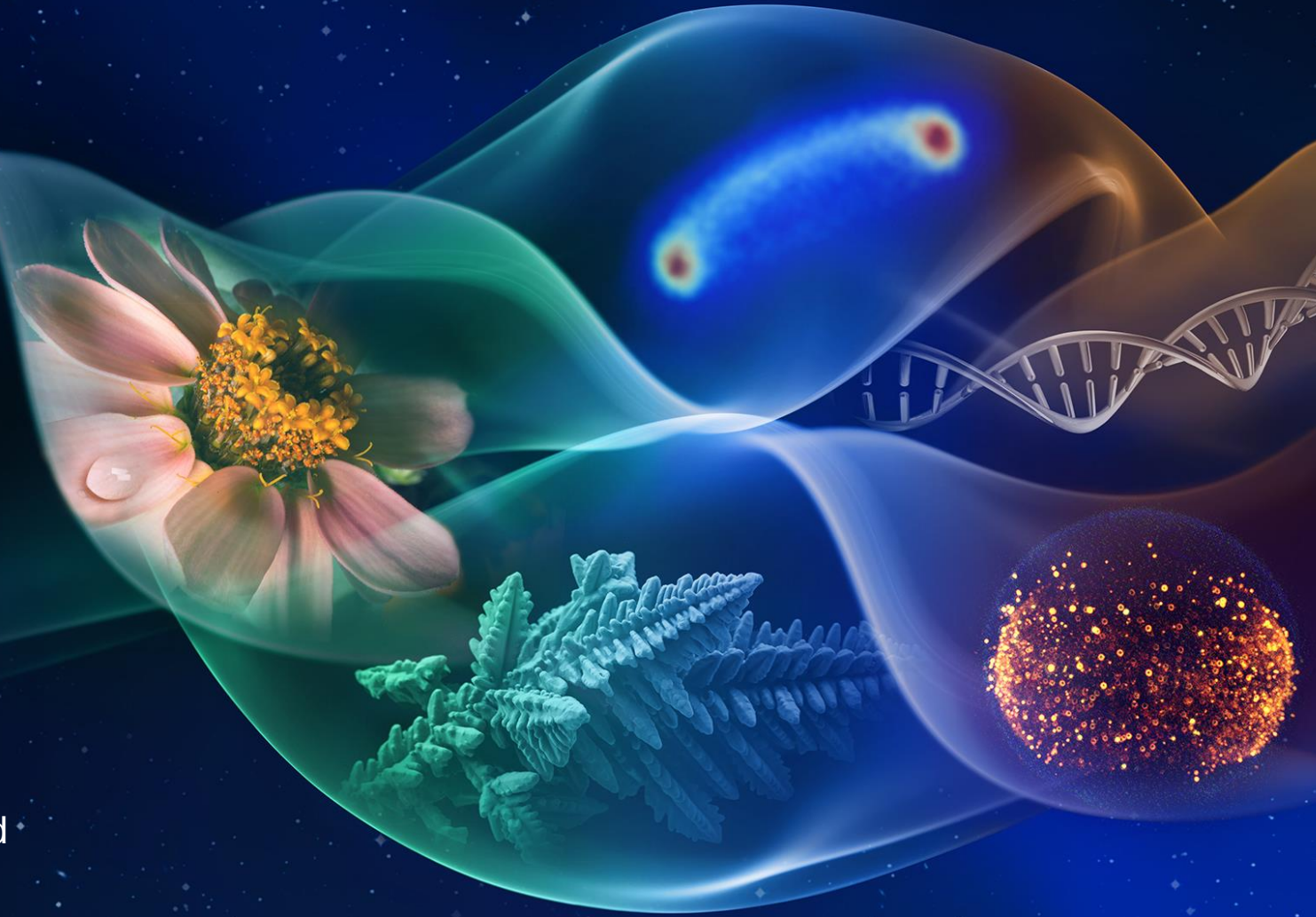


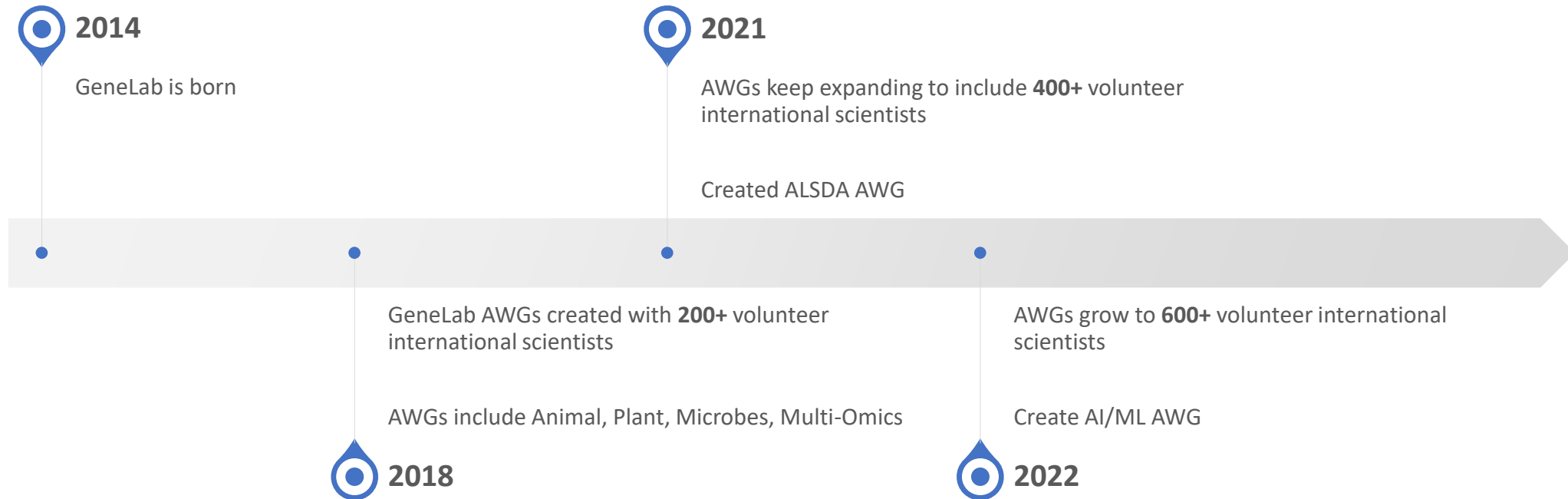


Fostering Open Science Through Analysis Working Groups (AWGs)

Lovorka Degoricija, PhD
GeneLab Science Communications Lead
KBR
NASA Ames Research Center



