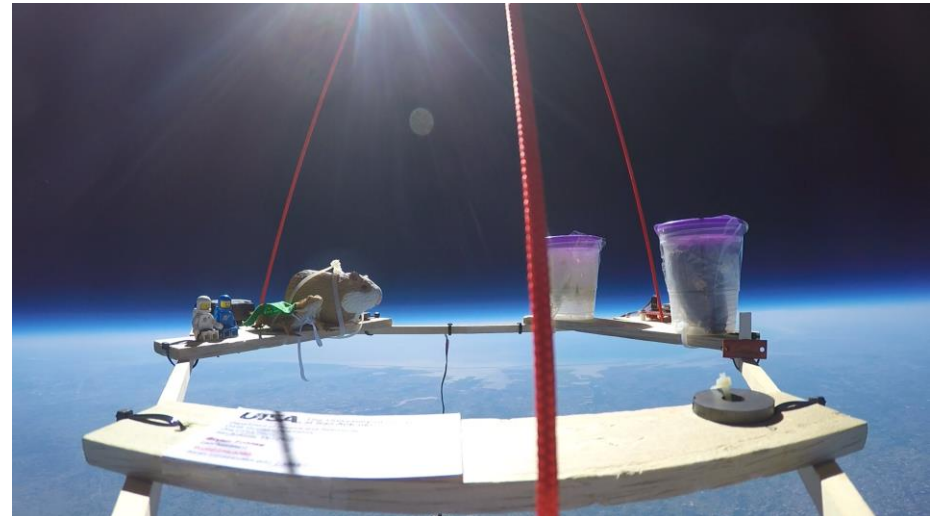




# Community Service Learning Projects: Education Process Yielding Benefits before Graduation

Gerald Mulvey<sup>1</sup>, CCM, Lisa Tobias<sup>2</sup>,  
and Bryan Tobias<sup>3</sup>



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<sup>2</sup> Lisa Tobias, Saint Peter Prince of the Apostles School, Middle School Science

<sup>3</sup> Brian Tobias, University of Texas San Antonio, Department of Physics & Astronomy



# Learning Objectives:

## 5<sup>th</sup>-8<sup>th</sup> Grade Students

1. Improve general experimental design in students ages 10-14 (5<sup>th</sup>-8<sup>th</sup> grade)
2. Apply knowledge of previous concepts to the study of the characteristics and effects of the Earth's atmosphere on objects
3. Collect data about the characteristics of the Earth's atmosphere for later analysis and evaluation in the classroom



# Learning Objectives

## 6<sup>th</sup> and 7<sup>th</sup> Grade Students

Apply information/data collected on the flight to the study of space flight (6<sup>th</sup> grade) and search for habitable worlds (7<sup>th</sup> grade)

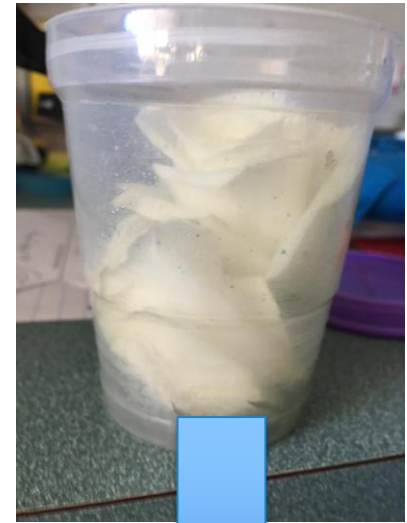
## Undergraduate Students

1. Apply concepts in radiosonde / balloon trajectory forecasting (METR 3390 Meteorological Instrumentation and METR 3330 Forecasting II)
2. Provide mini-research project experience in lower atmosphere structure data collection and analysis (METR 4315 Air Pollution)
3. Apply concepts learned in METR-4320 Weathercasting II on interviews to explore the St Peter's student projects



# Experimental Design Process

- Experimental design worksheet
  - Developing hypothesis
  - Identifying data to/how to collect
  - Control
- Brainstorming in small groups and then as a class
- Choosing and testing experiment pre-flight





