



SVOM Ground Support System

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Abstract

The Ground Support System (GSS) is a critical component of the Space-based multi-band Variable Objects Monitor (SVOM) mission's ground segment. Its main tasks include organizing and implementing the operations and management of the SVOM payloads, receiving scientific data, as well as preprocessing and managing the scientific data. To address the specific requirements of the SVOM mission, including specialized mission planning, data reception, status monitoring, and product processing, a dedicated SVOM GSS has been designed based on the integrated architecture of the Chinese Space Science Satellite Project GSS. This system has successfully supported SVOM's launch and on-orbit operations.

Key words: methods: analytical – Astronomical Instrumentation, Methods and Techniques – astroparticle physics

1. Introduction

The Space-based multi-band Variable Objects Monitor (SVOM) mission is a collaborative mission between China and France aimed at detecting, localizing, and studying gamma-ray bursts (GRBs) and other high-energy transient phenomena (Cordier et al. 2025).

SVOM mission is a complex space-ground integrated system composed of on-orbit satellite and ground segments, including the Chinese and French ground segments, as shown in Figure 1. The Ground Support System (GSS) is a component of the Chinese ground segment of SVOM and is the core of SVOM operations. It acts as a hub connecting satellite and other centers, achieving operational control and management of SVOM payloads, scientific data reception, as well as preprocessing and management of scientific data (Cordier et al. 2026).

In addition, the GSS provides dedicated service tools to support scientific users for efficient scientific research and applications. These tools include observation status query services, Operation Coordination Group (OCG) support services, and data services, among others.

1.1. System Requirements

The SVOM GSS consists of three main components: the Mission Center (MC), the Space Science Data Center (SSDC), and the ground receiving subsystem, which includes a Chinese X-band ground station.

1.2. Requirements of Mission Center

The MC is the coordination and operation center for SVOM mission, serving as the in-orbit management center for the payload. Its main tasks include mission planning and uplink control, along with downlink data processing and real-time monitoring.

For mission planning and uplink control, MC is responsible for generating work plans, integrating routine observations, opportunity observations, GRB observations. It conducts comprehensive planning and analysis of observation tasks and distributes the results. It is responsible for generating control commands for Chinese payloads, collecting and merging control commands from both Chinese and French sides, and it plans the data transmission schedule for the onboard X-band transmitter, generating command sequence files, and sending them to the tracking and control system. For ToO urgent observations, immediate uplink can be performed via the BeiDou system.

For downlink data processing and real-time monitoring, MC is responsible for collecting S-band and X-band downlink data sent by ground stations and promptly sending the data to the SSDC; it processes downlink data in real time, monitors and displays payload status parameters, and tracks key parameters related to satellite operation conditions. Moreover, MC sends the monitoring results to the Chinese Science Center for on-board payload status assessment, and is also responsible for the in-orbit status management of the payload.

1.3. Requirements of Space Science Data Center

The SSDC is the data processing, management, and archiving center for SVOM mission. Its main tasks include data preprocessing and product distribution, along with data archiving and release.

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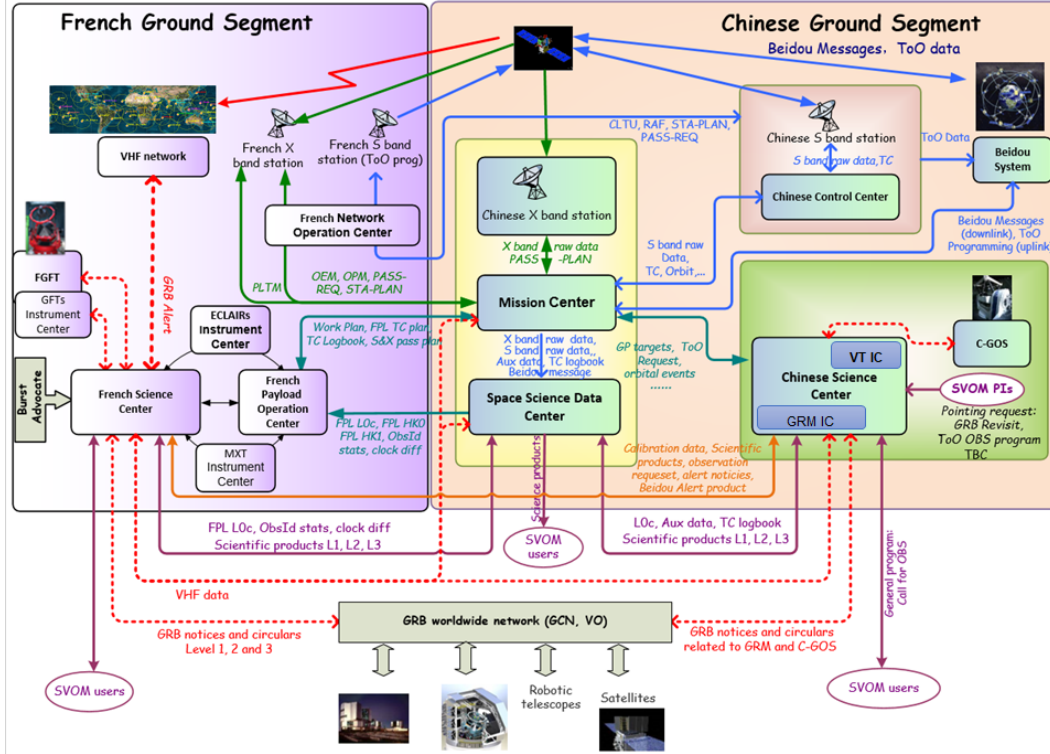


Figure 1. Overall of SVOM mission.

SSDC is in charge of preprocessing and performing quick-look transformation of satellite raw data to generate primary scientific data products and auxiliary data products. These products are then distributed to the scientific centers of both China and France, and the payload operation center in France receives the payload engineering data products.