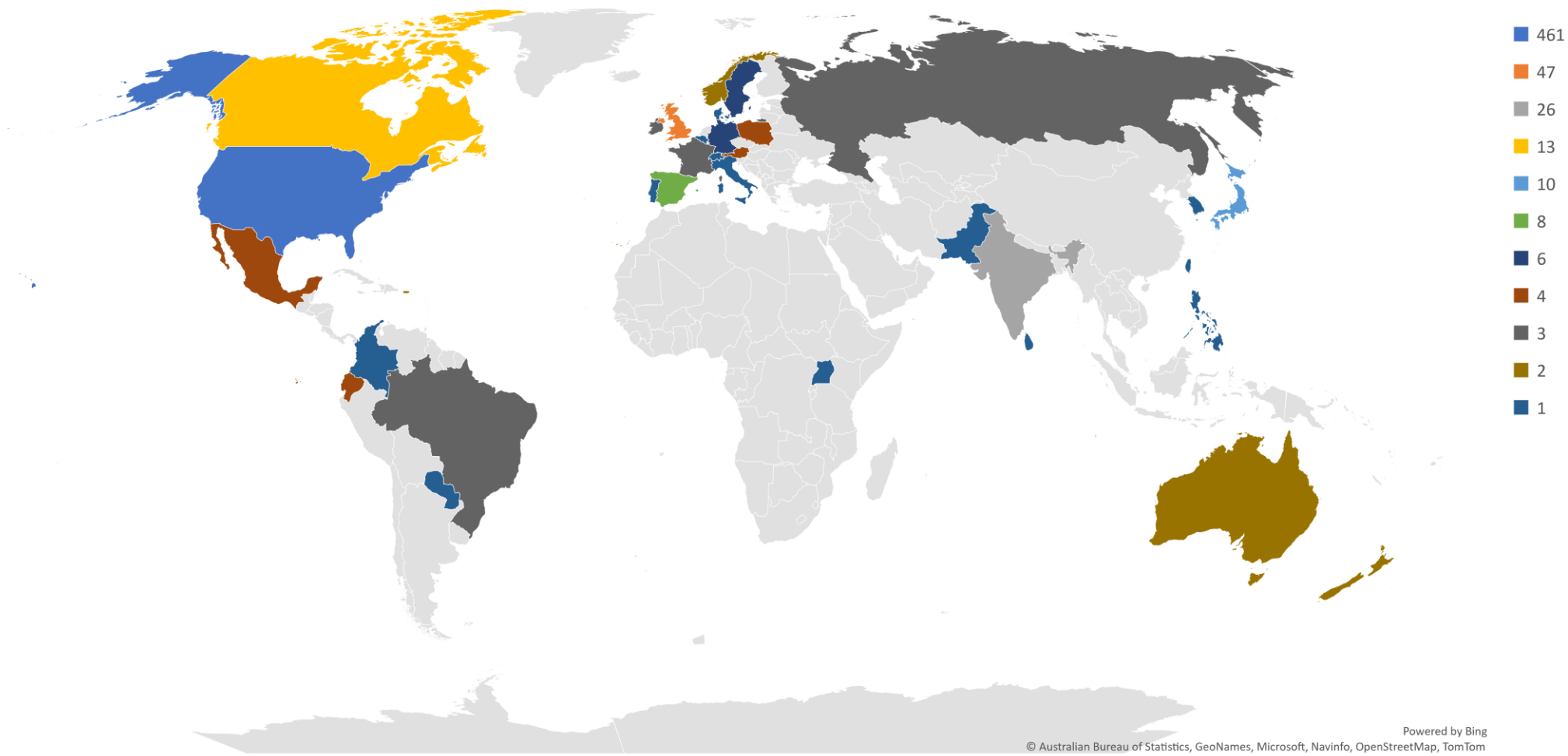
Connecting the World Through Science



- *Monthly meetings to analyze data in the GeneLab repository*
- *Attend annual meetings and workshops*

Who are the AWGs?

AWG Members



Original AWGs

ANIMAL

79 members

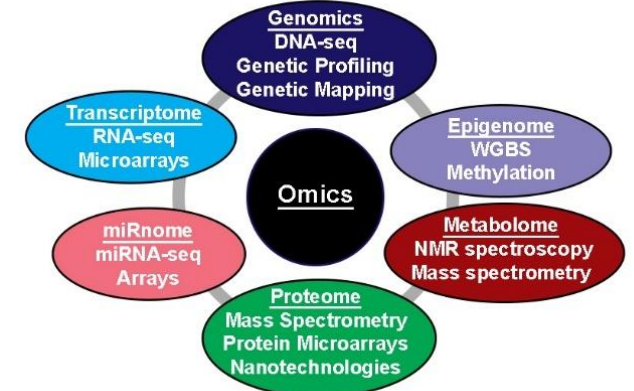
Facilitates the use of omics in understanding basic mechanisms by which animals and constituent tissues and cells adapt to the spaceflight environment.



MULTI-OMICS

259 members

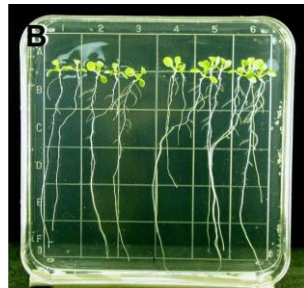
Interactions between the different omics to provide a better understanding of the systemic response.



PLANTS

66 members

