

Webinar on Writing Research Questions

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Play the Game: Do Science



Project-Based Science

- **Driving Question:** Student designed project centered around answering their question.
- **Investigations:** Students pursue solutions to authentic problems.
- **Artifacts:** Students produce products to represent their knowledge.
- **Collaboration:** Students discuss, try out their ideas and challenge the ideas of each other.
- **Technology:** Students use technology to develop and present their projects.

Krajcik, J., and Czerniak, C. (2007). *Teaching science in elementary and middle school*. New York: Lawrence Erlbaum.

American Geophysical Union Meeting 2007



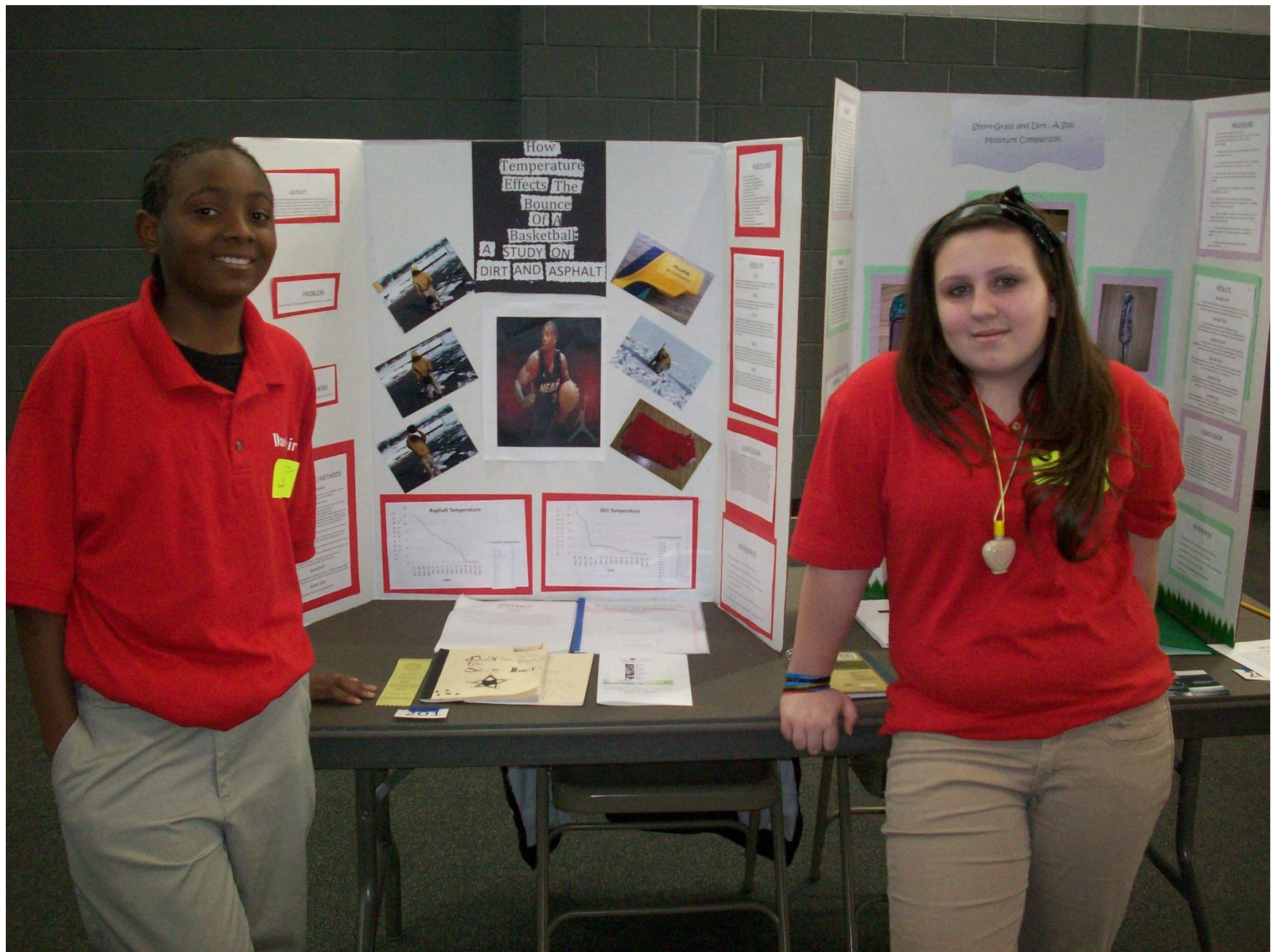
Large trophies and medals for winners

State politicians gave out awards

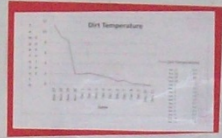
Scientist judges

Extra volunteers





How Temperature Effects The Bounce Of A Basketball: A STUDY ON DIRT AND ASPHALT



Short-Grass and Dirt - A Soil Moisture Comparison



Students Present at the SATELLITES Conference



Elementary to Ph.D. students
Judging of projects – awards
Keynote address by someone important
First step to other conferences