Furthermore, the center is responsible for collecting, uniformly managing, and long-term preserving all levels of scientific data products, auxiliary data products, and document tools generated by SVOM mission. It creates scientific data archives and catalogs to ensure the completeness, security, and permanent usability of scientific data, providing data release services to scientific users.

1.4. Requirements of the Ground Receiving Subsystem

The ground receiving subsystem provides data reception by the Sanya station, with a reception time exceeding four tracks per day. The received data is promptly transmitted via the communication network to the Mission Center for further processing.

1.5. SVOM Mission Special Requirements

Compared with general scientific satellites, the SVOM mission has the following special requirements, which need to be focused on in system design.

- 1) Mission planning and control integrating the General Program (GP) and the Target of Opportunity Program (ToO)

SVOM's on-orbit observations are categorized into three types: the Core Program (CP) driven by on-orbit detections, the GP targeting pre-selected sources, and the ToO program responding to ground requests for active sources. For GP and ToO observations, the MC is required to conduct planning and command uplinking based on the scientific teams' source catalogs and observation requests—demanding high planning efficiency and rapid uplinking, which is a key design focus of the MC.

- 2) Reception, processing, and monitoring of multi-source data

For data downlink, SVOM transmits data through multiple channels: S-band telemetry (for status monitoring), X-band data transmission (primary scientific data), Very High Frequency (VHF) channel data (scientific and engineering), and BeiDou short message data (scientific and engineering). Real-time processing and monitoring of these multi-source data are critical functions of the MC, while dedicated data product generation is the core responsibility of the SSDC and requires SVOM-specific design.

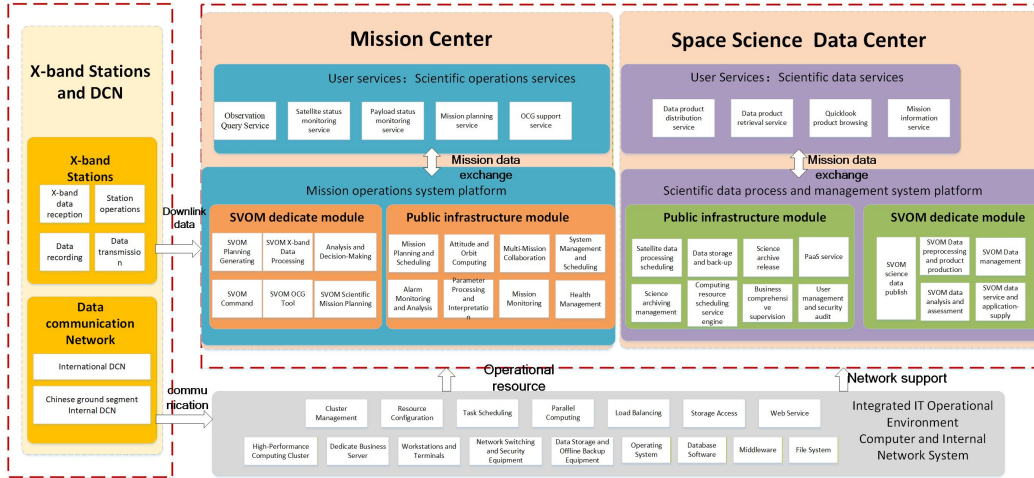


Figure 2. The architecture of SVOM ground support system.

3) Complete and reliable reception of scientific data

As the main channel for scientific data, the X-band relies on collaboration between Chinese and French ground stations, the MC, and the SSDC to ensure downlink integrity and timeliness: ground stations transmit received data to the MC in near real time; the SSDC assesses data quality during product generation; and the MC arranges supplementary downlink for missing data when necessary, thus guaranteeing data integrity.

2. The Design of SVOM Ground Support System

The SVOM GSS is designed based on the overall architecture of the Chinese Space Science Satellite Project GSS, adopting a combination of public infrastructure modules and SVOM-dedicated modules to support the SVOM mission, as illustrated in Figure 2.

The Chinese Space Science Satellite Project GSS provides system operation resources and network support for the MC and SSDC through the integrated IT operational environment computer and internal network system. Both the MC and SSDC are internally divided into public infrastructure modules and SVOM-dedicated modules: the public infrastructure modules can support multiple satellite missions, while the dedicated modules are customized for the SVOM mission. The SVOM-dedicated modules of the MC include planning generation, commanding, X-band data processing, OCG tool, analysis and decision-making, and scientific mission planning. The SSDC's dedicated modules consist of data pre-processing and product production, data management, data analysis and assessment, data service and application provision, and scientific data publication. The MC and SSDC provide mission operation and data product services to scientific users through user service modules. The Data Communication Network

(DCN) of the GSS is also multi-mission-capable, including the internal communication network of the Chinese ground segment and the international communication network. It supports data transmission from ground stations to the MC and SSDC, data exchange between the ground support system and the Chinese Control Center (CCC) as well as Chinese Science Center (CSC), and data transmission with the French Science Center (FSC), French Payload Operations Center (FPOC), and Network Operations Center (NOC) via the international DCN. For the SVOM mission, the Sanya ground station of the ground support system is utilized, and together with the French X-band stations, completes the reception of SVOM X-band downlink data.

3. Mission Center

3.1. Mission Planning and Payload Controlling

There are two types of SVOM mission planning: GP planning and ToO planning. MC is responsible for scientific observation scheduling and TeleCommand (TC) generation.

- i. *GP Programming* The GP planning (as shown in Figure 3) consists in updating, on a weekly basis, the general program for the following 7 days. The MC splits the observing program into 7 days Work Plan.

Each week, the MC implementation flow is as follows:

- 1) MC receives the GP-Catalog which is submitted by CSC in advance.
- 2) MC conducts mission scheduling and generates the GP-Workplan.
- 3) The OCG decides the 7 day Work Plan, using the GP Work Plan generated by MC as input based on the Orbital Ephemeris Message (OEM). The program also includes nominal calibrations.

