

## **EXPANDING REPOSITORY DATA AVAILABLE FOR SHARING AND KNOWLEDGE DISCOVERY**

Ryan T. Scott<sup>1</sup>, Danielle K. Lopez<sup>1</sup>, Alison J. French<sup>2</sup>, Alan E. Wood<sup>1</sup>, April Gage<sup>1</sup>, Evelyn N. Wong<sup>3</sup>, Samrawit G. Gebre<sup>1</sup>, Sylvain V. Costes<sup>4</sup>

<sup>1</sup>KBR, Moffett Field, CA; <sup>2</sup>Bionetics, Moffett Field, CA; <sup>3</sup>Blue Marble Space Institute of Science, Moffett Field, CA; <sup>4</sup>Space Biosciences Division, NASA Ames Research Center, Moffett Field, CA

Some of the hardest space biology and space health challenges require data-intensive, bioinformatic, meta-analytical, and computer-assisted research approaches. These challenges include examining interdisciplinary space life science research across experiments and across interacting spaceflight hazards (radiation, altered gravity, confinement, hostile-closed environments, distance-duration from Earth). The approaches to confront these challenges involve mining multiple datasets simultaneously from various hierarchical organizations of biological complexity, all while concurrently evaluating how experimental design factors affect endpoints of standard assays. To enable this field, it is essential that principal investigators (PIs) submit data in a structure so it can be maximally re-used.

The purpose of the NASA Ames Life Sciences Data Archive (ALSDA) is to collect, curate, and make publicly available all non-human space-relevant biological data. ALSDA must also ensure data are open-access, and maximally findable, accessible, interoperable, and reusable (FAIR). The scope of ALSDA data collected and submitted by PIs include subject and study design metadata, assay metadata parameters, raw and processed assay data, assay imagery/video, and subject-experienced mission data telemetry (radiation, temperature, humidity, acoustics, vibrations, etc.). ALSDA recently integrated into a collaborative group of Open Science projects to facilitate a suite of new tools and workflows that will improve data submission, accessibility, and reusability by implementing digital data submission agreements, and adopting the data management system originally developed by NASA GeneLab. ALSDA intends to bring current biological repository data and all future collected data into this new scientific data reuse reality.

This new suite of tools will enable ALSDA to deploy a science curation system using scientific assay configurations for the data submission portal. It will capture essential assay parameters according to established standards in each sub-field within biology. The submission portal expedites data collection by enhancing ease of PI data submission, providing a user interface and specificity for which data is to be submitted. Data submissions can be brought into cutting-edge informatic analysis portals to enable mining of physiological, behavioral, biochemical, and imaging datasets in conjunction with 'omics-level datasets. As ALSDA datasets are submitted, curated, and published (e.g., micro-computed tomography, histology, pulse oximetry, serum metabolites, magnetic resonance imaging, intraocular pressure, novel object recognition, etc.), the merging together of spaceflight data along this multi-hierarchical complexity of biology will enable informatics and data-intensive approaches resulting in knowledge discoveries across missions, space hazards, and biological disciplines.