

SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)

Lift-Off - Secondary Space Education (2)

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PROMOTING STEM EDUCATION IN NORTH DAKOTA WITH HIGH ALTITUDE BALLOONS

Abstract

The main objective of the North Dakota Space Grant Consortium (NDSGC) is to provide and support opportunities for our students to pursue research in science, technology, engineering, and mathematics (STEM) fields and prepare them for careers that support NASA's goals and the high-tech workforce development needs of North Dakota. One way this is done is through hands-on high altitude ballooning projects with both middle and high school students throughout the state. This active-learning pedagogy prepares students for real-world jobs that require critical thinking.

Starting in the fall of 2011, the NDSGC has sponsored and organized the annual Near-Space Balloon Competition (NSBC), a statewide competition which involves secondary student teams designing and constructing scientific payloads to be flown on a high altitude balloon in the spring of that school year. Professors and graduate students in the Department of Space Studies at the University of North Dakota work with the student teams throughout the school year, completing design reviews that lead up to the launch, chase, and retrieval of the high altitude balloon and payloads. Students complete research on subjects ranging from solar radiation and atmospheric properties to bacterial growth in a near-space environment. The third annual NSBC will take place in the spring of 2014.

As an expansive initiative, in the fall of 2013, 124 eighth-grade students from Valley Middle School in Grand Forks, North Dakota, participated in a 3-week-long high altitude balloon payload mission. The students formulated hypotheses, designed, and constructed their own experimental payloads. They successfully flew these experiments onboard two balloons which both surpassed 102,000 feet (31 km). They were able to analyze the post-launch data in order to produce a final science report, completing the scientific process. This ballooning practice is ongoing with two more eighth grade classes from Schroeder Middle School and South Middle School in Grand Forks, ND, with launches scheduled for May of 2014.

A two-part self-assessment was used to determine how much the Valley Middle School students learned from the experience, as well as how much it changed their opinions about STEM subjects. The survey analysis revealed the students greatly appreciated and learned from this project, and these evaluations are being used to improve future high altitude ballooning practices with secondary students in North Dakota.