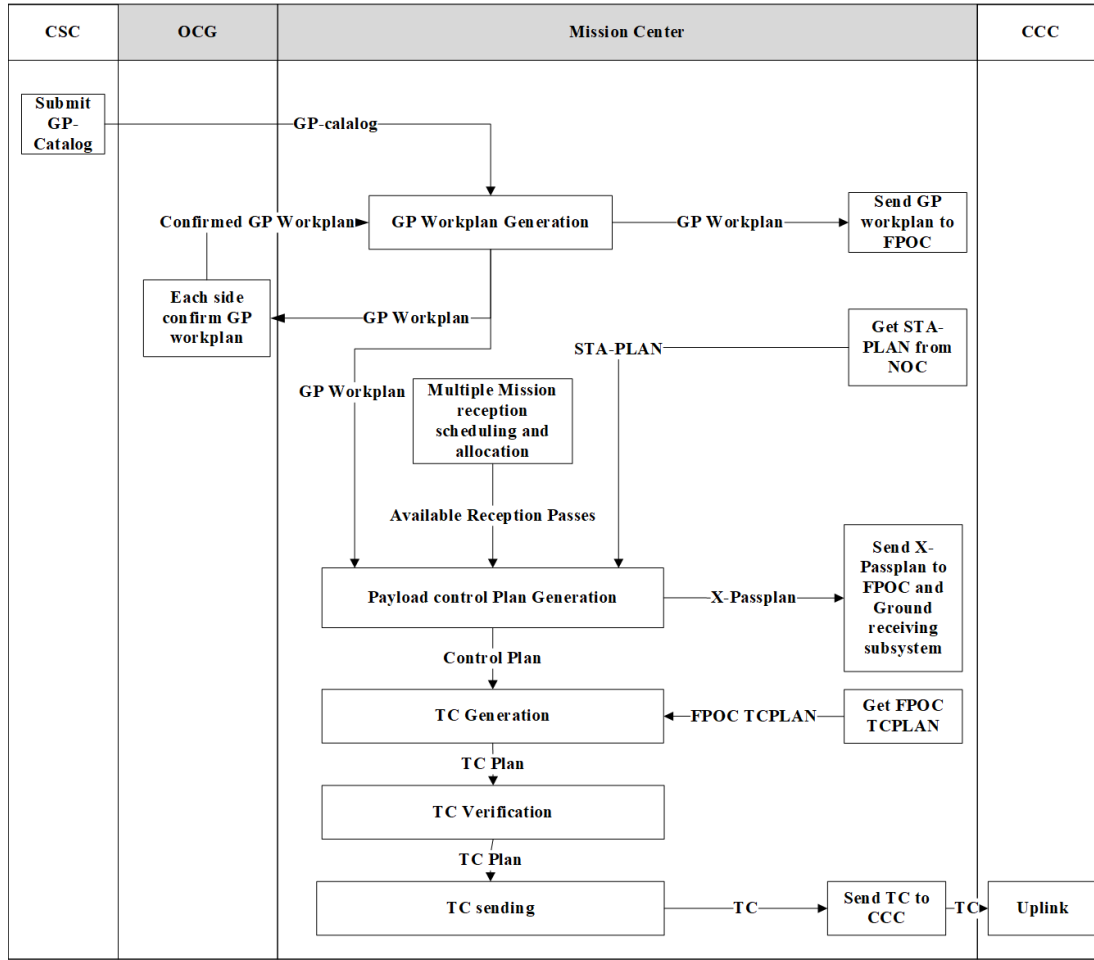


Figure 3. GP Planning in MC.

4) MC sends the GP telecommand plan (including pointing plan, general slew points, earth eclipse, etc.), Chinese payload and French payload telecommand plans to CCC.

5) CCC collects the 7 day Chinese and French payload telecommand plan and the satellite platform telecommand plan, uplinks them on available passes before execution.

ii. ToO Programming

The ToO planning process (as shown in Figure 4) has to be able to modify the global observation timeline to take into account urgent observing needs (including GRB revisits) that are submitted with ToO requests (Nominal or Exceptional or Multi-Messenger ToO). These requests have to be agreed by the PI or a ToO scientist and are elaborated by the CSC and then, transmitted to the MC. Furthermore, non-routine calibration needs will also be fulfilled by these asynchronous ToO requests.

Nominal ToO shall be started within 48 hr from ToO acceptance or triggered by the ToO Scientist and PI.

Exceptional ToO shall be started within 12 hr (goal) from acceptance by the ToO Scientist and PI. The default uplink channel to satellite is BeiDou short message.

Multi-messenger ToO shall be started within 12 hr (goal) from acceptance by the ToO Scientist and PI. The default uplink channel to satellite is BeiDou short message.

During the operation phase, above 80% percent of the ToO-EX and ToO-MM is uplink by BeiDou short message, the time delay is less than 1 hr (Bai et al. 2026).

Once PIs agree on the ToO proposal, the ToO request is then sent to MC, which then engages the ToO programming process depending on ToO category as mentioned above.

3.2. Mission Monitoring

MC is monitoring the SVOM mission key parameters and health checking by S-band, X-band, VHF band and BeiDou

