



National Aeronautics and Space Administration

The Space Life Sciences Hardware Database

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CLDP Utilization Forum
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National Aeronautics and
Space Administration



The Space Life Sciences Hardware Database (SLSHD)

Mission Statement: To provide to the public a searchable database, integrated into the NASA Open Science Data Repository (OSDR), describing hardware for spaceflight biology experiments, past and current.

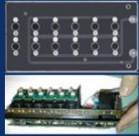
Goals

- 1. Understanding the past:** Provide reference information about the experimental hardware that was used to generate the data and samples present in other OSDR databases.

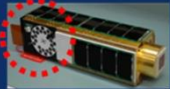
GeneLab, ALSDA, BSP, and NBISC entries, as well as the KSC Space Life Sciences Library, will link to the relevant hardware entry in SLSHD, allowing users to learn more about the hardware component of the study.

- 2. Shaping the future:** Facilitate design of experiments or new hardware by providing users with a comprehensive understanding of what capabilities already exist.

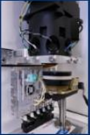
SLSHD can be linked in solicitations as an additional information source for proposers. SLSHD entries should contain links to as much public information as available about instruments' specifications and previous uses, and ideally provide a mechanism for users to contact the relevant hardware providers. The database would be continually updated, welcoming input from the community.



GeneSat Payload



O/OREOS SEVO Payload



ELM Imager (Europa Life

Micros...



Wetlab-2



MVP-Cell(Space Races)





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Landing page

BLEO HWInstrument CatalogSubmit Instrument

AdminJessica

Droplist

BLEO Hardware Database

BLEO Hardware Database

Welcome, Jessica!

Continue to catalog

Logout

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Catalog View

BLEO HWInstrument CatalogSubmit Instrument

AdminJessica

Droplist

BLEO Hardware Database — Catalog

Keyword search

Expand

☐ Instrument/Platform Name	OPERATIONS	Category
☐ Optical Density/Colorimetric Measurement[next-gen PharmaSat/ EcAMSat/SESLO/PowerCell]	FULL AUTONOMY + NO SAMPLE RETURN REQUIRED	CubeSat Payloads
☐ BioSentinel / BioSentinel II Payload	FULL AUTONOMY + NO SAMPLE RETURN REQUIRED	CubeSat Payloads
☐ GeneSat Payload	FULL AUTONOMY + NO SAMPLE RETURN REQUIRED	CubeSat Payloads
☐ GraviSat Payload	FULL AUTONOMY + NO SAMPLE RETURN REQUIRED	CubeSat Payloads
☐ SporeSat Payload	FULL AUTONOMY + NO SAMPLE RETURN REQUIRED	CubeSat Payloads
☐ O/OREOS SEVO Payload	FULL AUTONOMY + NO SAMPLE RETURN REQUIRED	CubeSat Payloads
☐ GEMM:Gene Expression Measurement Module	FULL AUTONOMY + NO SAMPLE RETURN REQUIRED	CubeSat Payloads
☐ ELM Imager (Europa Life Microscope)	FULL AUTONOMY + NO SAMPLE RETURN REQUIRED	Search-for-Life Payloads
☐ MICA (Microfluidic Icy-world Chemical Analyzer)	FULL AUTONOMY + NO SAMPLE RETURN REQUIRED	Search-for-Life Payloads
☐ Single-Cassette Bioculture System (with imaging config)	MINIMAL CREW TIME; NO SAMPLE RETURN REQ'D.	Culturing, Growth, Microscopy
☐ BioChip Space Lab	MINIMAL CREW TIME; NO SAMPLE RETURN REQ'D.	Culturing, Growth, Microscopy

Instruments per page 251 - 25 of 64

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Select one instrument for expanded information.

BLEO HW Instrument Catalog Submit Instrument Admin Jessica

Droplist

BLEO Hardware Database — Catalog

Keyword search Expand

☐ Instrument/Platform Name	OPERATIONS	Category
☐ Optical Density/Colorimetric Measurement[next-gen PharmaSat/ EcAMSat/SESLO/PowerCell]	FULL AUTONOMY + NO SAMPLE RETURN REQUIRED	CubeSat Payloads
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BioSentinel is a fully autonomous satellite designed to study radiation exposure on yeast -- ARC

Click here to navigate to detailed instrument entry

[More details](#)

Instruments per page 25 1 - 25 of 64

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Clicking on “More details” brings up the detailed entry for the instrument.