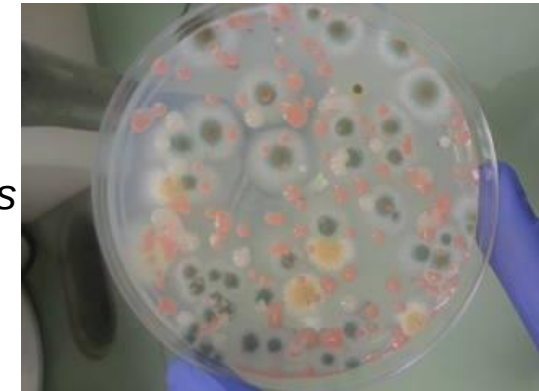
*Share and discuss the latest developments in **AstroBotany** – the discipline of botany concerned with interactions between plant biology and space environment.*



MICROBES

61 members

Focuses on analyzing microbial datasets within GeneLab that includes gene-expression, proteomic, metabolomic and environmental metagenomic datasets.

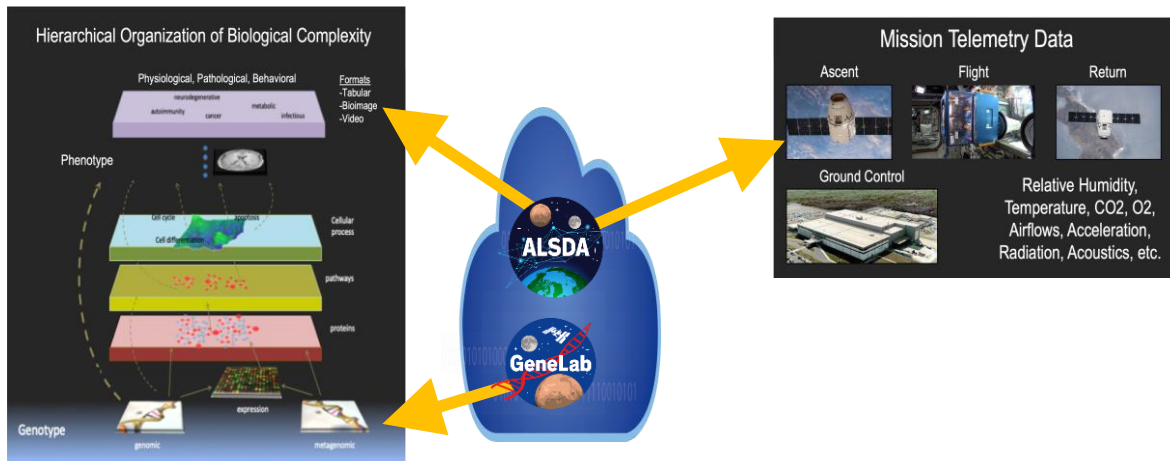


Expanded AWGs

ALSDA

110 members

Feedback on science data and metadata standards for physiological, phenotypic, and behavioral datasets to be reusable. Datasets span from raw to processed-results data, and across tabular, bioimaging, and video formats.