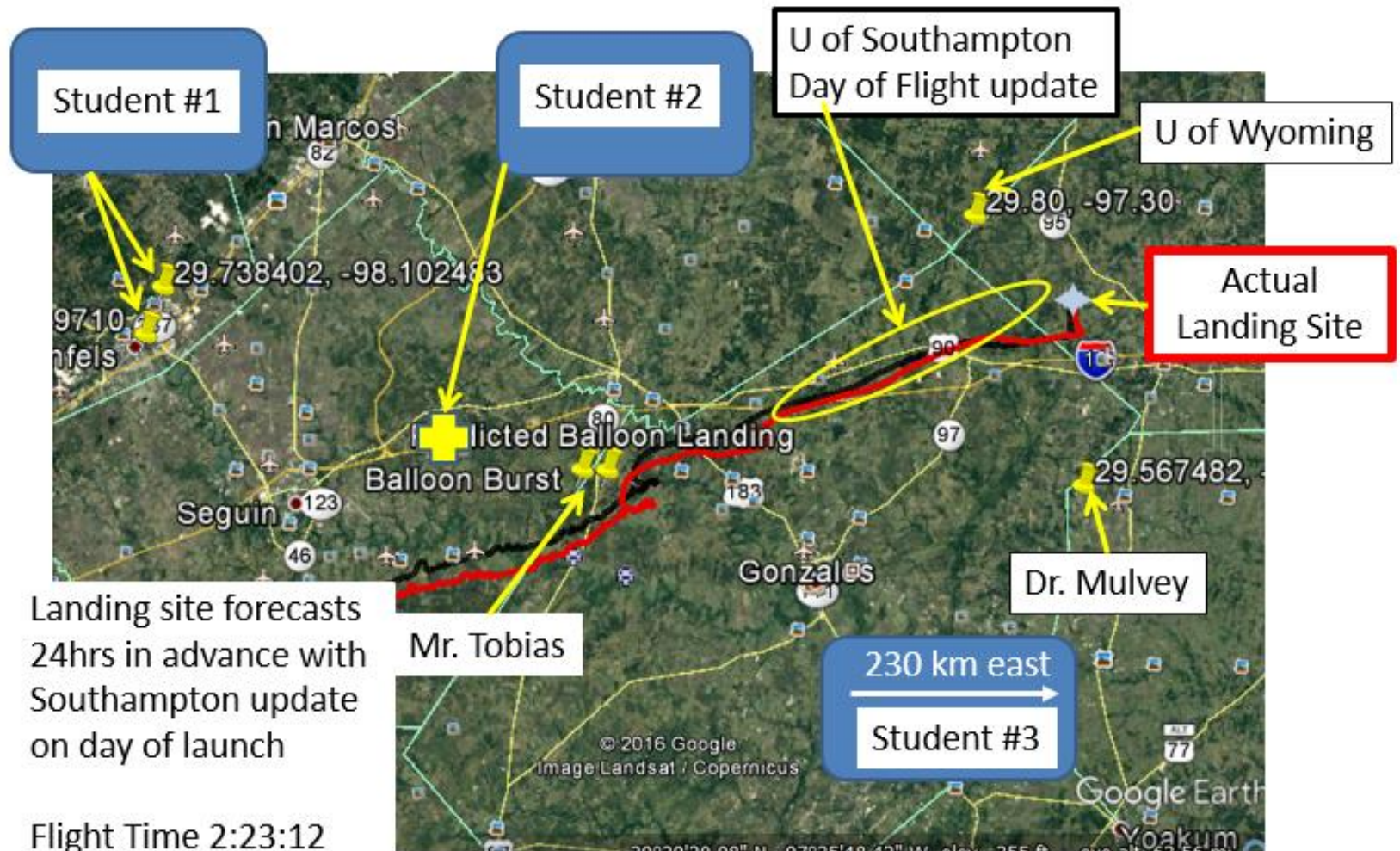
# Mission Assignments

- Sixth grade is in charge
- Assignments were designed like our version of Mission Control
- Students made requests for roles (1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup>) and assignments from these interests were based on need and personalities / strengths
- Incarnate Word meteorology students were assigned to:
  - Prepared Flight Forecasts
  - Make surface observations at launch
  - Interview students on roles
  - Analyze the resulting data





