

High Altitude Ballooning At UND

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What is a High Altitude Balloon?

- Sometimes called a Weather Balloon or Near Space Balloon
- Filled with Hydrogen or Helium
- Carry scientific payloads high into the stratosphere



How High Does a High Altitude Balloon Go?

- Our balloons can go up to about 100,000 feet or 19 miles high (30.5 km)!
- That's high enough that you can see the dark of space and the curvature of the Earth!





Activities

- Near Space Balloon Competition (NSBC)
 - Annual event, invite schools across North Dakota
 - Each team proposes, designs, builds experiment
- Mega Launch
 - Annual event, every student in eighth grade of Schroeder MS
 - April 29, 2015
 - Global Space Balloon Challenge

Collaborative Activities

- HASP (High Altitude Student Payload)
 - Working with University of North Florida
 - Since 2008, had proposal accepted and flown for NASA
 - Ozone sensor, pollutant gas sensors
 - Over the years, most workload shifted to UNF

The MEGA LAUNCH

- Started in October 2014, pre NSBC
- Continued in February, emphasis on April
- used surveys to assess STEM impact
- students filled out proposal forms...





High Altitude Ballooning Project

The Mission: You are the Research and Development team for a High Altitude Balloon launch to take place in April 2015.



Your Task:

1. Design scientific an experiment to fly with the balloon.
2. Submit a proposal.
3. Build a payload to carry your experiment.
4. Analyze the experimental results after the launch.

Part 2 - Submit a Proposal:

- I. Describe your experiment ideas to your group then together decide which experiment you would most like to fly.

Group Name: _____

Group Members:

The experiment we chose is:

- II. In the space below describe how each member of your group will contribute to your experiment. All team members should contribute equally.

Example team roles:

Team Leader - manages the group's time and ensures that teammates stay on task

Chief Scientist - uses feedback from teammates to write a proposal (next page)

Payload Engineer(s) - design, build and install payload components

Payload Technician(s) - in charge of final payload preparations before launch (turning on sensors, etc.) and collection of data from payload

Budget Analyst - keeps track of materials and makes sure the experiment fits the specified requirements

Payload Requirements:

1. *It can be any shape but must be no bigger than 6 x 6 x 6 inches.*
2. *The total weight of your experiment and payload must be less than 1 lb.*

Payload Limitations:

Prohibited items

- Animals (live or dead)
- Anything hard that may explode (ex: pop cans, aerosol cans, etc.)
- Anything that may cause fire or burning
- Cell Phones

Encouraged items

- Plants/microbes
- Digital Sensors
- "Spacesuits"/ innovative containers that may protect sensitive items (eggs, marshmallows, plants, etc.) from the conditions in near space.

The following list of sensors are available from UND for use in your experiments:

<i>Sensor</i>	<i>Sensor range</i>	<i>Quantity</i>	<i>Mass (grams)</i>
Temperature	-35C – 150C	1	58
Oxygen	0-25%	1	100
Humidity	0-95%	1	43
Pressure	0-700 kPa	1	50
Magnetic Field	+/- 10 mT	1	46
CO2	350-10000 ppm	1	120
Acceleration	-80-80 m/s ²	2	44
UVB	0-1500 mW/m ²	1	45
Wide Range Temperature	-200C – 1200C	1	56

III. Answer the following questions about your experiment:

1. What hypotheses can be drawn from the experiment?

2. What will be the control group for the experiment?

3. What materials will be needed for this experiment?

4. How will the data be recorded?

IV. Draw a sketch of your experiment (attach another sheet of paper if more space is needed):

Example Experiments

- Green Thumb
 - send up seeds at different germination stages
- Magnetic Monkeys
 - Send up magnet + ferrofluid + camera
- Flying Butter Socks
 - send up cream + sugar + cold = ice cream?

Global Space Balloon Challenge

- Second year it has taken place
- Participation requirements:
 - Sign up on website, www.balloonchallenge.org
 - Fly with a camera
 - Launch between April 10 – April 27 2015
 - (unless weather causes delay)
- Great community, global community
- First year had 60 teams from 18 countries



There are 295 teams in 47 countries signed up



Schroeder MS

Grand Forks

Map Satellite

Las Vegas Google

Map data ©2015 Google, INEGI Terms of Use Report a map error

Schroeder Middle School

April 29th 2015



High Altitude Balloon Launch







Flight Coordinates and Information

Launch Latitude: [decimal degrees]
Launch Longitude: [decimal degrees]
Launch Elevation: [masl]
Balloon Ceiling: [masl]
Est. Landing Elevation: [masl]