AI/ML

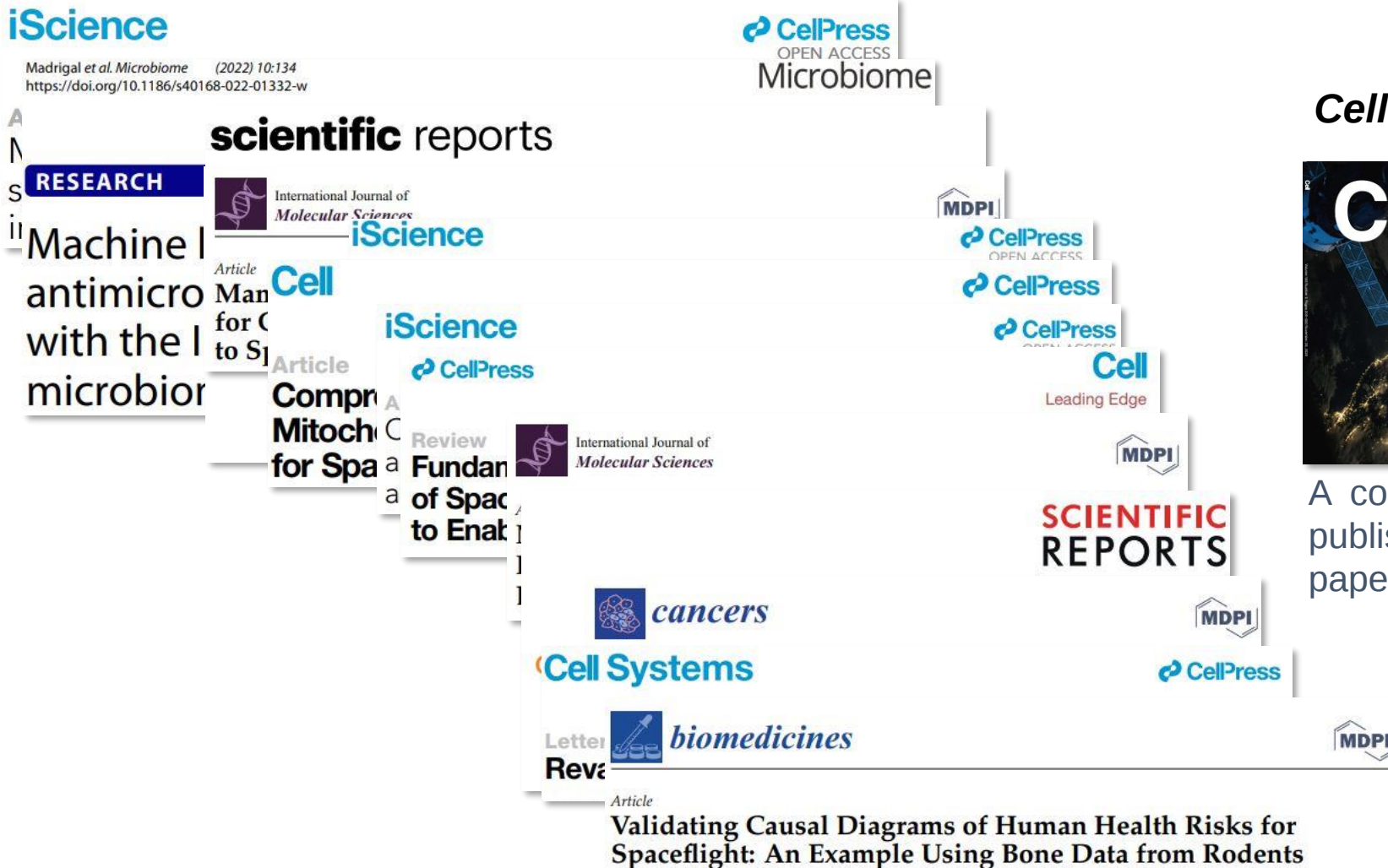
56 members

Focuses on developing data AI-readiness guidelines, algorithm and automation development, and developing ethical guidelines to increase trust and explainability surrounding AI in space biology.