Projects Presented at GLOBE Learning Expedition in India 2014



GLE in South Africa 2008: 7th grade girls from Roswell Kent Middle School in Akron, OH

English Español Français Русский اللغة العربية Deutsch Nederlands

The GLOBE Program [Log in](#)

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SOUTH AFRICA

GLOBE LEARNING EXPEDITION & 12TH ANNUAL CONFERENCE

GLOBE Research for Sustainable Communities

GLOBE Learning Expedition and 12th Annual Conference
Cape Town, South Africa
22 - 28 June 2008

THIS IS WHY I'M HOT

Problem
Our teacher, Mr. Franz, was complaining that there are more sunny days in the rural area he lives in, but here in the city there are very sunny sunny days. We wanted to know why this is.

Hypothesis
Because the sun's energy is better absorbed by darker colors, we believe urban areas are warmer than rural areas because of the greater surface area covered by asphalt. Our hypothesis is that even short grass areas will be affected by the greater surrounding area.

Materials & Procedures

Asphalt Man Made Structures Natural Cover

Results

Conclusions
We did our hypothesis test by measuring the temperature of the sun's rays in the city and in the rural area. We found that the temperature was higher in the city than in the rural area. This is because the sun's rays are better absorbed by the darker colors of the city buildings and asphalt. We also found that the temperature was higher in the city than in the rural area. This is because the sun's rays are better absorbed by the darker colors of the city buildings and asphalt.

References

Neighbors WEST



Woodward High School Students Attended White House Science Fair, 2010



In the White House waiting for the President to speak.



Tazihana and Alexandria meet the Myth Busters.

