the scientific products for a specific GRB through the GRB Data Product Dashboard. The dashboard also visualizes quick-look scientific product images and light curves of optical counterpart candidates detected by the Visible Telescope (VT; Qiu et al. 2026) and the Chinese Ground Follow-up Telescope (CGFT; Wu et al. 2026), facilitating rapid identification of optical counterparts and assessment of their variability characteristics.

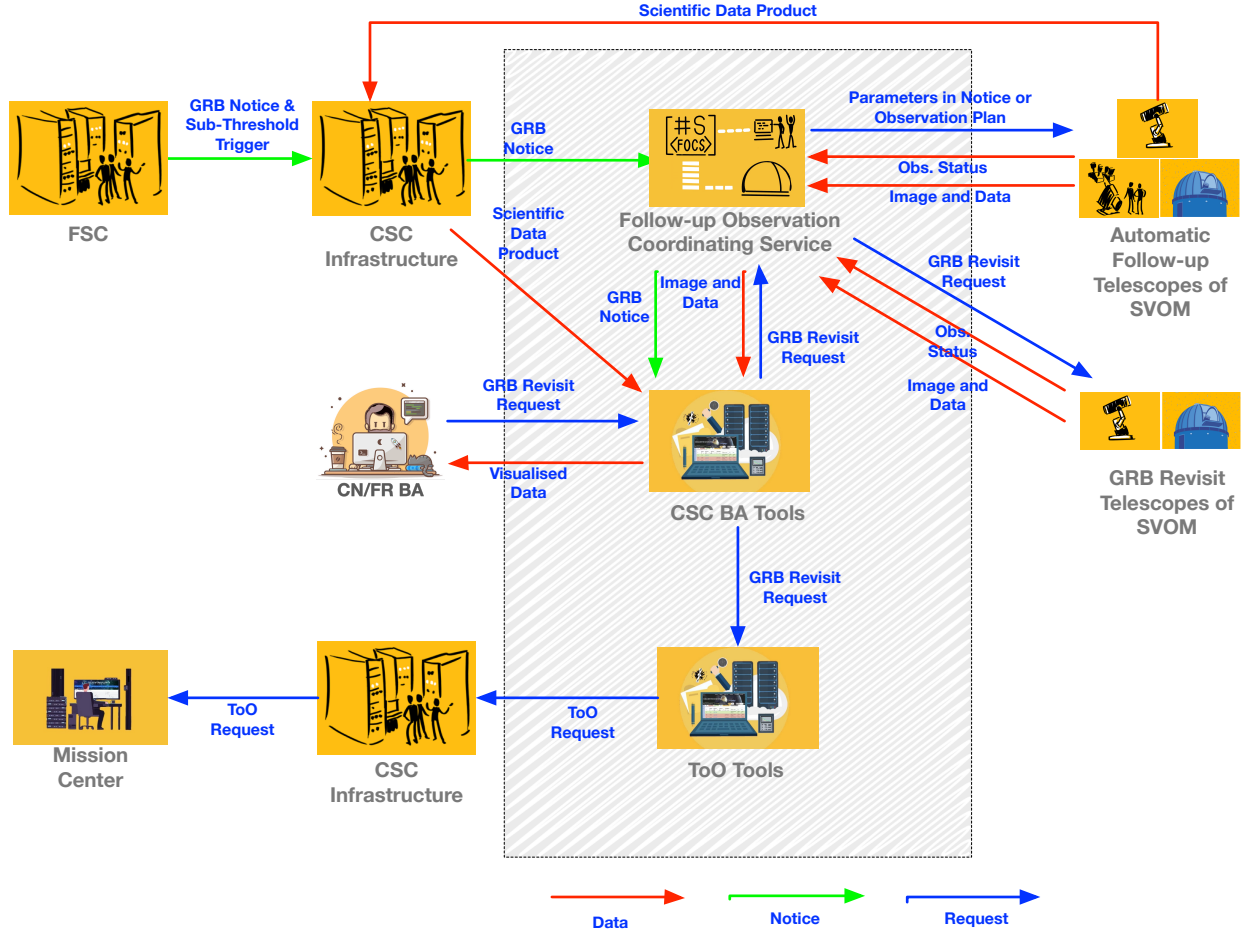


Figure 7. The operational process for automatic follow-up observations and rapid revisit observations is illustrated in the figure.