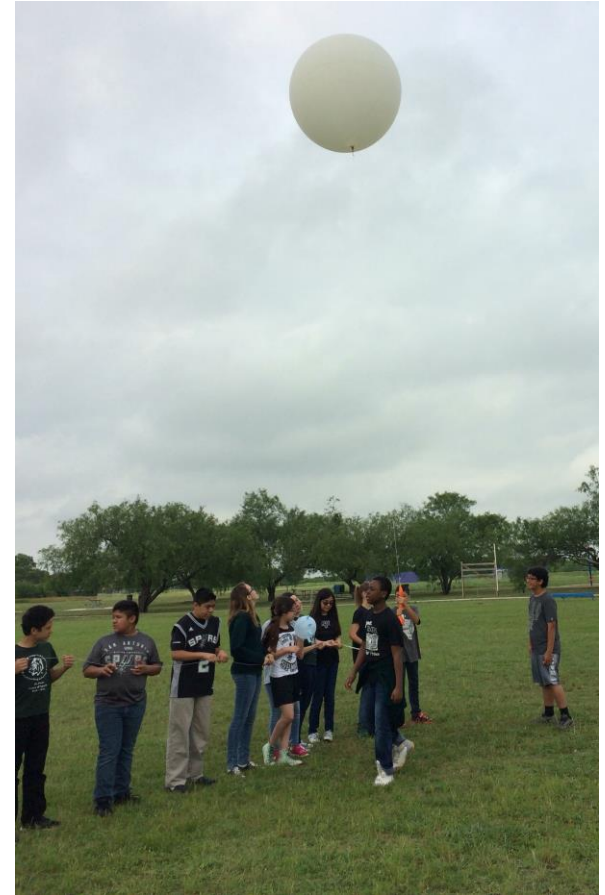
# Landing Site Forecasts





# Flight Launch

- Jobs/responsibilities have been discussed and reviewed
- Be flexible in unforeseen changes
- Everyone helps





# Inflight Data Examples



## Position

Received	2017-03-31 11:56:09 CDT / 3m25s
Latitude	29°43.96" N
Longitude	97°11.95" W
Speed	23 MPH
Course	18 °
Altitude	3110 ft
Distance	78.0 miles
Bearing	76 °
Position resolution	19.7 yards
Location	Flatonia, TX, United States

