CASE STUDY

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Labdisc in Near Space

Students, Your Mission: To Take Pictures of Earth from Space

Picture of the San Francisco Bay Area taken from the balloon at 80,000 feet

The NASA-funded afterschool NOVAS program (http://nasanovas.org), now in its third year, engages teens in astronomy, engineering, earth observation, and more. In collaboration with Hi-Impact Consultancy in the UK, NOVAS teens and UK students recently launched high-altitude weather balloons to the edge of space. This project engages some of the most marginalized and disadvantaged students in the UK and US, motivating them to study science and even consider scientific fields as a valid path for their future.

Students were given complete ownership of the project, using their own initiative to resolve every challenge and setback that arose. They were really excited, knowing they would make valuable scientific discoveries and perform an experiment none of their teachers had ever carried out before.

Thinking like real scientists

Fully immersed in inquiry-based learning, the students approached this grand-scale science project just like real scientists. Once they’d decided on building a Styrofoam spacecraft, they had to consider how to launch it into space. They also worked in teams to address sponsorship and community involvement, health and safety issues, as well as coordinating with the Civil Aviation Authority and using predictive climate software to optimize the weather conditions and flight path.

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The Labdisc breaks new scientific ground

The initial launch objective was to capture images of Earth, but using the Labdisc in the second launch created a unique opportunity to collect some real scientific data from near space. The Labdisc's built-in sensors recorded a rich variety of in-flight data, including the upper atmosphere, and enriched the students' understanding of massive data changes in a short time frame.

What was inside the helium balloon spacecraft?

The Labdisc measured ambient temperature from inside a Styrofoam cooler, with an external sensor protruding through the foam. In addition, the Labdisc was configured to measure air pressure, humidity, GPS (latitude and longitude), and air pressure computed to altitude. What the students could deduce from raw data over time provided new insights about the flight, such as how the balloon suddenly moved at 100 kilometers per hour due to gusts of wind and the exact location when the balloon burst.

From the initial hypothesis, experiment design, and pre-launch prediction tools to the post-landing data analysis, the students conducted themselves like real scientists.

What conditions did the Labdisc contend with in near space?

"I was really surprised at what a rich data set we got from the Labdisc considering the extreme conditions in near space, similar to those found on Mars with around 0.6% of the Earth's atmospheric pressure and temperatures of -60 °C."

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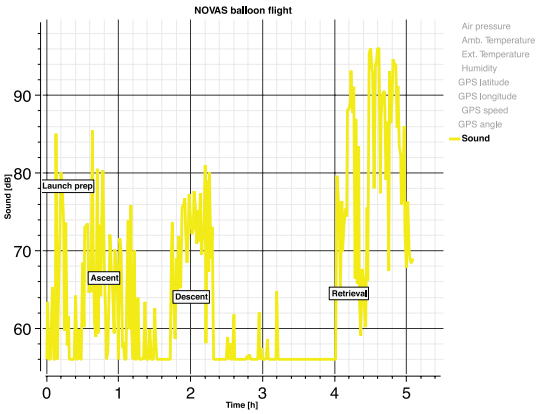
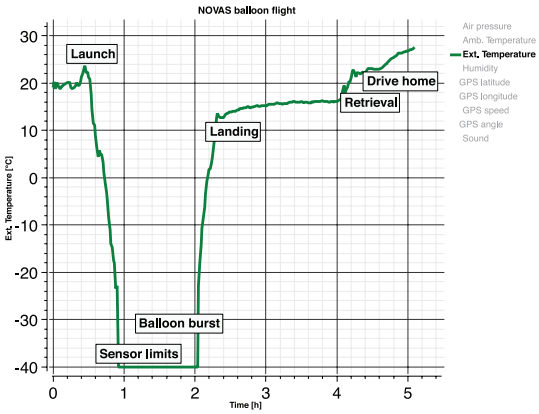
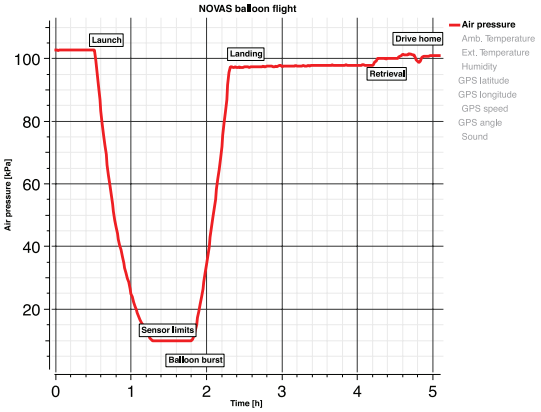
SOUND DATA



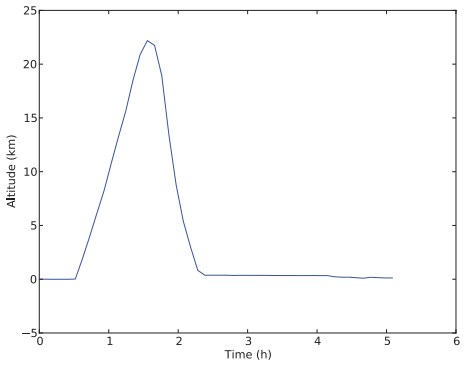
EXTERNAL TEMPERATURE DATA



ATMOSPHERIC PRESSURE DATA



ALTITUDE DATA



Pressure at launch was 102.7 kPa, but on landing it was only 97.5 kPa. The students quickly realized why—they'd launched from sea level, but landed on top of a hill.

The project was the brainchild of Simon Sloan

"Having seen a similar project carried out by the BBC, I knew straight away that something like this would inspire, excite, and motivate children in our partner schools in a way that would take them far beyond the physical and mental confines of the classroom. We invited Dr. Croft to share his expertise with us, and following a really successful pilot, both the UK and USA groups have continued to develop the project every time, incorporating Labdisc sensors, trackers, and even 3D printed mission patches."

The facilitators of this exciting project were Alan Thompson and Alan Crist, education technology facilitators from Hi-Impact Consultants, UK

"Every year at BETT, we hand-pick fresh education technology tools, and when we saw the Labdisc we knew it would be perfect for the Near Space Balloon Challenge."

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Balloon landing in the British countryside

Dr. Steve Croft, with Dan Zevin and colleagues at the UC Berkeley Space Sciences Lab

"The Labdisc provides a science gateway for kids who feel less involved and can't connect to a picture of their place in the universe. It is a tool that can engage every type of population in science, and in the Balloon Project, students collaborated in scientific discoveries that they knew would make a difference."

The young heroes of the space mission were UK students from Bedford Drive Primary School, West Kirby Residential School, and Kilgarth School, along with NOVAS afterschool program participants from San Francisco Bay Area high schools

"The Labdisc is nice and sturdy, so it didn't get damaged during the landing."

"The Labdisc gave us pretty accurate readings about what was happening to the payload, and the data all matched up."

"I love the Labdisc because we were able to conduct many experiments for our balloon launch such as air pressure, temperature, and the highest point of the balloon."

Click here to see a short movie about this exciting project.

Follow the balloon project and other programs like it at:

Web:	www.hi-impact.co.il
Twitter:	@hiimpactconsult
Facebook:	page/hiimpactconsultancy

Want to learn more about the Labdisc portable STEM lab? Visit **mimio.boxlight.com/labdisc**.