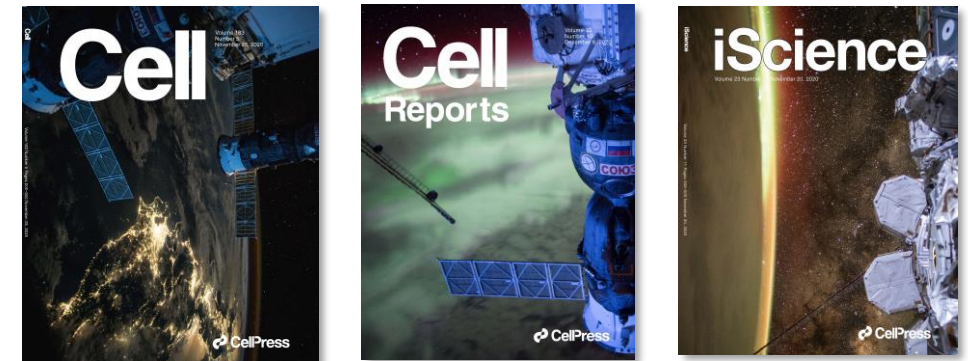


Publications

50 publications (12 publications produced by the AWGs) using data available in GeneLab.



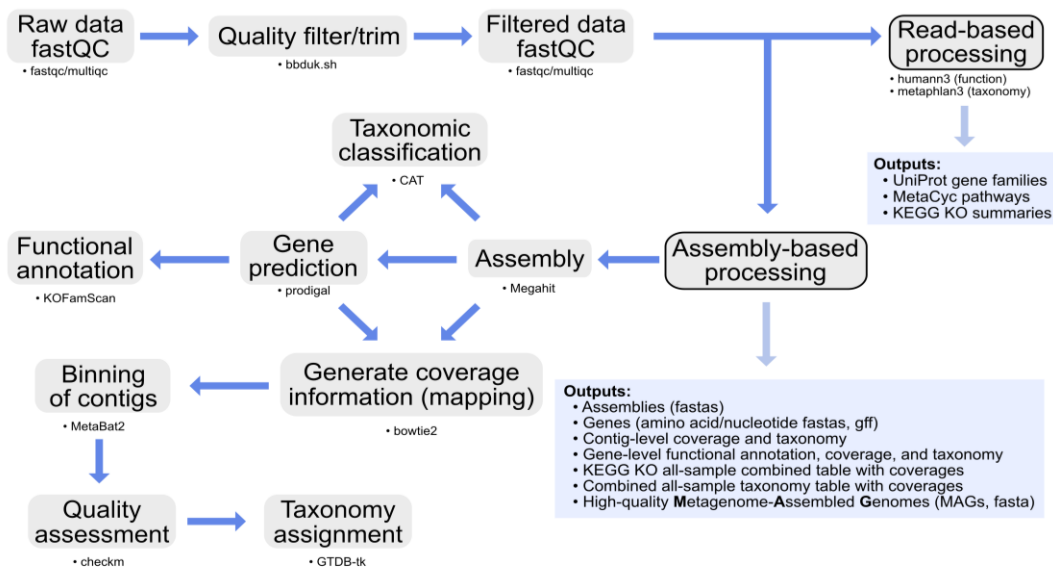
Cell: The biology of spaceflight package



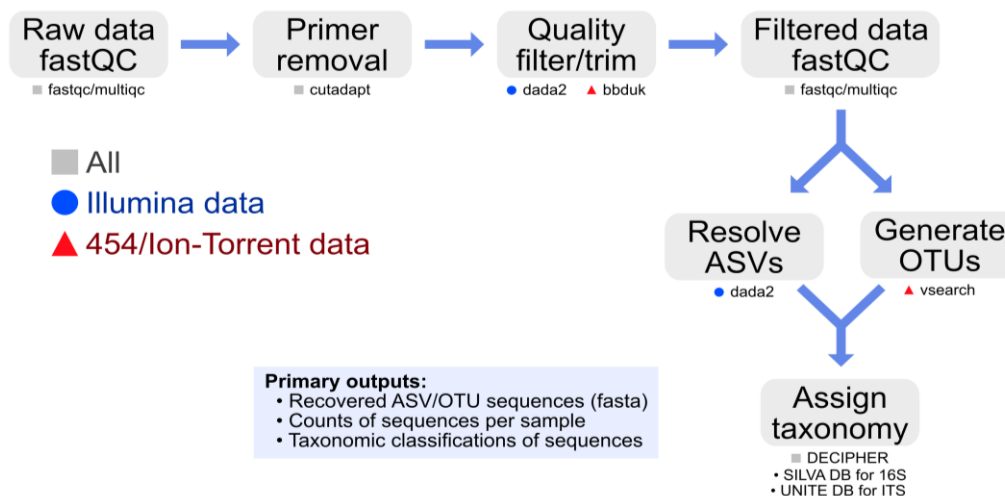
A coordinated package of 29 scientific papers published in five *Cell Press* journals featuring 9 papers utilizing data or resources in GeneLab.