2.2.4. Follow-up Scheduling System

The Follow-up Scheduling System implements automatic follow-up observations for GRBs (both space-based and ground-based) and rapid revisit observations for GRB optical counterparts through two technical solutions. When SUSS receives a GRB alert triggered by SVOM/ECLAIRs, it sends the alert information to various clients of the Follow-up Observation Coordinating Service (FOCS; Han et al. 2026) based on user subscription needs via the FOCS server. Each telescope deploys a user-customized FOCS client program, which generates follow-up observation plans and triggers the telescope to perform automatic follow-up observations. For rapid revisit observations, BAs can generate revisit observation requests through the Follow-up Scheduling webpage in the CSC BA Tools and send them to the FOCS server. The FOCS server then forwards them to the FOCS client, which generates observation plans and triggers the telescope to perform rapid revisit observations. Figure 7 presents a schematic of the operational process for automatic follow-up and rapid revisit observations.

2.2.5. BA Shift Management System

The Chinese and French BA teams are responsible for 60% and 40% of the duty time, respectively, and manage their schedules independently. From 00:00 to 13:00 UTC each day, the CSC BA Tools support the Chinese BA team on duty. The BA Shift Management System provides scheduling services for the Chinese BA team; the BA manager can set duty dates, shift handover times, etc., for each BA. The system provides the Chinese duty information to the French iFSC tools (Louvin et al. 2026) and displays the duty schedules of both the Chinese and French BA teams.

2.3. ToO Tools

The SVOM mission encompasses three distinct types of ToO: ToO Nominal (ToO-NOM), ToO Exceptional (ToO-EX), and ToO Multi-Messenger (ToO-MM).

Both ToO-NOM and ToO-EX observations are initiated through user-submitted proposals, which undergo review and approval by a ToO Scientist or the Principal Investigator (PI) before implementation.

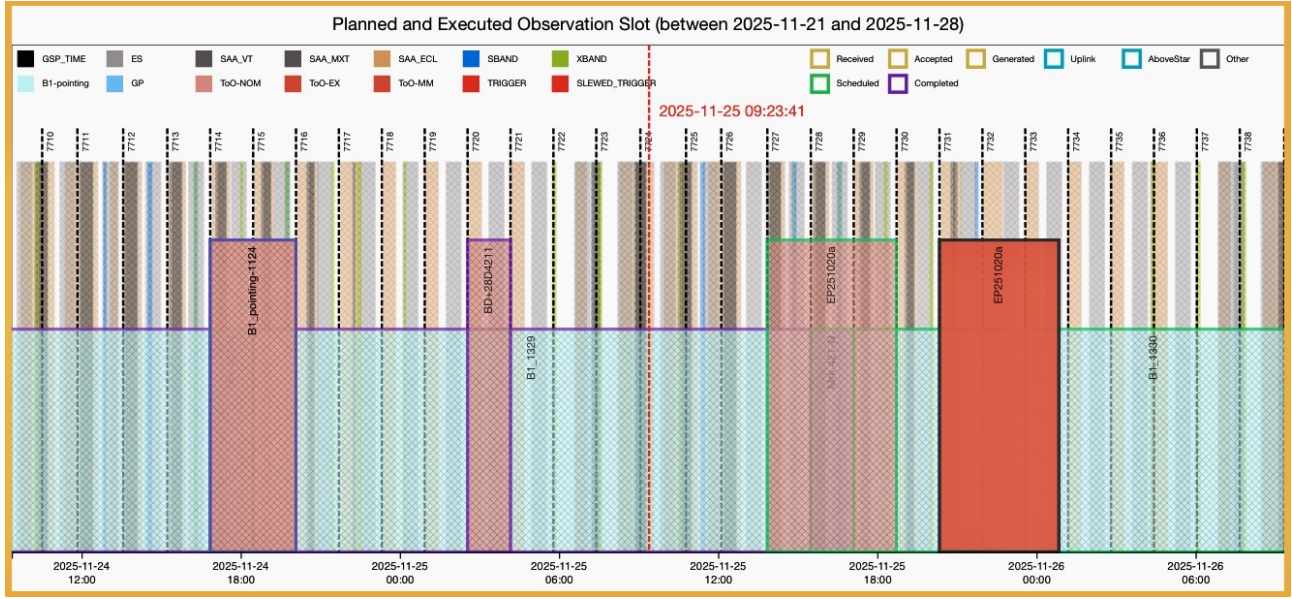


Figure 8. Schematic of the observation scheduling interface. Distinct rectangles and lines represent different targets, showing their observation status and concurrent satellite states (slewing, eclipse, SAA passage, ground station contact). ToO Scientists schedule ToOs by dragging the red boxes to set the time window and inputting the desired duration.

In contrast, ToO-MM observations are typically automated: the system generates a list of potential sky regions for SVOM to observe based on trigger data from significant transient events, such as gravitational waves or neutrinos. This automatically proposed observing plan is then reviewed by a ToO Scientist or PI before moving into the implementation phase.

