Using the Ames test to measure the viability and mutagenicity of spacefaring *Salmonella enterica* and establish the efficacy of a flight platform

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Measuring effects of ionizing radiation on *Salmonella enterica* via the Ames mutagenicity assay.

Providing proof of concept and conducting a test flight in preparation for the AZSGC RockSat-C mission launching in June 2018.
Sample Containment

- Locking-Cap Microcentrifuge Tubes
  - Rated to 10,000g
- Parafilm
Absorbent Aerogel Insulation

Isolated 3D-printed (PLA) Container
1. Experimental Flight Samples
2. Ground Control
3. Identical Incubation
4. Dilution series and colony counting
Methodology

- Incubation (Pre- and Post-flight)
- Maintaining sterile technique in the field
Measurement of radiation levels over time shows the samples experienced beta and gamma radiation during the flight.
Colony counts on nutrient-rich media show proof of in-flight sample viability
Mutated colonies observed, but not statistically significant
Flight negatively affects cell viability
  ○ 10-fold decrease in survival

Our apparatus allows for live cell recovery
Future Directions

- Testing with on-flight radiation shielding
  - Radiation-specific control
- Sounding rocket flight to Thermosphere
  - Gel Fixation
  - Increased Container Durability
- Other Cell types
  - TA98 Salmonella
  - Human Immune Cells
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