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Project HALON: Engaging Secondary Students in High-Altitude Balooning Experiments

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Omaha, NE and Council Bluffs, IA, as seen from 15,000 m

Problem Description

- Fewer US STEM graduates
- Shortage of STEM educators
- **Lack of engaging, high quality STEM material in the classroom**
- Potentially results in lower global economic competitiveness

Project HALON Overview

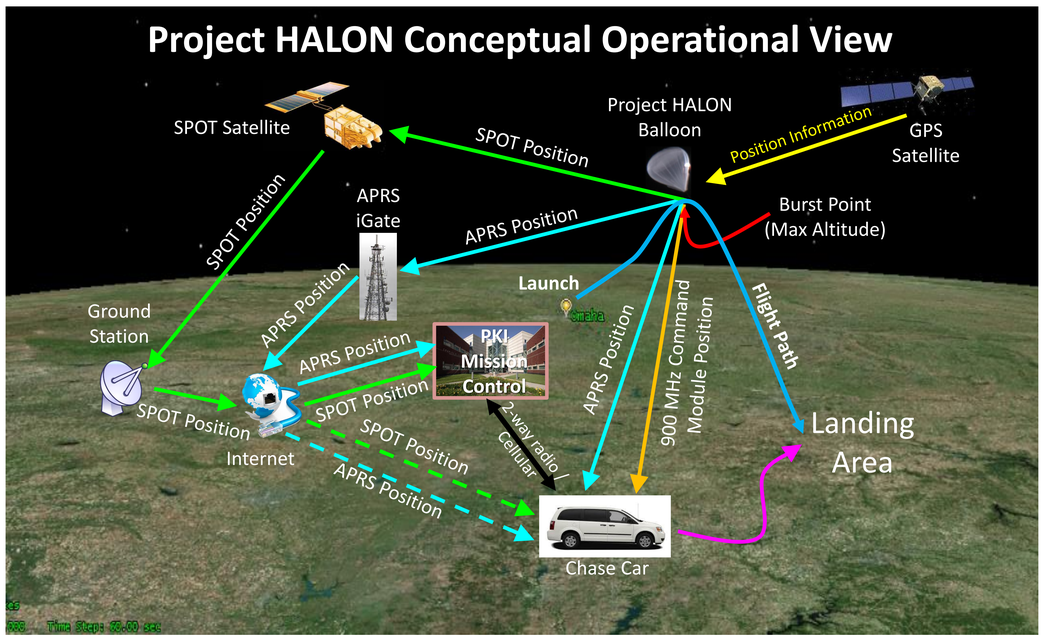
HALON: **H**igh **A**ltitude **L**earning **O**ver **N**ebraska

- High altitude balloon lift platform
- **Student-designed experiments** tailored to student team abilities
- NASA-inspired near-space systems engineering process for **tradeoffs**
- Engagement / mentoring for pre-service and in-service educators

Research Methodology

- Student teams set research goals
- STEM mentor guides experiment build
- Follows NASA Systems Engineering
  - Preliminary Design Review (PDR)
  - Critical Design Review (CDR)
  - Test Readiness Review (TRR)
  - Benchtop, 2 m Drop, Freezer Tests
  - Flight Readiness Review (FRR)

Project HALON launch

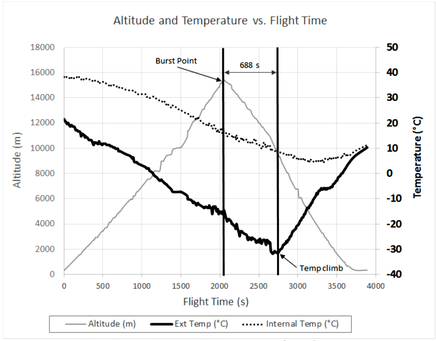


Selected Student Learning Objectives

- Experiential application of the scientific method
- Design requirement identification and tradeoffs
- Use of simulation and test to refine experiment
- Data collection, analysis, and results presentation

Experiment Constraints

- FAA and FCC requirements
  - Total payload mass < 5.4 kg
  - HAM radio license for APRS use
- Operational requirements
  - Air temperatures down to -50 °C



Project HALON sample data

Results

- Project brings together STEM major mentors and educators
- Builds understanding of research and operational challenges
- Students get excited about more complex experiments (CubeSATs)

Project HALON students recover payload