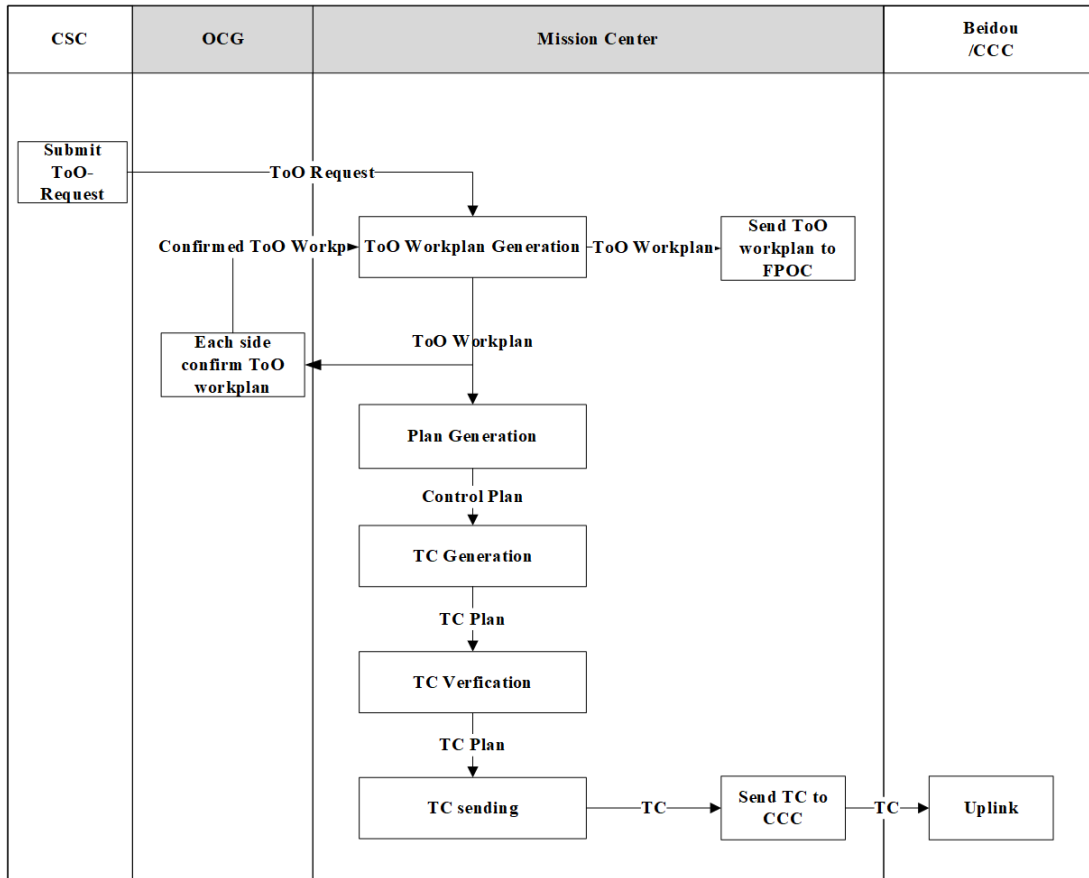


Figure 4. ToO Planning in MC.

downlink data. MC also provides the monitoring service for the team.

i. Real-Time Multi-Channel Data Processing

MC has implemented an integrated downlink processing system that seamlessly combines data from multiple channels, including BeiDou, Telemetry, Tracking and Command (TT&C), and VHF channel. By leveraging advanced fusion algorithms and parallel processing technologies, the system achieves real-time data integration and decoding. This ensures timely, synchronized, and comprehensive handling of heterogeneous data streams, greatly enhancing the efficiency and reliability of downlink operations.

ii. User-Oriented Satellite Status Monitoring Service

A dedicated satellite status monitoring platform has been developed to provide users with intuitive and detailed visibility into the health and performance of both the satellite platform and its payloads. This service features customizable dashboards, anomaly detection alerts, and trend analysis tools,

enabling users to quickly assess system status, diagnose issues, and support decision-making processes. It has become an essential tool for ensuring mission status monitoring and maximizing the value of satellite data.

4. Ground Receiving Subsystem

4.1. Introduction to RSGS

China Remote Sensing Satellite Ground Station (RSGS) was founded in 1986, and now belongs to Aerospace Information Research Institute (AIR), Chinese Academy of Sciences. The RSGS is mainly responsible for the data reception task of the SVOM satellite. RSGS has formed an operation pattern centered around Beijing Headquarters for operation management. This network includes the Miyun, Kashi, Sanya, Lijiang, and Mohe stations, which collectively form the data receiving infrastructure. Sanya station undertakes the X-band data receiving task in the SVOM mission as shown in Figure 5.

4.2. X-band Ground Station of RSGS

The Figure 5 shows the composition of X-band ground station. Its main parameters of RSGS X-band Ground Station.

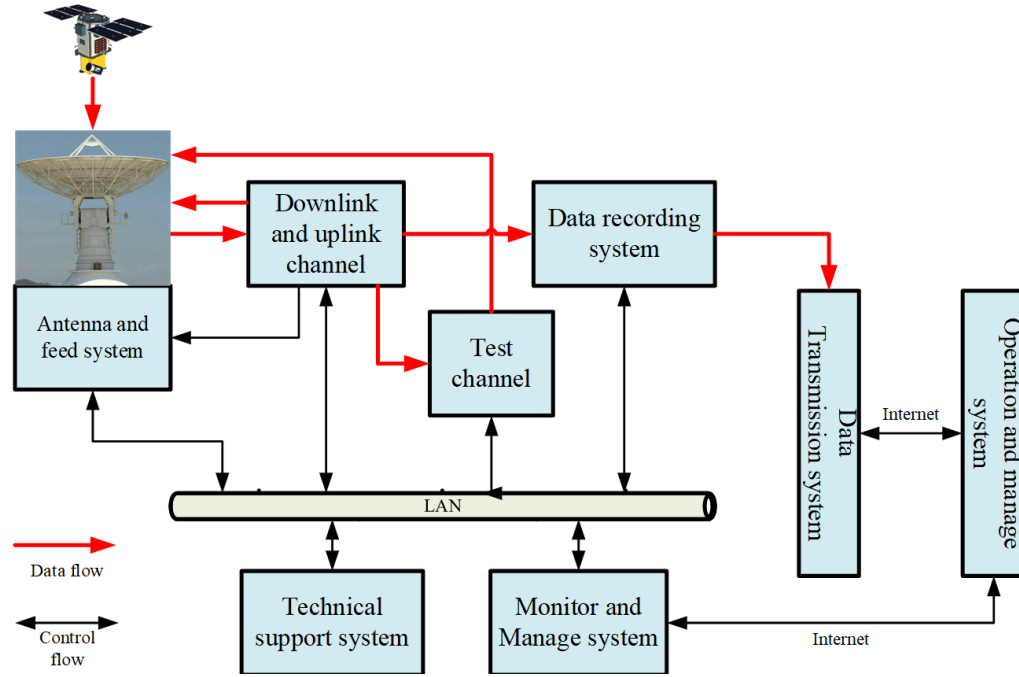


Figure 5. Composition of X-band ground station.