## Properties

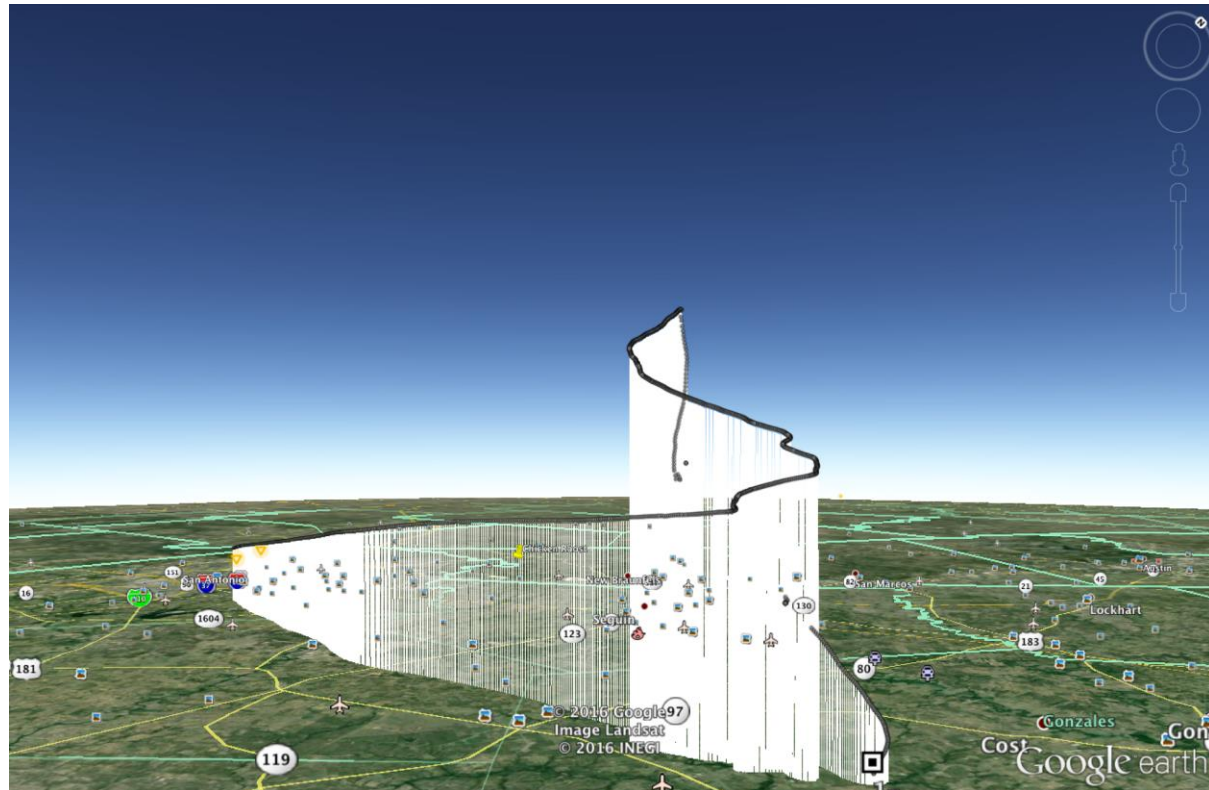
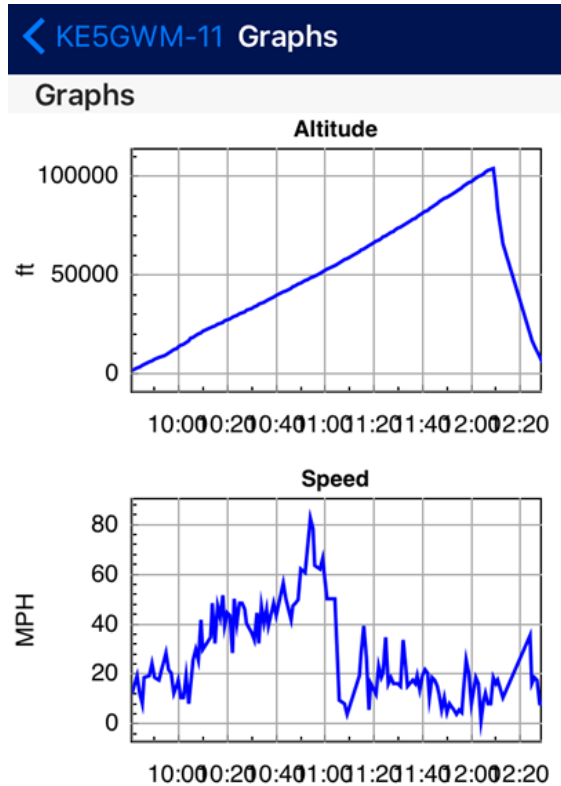
Station type	APRS station
Symbol	Balloon
Destination callsign	CQ
Packet path	WIDE1-1,WIDE2-2,qAR,KA5WMY-5





