Title: GL4U: Using space omics data to provide bioinformatics training for students and educators

Track: Education

Authors: Amanda M. Saravia-Butler, Lauren M. Sanders, Sigrid S. Reinsch, Steven Boring, Saba Hussain, Samrawit G. Gebre, Arman Seuylemezian, Lisa Guan, Alvin L. Smith, Parag Vaishampayan, Philip Heller, Sylvain V. Costes

Abstract (300 words)

NASA's GeneLab project provides researchers open access to space-relevant experiment multi-omics data that can be mined to understand the effects of spaceflight on biological systems. To maximize the number of scientists who understand and utilize GeneLab data and data processing pipelines, GeneLab has created GeneLab for Colleges and Universities (GL4U).

GL4U provides space biology-relevant training in bioinformatics to the next generation of scientists through direct and indirect approaches. The GeneLab team plans to host two annual data processing bootcamps, one for college-level students (direct) and one for college educators (indirect – training of trainers), in which participants learn to analyze GeneLab's space-relevant omics data.

The GL4U direct training pilot program was conducted in June 2021. During the pilot, students participated in a week-long bootcamp consisting of space biology-specific lectures and hands-on instruction using Jupyter Notebooks to analyze RNA sequence data. This pilot demonstrated the capacity of GL4U for training young scientists and encouraging data re-use.

In June 2022, GL4U partnered with Jet Propulsion Laboratory's (JPL) Planetary Protection Center of Excellence to conduct the indirect training pilot program by training educators at historically black colleges and universities (HBCUs) and minority serving institutions (MSIs). During the educator pilot, participants received materials, training, and will be provided the necessary compute resources to enable them to run the bootcamp at their home institutions or alternatively to adapt the content to implement within existing courses, thereby extending the reach of this initiative. The GL4U training program provides undergraduate students from underrepresented groups the opportunity to learn about NASA and Space Biology, and to enhance their career prospects by gaining hands-on experience analyzing omics data, a skillset that is highly applicable and marketable in the life sciences. Pre- and post-bootcamp surveys were completed by all participants and show the overwhelming success of the bootcamps.