Main Characteristics of RSGS X-band ground station is described in Table 1.

4.3. Data Flow of Daily Work

The workflow of data reception is as follows as shown in Figure 6:

- 1) Beijing Headquarter of RSGS receives the pass plan and ephemeris file from MC.
- 2) Beijing Headquarter checks if the pass plan and ephemeris file are coherent, then send the verified pass plan and ephemeris file to Sanya station.
- 3) Sanya station will track, receive, record, transmit the X-band data.

4.4. Transmission Duration

Through high-speed network, the average duration of data transmission for one pass between Station and MC less than 3 minutes in nominal case.

5. Space Science Data Center

5.1. Science Data Processing Workflow

(1) Data Product Level Definition

The SVOM data products are primarily categorized into several representative classes according to the product level definition, such as raw data, Level-0, Level-1, Level-2, and

Table 1
Main Characteristics of RSGS X-band Ground Station

Characteristic	Value
Antenna Size and type	12 meter diameter cassegrain antenna
Receive RF bands	S-band: 2200 MHz–2300 MHz X-band: 8025 MHz–8400 MHz
Receive G/T	S-band: ≥ 20.0 dB/K (with bandpass filter) X-band: ≥ 33.5 dB/K (with radome)
Receive Polarization	Track: RHC and LHC selectable in S/X- bands Data: RHC and LHC selectable in S-band Data: RHC and LHC simultaneously in X-band
Receive Modulation	BPSK, QPSK, S/OQPSK, GMSK, 8PSK
Receive Coding	LDPC, Reed-Solomon, Viterbi
Receive Data Rate	500 K–400 Msps
Short term record capacity	≥ 10 T
Monitor and control	Automatically, Remotely

Level-3 products. The specific definitions are summarized as follows:

Raw Data: Original downlinked data received by the ground stations, including four categories: X-band, S-band, VHF, and BeiDou.

Level 0 (L0): Binary source packet products generated after data stitching, sorting, and de-duplication, segmented by observation ID (OBSID) and hourly intervals.

Level 1 (L1): Products derived from L0 data through source packet parsing, physical quantity conversion, and formatting. These are expressed in engineering units (e.g., count s^{-1}).

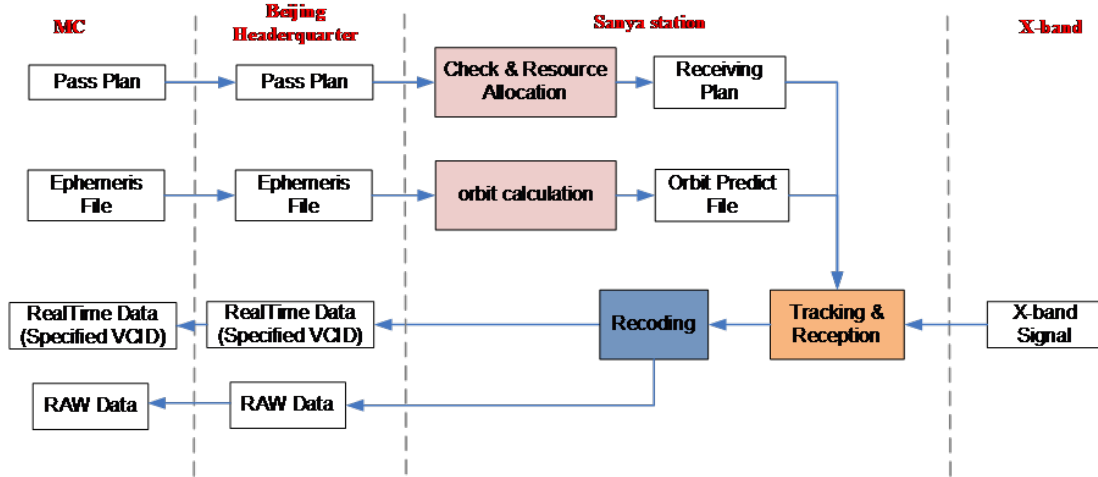


Figure 6. SVOM X-band data reception workflow design.