GeneLab Standard Omics Processing Pipelines

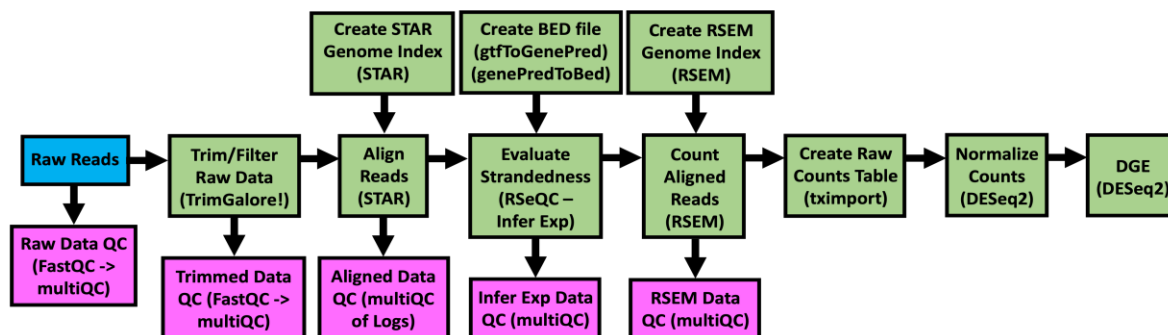
Metagenomics (Illumina) Pipeline



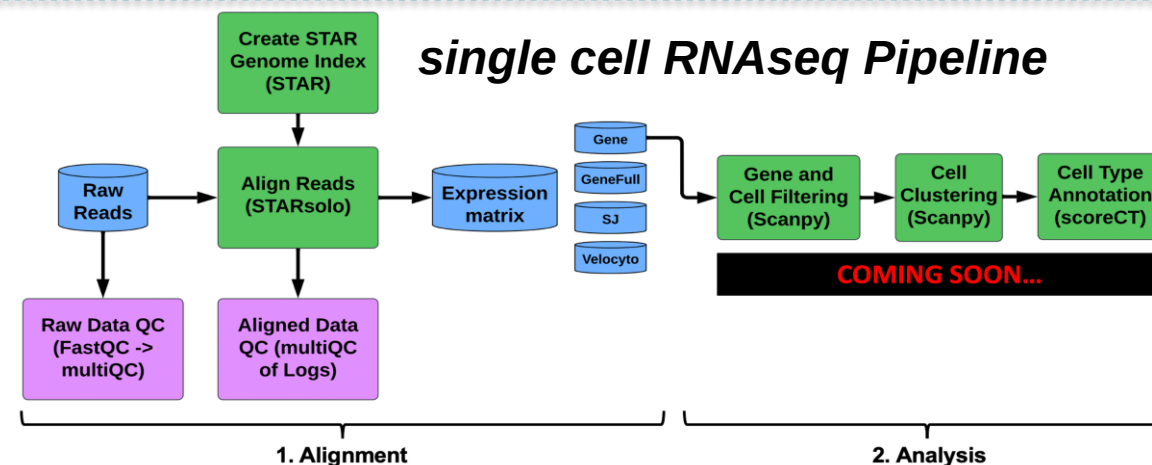
Amplicon Pipeline



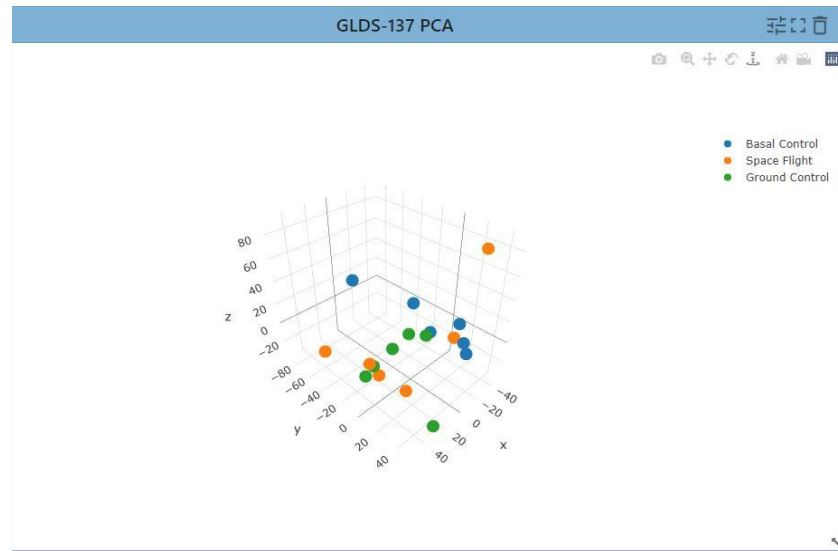
(bulk) RNAseq Pipeline



single cell RNAseq Pipeline



GeneLab Data Visualization Portal (Transcriptomics)