Detroit Public School Student White House Science Fair, 2012

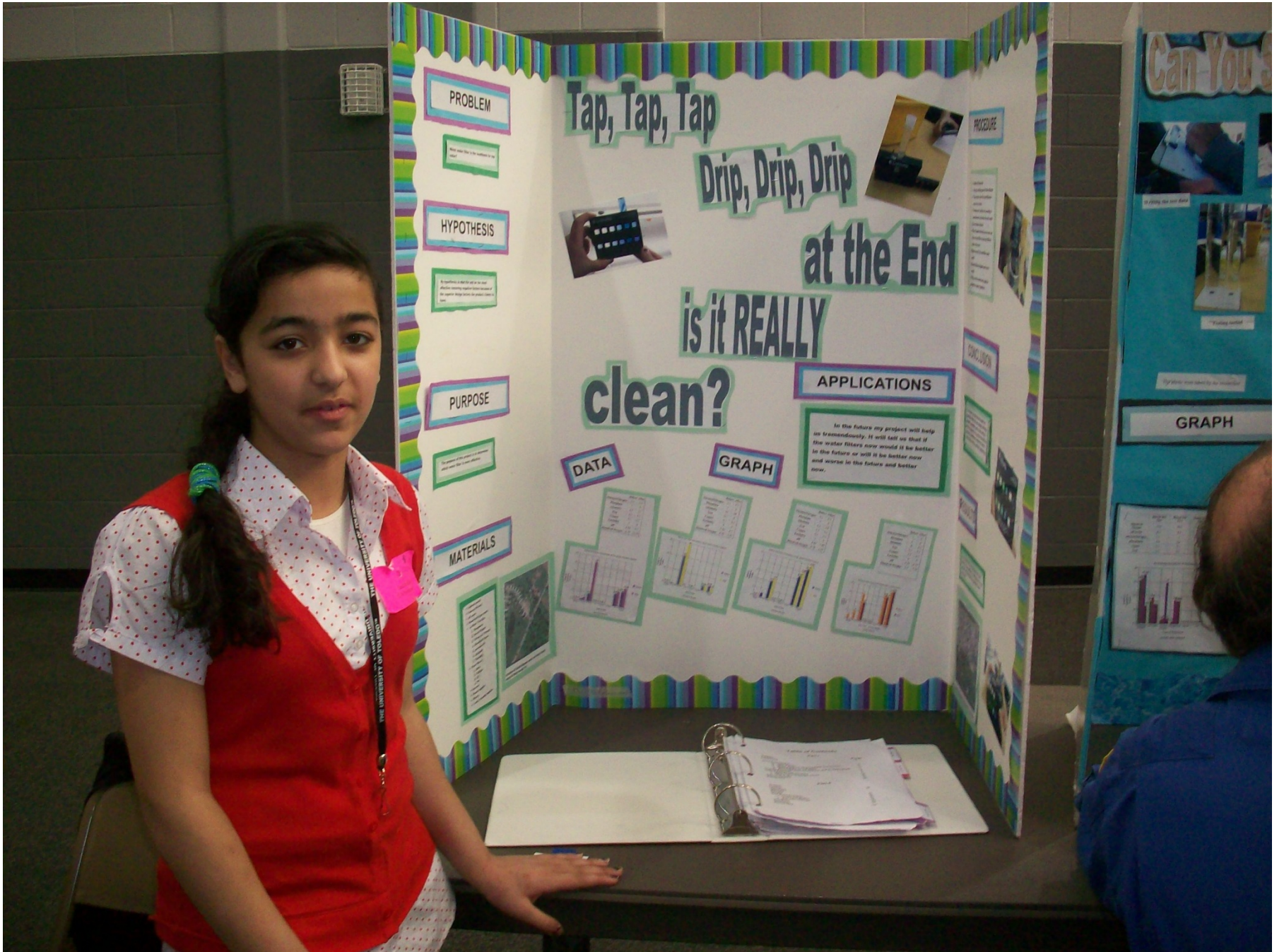


Play the Game = Do Science



Developing a Doable Question

- Most questions are too hard for students to solve.
- Students should pick a question they want to answer.



Tap, Tap, Tap Drip, Drip, Drip at the End is it REALLY clean?

PROBLEM
Water filters are used to remove impurities from water. However, some filters are better than others. This project aims to determine which filter is the most effective.

HYPOTHESIS
It is hypothesized that the activated carbon filter will be the most effective at removing impurities from water.

PURPOSE
The purpose of this project is to determine which water filter is the most effective at removing impurities from water.

MATERIALS
Activated carbon filter, Brita filter, and tap water.

DATA

GRAPH

APPLICATIONS

In the future my project will help us tremendously. It will tell us that if the water filters now would it be better in the future or will it be better now and worse in the future and better now.

PROCEDURE

CONCLUSION

Can You



GRAPH





BRICK PIGMENTATION VERSUS SURFACE TEMPERATURE

What is the Effect of
Pigmentation on Surface
Temperature of Brick?

By
Corinne Vance
Maddison Roney
Bailey Street
School
Dyer Local Schools

Abstract

Abstract text describing the project's findings and objectives.

Purpose

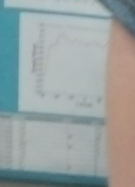
Purpose text explaining the goal of the experiment.

Hypothesis

Hypothesis text stating the expected outcome.

Procedure

Procedure text detailing the steps of the experiment.



What Is The...

SHORT-GRASS, DIRT, AND ASPHALT SURFACE TEMPERATURE: A STUDY ON THE EFFECT OF ALBEDO

Mai See Lor
Roswell Kent Middle School
Akron Ohio, U.S.A

Abstract

The purpose of this project was to see what the albedo effect (the amount of the sun's heat energy as absorbed by different colored surfaces) has on surface temperature. The hypothesis is that asphalt would be warmest because asphalt is low in albedo. The GLOBE Program protocol for collecting surface temperature was followed using a Fluke 63 infrared thermometer (IRT) and Garmin ETrex Venture GPS unit. The IRT was encased in an oven mitt to avoid thermal shock from being stored indoors where it is warm to going outdoors where it is much colder. The data has supported the hypothesis seven out of the eleven days data was collected. The four days data did not support the hypothesis all three surfaces were covered by snow, resulting in all three sites having the same albedo. According to the albedo effect, asphalt should be warmer, which the data supports. Other relevant research can be done in the future, such as monitoring ozone alert days during peak summer months, further understanding the transfer of heat to and from the ground, or the effect asphalt has on surrounding ground.



Surface Temperature Between Dirt, Short-Grass, and Asphalt



Teacher Project: Can Plants Save You Money?



Focus on Field Campaigns

- Teachers need to guide students – set up an area to focus on.



GPM (Global Precipitation Measurement) Field Campaign

GLOBE Scientist: Olawale Oluwafemi, MSc
Nigerian Space Agency



When: Ongoing

Where: Schools worldwide

Equipment: Rain gauge



Research Questions

Is the GPM sensor accurate?