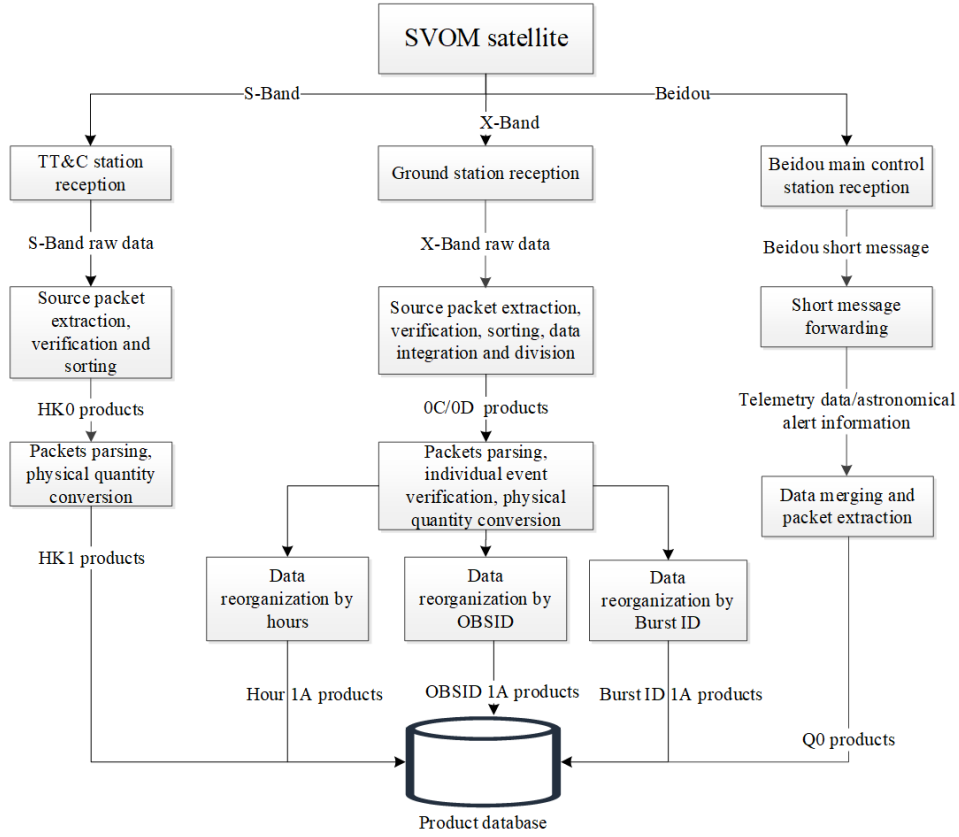


Figure 7. SVOM science data processing workflow design.

Level 2 (L2): Calibrated products generated from L1 data by applying instrument calibration, expressed in physical units (e.g., $\text{photon cm}^{-2} \text{s}^{-1}$).

Level 3 (L3): High-level science products obtained by fusing and analyzing L2 data. These are designed for scientific interpretation, such as characterizing the variability of physical

parameters, applying model-dependent analysis, or combining data from multiple instruments.

Within this framework, the SSDC is responsible for generating L0 and L1 products, while higher-level science products are produced by the FSC and CSC (Louvin et al. 2026).

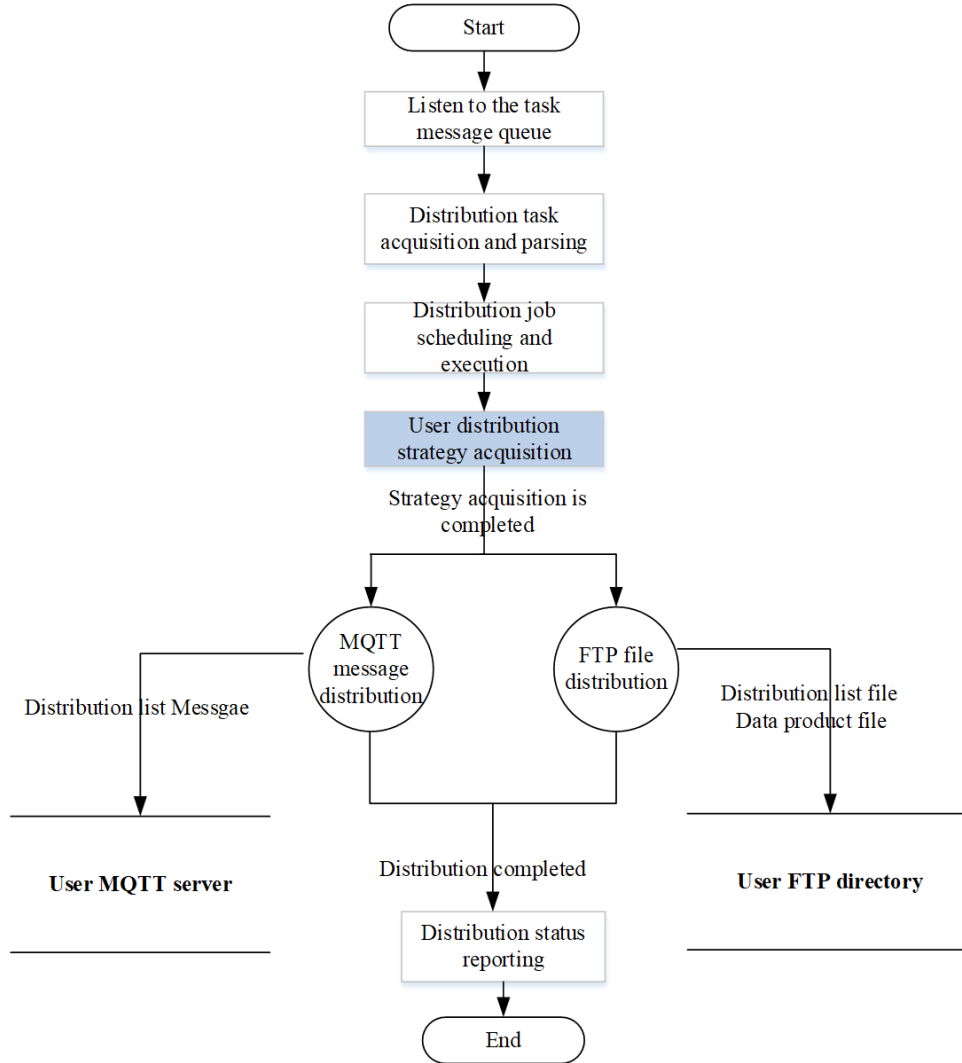


Figure 8. SVOM science data product distribution workflow design.

(2) Data Processing Workflow

Based on the hierarchical definition of SVOM data products and their associated format templates schema, the preprocessing software handles raw observational data acquired from different downlink channels, including X-band, S-band, and BeiDou. Dedicated data processing plug-ins are configured separately for each channel according to its specific requirements, with inter-product dependencies explicitly defined. Together with job management and resource scheduling mechanisms, this approach supports the generation of multiple product classes such as HK0, HK1, L0C, L0D, L1A, and Q0. Each product is accompanied by an XML metadata file that records quality information. Before ingestion into the database, all products are automatically validated against predefined format schema files to ensure compliance with formatting requirements. The entire data processing workflow is visualized in Figure 7.