The scientific organization of SVOM's ToO observations requires execution by ToO scientific users with the support of ToO Tools. Therefore, the ToO Tools provide the following functionalities:

2.3.1. Proposal Submission Platform

SVOM users use the Proposal Submission Platform to create and edit ToO-EX and ToO-NOM observation proposals and submit requests through the ToO Tools.

The ToO process demands high timeliness, necessitating robust support for both rapid proposal submission and efficient review. The Proposal Submission Platform facilitates this by providing proposal templates, validating target parameters, pre-populating observational configuration combinations, and allowing the import of historical proposals to accelerate preparation.

2.3.2. Proposal Review Platform

ToO Scientists use the Proposal Review Platform to review ToO-EX and ToO-NOM observation proposals, adjusting and refining observation configuration parameters. The platform streamlines the review process by integrating a target visibility checking feature and implementing mobile-web optimization,

enabling ToO scientists to evaluate proposals efficiently from their smartphones.

2.3.3. ToO Scheduling Dashboard

ToO Scientists are also responsible for planning ToO observations, determining specific targets, their observational priority, optimal time windows, and exposure durations. They must also promptly adjust existing ToO plans in response to rapid observational demands triggered by significant astronomical events such as GRBs.

The ToO Scheduling Dashboard supports these tasks by enabling scientists to monitor both completed and pending SVOM observations. Through visual interactive tools, users can quickly adjust observation plans via simple drag-and-drop operations. The dashboard facilitates the online generation and submission of ToO observation plans (ToO Requests) to the SVOM Mission Center (MC; Liu et al. 2026) and displays the status of ToO execution plan (ToO Workplan) generation.

The diagram (Figure 8) illustrates different observation targets represented by distinct rectangles and lines. For each target, it displays the observation status and satellite operational states during the observation—including satellite slewing maneuvers, entries into eclipse periods, passages through the South Atlantic Anomaly (SAA) region, and contacts with the telemetry download and telecommand upload ground stations.¹¹ ToO Scientists can schedule the observation

¹¹ The communication windows are critical for ToO Scientists to predict when observation commands can be uploaded to the satellite and when scientific data will be downlinked, facilitating more effective observation planning.

time window for ToOs by dragging the red boxes (targets awaiting observation) left or right, and set the observation duration by entering the required value.

2.3.4. ToO Status Display

The ToO Status Display shows the execution status of ToOs, including request generation, work plans, observation completion status, and data arrival status. ToO Scientists can monitor the entire processing and completion status of ToOs.

2.3.5. ToO Data Product Explorer

The ToO tools organize scientific data products from space-based instruments and ground telescope detections by observation proposal. ToO Scientists and proposers can view the observation data for a specific proposal through the ToO Data Product Explorer. The explorer also provides services to search, view, and retrieve data based on criteria such as target name, coordinates, observation ID, and time range.

2.3.6. Proposal Alert Module

The Proposal Alert Module, integrated into the ToO tools, automatically notifies ToO scientists of newly submitted proposals via email and SMS through the Push Notification Service, enabling them to rapidly process ToO requests and reduce observation latency.

2.4. GP Tools

The GP serves as the primary observational framework for the SVOM mission's routine operations. Each GP cycle is typically finalized prior to the start of a calendar year, establishing the specific observation targets and their allocated time slots for the upcoming year.

The GP development process, coordinated through the CSC, involves multiple stages: a "Call for Proposals" (CfP), proposal submission, proposal evaluation, time allocation, and the generation of a GP Catalog. This catalog is subsequently submitted to the SVOM MC, where it is incorporated into the comprehensive GP Yearly Planning.

All GP-related activities within the CSC are conducted using the dedicated GP Tools, which provide the following functionalities:

2.4.1. Proposal Submission Platform

During the CfP campaign of each GP semester (typically one year), GP proposers use the Proposal Submission Platform to create and submit two types of GP observation proposals: GP-PPT (Pre-Planned Target) for anticipated pre-planned target observations, and GP-ToO for non-planned target observations (i.e., known targets with unpredictable active phases).

The Proposal Submission Platform enables users to complete proposals by providing all required information, including scientific objectives, observation strategy, target lists, and observation configurations. It supports bulk target import and offers auxiliary tools—such as the Target Visibility Calculator, B1 Reference Pointing Calculator, and VT Exposure Tool—to assist proposers in configuring observations accurately.