UWYO Sounding Wind Data Site

Closest Site: INT.FALLS/FALLS_INT

Make a Reverse Prediction (Set Landing, Predict Launch)

Default Launch Sites:

About

Rise Rate Calculation

Ascent

	Altitude [m]	Rise Rate [m/s]
▶	2000.00	5.10
	3000.00	5.10
	4000.00	5.10
	5000.00	5.10

Descent

	Altitude [m]	Fall Rate [m/s]
▶	2000.00	-5.00
	3000.00	-5.00
	4000.00	-5.00
	5000.00	-5.00

Default Rise Rates:

Prediction Date/Hour

Prediction Date: [Central Standard Time]
Prediction Hour: [Central Standard Time]

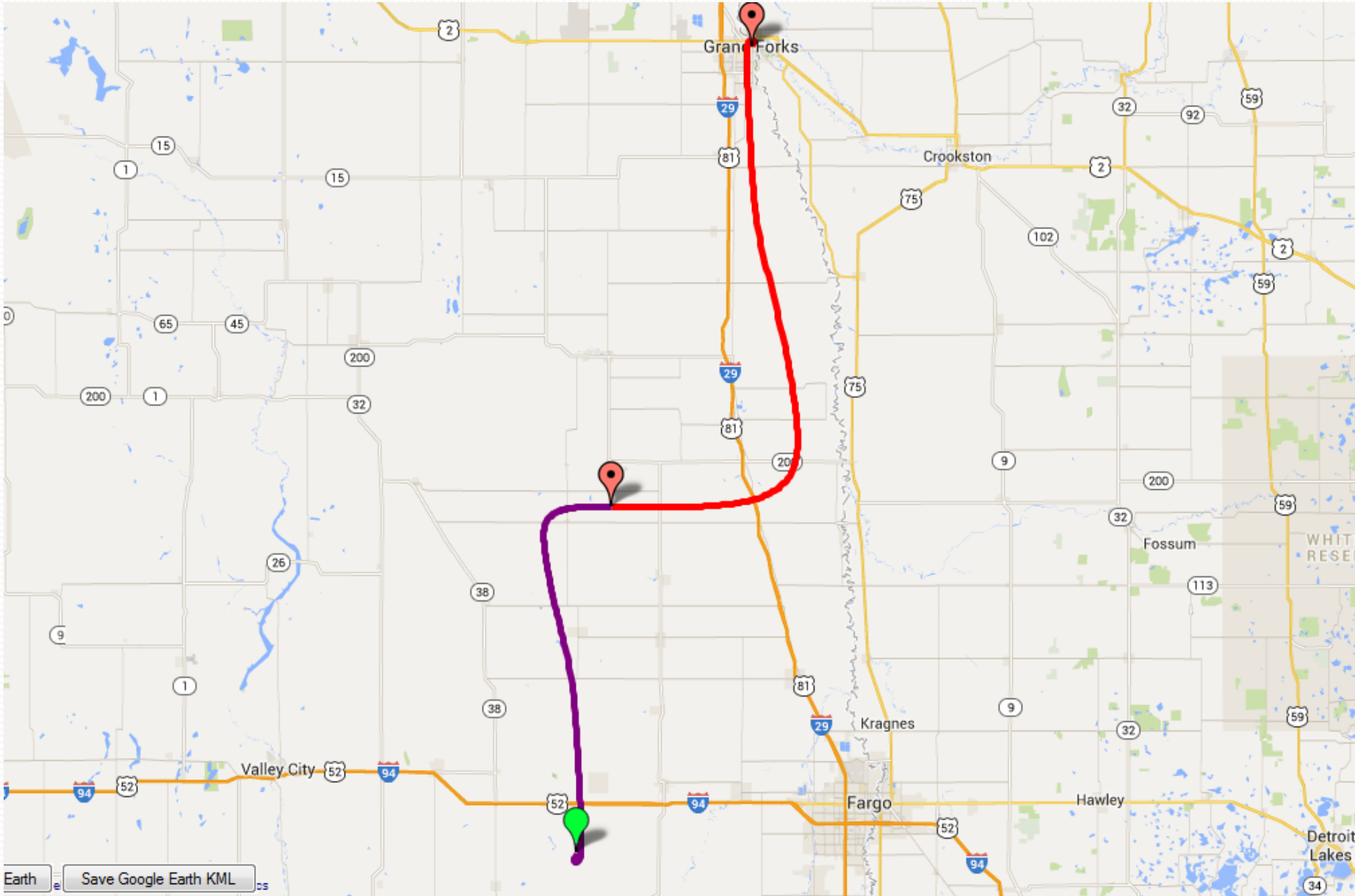
Prediction Date/Time GMT: Wednesday, 29 April 2015 at hour 14