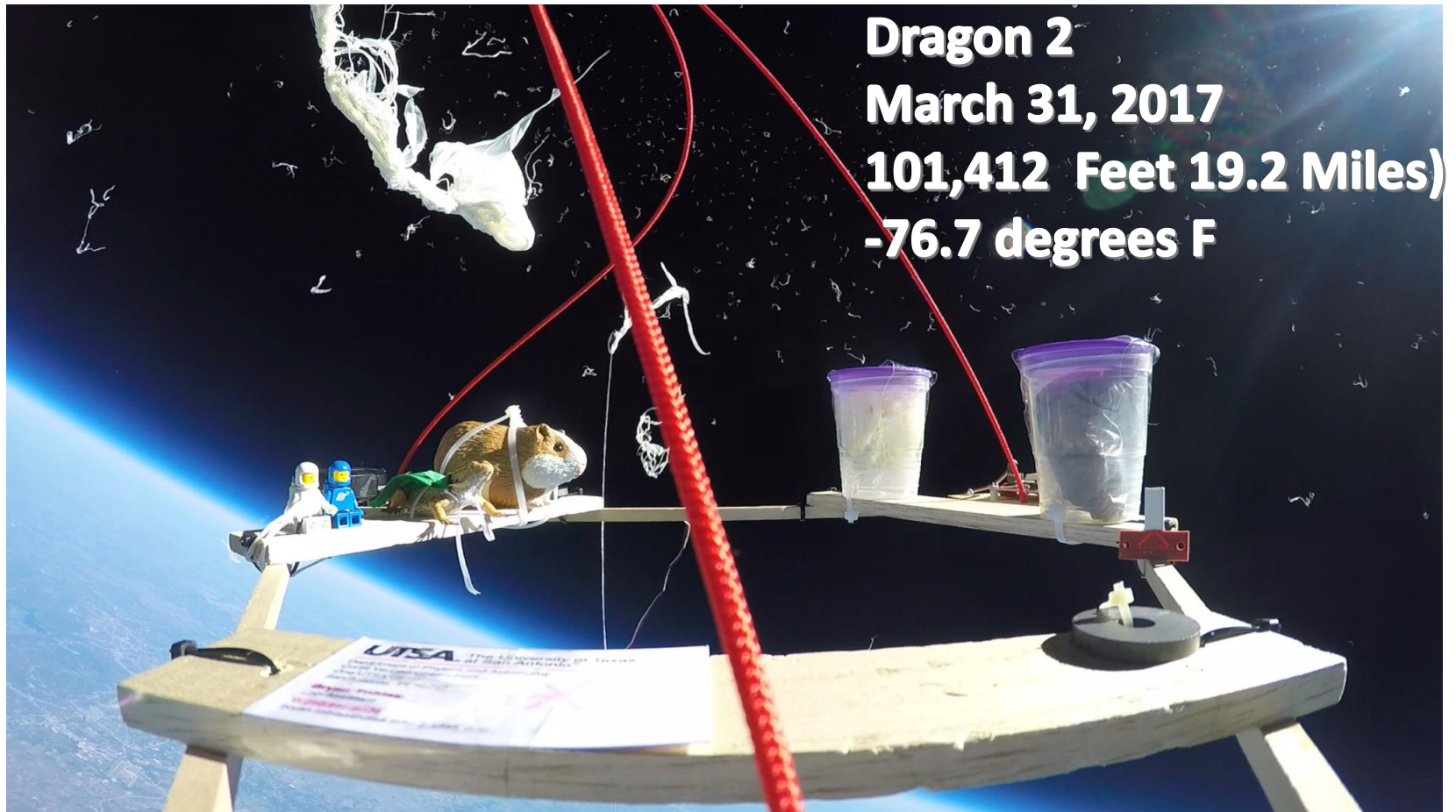
# Post Flight

- Post flight experimentation and evaluation
- Flight/experiment debrief and analysis
- Data analysis and interpretation
- Data application





# Balloon Burst





# Learning Outcomes

Both sets of students practice their communication skills  
(Broadcast Meteorology and grade school Mission Control Team)

## Grade School Students

- Explored science testing their imagination as seeing the results

## University students

- High Resolution low level data for case studies in Air Pollution and Micrometeorology
- Experience real world forecasting opportunity and realized the difficulty in forecasting high altitude events.
- Collection of launch time surface observations Broadcast Meteorologist field interview