2.4.2. Proposal Review and Time Allocation Platform

All GP proposals (including both GP-PPT and GP-ToO) collected during the CfP campaign undergo review by the GP Manager. The Proposal Review Platform supports this process by providing functionality for evaluating observation proposals and adjusting GP observation configuration parameters.

The Time Allocation Committee (TAC) utilizes the Time Allocation Platform to evaluate observation proposals, determine their acceptance, and allocate observing time and priorities to those approved.

2.4.3. GP Catalog Generation Platform

To handle the hundreds or even thousands of GP targets in each observing season, targets from GP proposals are automatically ingested into the system, with their parameters and observational configurations validated automatically. The GP Catalog Generation Platform efficiently manages GP targets, enables GP Managers to select targets in bulk, adjust observational configurations, generate the annual GP target catalog, and supports its submission to the MC to finalize the yearly GP observing plan.

2.4.4. GP Status Display

The GP Status Display shows the execution status of GPs, including work plans, observation completion status, and data arrival status. GP managers can monitor the entire processing and completion status of GPs.

2.4.5. GP Data Product Explorer

Although the main instruments used in GP observations are the Microchannel X-ray Telescope (MXT; Götz et al. 2026) and VT, all four instruments - ECLAIRs (Godet et al. 2026), the Gamma-Ray Monitor (GRM; Sun et al. 2026), MXT, and VT - are considered to be involved and activated by default. The GP tools are used to organize scientific data products from those instruments by observation proposal. GP managers and proposers can view the observation data for a specific proposal through the GP Data Product Explorer. For example, users can search for all observations of a specific target by entering its name or coordinates, and retrieve the corresponding data products. The explorer also provides services to search, view, and retrieve data based on criteria such as proposal title, target name, coordinates, observation ID, instrument, and time range.