5.2. Science Data Product Distribution Workflow

Upon completion of product generation and quality assessment, the distribution service listens for task notifications via a message queue. Based on the task list, the system generates distribution jobs that copy product files into a dedicated cache space. To accommodate the specific distribution requirements of the SVOM mission, customized strategies are configured for each product type, covering product categories, target users, directory rules, distribution lists rules, and priority levels. Among these, BeiDou products are assigned the highest distribution priority. Following the configured strategies, data products are delivered to different users (e.g., FSC, CSC, FPOC) via FTP directories, accompanied by distribution manifest files. Upon successful completion, the system issues MQTT message to ensure timely distribution notifications, while scientific team users can monitor distribution status



SVOM observations schedule and performed information

The following form allows you to query the current and upcoming SVOM observing schedule. There are two types of SVOM schedule. The Pre-Planned Science Timeline (PPST): This is the plan of observations for SVOM. Note this may be altered by GRBs and uploaded ToOs. As-Flown Science Timeline (AFST): This is the log of observations performed by SVOM, including uploaded ToOs and GRBs. So if you are interested in which observations are scheduled for the upcoming few days, look at the PPST. If you wish to see what SVOM actually observed, look at the AFST.

Choose Schedule Day for Viewing

Select Date:

☒ Last 1 day
 ☐ Last 3 days
 ☐ Last 7 days
 ☐ customize

Start date: 2025/09/25
 End date: 2025/09/25

Schedule type:

☒ PPST (Planned observations)
 ☐ AFST (Observations performed)

Submit

You can also search for individual targets, by entering the OBS IDs the the form below:

Search Target Schedule History by OBS ID

Search by OBS ID(s):

Submit

You can also search for individual targets, by entering the Source ID the the form below:

Search Target Schedule History by Source ID

Source ID:

Submit

Finally you can search around a particular coordinate, given in decimal degrees (J2000):
The search is conducted based on celestial longitude and latitude positions, with the search area defined as a rectangular region centered on the coordinate point in the J2000 coordinate system, spanning ± 0.5 degrees in both celestial longitude and latitude.

Search Target Schedule History by Coordinate

RA*(J2000) Range: (0,360)

Dec*(J2000) Range: (-90,90)

Submit

Range(0.1~10):

0.5

The default value is 0.5 degrees. If you need to change the range, you can modify it.

Figure 9. SVOM Observation Query tool.

through the space science mission operation website. The entire data product distribution processing workflow is visualized in Figure 8.

6. User Service

6.1. SVOM Observation Query Service

To efficiently organize SVOM scientific activities in the short term, scientists need to know when a given target is supposed to be observed, and when it has been effectively observed. This need arises from the necessity of coordinating SVOM observations with the schedules of other observatories, especially those that need to be triggered in a Target of Opportunity mode. To satisfy the scientific needs, MC has implemented the SVOM Observation Query (SOQ) tool (<https://soqt.smoc.ac.cn/>) where users can search a given observation either by date, target Id, target name or coordinates, getting the observation plan and the real execution status. In parallel, the tool provides the service for searching all the observations performed for a given source. The tool is very convenient for the scientists to master the observation status.

SOQ tool as shown in Figure 9 provides scientists with real-time visibility into science mission observations, allowing them to seamlessly track both scheduled and executed observation tasks. It enables quick comparison between planned and actual observations, helping scientists identify discrepancies and adapt their strategies.

6.2. Operation Coordination Group Support Service

The OCG is a joint working group lead by the Mission Manager with representatives from all operational teams. It is the operational entity that validates all operations. It meets regularly on a daily basis through the dedicated system tool (OCG tool <https://ocg.smoc.ac.cn/svom/index>), developed by MC. OCG meetings are hold daily during the routine phase to the assess the status of the past weekly operational plan and planification of payload and satellite activities, observations selection for GP for the next week.

The OCG tool as shown in Figure 10 aims at helping all operational teams to make a validated and confirmed plan, through simulation, analysis and approval procedure. OCG tool primarily focuses on the engineering aspects of the

Scientific Satellite Cooperative Consultation Platform

V 3.41 2025-09-25T05:45:38Z UTC time liuyurong

[Create a plan meeting](#) [New message](#)

Satellite name: Plan type: Start and end time: [Query](#) [Empty](#)

choose	Satellite code	Plan type	Creation time	Confirm status	workplan	too-request	operate
☐	SVOM	GP	2025-09-25 02:10:10	Uplink	SVOM_WORKPLAN_...		Create a plan meeting Enter the planning meeting Initiate plan confirmation confirm View Results Forced confirmation
☐	SVOM	ToO-NOM	2025-09-25 00:16:52	Above star (Beidou)	SVOM_WORKPLAN_T...	SVOM_ToO_NO_202...	Create a plan meeting Enter the planning meeting Initiate plan confirmation confirm View Results Forced confirmation
☐	SVOM	ToO-NOM	2025-09-24 23:49:16	Above star (Beidou)	SVOM_WORKPLAN_T...	SVOM_ToO_NO_202...	Create a plan meeting Enter the planning meeting Initiate plan confirmation confirm View Results Forced confirmation
☐	SVOM	ToO-NOM	2025-09-24 13:01:12	Above star (Beidou)	SVOM_WORKPLAN_T...	SVOM_ToO_NO_202...	Create a plan meeting Enter the planning meeting Initiate plan confirmation confirm View Results Forced confirmation
☐	SVOM	ToO-NOM	2025-09-24 09:29:31	Above star (Beidou)	SVOM_WORKPLAN_T...	SVOM_ToO_NO_202...	Create a plan meeting Enter the planning meeting Initiate plan confirmation confirm View Results Forced confirmation
☐	SVOM	ToO-NOM	2025-09-23 13:11:14	Above star (Beidou)	SVOM_WORKPLAN_T...	SVOM_ToO_NO_202...	Create a plan meeting Enter the planning meeting Initiate plan confirmation confirm View Results Forced confirmation
☐	SVOM	ToO-NOM	2025-09-23 13:01:12	Above star (Beidou)	SVOM_WORKPLAN_T...	SVOM_ToO_NO_202...	Create a plan meeting Enter the planning meeting Initiate plan confirmation confirm View Results Forced confirmation
☐	SVOM	ToO-NOM	2025-09-23 11:08:50	Above star (Beidou)	SVOM_WORKPLAN_T...	SVOM_ToO_NO_202...	Create a plan meeting Enter the planning meeting Initiate plan confirmation confirm View Results Forced confirmation
☐	SVOM	ToO-NOM	2025-09-23 06:47:55	Above star (Beidou)	SVOM_WORKPLAN_T...	SVOM_ToO_NO_202...	Create a plan meeting Enter the planning meeting Initiate plan confirmation confirm View Results Forced confirmation