How is the precipitation affecting water availability, drought, storms and floods etc?





SMAP Field Campaign

Soil Moisture Active-Passive

GLOBE Scientist: Dr. Narendra N. Das

When: Ongoing

Where: Schools worldwide

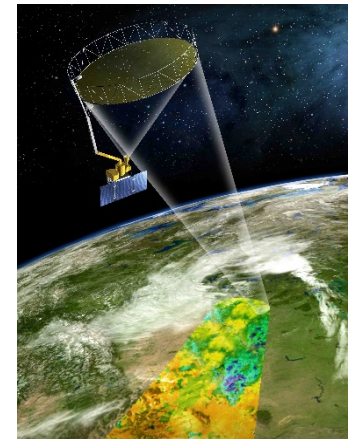


Equipment: Soil cans, weighing scale, drying ovens or alternate drying equipment (heating lamps), graduated cylinder for measuring can volume, wooden block, digging scoop, hamper, ziplock bags, plastic wraps, and rubber bands

Research Questions

How the soil moisture vary with season close to my School? What is the correlation of measured soil moisture with weather variables?

How does the soil moisture trend relate to soil texture?





Surface Temperature Field Campaign

GLOBE Scientist: Dr. Kevin Czajkowski
The University of Toledo



When: December 1 through December 31, 2014

Where: Schools worldwide

Equipment: An infrared thermometer with accuracy of +/- 1 C.

Research Questions

How are cities changing the temperature?

Are growing cities leading to hotter and longer heat waves?





Aerosols Campaigns



GLOBE Scientist: Dr. Danielle De Staerke

When: Fall campaign – 15 Sept. to 17 Oct. 2014

Spring campaign – Mar. to May 2015

Where: Schools worldwide

Equipment: sun photometer

Research Questions

What is the air quality at your school?

How does your data compare to other schools?

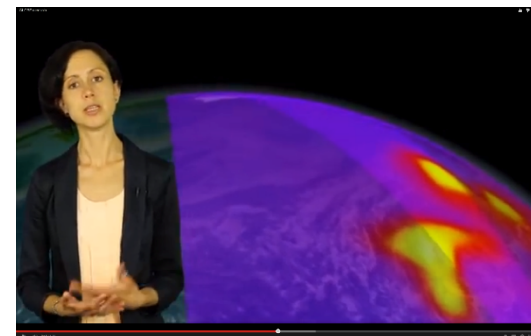
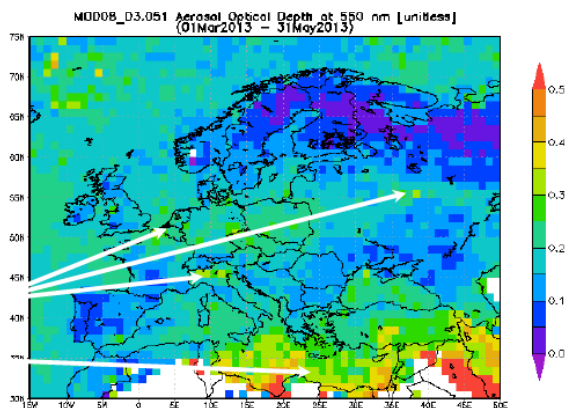
How does your data compare to satellite sensors?



MODIS Terra
(morning)

traffic & industry

Saharan dust





El Nino Field Campaign

GLOBE Scientist: Claudia Caro Vera,
MSc



When: El Nino is currently occurring

Where: Schools worldwide especially
in areas with El Nino

Equipment: TBD – to be determined

Research Questions

How will El Nino affect the place
where I live?

Precipitation, temperature, phenology

Will this El Nino be the same as others?



Timmy Czajkowski
Ida Middle School, Ida, MI

Problem Statement

Ida Middle School and a school in Peru have been taking data and been sharing it with each other over GLOBE and communicating over Skype.

Research Question

Does the different hemispheres affect the climate of these two places: Ida, Michigan and Lima Peru?