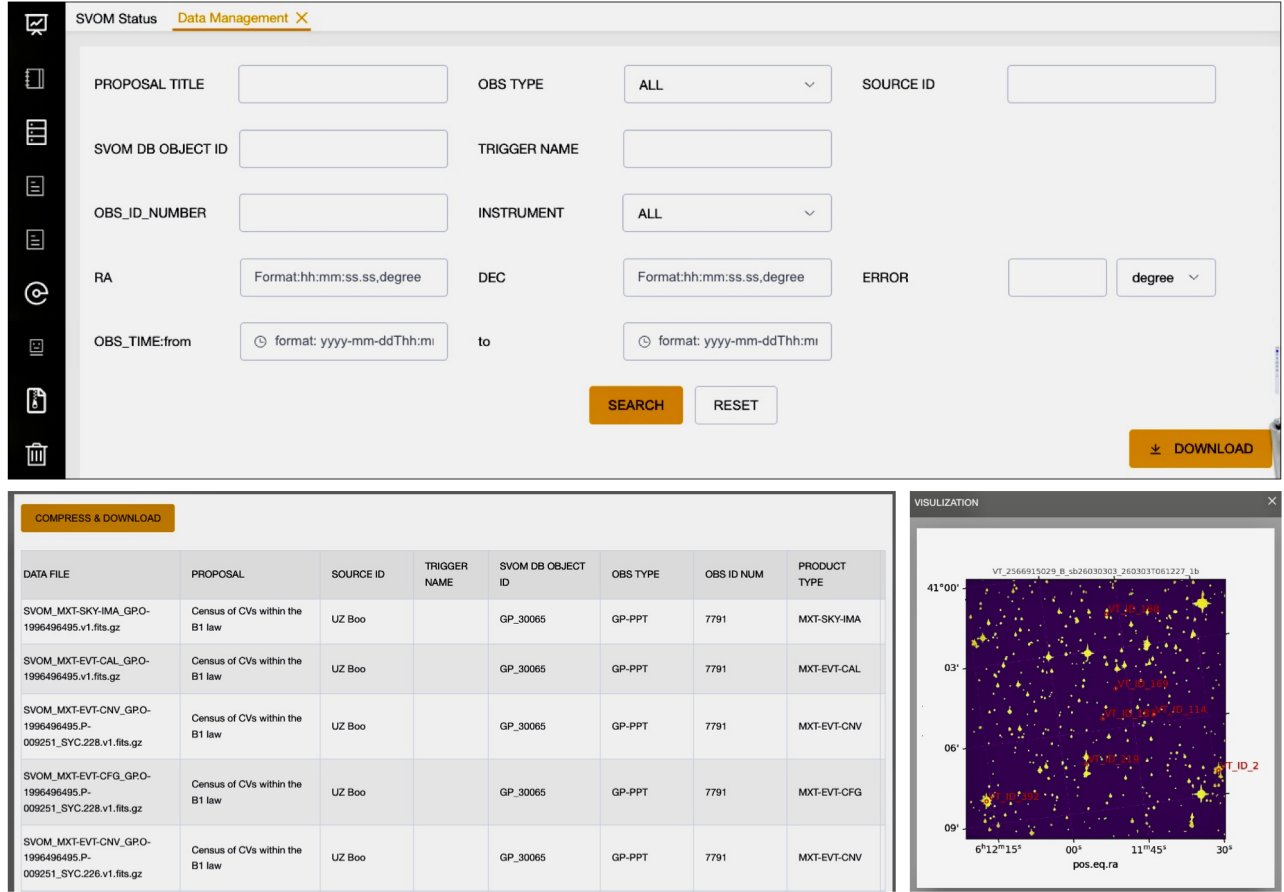


Figure 9. The GP Data Product Explorer interface. The top panel shows the query interface with search criteria fields (proposal title, target name, coordinates, observation ID, time range). The lower left panel displays the list of retrieved multi-instrument SVOM data products from a sample search. The lower right panel provides an optical image preview of the selected target.

Figure 9 shows the GP Data Product Explorer interface, including:

1. The data product query interface with search criteria fields;
2. A list of retrieved multi-instrument SVOM data products from a sample search;
3. An optical image preview panel.

2.4.6. Proposal Alert Module

The Proposal Alert Module automatically notifies GP managers of newly submitted proposals via email through the Push Notification Service.

3. Arrangement of the Science Operations

To provide context for SVOM's scientific activities and SUSS service offerings, this section presents an overview of their organizational workflow.

3.1. Science Activities Related to BA

3.1.1. BA Shift Scheduling

The Chinese and French BA teams are managed and scheduled independently. The CSC BA Tools provide management functions for the Chinese BA team. The Chinese BA manager can set the daily duty BA personnel, shift schedules, and handover times. BAs can receive automatically pushed duty information through multiple platforms and view the duty schedules of both teams via the CSC BA Tools. Shift handovers can be performed via WeChat groups and Mattermost channels.

3.1.2. Strategy for Trigger Validation

The validation of SVOM GRB authenticity is completed by the ECLAIRs Trigger Advocate, the GRM instrument team, and the BAs using instrument centers and iFSC tools. BAs can annotate the authenticity of each SVOM GRB in the CSC BA Tools.

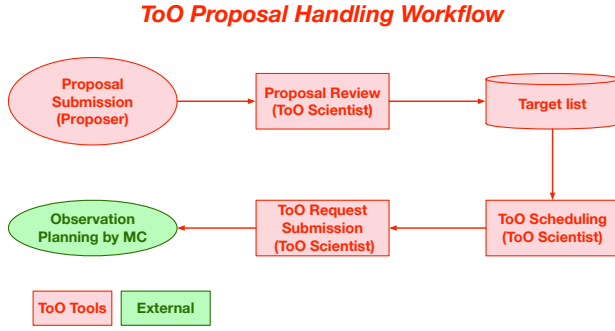


Figure 10. The ToO proposal handling workflow.

3.1.3. GRB Follow-up Organization

To meet the need for rapid follow-up observations of SVOM GRBs, the CSC BA Tools implement rapid follow-up observation request planning and submission in two phases.

First, the automatic follow-up phase generates follow-up observation requests automatically, triggering automatic ToO-NOM-GRB observations for the SVOM satellite (submitted when the automatic slewing threshold is not met) and for the Chinese ground telescopes (including core telescopes such as CGFT and GWAC, and partner telescopes).

Second, the revisit phase involves the manual submission of deep-photometry or spectroscopy revisit observation requests by BAs. Chinese ground telescopes complete the automatic revisit observation process upon receiving the request. For SVOM satellite revisit observations, BAs manually submit ToO observation proposals through the ToO Tools, which handle the creation, planning, and sending of observation requests to the MC.

3.2. ToO Proposal Handling Procedure

ToO offers two observation modes with different priorities: ToO-EX and ToO-NOM. ToO-EX has a higher priority than the GRB observation mode, while ToO-NOM has a priority lower than GRB but higher than the GP observation mode. The handling procedure is the same for both types, as illustrated in Figure 10.

Members of the SVOM science consortium can submit ToO observation proposals through the ToO Tools. A proposal includes the requested ToO type, scientific objective, parameters of the astronomical target, and observation parameters. Proposers must check target visibility, VT exposure times, and other necessary information before submission. Each ToO proposal must be reviewed and approved by a ToO Scientist before proceeding. ToO Scientists evaluate proposals based on scientific importance, target observability, and operational feasibility.