Figure 10. OCG tool.

SVOM HOME ABOUT DATA OPERATIONS TOOLS NEWS PUBS REGISTER | LOG IN

SVOM DETECTING GAMMA-RAY BURSTS

SVOM is a French-Chinese astronomy mission to detect gamma-ray bursts generated by the explosion of massive stars or the merger of neutron stars or black holes.

[Chinese Entrance](#) [French Entrance](#)

Latest News

Announcement

Call for Proposal for SVOM General Program 2026

Announcement: Call for Proposal for SVOM General Program 2026

SVOM INSTRUMENT

SVOM is devoted to detect Gamma-Ray Burst (GRB) in very wide energy range: visible light (by Visible Telescope - VT), soft X-rays (by Microchannel X-ray Telescope - MXT), hard X-rays (by ECLAIR) and gamma-rays (by Gamma-ray Burst Monitor - GRM).

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Figure 11. Homepage of the SVOM satellite data release website.

mission rather than the scientific aspects. Periodic status reporting will be required during operations to provide assessment of the health and safety of the spacecraft, instruments, and ground systems. These reports are tackled during OCGs. Daily or weekly status reporting should be performed to provide all operational teams a global view of SVOM science mission and engineering status. Exceptional ToO OCG can also be performed to assess planification of exceptional ToO or Multi-Messenger ToO. Figure 10 shows the OCG tool main function.

6.3. Data Service

For satellite engineering and science teams, the ground support system provides rapid-access data services through the space science mission operation website. These services include near real-time monitoring of satellite-ground data transmission, status of data product processing and distribution, data quality inspection, and product overview visualization. Users can access this information through multiple interfaces such as web portals and mobile applications, thereby enabling timely situational awareness of data processing across all product levels and categories.

For the public scientific user, SSDC operates a dedicated data release portal (<https://svom.ac.cn>), as depicted in Figure 11, where users can search, browse, and download SVOM satellite data, related documentation, and software tools. The portal supports multi-parameter search queries based on Burst ID, OBSID, date, source position, payload, and product level, and also provides quick-look visualizations. In addition, the portal integrates data policy guidelines, mission background, and tracking information of scientific achievements.

7. Commissioning and Routine Operations

The SVOM satellite was launched on 2024 June 22, and began the commissioning test. During the nine-month commissioning phase, the MC, SSDC, Sanya X-band station, DCN, and the integrated operational environment operated stably and met all specified requirements. The MC generated GP work-plans on a weekly basis, which were uplinked to the satellite via the CCC. More than one ToO observation request was uplinked daily, totaling 37 GP work-plans and 492 ToO observation plans—including 54 uplinked through the BeiDou system. Currently, one BeiDou-uplinked ToO observation is implemented daily. The latency from ToO observation request submission to the start of SVOM satellite observation can be as fast as less than 5 minutes. A total of 1007 passes of downlink data were received via the Sanya X-band ground station, while 914 passes were jointly received by the French Kourou ground station and Hartebeeshoek ground station. The daily data reception amounts to eight passes, with a total reception duration exceeding 70 minutes. In accordance with product definitions and interface requirements, SSDC completed the production and distribution

of Level 0C, 0D, 1A, Level 1, HK0, and HK1 data products. The SVOM satellite was officially delivered for on-orbit operations on 2025 April 23, and the SVOM GSS continues to provide support for its on-orbit operations.

During the commissioning phase, the GSS was upgraded to address issues encountered during testing, new requirements, and interface changes. These updates guaranteed data processing accuracy, improved operational efficiency, and delivered better support for scientific users. In response to feedback from the satellite and payload teams on the downlink data monitoring interface and HK products, some parameter processing algorithms were revised in the data processing, mission monitoring, and HK product generation modules. To enhance the rapid uplink success rate of ToO observations, the BeiDou short message automatic uplink procedure was optimized with an automatic retransmission mechanism. In response to the new requirement that nominal ToO observations, originally uplinked via CCC, be transmitted with high priority via BeiDou short messages, the planning generation, command generation, and BeiDou uplink modules were modified. These improvements greatly strengthened the system's ToO rapid response capability. At the request of the SVOM PIs, an observation status query module (<https://soqt.smoc.ac.cn/>) and the Chinese SVOM website module (<https://svom.ac.cn/>) were integrated into the GSS, further enhancing its end-to-end support service capability.

8. Summary

The SVOM GSS ensures efficient planning for scientific observation needs, rapid uplink for ToO observation requirements, complete reception and high-quality processing and management of scientific data, thus supporting the continuous production of scientific outcomes for the SVOM mission. Compared to other space science satellite missions, the SVOM GSS has achieved 24/7 near-real-time full-system status monitoring, round-the-clock rapid response, and whole-process international cooperation. The SVOM GSS is a comprehensive and distinctive system that can support the SVOM mission, and it also provides a reference for the design of ground support systems for other astronomical satellites. The system can be further improved in user services by drawing on the ground systems of on-orbit astronomical satellites.

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