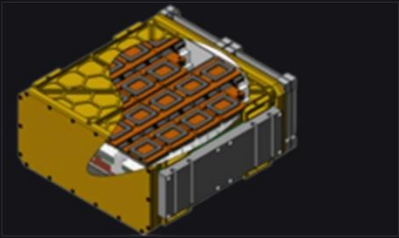
BLEO HW Instrument Catalog Submit Instrument Admin Jessica

Droplist

BLEO Hardware Database — Details

BioSentinel / BioSentinel II Payload

Background/Purpose
BioSentinel is a fully autonomous satellite designed to study radiation exposure on yeast



General Specifications Research Logistics

OPERATIONS
FULL AUTONOMY + NO SAMPLE RETURN REQUIRED

Category
CubeSat Payloads

Operator/Vendor
ARC

Availability
plans available - no extra units

Flight Heritage
not flown yet

Age
New

Study
OSD-624

Study
OSD-626

Links to related OSDR entries

Return

last updated on 7/9/2024, 3:54:42 AM by Jessica Lee

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Each instrument page has multiple tabs;
each tab has multiple fields.

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Droplist

BLEO Hardware Database — Details

BioSentinel / BioSentinel II Payload

Background/Purpose
BioSentinel is a fully autonomous satellite designed to study radiation exposure on yeast

Navigate among tabs here

General Specifications **Research** Logistics

Microbiology ☒ Yes ☐ No Microbiome ☐ No Environmental monitoring ☒ monitoring radiation environment ☐ No Planetary Protection ☐ No Life Detection ☐ No Immunology ☐ No Cell Culture ☐ No Tissue Culture ☐ No Lab-on-a-chip ☒ Yes Tissue engineering ☐ No Synthetic Biology ☐ No

Nutrient Production ☒ * Systems Biology ☐ No Molecular Biology ☐ No Genomics ☐ No Proteomics ☐ No Metabolomics ☐ No Specimen types supported yeast, other microorganisms possible Specimen Size/Quantity Holds 18, 16-well fluidic cards Temperature Range at Sample Location 10-23C - maybe higher depending on power budget

Relative Humidity Range 0-100% pH Range N/A not controlled Gas Control no Experiment Duration depends on how often cards are activated Measurements and monitoring temp monitoring, 3 color LED readings Pressure ☒ 1 atm, hermetically sealed Imaging ☐ No

Return

last updated on 7/9/2024, 3:54:42 AM by Jessica Lee

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Back at the catalog view, select multiple instruments to compare them.

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Droplist

BLEO Hardware Database — Catalog

Keyword search Expand

Instrument/Platform Name	OPERATIONS	Category
☐ Optical Density/Colorimetric Measurement[next-gen PharmaSat/ EcAMSat/SESLO/PowerCell]	FULL AUTONOMY + NO SAMPLE RETURN REQUIRED	CubeSat Payloads
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☐ Single-Cassette Bioculture System (with imaging config)	MINIMAL CREW TIME; NO SAMPLE RETURN REQ'D.	Culturing, Growth, Microscopy

“Compare instruments” button

☒ Compare 2 instruments ☐ Add to droplist

Instruments per page 25 1 - 25 of 64

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Instrument comparison is customizable. Results can be exported as a spreadsheet.

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BLEO Hardware Database – Compare

Choose columns for comparison

Compare by: Instrument/Platform Name Mass Size Payload Volume Required (in U) Power (average) Data Rate Required Crewtime needed Add columns...

Instrument/Platform Name	Mass	Size	Payload Volume Required (in U)	Power (average)	Data Rate Required	Crewtime needed
 GeneSat Payload	2.5 kg	2U	2U	3 W (thermal environment & expt. temperature dependent)	I2C bus	N
 BioSentinel / BioSentinel II Payload	Small sat: 5 kg (6-7 L vol) ISS: 7kg (5kg for science payload + 2kg for payload interface hardware)	4 x 9 x 9 in.	~4U	Nominal 6W	Wired RS-422 at 1 Mbit/day	M, none - automated

Return to catalog Export to CSV

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Users can submit new instruments.

BLEO HW Instrument Catalog Submit Instrument Admin Jessica

BLEO Hardware Database — Submit Instrument

Instrument/Platform Name

Background/Purpose *

General Specifications Research Logistics

OPERATIONS * **Category *** **Operator/Vendor ***

Availability Flight Heritage Age Study Study

Submissions are sent to administrators for review.
Not shown here: administrators can also edit existing entries.

Cancel

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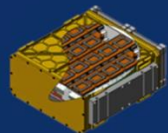
Current status

- **SLSHD is currently in pilot phase, available only internally at Ames**
 - 64 instruments
 - ~80 data fields
 - Diverse organisms and assays, including space biology, search for life, and radiation detectors. Differing levels of autonomy, life support, and sample return needs
- **Planned for 2025:**
 - Additional user testing
 - Content updates
 - User guide development
 - Public release on OSDR (pending additional resources)
- **We welcome expressions of interest from potential users and information about additional instruments to incorporate!**

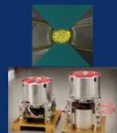


Optical

Density/Colorimetric M...



P...



SporeSat Payload



MICA (Microfluidic Ice-
world C...



Exocube