Students taking observations



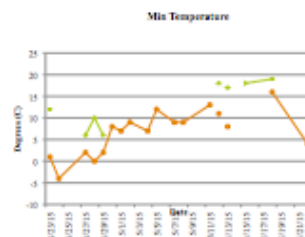
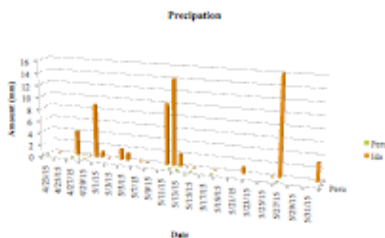
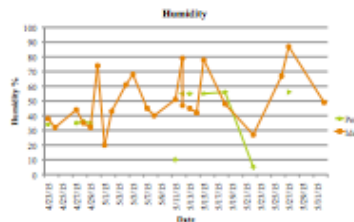
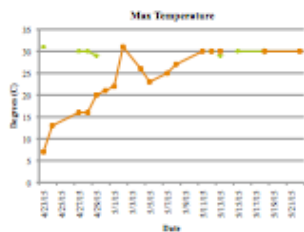
Students taking precipitations data

Background

My 4th grade class in Ida, Michigan collected surface temperature data in 2013. In February of 2015 we have started taking other weather data we also know that Peru is almost directly south of the us and that we are in different hemispheres.

Methodology

- Ida Middle School has been taking data such as:
 - precipitation – rain and snow
 - surface temperature – grass and asphalt
 - Air temperature, and humidity
 - The **Colegio Altair School**, Lima, Peru took data such as:
 - precipitation – rain and snow
 - Air temperature, and humidity
- Then they have compared with Peru over GLOBE and communicated over Skype.



Me with the weather box



Student taking surface temperature



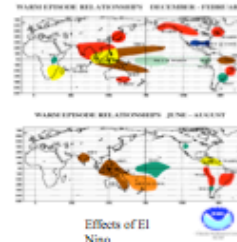
Skype call with Peru

Results

- The humidity in Peru was lower.
- Temperatures in Michigan climbed while it stayed the same in Peru.
- It did not rain in Peru while it rained a lot in Michigan.

In a recent Skype call with Peru a girl from Peru brought it to our attention that El Nino might have had an effect in the odd temperature they have been having in their warm winter.

We thought about if El Nino was happening in Ida Michigan it has been very rainy. It turned out that being rainy can be a side affect of El Nino. Also when its wet it can bring cold with it.



Conclusions

In conclusion we have looked at our data and it shows that El Nino has been affecting both of the two countries and hemispheres. Also Peru has had a drought but Ida had a lot of rain. Normally, the temperature is mainly opposite but this year because of El Nino the temperature in Peru has stayed the same.

References

<http://www.erh.noaa.gov/cle/office/localinterest/enso.html>
<http://www.vox.com/2015/3/6/8161511/el-nino-weak-2015>
http://earthguide.ucsd.edu/virtualmuseum/climatechange/11_1_shtm
 Kevin Czajkowski a professor in atmospheric science and geography at The University of Toledo
<http://kxan.com/2014/12/04/still-no-drought-busting-el-nino/>



Mosquito Campaign

GLOBE Scientists: Dr. Mullica Jaroensutasinee, Krisanadej Jaroensutasinee and Dr. Elena Sparrow



When: During breeding season

Where: Schools worldwide

Equipment: fish net

Research Questions

What is the distribution of mosquito larva?
Mosquitoes are vectors for Malaria, Dengue Fever and West Nile Virus.



MOSQUITO RESEARCH

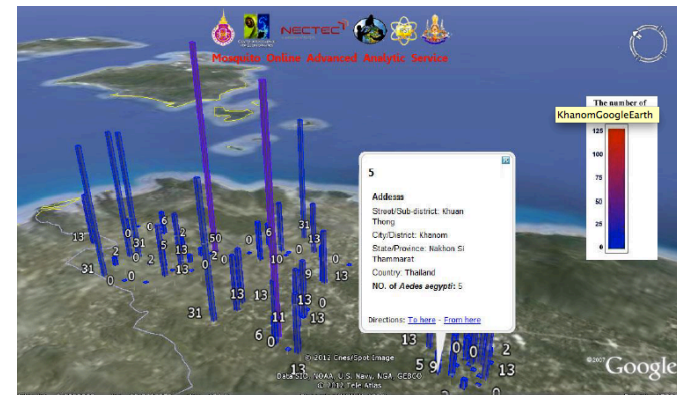
ABOUT PROJECT
Mosquito Research is a group for students, teachers and scientists who interested in the research about mosquito to exchange the knowledge or information and discuss some method or results during doing the research.

STUDENT RESEARCH PROJECTS

- 1. Project site:** Mosquito number and species differ between rural and urban areas in Hongkaron district, Thailand.
Researcher: Sattapit Kinsee
- 2. Project site:** The Relationship between Weather, Season and Diversity of Mosquito Larva in Nanonok, Lao Lao District, Thailand.
Researcher: Patanon Sanchanta

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What ideas do you have?