The SVOM mission profile

Cordier Bertrand CEA-Saclay
Wei Jianyan NAOC-Beijing
On behalf of the SVOM consortium

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GRB Observation scenario

T0 GRB trigger

Auto slew

VT, MX observation

T0 + 5 min

Waiting

On board

On Ground

VHF

Inside SVOM

Outside SVOM

Other SC mission center

C SC

T0 + 30 s

GRB coordination distribute

F SC

T0 + 1 min

Large telescope

GCN

Large telescope
SVOM scientific instrument arrangement

ECLAIRs
MXT
VT
GRM
GFT-2
GWAC
GFT-1

Satellite ~ 930 Kg
Payload ~ 450 kg
SVOM multi-wavelength capabilities

Space and ground instruments join to enable a unique coverage
The SVOM orbit

Based on Demeter/IDP electron flux

LEO altitude 625 km, with an inclination of 30°, launched by a LM-2C from Xichang

→ the satellite passes through the South Atlantic Anomaly
→ induces a dead time of (13-17)%
The SVOM attitude law

To detect GRB on the night side → attitude law : roughly antisolar
The SVOM attitude law

Low Earth Orbit + roughly antisolar attitude law

Consequence: at each orbit the Earth occults the instruments FOV

- ECLAIRS duty cycle 65%
- VT duty cycle 50%
- MXT duty cycle 50%
Optimization of the SVOM attitude law

To favor the GRB detection by ECLAIRs
• avoidance of the the Sco X1source (outside of the ECLAIRs FOV)
• avoidance of the Galactic Plane (+/- 10° for the ECLAIRs FOV)

To favor the redshift measurement on ground.
• → to favor the sky area observable from both Hawaii, Chile and the Canary
• → SVOM points to areas near the equator (declination δ=0)

To maintain a cold face for the satellite
Offset of 45° with respect to the antisolar direction

Tolerance of 5° with respect to the nominal pointing
Optimization of the SVOM attitude law

The B1 attitude law over one year
The SVOM attitude law: consequences on the exposure map
1 year scenario

Wide field instruments: ECLAIRS, GRM,

Narrow field instruments: MXT, VT
Nominal mission

- Core Program: the GRBs
  - 70/year
  - duration of observation: 14 orbits (tunable)

- Targets of Opportunity
  - ToO nominal: 1/day, programming delay 48h, duration of observation 1 orbit
  - ToO exceptional: 20/year, programming delay <12h, duration of observation 14 orbits (tunable)

- General Program (preplanned observation selected by a TAC)
  - 90% at 5-10° from the B1 law
  - 14 targets max per day
  - duration of observation 1 orbit minimum

Distribution of the usefull time of the mission
Night side

General Program
14 targets max per day in limited sky area
duration min 1 orbit

ToO
1 target per day, all observable sky
duration 1 orbit

GRBs
70 GBS/year, all observable sky
duration 14 orbits

Day side

Nominal case : remains on B1 Attitude (+/- 5-10°), GP targets pointed on sub-solar point
ToO case: ToO pointed on sub-solar point
GRB case : remains on the GRB (14 orbits)
Evolution of the distribution of the useful time

Nominal mission
USEFUL MISSION TIME

Extended mission
USEFUL MISSION TIME

1 ToO per day
10% of the GP outside the B1 law

5 ToO per day
50% of the GP outside the B1 law
Common field of view: SVOM - JWST

Angle between JWST optical axis and sun must be between 85°-135°

Example for one given day

On average 61% of the SVOM field of view (B1 law) is accessible by JWST
Each GRB detected in the southern Sky will be followed by LSST. Thanks to the antisolar choice, the transients sources detected by LSST could be observed immediately by SVOM.
GO SVOM!

launch 2021
PDR July 2016

NAOC, Beijing
IHEP, Beijing
XIOPM, Xi'an
SECM, Shanghai
CEA-Irfu, Saclay
IRAP, Toulouse
APC, Paris
IAP, Paris
LAM, Marseille
Obs Strasbourg
LPAG Grenoble
LUPM Montpellier
  LAL Orsay
GEPI Meudon
LPC2E Orléans
University of Leicester
  MPE, Garching
CNES, Toulouse

Shanghai - September 25, 2014
Telecommand Upload link

Sanya is dedicated, the others (Kourou & HBK) are on request

Time delay related to upload the slew commands:

70% [40%] within 6 [4] hours
Prompt Dissemination of GRB Parameters

Alerts are transmitted to a network of VHF receivers on Earth by the on-board VHF emitter.

The inclination of the orbit (30°) implies 30-40 VHF receivers

Goal: 65% of the alerts received within 30 sec
JWST Field of Regard

- Observatory thermal design defines the allowed Solar orientations
  - Solar elongation 85° to 135° (like Spitzer)
  - Roll ±5° about line of sight

- JWST can observe the whole sky every year while remaining continuously in the shadow of its sunshield.
  - Field of Regard is an annulus covering 35% of the sky
  - The whole sky is covered each year with small continuous viewing zones at the Ecliptic poles