GLDS-137 DGE

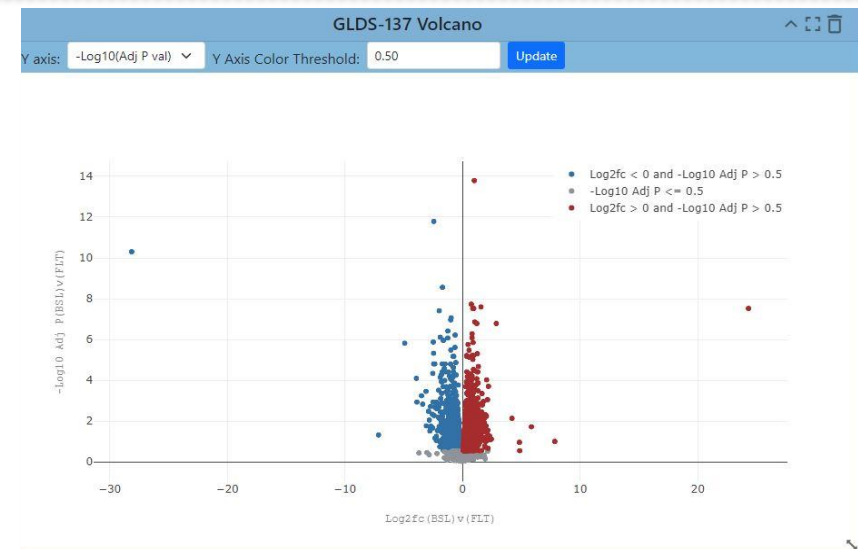
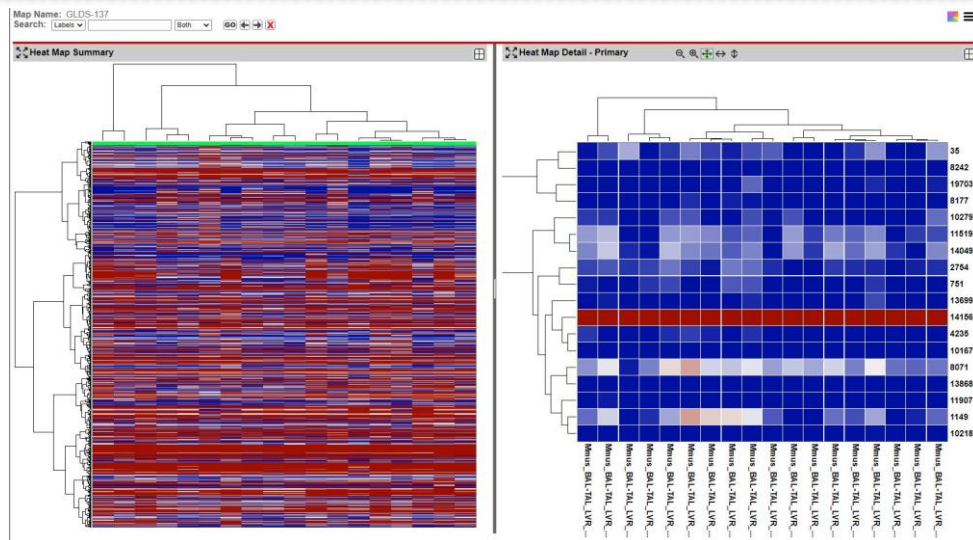
Maximum p-value:
Maximum adjusted p-value:
Search:

Copy CSV Excel PDF Print

ENSEMBL	Symbol	LOG2FC	PVAL	ADJP
Pvalb	Pvalb	-6.29773327428316		
Actn3	Actn3	-5.97815189279096		
Casq1	Casq1	-3.95963363476749		
Tcap	Tcap	-3.25435847812658		
Eef1a2	Eef1a2	-4.65720049798742		
Tnnc2	Tnnc2	-6.08619947458785		
Jph2	Jph2	-0.8961587251770401		
Trdn	Trdn	-3.2468444937389904		
Ddit4	Ddit4	-0.951185504460951		
Pgam2	Pgam2	-5.63776597708189		

Showing 1 to 10 of 22,228 entries

Previous 1 2 3 4 5 ... 2,223 Next



Ames Life Science Data Archive (ALSDA) AWG

SME Feedback on Assay Metadata “Configurations”