For approved proposals, ToO Scientists review the targets and observation parameters, and visually configure the

priority, observation duration, and start time for the ToO target, thereby planning the observation tasks and submitting observation requests. When planning, they consider the sequence of different tasks and the observation duration of each task. Typically, the end time of the previous task is selected as the start time for the subsequent task to avoid overlaps. However, for sudden, important tasks, scientists can specify observation requests that override other ongoing ToO tasks.

There are two uplink channels for ToO observation requests at the MC: via the BeiDou link (via the Short Message Service of the Chinese BeiDou Navigation Satellite System) and via the S-band. The typical uplink time delays are different; the BeiDou link has a delay on the order of minutes (usually within 10 minutes), while the S-band has a delay on the order of hours (usually over 8 hr). To execute ToO observation tasks faster, the SVOM CSC and MC are working together to optimize the process. By automatically using the GSP sub-satellite point time matching satellite orbital maneuvers as the observation task start time, and automatically temporarily modifying the GSP sub-satellite point time for the next orbital maneuver, the start time of observation tasks can be shortened to within 30 minutes of request submission, significantly enhancing scientific output.

The processing status of each submitted observation proposal can be tracked in the ToO Tools. After submitting an observation request, ToO Scientists can view the work plan for the observation task, its execution status, data reception status, and completion status.

3.3. GP Proposal Handling Procedure

SVOM solicits GP observation proposals once a year. The GP manager releases the GP CfP announcement via SUSS Portal, initiating the procedure illustrated in Figure 11. The annual proposal call typically opens in May, and proposers have 3–4 months to prepare and submit proposals.

The GP proposal call receives two types of proposals: GP-PPT for pre-planned target observations, and GP-ToO for non-planned target observations. GP-PPT proposals are suitable for targets with predictable behavior, such as monitoring known active galactic nuclei (AGNs) or cataclysmic variables. GP-ToO proposals are designed for sources that undergo unpredictable outbursts, such as X-ray binaries or extreme blazar flares, allowing observations to be triggered when the source becomes active.

Both types must be submitted through GP Tools. Proposers must declare the proposal type and its scientific category. The TAC categorizes and reviews proposals based on scientific domain. Currently, GP accepts proposals in areas such as AGNs, TDEs/Clusters/Galaxies, FRBs/Magnetars/AXPs/SGRs, X-ray binaries, ULXs, CVs/Novae, and other galactic and miscellaneous sources.

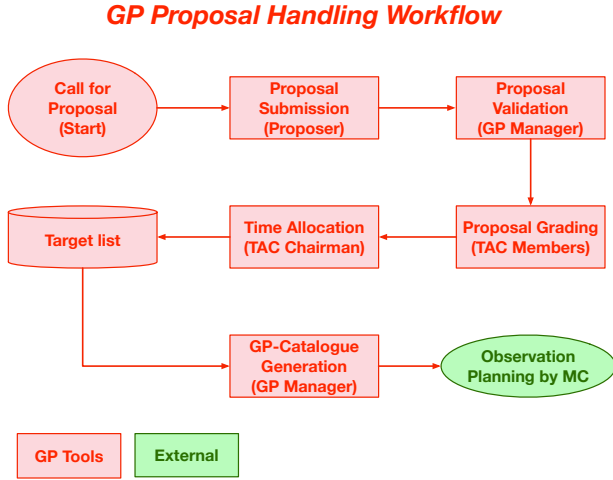


Figure 11. The simplified GP proposal handling workflow.

GP proposals must clearly elaborate on the scientific background, overall significance, relevant references, and prior results. Proposers need to describe the observation plan, state immediate analysis objectives, and elaborate on the proposed targets and specific observation content. For GP-ToO proposals, the observation strategy must clearly provide the trigger criteria and trigger probability.

The GP manager oversees the validation of each proposal's format and completeness and assigns them to TAC members.

The TAC is responsible for reviewing and evaluating each proposal based on scientific significance, feasibility of the observation strategy, and reasonableness of the observation configuration. The TAC organizes a review meeting each year around October–November to formally approve proposals and allocate the total observation time. It provides recommendations on the observation strategy and configuration for each proposal or target.

The TAC's proposal review, approval, and recommendations are completed through GP Tools. The approved GP observation targets form a master target list.

Based on the TAC's recommendations, the GP manager compiles a one-year GP source catalog (GP Catalog), including targets and observation parameter configurations. The SVOM MC uses this catalog to complete the annual long-term observation planning. The catalog aims to allocate approximately 60% of the total effective GP observation time to proposals submitted by Chinese Co-Investigators and approximately 40% to those submitted by French Co-Investigators.

1. Observation time for proposals led by Chinese Co-Investigators is deducted from the Chinese allocation (60%).
2. Observation time for proposals led by French Co-Investigators is deducted from the French allocation (40%).

During observation execution, GP observation tasks may be interrupted by GRB or ToO tasks. The SVOM MC performs re-planning weekly to ensure that each GP target receives its allocated total observation time. The actual observation time for each target is tracked to strive to maintain the preset 60/40 allocation ratio as much as possible.

The processing status of each submitted observation proposal can be tracked in GP Tools. After submitting the GP source catalog, the GP manager can view the work plans for observation tasks, their execution status, data reception status, and completion status.

GP managers and proposers can query observation tasks and scientific data products using criteria such as proposal name, task type, target name, target ID, coordinates, coordinate range, and observation time range. For instance, users can search for all observations related to a particular proposal by entering the proposal name, or retrieve data for a specific target by providing its coordinates and a time range. They can also package and download scientific data products (see Figure 12).

4. SUSS Performance in the First Operation Year

Since the launch of SVOM, the SUSS platform has provided stable service for over 16 months to more than 140 users, including proposers, BAs, GP managers, ToO managers, and TAC members, from more than 30 Chinese and French research institutes and universities, including the NAOC, IHEP, CEA, IAP; GXU, BNU, IRAP etc.¹²

The ToO Tools have successfully facilitated the processing and observation planning for 634 ToO proposals (from 2025 January 15 to 2025 November 9). During this period, a series of targeted enhancements were implemented to significantly accelerate the workflow. These included automating GRB follow-up ToO submission, optimizing the proposal handling logic, introducing rapid-processing alerts, deploying a visual ToO scheduling dashboard, and increasing the flexibility of uplink switching conditions for ToO tasks. Collectively, these upgrades have drastically reduced the end-to-end processing time for ToO operations. Prior to these enhancements, ToO-EX proposals typically required up to 12 hr from submission to execution, while ToO-NOM proposals required up to 48 hr. Following the implementation of the upgrades, both ToO-EX and ToO-NOM proposals now consistently achieve processing times of less than 1 hr, markedly improving the mission's responsiveness to transient events.

The GP Tools have supported the management of GP targets and the generation of GP catalogs for both the 2024 and 2025 cycles. To date, the scientific task phase for the first SVOM

¹² National Astronomical Observatories, Chinese Academy of Sciences (NAOC); Institute of High Energy Physics, Chinese Academy of Sciences (IHEP); Commissariat à l'énergie atomique et aux énergies alternatives (CEA); Institut d'Astrophysique de Paris (IAP); Guangxi University (GXU); Beijing Normal University (BNU); Institut de Recherche en Astrophysique et Planétologie (IRAP).

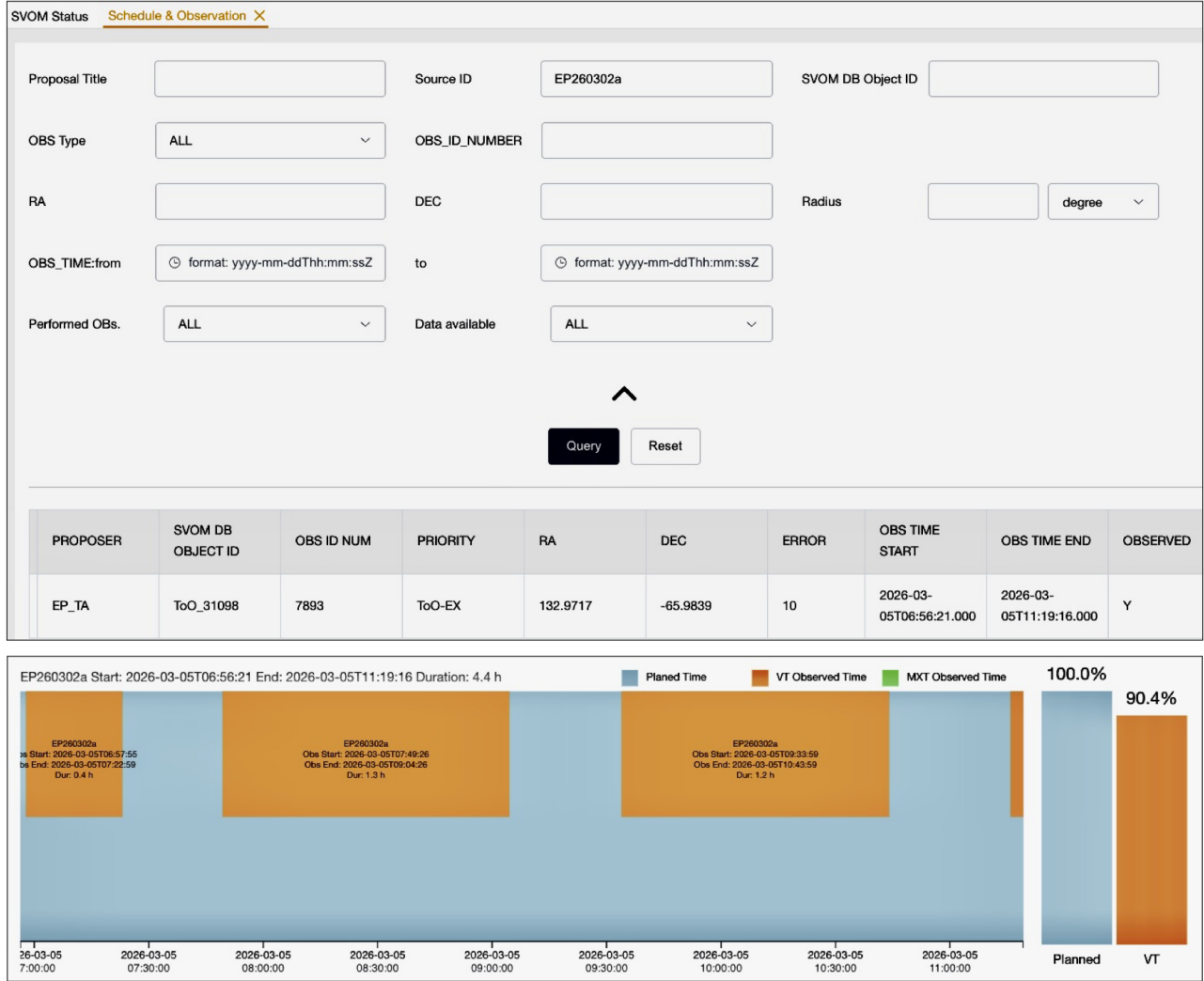


Figure 12. The GP observation task and status query interface. The top panel shows the search criteria fields (proposal name, task type, target name, coordinates, time range, etc.). The middle panel lists the retrieved observation tasks with detailed information including proposal name, PI, target, observation type, coordinates, scheduled time, completion status, and data downlink status. The bottom panel provides a visualization of the observation completion progress.

public Cfp for the 2026 GP has been successfully completed. The entire workflow—from the Cfp, through proposal submission, review, and time allocation, to the final generation of the GP Catalogs—was seamlessly accomplished with the support of the GP Tools.

Meanwhile, the BA Tools have supported the continuous expansion of the ground-based telescope network. So far, over ten telescopes and groups—such as the SVOM Chinese Core Telescopes (CGFT, GWAC), the 1.6 m Multi-channel Photometric Survey Telescope (Mephisto) of Yunnan University, NAOC’s 2.16 m telescope, the Katzman Automatic Imaging Telescope (KAIT) at Lick Observatory (USA), and Shandong University’s 1 m telescope—have been connected to the FOCS service. Furthermore, the introduction of multi-platform

message notifications by the BA Tools has significantly improved support for the team’s rapid GRB processing workflows.

To continuously meet the evolving needs of scientific users and optimize workflows, SUSS has been updated through three major releases alongside multiple minor iterations.

5. Conclusion

The SUSS has been successfully developed and deployed as a cornerstone of the SVOM Chinese Ground Segment. It provides a unified, web-based platform integrating the CSC BA Tools, ToO Tools, and GP Tools, effectively centralizing support for the core scientific operations of the SVOM mission.

Throughout its first operational year, SUSS has demonstrated robust performance and stability in facilitating the complex workflows associated with GRB follow-up (CP), ToO observations, and GP management. The system has proven essential for tasks ranging from rapid GRB alert dissemination and BA shift management to streamlined proposal submission, review, scheduling, and data access for ToO and GP programs. Its integrated architecture has enhanced operational efficiency by providing users with a single point of access for information and tools, supported by comprehensive observation monitoring capabilities.

The initial evaluation confirms that SUSS effectively meets its primary objectives and user requirements, serving over 140 users reliably. The insights gained from this initial operation phase, particularly regarding user interaction and system performance under real-world conditions, provide valuable guidance for future development. Ongoing enhancements will focus on further optimizing the user experience, expanding functionality, and improving automation to better serve the evolving needs of the SVOM scientific community and maximize the scientific return of the mission.

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ORCID iDs

Yang Xu  <https://orcid.org/0000-0002-8694-4672>

Zhu-Heng Yao  <https://orcid.org/0009-0000-1228-2373>

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