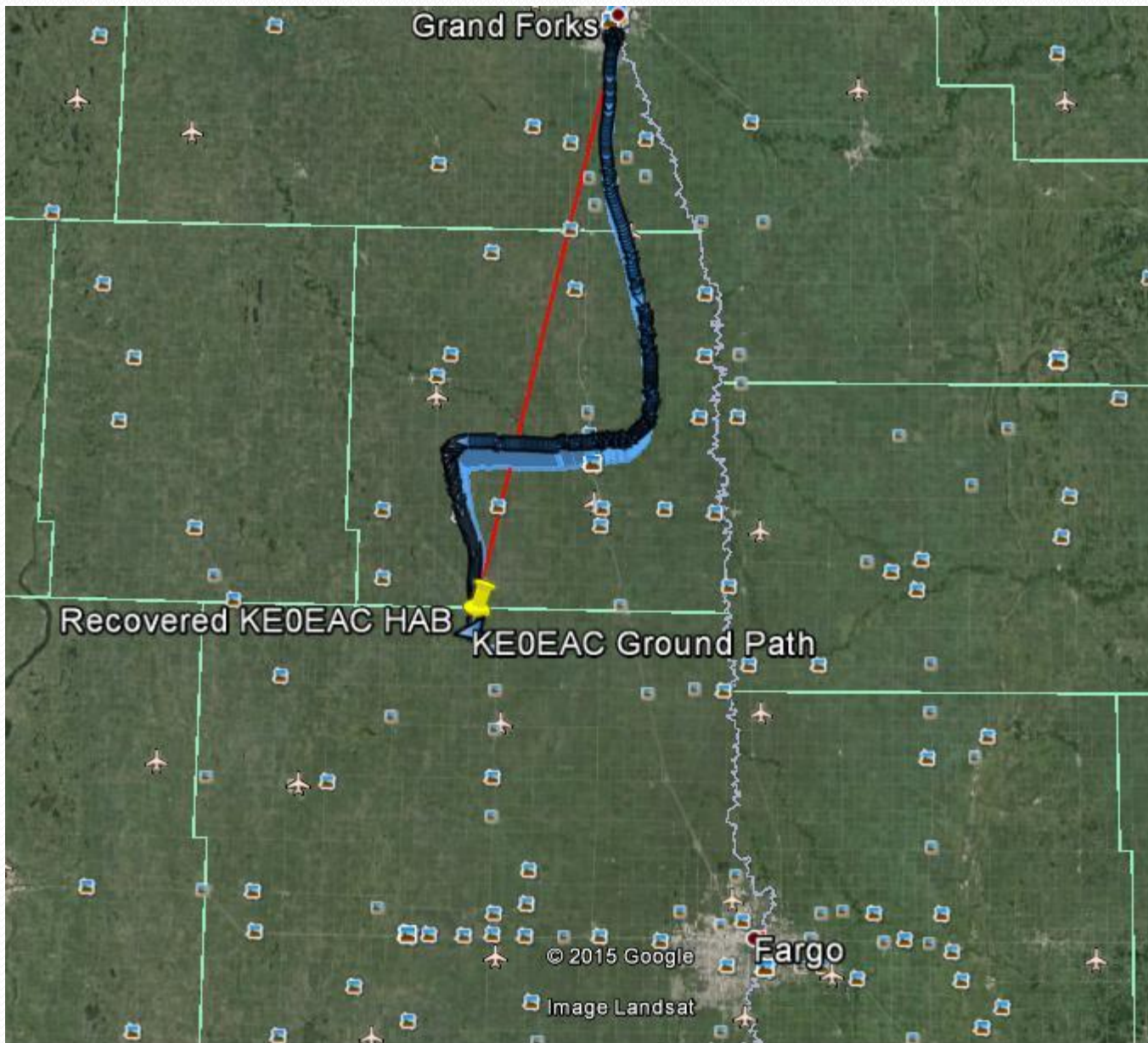
Get Extra GFS Data for Plotting

Defaults

**Make Prediction:
GFS Model**

**Make Prediction:
Actual Winds**







KE0EAC HAB

KE0EAC Ground Path

Grand Forks

Cass

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Image Landsat

Google



Near Space Balloon Competition 2014

- Invited schools across North Dakota, K-12
- Received over 25 proposals from 9 different schools
- Accepted 7
- Including Mayport CG Science Geeks....



you know that awesome feeling
when you finally understand math?

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NON-RECYCLABLE
WASTE