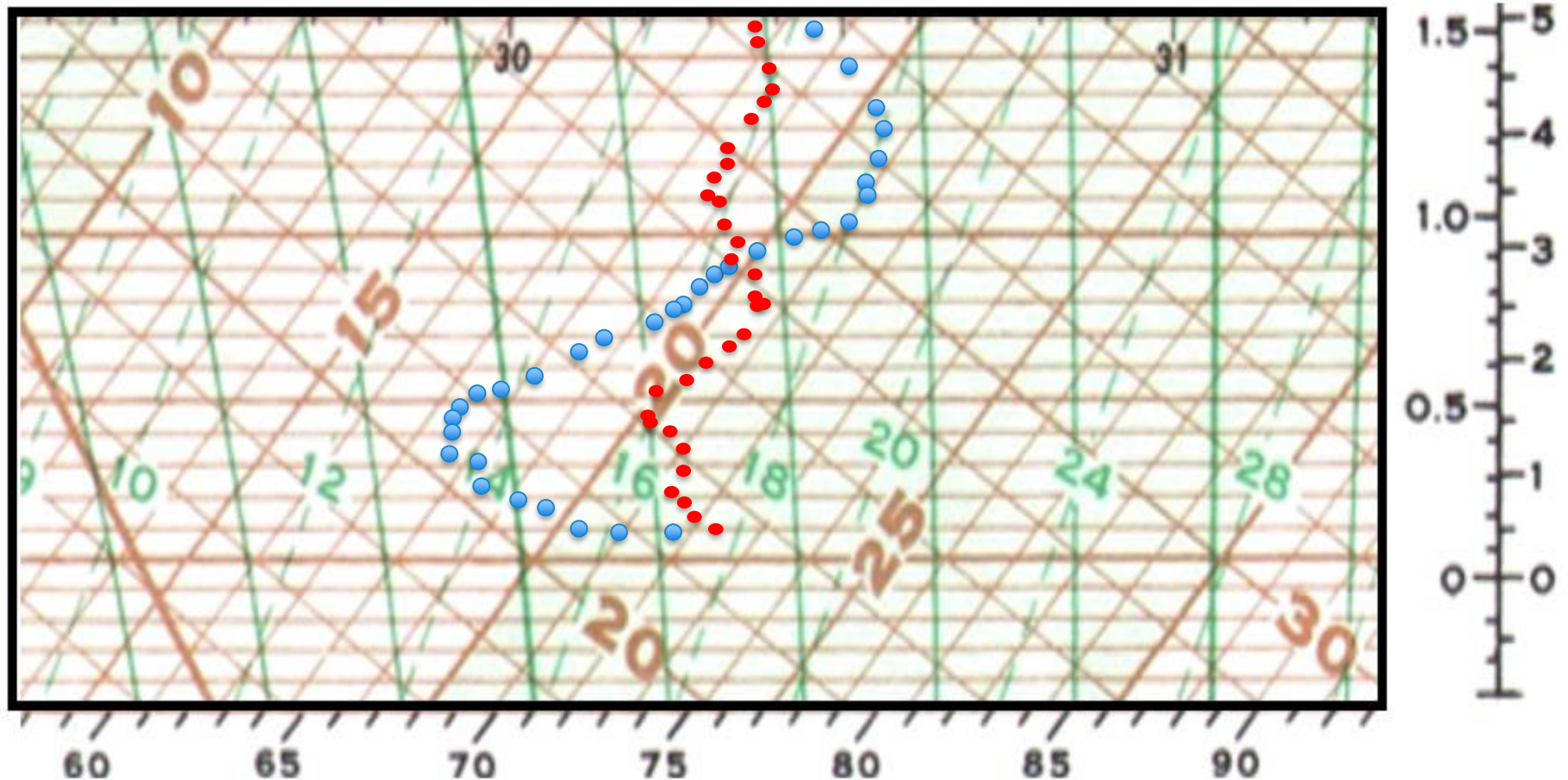




# Lower Level Sounding

Ascent ●

Descent ●





# Summary and Conclusions

- **Summary:** A case study of the on-going service - learning relationship between the University of the Incarnate Word meteorology students and the Saint Peter Prince of the Apostles grammar school science students.
- **Goal:** Encouraging grammar school students to pursue STEM careers, field work training for university students.
- **Results:** For both the grade school and the university students this was a service – learning experience benefiting both groups, by introducing them to real world meteorology before the each reached their respective graduations.

This is a continuing link called “The Brainpower Connection”.





# Finally

*Don't mess with the dragon. Your are crunchy and taste good with ketchup.*