Current Assay Metadata Configurations
Molecular Cellular Imaging (Light/Fluorescence Microscopy)
Behavior (Elevated Plus Maze)
Behavior (Novel Object Recognition)
Calcium Uptake (Spectrofluorimetry)
Protein Quantification (Western Blot)
Flow Cytometry (Flow Cytometry)
Bone Microstructure (Micro-Computed Tomography)
Behavior (Unconstrained Cognitive Flexibility)
Behavior (Attentional Set-Shifting)
Behavior (Object in Place)
Immunoassay (ELISA)
Echocardiogram (Ultrasonography)
Histological Assay (Histomorphometry)
Mechanical Testing (3pt/4pt Bend/Torsion)
Intra-Ocular Pressure (Tonometry)
Behavior (Radial Arm Water Maze)
Behavior (Open Field)
Behavior (3-Chamber Social Interaction)
Behavior (Barnes Maze)
Behavior (Gait)
In Vivo Bone (pQCT)
Mineral Density and Composition (DXA)



Upcoming Configurations
Behavior (Object in Place)
Behavior (Novel Location)
Neurophysiology (Electrophysiological Recordings)
Physiology (Blood Pressure)
Behavior (Prepulse Inhibition)
Metabolites (HPLC with ECD)
Cardiovascular Imaging (MRI)
Neuroimaging (MRI)
Eye Microstructure (microCT)
Grip Force (Force Transducer)
Behavior (Spatial Novelty Y Maze)
Behavior (Tail Suspension Test)
Behavior (Startle Test)
Behavior (Wire Hang)
Behavior (Escher Staircase Track)
Immunophenotyping (Blood Cell Counts)
Infrared Spectroscopy (Infrared Spectroscopy)
Muscle Physiology (Muscle Fiber Typing)
Blood Analysis (Serum Metabolites)
Behavior (Contextual Fear Conditioning)
Behavior (Rotarod)
Physiology (Pulse Oximetry)

- 22 Configs Created
- Feedback on Tabular Data Templates for Reuse Standards per Assay

Detailed Sample and Assay Metadata Crucial

Assays

+ Add Assay

- Histone Modification Profile
- Novel Object Recognition
- Micro-computed tomography
- Transcription Factor Binding Site Identification
- Post-Transcriptional Modification Profiling
- Histomorphometry
- Protein Identification
- Protein-Protein Interaction Detection
- Western Blot
- Copy Number Variation Profiling
- Ultrasonography

Configs Used to Add Phenotypic Assays to Submission Portal

This Enables Common Search of Omics & Phenotypic Datasets

Search Filters

Search Datasets

Organism	Factors	Assay Type	Release Date	Description
GL25-910	Mice	Transcription profiling	03-Aug-2022	The objective of the Rodent Research-23 mission (RR-23) was to better understand the effects of spaceflight on the same, specifically on the structure and function of the genome, cells, and proteins...
GL25-911	Mice	Transcription profiling	03-Aug-2022	In Rodent Research Reference Mission-1 (RRM-1), also known as RR-1, forty female BALB/cJ mice were flown on the International Space Station. To assess differences in outcomes due to age, twenty...
GL25-910	Arabidopsis thaliana	Transcription profiling	15-Nov-2016	To combat DNA damage, organisms mount a DNA damage response (DDR) that results in cell cycle regulation, DNA repair, and, in severe cases, cell death.

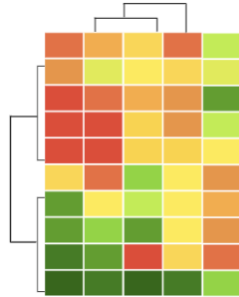
Artificial Intelligence and Machine Learning (AI/ML) AWG Goals

Focus Area 1: AI-Readiness

Pre-processed datasets ready for AI model training

Action items:

- AI-readiness data and metadata guidelines for the Open Science Data Repositories (OSDR)
- Standardized AI-ready dataset structure
- AI-readiness “score”

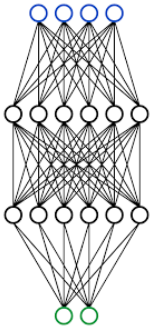


Focus Area 2: Algorithms for Space Biology

*Address specific space biology data challenges
(low n, high-dim)*

Action items:

- Prioritize research questions: Decadal Survey on Life and Physical Sciences Research in Space 2023-2032
- Focus on gaps in current capabilities
- Develop benchmarking tasks for new algorithms

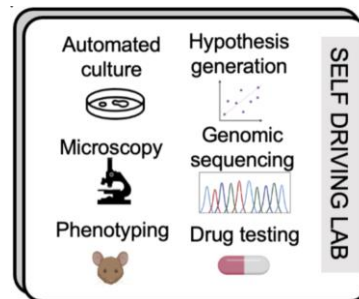


Focus Area 3: Self-Driving Labs

Automate space biological experiments

Action items:

- Prioritize physiological biological questions for automation
- Integrate several automated experimental platforms for comprehensive experimental readout
- *In-situ* analysis capabilities



Focus Area 4: Trust, Ethics & Explainability

Ethical AI guidelines for space biology

Action items:

- Education of next generation of AI scientists
- Consensus document for ethical standards for AI in space biology
- Guidelines for experimental design, metadata, and data



Interested in becoming a member?

Here's how to join:

