



GeneLab for High Schools: Data Mining for the Next Generation

A New Space Biology Training Initiative

Elizabeth A. Blaber, Ph.D.
GL4HS, Program Manager

Diana Ly, Task Lead and Logyx Deputy Program Manager, FILMSS
Kevin Y. Sato, Chief Scientist, FILMSS
Elizabeth Taylor, ARC Space Biology Project Manager





GL4HS: What is it?



- GeneLab for High Schools is a new Space Biology Training/Education Initiative led by NASA ARC
- Initiated in April 2016
- Aimed at high school students with the goal of teaching them about the importance of 'omics studies and how to analyze datasets using the GeneLab Data Platform
- Three week interactive and exciting summer program hosted at Ames Research Center
- Launching in Summer 2017!



GL4HS: Program Aims



- To inspire the next generation of scientists to become involved in space-based research
- To introduce and teach high school students about 'omics data and how it relates to biological research, with a specific focus on space based research
- To introduce and teach high schools students basic bioinformatics skills enabling them to excel in both their college curriculum and academic research laboratories
- To provide students with networking opportunities with their peers, NASA research scientists, NASA Space Biology management and University professors
- To present students with an opportunity to conduct hypothesis driven, research of a publishable standard in collaboration with a NASA mentor at a NASA research facility
- To provide tools for teachers to include GeneLab and bioinformatics analysis in their classrooms



GL4HS: Why?



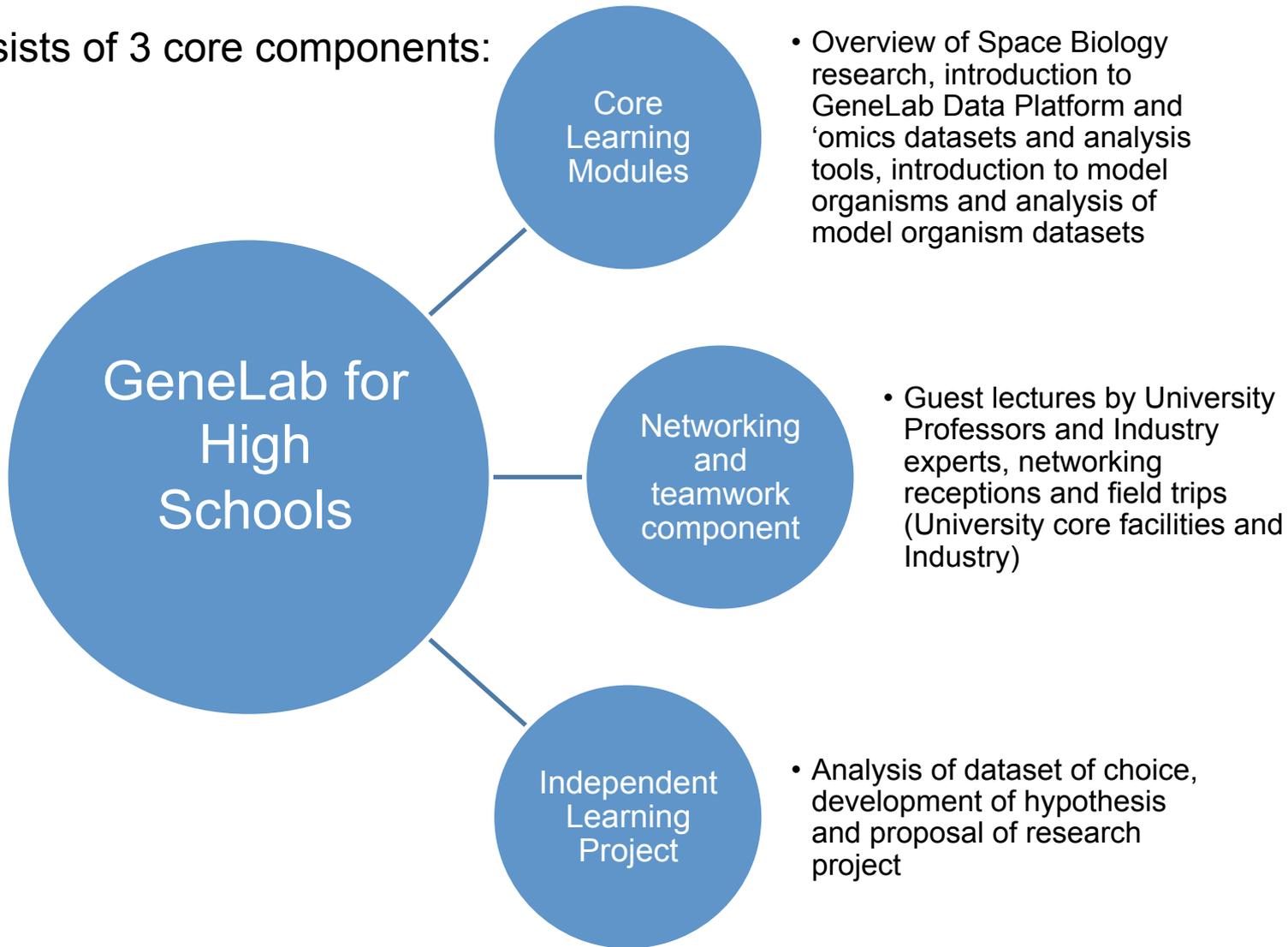
- Modern biological research has moved into an ‘omics revolution’ i.e. we are increasingly using high-through-put techniques (genomics, transcriptomics, proteomics) to understand complex biological processes
- NASA has aimed to use ‘omics techniques to understand the response of living organisms to spaceflight and to aid in fundamental research discoveries on Earth
- GeneLab is an open access data repository that archives ‘omics data collected from government funded space and ground-based researched
- Data is available for all to examine and analyze, including students
- Most college-level interns have had some interactions/training with ‘omics datasets, but most high-school students have not
- This course aims to provide high school students with the background and skills to analyze the data efficiently



GL4HS: Course Overview



Consists of 3 core components:





GL4HS: Road to implementation



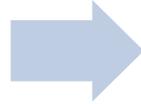
Phase 1: Planning and testing phase

• Goals:

- To develop a plan, budget and staffing requirements for the summer program and to develop course curriculum for use in Phase 2 of the program
- To work with local high school teachers to gain feedback on course curriculum
- To implement specific aspects of the course curriculum during the Summer 2016 internship period

• Outcomes:

- Determine applicability and interest of course content to target audience
- Gather feedback on course content from students, staff, and teachers



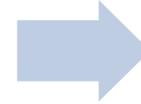
Phase 2: Launch of local program

• Goals:

- To provide students with a comprehensive and interactive curriculum that enables them to learn about 'omics data analysis and interpretation and allows them to propose a hypothesis driven research proposal for review by the Space Biology Project Office
- To provide a test-bed for all aspects of the program prior to Phase 3 implementation

• Outcomes:

- Implementation of a pilot GeneLab for high schools summer program with local high school students
- Submission of high quality hypothesis driven research proposals generated from data mining of the GeneLab repository
- Enabling students of selected proposal to test hypothesis in research lab at Ames Research Center under the supervision of a NASA mentor



Phase 3: Expansion of the program to larger group of high schools and establishment of remote learning centers

• Goals:

- To expand the GeneLab for High Schools Summer Program to allow participation from out of state students
- To allow High Schools from around the Nation to become involved and host remote learning centers for local schools

• Outcomes:

- Establishment of a nationally recognized Summer program that inspires the next generation of scientists to become involved in Space-based research, to use the GeneLab Data System to generate hypothesis driven ground-based research, and allows them to develop professional networking skills with renowned scientists in the field.

- Future goals are to include high school students from multiple states at ARC and in remote learning centers and following successful launch of the high school program we aim to expand to college students



Conclusions



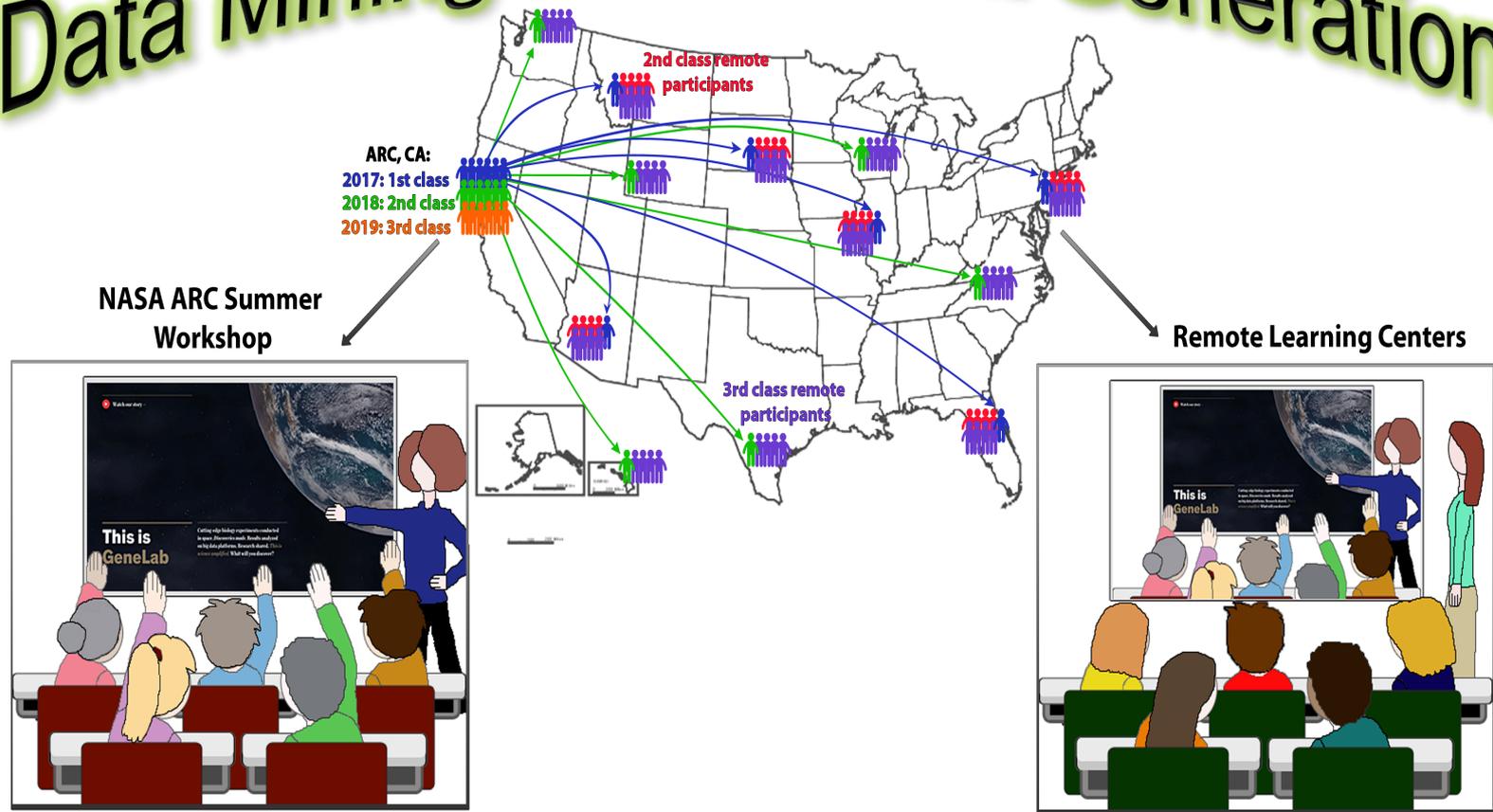
- GL4HS is a new Space Biology training/education initiative aimed at high school students that will be launched next summer
- The overall goal of this program is to teach students about 'omics techniques and help them develop critical bioinformatics skills that will help them in their career paths
- We also aim to teach students about Space Biology and to inspire them to get involved in space-based research

- Applications will open in Jan/Feb next year – please encourage students you know to apply!
- If you want to get involved, i.e. give a guest lecture, give a tour of your lab (local) etc. please contact me!



Thank you!

GeneLab 4 High Schools: Data Mining for the Next Generation



Elizabeth Blaber, Ph.D., Program Manager: e.blaber@nasa.gov, (650) 604-6015